Chapter 13
Water

Contents

13. Water

13.1 Introduction

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

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

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

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

An assessment of Proposed Scheme compliance with the Water Framework Directive (WFD) (Directive 2000/60/EC) requirements is provided in Appendix A13.1 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 13.3.10 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 water bodies within that area have been considered as receptors including those classified under the WFD, including riverine, transitional water bodies, lake (water) bodies and coastal water bodies, and also non-WFD classified water bodies. Artificial drainage features such as existing Sustainable Drainage Systems (SuDS) have not been considered as receptors within the baseline assessment.

The nearest surface water abstraction point is Leixlip Reservoir, which is approximately 6.5km (kilometres) west of the Proposed Scheme. This is a major public water supply abstraction point (approximately 195,000m^3/day (cubic metres per day)) which supplies approximately 600,000 people, serving Fingal, Kildare and North Dublin. However, due to separation from the Proposed Scheme and the fact that it is upstream of the study area, there is considered to be no potential for the Proposed Scheme to interact with this abstraction point and, accordingly, this abstraction point has not been considered further in the assessment.

13.2.2 Relevant Guidelines, Policy and Legislation

13.2.2.1 Water Framework Directive (WFD)

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

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

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

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

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

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

13.2.2.2 River Basin Management Plans

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

The second cycle RBMP 2018 - 2021 was published by the Department of Housing, Planning and Local Government (DHPLG) in April 2018 and covers Ireland as a whole (DHPLG 2018). For the second cycle, the original (2009) Eastern, South-Eastern, South-Western, Western and Shannon River Basin Districts were merged to form one national River Basin District (RBD). For those water bodies 'At Risk' of failing to meet the objectives of WFD, the RBMP 2018 - 2021 identified the most significant pressures 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 31 March 2022. The draft RBMP sets out at the outset that it is published in the context of a rapidly changing policy landscape at European and International levels and against a backdrop of 'widespread, rapid and intensifying climate change'. In addition, Ireland is now experiencing a sustained decline in water quality following many years of improvements, therefore stronger measures are now required to achieve sustainable water management in order to address and adapt to the impacts of climate change and achieve the desired outcomes for biodiversity.

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

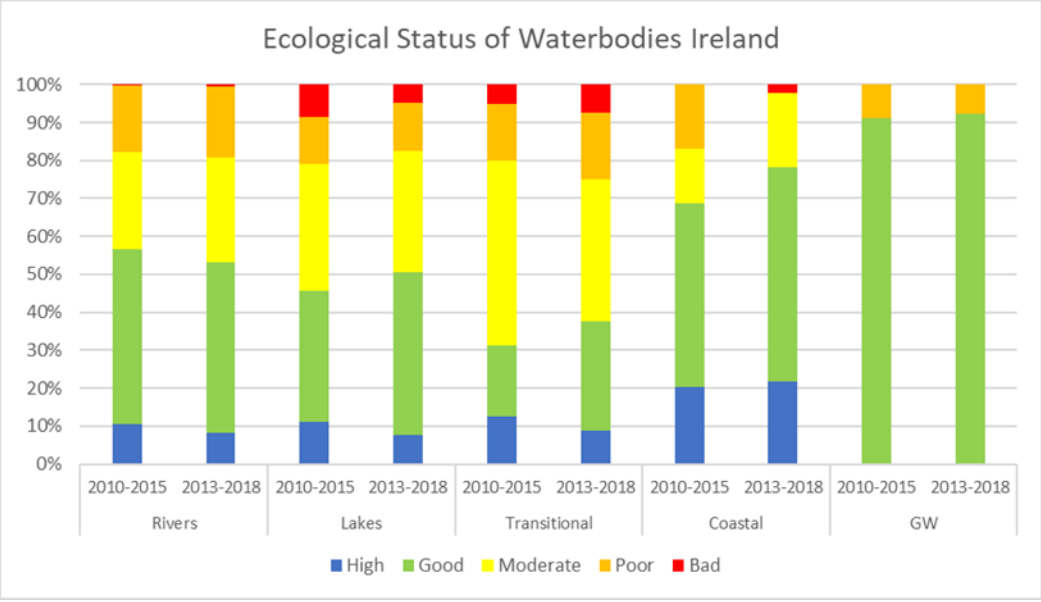

Image 13.1: Ecological Status of Water Bodies in Ireland

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

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); and • European Commission (EC) Environmental Impact Assessment of Projects. Guidance on the Preparation of the Environmental Impact Assessment Report, 2017 (EC 2017).
Water	• Transport Infrastructure Ireland (TII) Road Drainage and the Water Environment guidance document (TII 2015); • National Roads Authority (NRA) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (NRA 2005)*; • 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 2008)*; and • The Department of the Environment, Heritage and Local Government (DEHLG) and the Office of Public Works (OPW) Planning System and Flood Risk Management Guidelines for Planning Authorities (hereafter referred to as the FRM Guidelines) (DEHLG and OPW 2009).

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

13.2.3 Data Collection and Collation

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

13.2.3.1 Data Sources Used to Undertake Desk Study

Table 13.2 details the data sources consulted during the assessment.

Table 13.2: Data Sources Used to Undertake the Desk Study

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

13.2.3.2 Field Surveys

Field walkover assessments were carried out in March 2020 and March 2022. In March 2022, 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. 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 runoff 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).

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

13.2.4 Appraisal Method for the Assessment of Impacts

13.2.4.1 General Approach

The 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 Assessment Guidelines) (NRA 2008), 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 2018) have been considered in preparing this chapter of the EIAR.

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

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

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

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

13.2.4.2 Sensitivity of Receptors

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

Table 13.3: Criteria Used to Evaluate the Sensitivity of Surface Water Receptors (NRA 2008 adapted to include WFD Assessment Guidelines (Environmental Agency 2016))

Sensitivity	Criteria	Typical Example
Extremely High	Receptor (or receptor attribute) has a very high quality or value on an international scale	• Any WFD water body which is protected by European Union (EU) legislation (e.g. Designated European Sites (Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) or 'Salmonid Waters'; and • A water body that appears to be in natural equilibrium and exhibits a natural range of morphological features (such as pools and riffles). There is a diverse range of fluvial processes present, free from any modification or anthropogenic influence.
Very High	Receptor (or receptor attribute) has a high quality or value on an international scale or very high quality or value at a national scale	• Any WFD water body (specific EPA segment) which has a direct hydrological connection of <2km to European Sites or protected ecosystems of international status (SAC / SPA or Salmonid Waters); • WFD water body ecosystem protected by national legislation (Natural Heritage Area (NHA) status); • A water body that appears to be largely in natural equilibrium and exhibits a diverse range of morphological features (such as pools and riffles). There is a diverse range of fluvial processes present, with very limited modifications; and • Nutrient Sensitive Areas.
High	Receptor (or receptor attribute) has a moderate value at an international scale or high quality or value on a national scale	• A WFD water body with High or Good WFD Status; • A Moderate WFD Status (2013 - 2018) water body with some hydrological connection (<2km) to European Sites or protected ecosystems of international status (SAC / SPA or Salmonid Waters) further downstream; • WFD water body which has a direct hydrological connection to sites / ecosystems protected by national legislation (NHA status); • A water body that appears to be in some natural equilibrium and exhibits some morphological features (such as pools and riffles). There is a diverse range of fluvial processes present, with very limited signs of modification or other anthropogenic influences; and • Direct hydrological connectivity to Nutrient Sensitive Areas.
Medium	Receptor (or receptor attribute) has some limited value at a national scale	• WFD water body with Moderate WFD Status (2013 - 2018); • WFD water body with limited (>2km <5km) hydrological importance for sensitive or protected ecosystems (much further downstream); • A water body showing signs of modification or culverting, recovering to a natural equilibrium, and exhibiting a limited range of morphological features (such as pools and riffles). The watercourse is one with a limited range of fluvial processes and is affected by modification or other anthropogenic influences; • Evidence of historical channel change through artificial channel straightening and re-profiling; and • Some hydrological connection downstream Nutrient Sensitive Areas.
Low	Receptor (or receptor attribute) has a low quality or value on a local scale	• Water body with Bad to Poor WFD Status (2013 - 2018); and • A WFD water body with >5km (or no) hydrological connection to European Sites or national designated sites. Or • A non-WFD water feature with minimal hydrological importance to sensitive or protected ecosystems; and / or economic and social uses; • 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 • Many existing pressures which are adversely affecting biodiversity.

13.2.4.3 Magnitude of Impact

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

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

- Nature of the impacts;

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

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

Table 13.4: Criteria for Determining the Magnitude of Impact on Surface Water Receptors (NRA 2008)

Nature of Impact	Description	Scale and Nature of Impacts
High Adverse	Results in loss of attribute and/or quality and integrity of the attribute	• Loss or extensive change to a fishery. • Loss of regionally important public water supply. • Loss or extensive change to a designated nature conservation site. • Reduction in water body WFD classification or quality elements. • Results in loss of receptor and/or quality and integrity of receptor. • An impact, which has a high likelihood of occurrence and that has the potential to alter the character of a small part or element of the receptor in the medium-long term. This could be frequent or consistent in occurrence, and result impact which may alter the existing or emerging trends.
Medium Adverse	Results in effect on attribute and/or quality and integrity of the attribute	• Partial loss in productivity of a fishery. • Degradation of regionally important public water supply or loss of major commercial / industrial / agricultural supplies. • Contribution to reduction in water body WFD classification. • Results in impact on integrity of receptor or loss of part of receptor. • An impact, which has reasonable likelihood of occurrence and that has the potential to alter the character of a small part or element of the receptor in the medium term. This could be intermittently or occasionally, and result impact which may be consistent with existing or emerging trends.
Low Adverse	Results in some measurable change in attributes, quality or vulnerability	• Measurable impact but with no change in overall WFD classification or the status of supporting quality elements. • Minor impacts on water supplies. • Results in minor impact on integrity of receptor or loss of small part of receptor. • 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. • Results in an impact on receptor but of insufficient magnitude to affect either use or integrity.
Low Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring	Has some potential to results in minor improvement WFD quality element(s)
Medium Beneficial	Results in moderate improvement of attribute quality	Contribution to improvement in water body WFD classification.
High Beneficial	Results in major improvement of attribute quality	Improvement in water body WFD classification.

13.2.4.4 Significance of Impacts

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

Table 13.5: Categories of Environmental Impacts (EPA 2022)

Importance of Attribute	Magnitude of Impact			
	Negligible	**Small**	**Medium**	**Large**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant / Moderate	Very Significant	Profound
High	Imperceptible	Moderate / Slight	Significant / Moderate	Profound / Very Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

13.2.4.5 Methodology for Operational Traffic Impact Assessment Method

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

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

To help determine this, the TII Standard DN-DNG-03065TII Road Drainage and the Water Environment (2015) (TII 2015) was consulted. It states that roads carrying less than 10,000 AADT (Annual Average Daily Traffic) are lightly trafficked and therefore pollutants occur in lower concentrations. As such no significant impact on receptors are considered likely. Therefore, this was used as a threshold point to determine whether there was the potential for impacts on water bodies.

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

In order to determine which water body drainage from side roads carrying displaced traffic would discharge to, the Proposed Scheme Catchment Plans were consulted (see Proposed Surface Water Drainage Works (BCIDB-JAC-DNG_RD-0007_XX_00-DR-CD-9001) in Volume 3 of this EIAR).

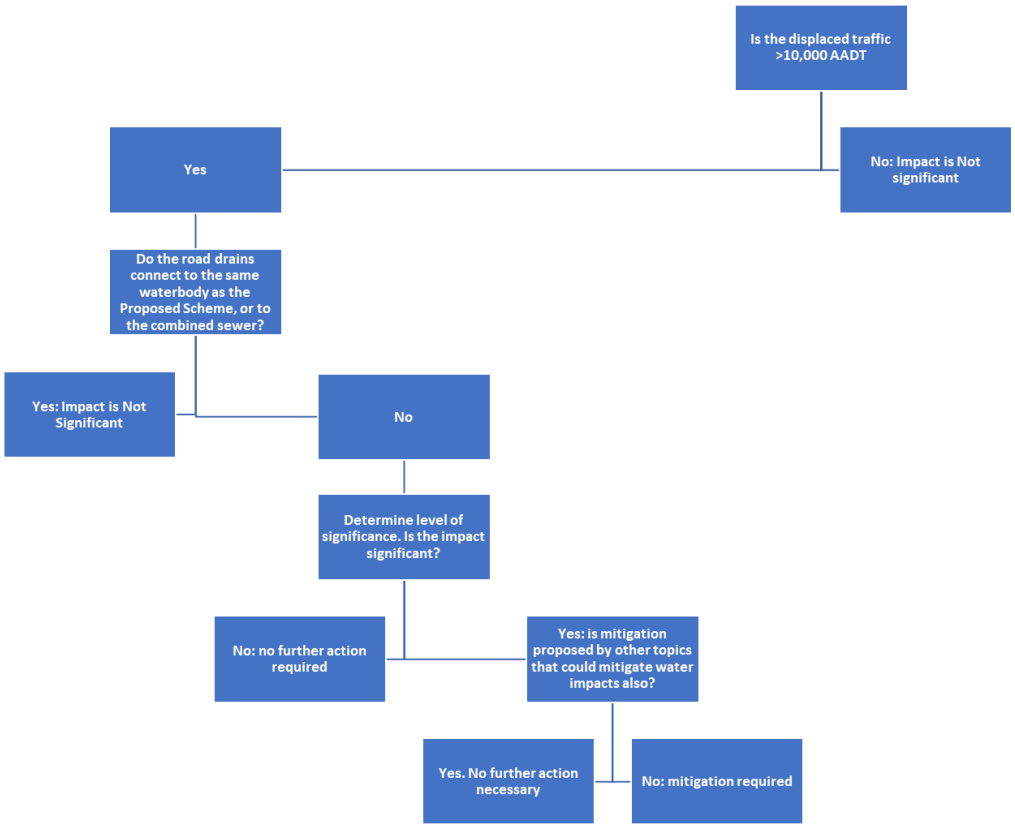

Diagram 13.1 Traffic Assessment Decision Tree

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

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

13.3 Baseline Environment

13.3.1 WFD Catchment Overview

The study area lies within Hydrometric Area (HA) 09 (Liffey and Dublin Bay) and is within the River Liffey catchment. The Liffey and Dublin Bay Catchment Summary (Liffey Catchment Assessment 2010 – 2015 (HA 09) (EPA 2018)) describes this catchment as including the area drained by the River Liffey and by all streams entering tidal water between Sea Mount and Sorrento Point in County Dublin, draining a total area of 1,616km^2. There are four water bodies within the study area in this catchment; River Liffey, River Camac, River Poddle and 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 Palmerstown, Ballyfermot, Chapelizod, Kilmainham, Islandbridge and Inchicore. The Liffey and Dublin Bay catchment contains the largest population (approximately 1,255,000) of any catchment in Ireland and is characterised by a sparsely populated, upland south-eastern area

underlain by granites; and a densely populated, flat, low lying limestone area over the remainder of the catchment basin. The catchment area is heavily urbanised and industrialised.

13.3.2 EPA Surface Water Monitoring

The EPA assesses the water quality of rivers and streams across Ireland using a biological assessment method (EPA 2018). The EPA assigns biological river quality (biotic index) ratings 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 water bodies (HMWB) and artificial surface water bodies (AWB). The WFD requires HMWB and AWB to achieve good ecological potential rather than Good Status.

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

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

13.3.3 Surface Water WFD Status

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

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

- Liffey_180
- Liffey_190
- Camac_040;
- Poddle_010;
- Grand Canal Main Line (Liffey and Dublin Bay); and
- Liffey Valley Estuary Upper.

The WFD Status of the rivers and streams within the study area of the Proposed Scheme are detailed in Table 13.7.

Table 13.7: Surface Water WFD Status

WFD Sub-Catchment	Waterbody Section ID	Heavily Modified?	Type	Status (2013 – 2018)	Key Pressures: Elements Causing or with Potential to Cause Less Than Good Status	Risk Categorisation
Liffey_SC_090	Liffey_180	No	River	Moderate	Storm water overflows (SWOs) and urban runoff	At Risk
Liffey_SC_100	Liffey_190	No	River	Moderate		At Risk
Liffey_SC_090	Camac_040	No	River	Poor	Urban runoff; and Hydromorphology	At Risk
Dodder_SC_010	Poddle_010	No	River	Poor	Urban runoff; and Hydromorphology	At Risk
N/A	Liffey Estuary Upper	No	Transitional	Good	Urban wastewater and SWOs	At Risk
N/A	Grand Canal Main Line (Liffey and Dublin Bay)	Yes - AWB	Canal	Moderate Ecological Potential	Elevated faecal coliforms and ammonia	Not at Risk

13.3.4 Field Survey

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

Table 13.8: Survey Information for Selected Sites within the Study Area

Survey Attribute	Survey Location LV1	Survey Location LV2	Survey Location LV3
Location	Chapelizod Hill Road Crossing	Camac Crossing at Emmet Road	Camac River at Suir Road Crossing
Date	2/3/2022 13:50	2/3/2022 14:47	2/3/2022 15:16
Climate Observations	Overcast, raining	Overcast, raining	Overcast, raining
Waterbody Crossed	Yes	Yes	Yes
Construction Compound	No	No	No
Closest Waterbody	Liffey_180	Camac_040	Camac_040
Distance to Waterbody	Survey point located over waterbody	Survey point located over waterbody	Survey point located over waterbody
River Flow	Moderate	Fast flowing	Fast flowing
Water Quality	High water level, slightly discoloured and scum noted on the surface.	High quality water, no pollution evident	Lots of debris from vegetation and rubbish present in waterbody. Waterbody looks discoloured.
Run-off pathway	Potential pathway from bridge	Surface water runoff from gully drains on road	Yes, pathway from gully drains
Run-off risk	High	High	High
Riverbed observations	Unable to see river bed (too deep)	Large angular boulder present on the river bed	Boulder and cobbles present along the riverbed
Riverbank observations	Straight river banks, with vegetated banks one side with concrete banks separating housing from river.	Concrete walls on both side of the river banks.	Concrete banks along the river with extensive vegetation and debris on the slopes
Features	Very high water level close to housing	Modified channel, concrete banks	
Barriers	None seen	None seen	None seen
Riparian Detail	Mix of concrete banks and vegetation	Concrete banks	Vegetation growth along banks of the river.
Comments	-	Gullies present on road highlighting potential pathway to waterbody	Petrol station located directly east of the site

13.3.5 Designated Sites

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

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

- North Dublin Bay SAC (site code: 000206) (approximately 6.5km from Proposed Scheme at its nearest point);
- South Dublin Bay SAC (site code: 000210) (approximately 10km from Proposed Scheme at its nearest point);
- North Bull Island SPA (site code: 004006) (approximately 8km from Proposed Scheme at its nearest point); and
- South Dublin Bay and River Tolka Estuary SPA (site code: 004024) (approximately 6km from Proposed Scheme at its nearest point).

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

- Liffey Valley pNHA (site code: 000128);
- Dolphins, Dublin Docks pNHA (site code: 000201);
- North Dublin Bay pNHA (site code: 000206);
- South Dublin Bay pNHA (site code: 000210); and
- Grand Canal pNHA (site code: 002104).

There are three Nutrient Sensitive Areas in the study area. They are the River Liffey, Liffey Estuary and Tolka Estuary, designated under the Urban Waste Water Treatment (UWWT) Directive (refer to Figure 13.2 in Volume 3 of this EIAR).

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

There are no designated marine bathing waters within potentially hydrologically connected to, the Proposed Scheme, as listed below. The EPA published its Bathing Water Quality- A Report for the Year 2020 in May 2020 (EPA 2020d) and the website www.beaches.ie keeps this information regularly updated. The beaches and the most up to date assessment (checked April 2022) 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 8km from Proposed Scheme at its nearest point);
- Half Moon Beach – Excellent quality (approximately 8km from Proposed Scheme at its nearest point);
- Shelley Banks – Excellent Quality (approximately 9km from Proposed Scheme at its nearest point);
- Sandymount Strand – Poor Quality (and was closed for the Summer 2021 bathing season) (approximately 11.5km from Proposed Scheme at its nearest point); and
- Merrion Strand – Poor Quality (approximately 13km from Proposed Scheme at its nearest point).

No designated salmonid rivers were identified within the study area during the desk study.

13.3.6 Drinking Water Supply (Surface Water)

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

13.3.7 Known Pressures

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

The following Industrial Emissions (IE) licensed site was identified within the study area:

- IE Licenced Facility St. James' Gate, Dublin 8, Reg No: P0301-04.

The above discharges to Watling Street Sewer, where it is carried by the public sewerage network to Ringsend Wastewater Treatment Plant (WwTP).

13.3.8 Existing Drainage

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

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

For the majority of the route of the Proposed Scheme surface water discharges directly to the Liffey_180 and Liffey_190 (see Table 13.9). Closer to the city centre, there is a combination of surface water sewers and combined foul and surface water sewers.

For the purposes of describing the Proposed Scheme it has been split into three sections as follows:

- Section 1: Liffey Valley to Le Fanu Road;
- Section 2: Le Fanu Road to Sarsfield Road; and
- Section 3: Sarsfield Road to City Centre.

Table 13.9: Existing Drainage

Catchment	Existing Network Type	Proposed Scheme Section ID	Water body
Catchment 1	Surface Water (Storm)	1	Liffey_180
Catchment 2	Surface Water (Storm)	1-2	Liffey_180, Liffey _190
Catchment 3	Surface Water (Storm) and Combined Sewer (Foul / Storm)	3	Liffey_190. Camac_040 and Ringsend WwTP

13.3.9 Surface Water Features

The six main WFD water bodies within the study area, are discussed within this Section. All of the water bodies listed in Table 13.10 ultimately flow into the Liffey Valley Estuary Upper and subsequently Dublin Bay, apart from the Grand Canal which flows in Liffey Estuary Lower (refer to Figure 13.1 in Volume 3 of this EIAR). None of these

water bodies is contained within the RBMP 2018 - 2021 'Priority Areas for Action' (DHPLG 2018). The desk study did not identify any surface water features within the study area which are not classified as WFD water bodies. Hydromorphological characteristics were assessed during field surveys. The study area includes highly modified straight planform water bodies with walled or artificial riparian zones, although they are not designated as Highly Modified Water Bodies (HMWB) under the WFD. A summary of the baseline condition of each of these WFD water bodies and their associated flood risk within the study area are detailed in the following sections.

Table 13.10: Distance of the Water Bodies Within the Study Area to the Proposed Scheme and the Individual Sections of the Proposed Scheme

WFD Water Body (EPA Name)	Nearest Proposed Scheme Section	Approx. Distance from Proposed Scheme	Number of Crossings
Liffey_180	Liffey Valley to Le Fanu Road, Le Fanu Road to Sarsfield Road	500m	0
Liffey_190	Le Fanu Road to Sarsfield Road	180m	0
Camac_040	Sarsfield Road to City Centre	0m	1
Poddle_010	Sarsfield Road to City Centre	0m	1
Liffey Estuary Upper	Sarsfield Road to City Centre	200m	0
Grand Canal	Sarsfield Road to City Centre	500m	0

13.3.9.1 River Liffey

The River Liffey rises, from a number of small streams, within the Liffey Head Bog between Kippure and Tonduff in the Wicklow Mountains, Co. Wicklow. It flows, for approximately 125km, through counties Wicklow, Kildare and Dublin to Dublin Bay and the Irish Sea. There are three hydroelectric power station dams along the river and two reservoirs, Poulaphouca and Leixlip. The watercourse was historically known for flash flooding events, which have been alleviated by these upstream dams and reservoirs (Dublin City Development Plan 2016 - 2022, Strategic Flood Risk Assessment) (DCC 2016). Both significant bog and plantation forestry exist at the source of the River Liffey which has a Moderate WFD status (WFD 2013 - 2018). As documented in the Catchment Assessment, forestry is one of the significant pressures which affects the greatest number of water bodies within this catchment in the upper extents of the River Liffey (Douglas (Liffey)_010 and King's (Liffey)_020) (EPA 2018). Within the study area the River Liffey is highly urbanised and is considered to be of high amenity value, used by local rowing clubs and tourist operations.

The most recent Biological Q Value assessment of the River Liffey was in 2019. Sixteen stations were monitored along the length of the watercourse, the lowest Q value along the River was Q3. The Assessment stated:

> *'Ecological conditions were found to be satisfactory at the majority (14) of the 16 stations surveyed on the River Liffey in 2019. Satisfactory ecological conditions were maintained in the upper reaches (0100, 0200, 0250). Stations 0400 and 0500 (Ballymore Eustace) improved for the first time since 1991 and 2010, respectively. At both stations 0700 (Kilcullen) and 0850 (Connell Ford) High ecological condition were noted, despite obvious signs of nutrient enrichment (and excess filamentous algae), an improvement since 2016. Similarly, station 1200 (Castlekeely Ford (RHS)) improved from Moderate to Good. However, a note of caution is advised regarding this recovery as there were still signs of nutrient pressure with significant amounts of filamentous algae. In contrast, the macroinvertebrate community indicated a decline at both station 2100 (Lucan) which dropped to Moderate and station 2360 (0.2 km d/s Chapelizon Br (Lynch's Lane)) which dropped to Poor ecological conditions.* Sewage fungus and Chironomus sp. were found at this site.'

None of the stations mentioned above is located within the study area.

The EPA segments of the River Liffey, which are contained within the study area, are Liffey_180 and Liffey_190.

13.3.9.1.1 Liffey_180

The Liffey_180 segment is 24.7km in length and consists of the main channel of the river from Lucan and Chapelizod, the Rusk River tributary (from Dunboyne to Lucan) and a number of other minor tributaries (Hermitage River, Annfield River, Quarryvale River, Astagob River, unnamed River at Carpenterstown, Longmeadow Stream and Glenaulin Stream).

The Liffey_180 flows into Liffey_190 and both run almost parallel to the Proposed Scheme, within the 500m study area and travel the whole length of the route, including the point at which it enters the Liffey Estuary Upper adjacent to the Dublin University Boat Club. The Proposed Scheme does not cross Liffey_180 at any point along its route.

The Liffey_180 has a Moderate Status and is At Risk of not achieving Good Status by 2027. Significant pressures have been identified including urban wastewater from SWOs and urban runoff from diffuse sources causing nutrient and organic pollution. SWOs are designed to operate during storm conditions, during which they discharge untreated waste water; however, this is diluted by surface water in the sewers and increased flows in the receiving water, thereby minimising the impacts. On occasion, SWOs will operate under other circumstances, for example if sewers are under capacity, or if there is a blockage. The key impacts are considered to be nutrient pollution and alterations to habitats due to morphological changes

It is within the Liffey Valley Nutrient Sensitive Area along its entire length and is a pNHA for much of its length with only the last 850m not designated as such. In terms of assigning sensitivity, its designation as a Nutrient Sensitive Area makes it Very High sensitivity.

13.3.9.1.2 Liffey_190

The Liffey_190 segment is 3.15km in length between Chapelizod and Islandbridge, consisting of the small section of the main channel of the River Liffey and tributaries, Magazine Stream and Creosote Stream. Both segment's catchment contributions are considered to be primarily urban. There are no Proposed Scheme crossings of the Liffey_190.

The Liffey_190 has a Moderate status and is also At Risk of not achieving Good Status by 2027. A range of significant pressures in relation to industry have been identified, in addition to waste, urban wastewater from SWOs and urban runoff from diffuse sources. It is within the Liffey Valley Nutrient Sensitive Area.

In terms of assigning sensitivity, the waterbody is of Moderate status and it is within the Liffey Valley Nutrient Sensitive Area. The Nutrient Sensitive Area makes it Very High sensitivity.

13.3.9.2 Camac_040

The River Camac is a significant tributary of the River Liffey. It rises in the west of Dublin City and flows through Saggart, Clondalkin, Inchicore and Kilmainham before entering the Liffey Estuary Upper just downstream from Heuston Station. The River Camac forms a number of stocked fishing lakes in Corcaigh Park, Clondalkin (Angling Ireland, Corkagh Park Fishery), while much of its course is dominated by concrete channels and significant culverting. The River Camac is considered to be a heavily industrialised urban river with similarly associated land use within its catchment. The River Camac amenity value is primarily a cultural one, Drimnagh Castle is the last remaining castle in Ireland with a flooded moat (Drimnagh Castle n.d.), while a number of mills and other industries historically lined the riverbanks.

The EPA segment of the Camac River within the study area is Camac_040. This section is 13.6km in length and includes the primary segment of the river from Clondalkin to where it joins the Liffey Estuary Upper at Heuston Station. The Camac_040 waterbody also includes a number of significant and minor tributaries including: Ballymount Stream, Robinhood Stream, Walkinstown Stream, and Drimnagh Castle or Walkinstown Stream.

Camac_040 is crossed by the Proposed Scheme at Emmet Road, Kilmainham. Here the waterbody flows under Emmet Road via a short culvert. From this point, the waterbody travels adjacent to the Proposed Scheme for approximately 2km, until it diverts north in culvert to join the Liffey Estuary Upper. It has Poor WFD status and is At Risk of not achieving Good Status by 2027. A range of significant pressures have been identified, including culverting causing alteration to habitats, urban wastewater from SWOs and urban runoff from diffuse sources.

The most recent Biological Q Value assessment of the Camac River was in 2019. Four stations were monitored along the length of the watercourse, Q3 being the lowest assigned Q Value. The assessment stated:

> *'The Camac was found to be at unsatisfactory conditions in August 2019. Poor ecological conditions recorded at 0100, 0310 and 0500, with 0100 (Saggart) declining from Good conditions in 2016. Moderate conditions were maintained at 0200 (Brownsbarn)'*

Only station 0500 is present within the study area.

Despite its Poor status and poor ecological conditions, the IFI, in their consultation response stated:

> *'The Camac River is a recognised salmonid system, under significant ecological pressure as a result of its largely urban situation. Although considerable sections of main channel are culverted, lengths of this river that remain on the surface invariably support self-sustaining populations of brown trout (Salmo trutta). The river also supports populations of the Freshwater Crayfish (Austropotamobius pallipes) and Lamprey (Lampetra sp.) species listed under Annex II of the EU Habitats Directive.'*

In terms of assigning sensitivity, its Poor status would normally render it medium to low sensitivity; however, its direct hydrological connection to the Liffey Valley Nutrient Sensitive Area, the fact that it is a recognised salmonid system, and it supports populations of Annex II species, mean it is determined to be High sensitivity.

13.3.9.3 Poddle_010

The River Poddle rises in Cookstown in Tallaght and flows towards Dublin City via Mount Argus where the river splits at a point known as the Tongue. The two rivers later converge and flow through Dublin in a culvert. The River Poddle is significantly culverted along its length or is within concrete channels and is considered to be probably the best example of an underground hidden river in Dublin (Rivers of Dublin (Sweeney 2017)). Land use within the River Poddle catchment is primarily urban / industrial.

The River Poddle is assigned a single EPA segment; Poddle_010. This segment is 10.1km in length and contains the main segment of the River Poddle and Tymon River. It joins the Liffey Estuary Upper at Wellington Quay, upstream of Father Mathew Bridge.

According to EPA online mapping (2022) (see Figure 13.1 in Volume 3 of this EIAR), the Poddle_010 is culverted at Mount Jerome cemetery and discharges to the Liffey Estuary Upper at a point almost directly north of the cemetery. However, ordnance survey mapping and Rivers of Dublin (Sweeney 2017) document it as flowing to the east, towards and around Dublin Castle and discharging to Liffey Estuary Upper at Wellington Quay. Image 13.2 is an extract from the Proposed Surface Water Drainage drawings (BCIDB-JAC-DNG_RD-0007_XX_00-DR-CD-9001 in Volume 3 of this EIAR). There is a surface water sewer which closely follows the description provided by Clair Sweeney in Rivers of Dublin (Sweeney 2017) and the ordnance survey map.

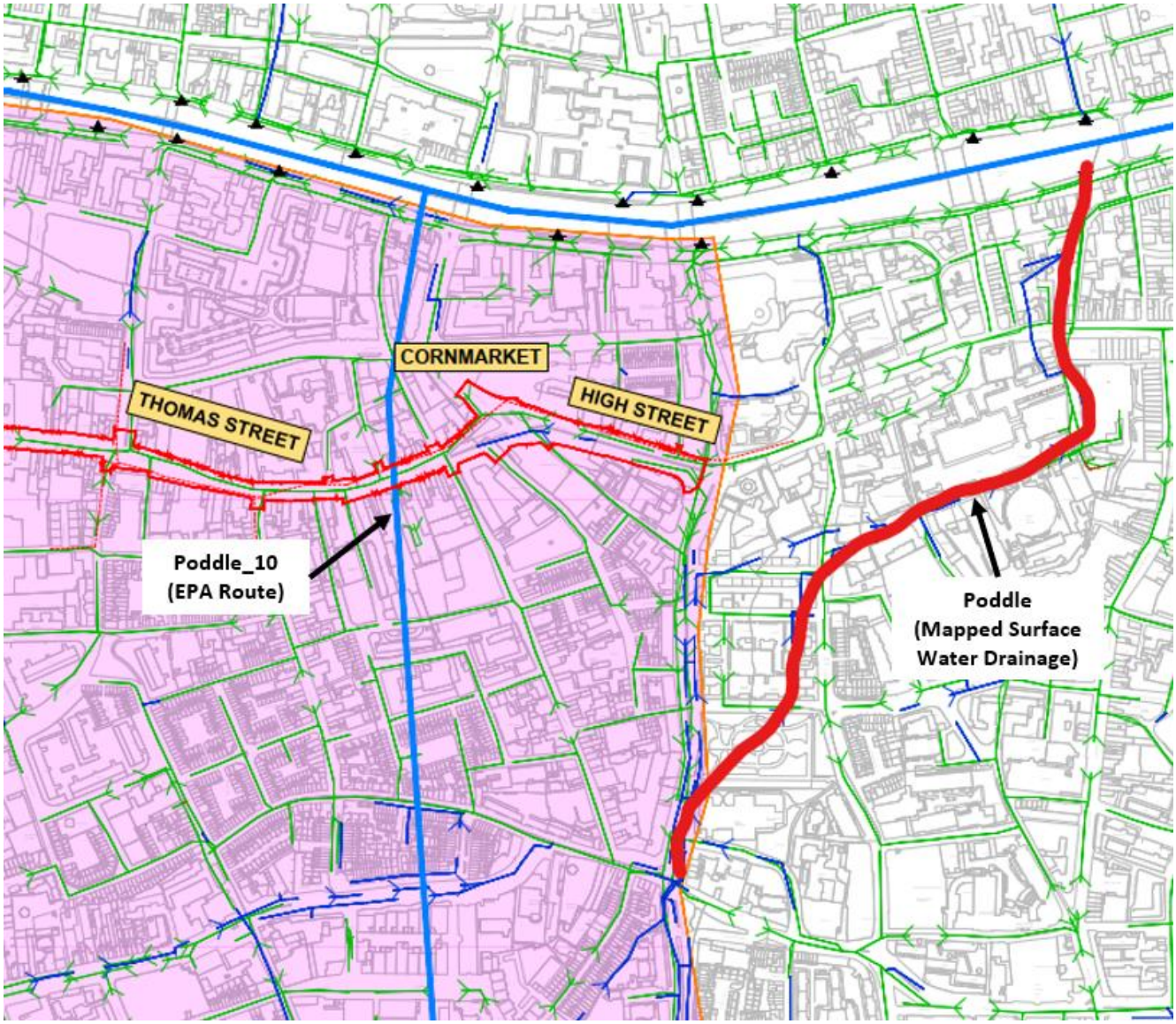

Image 13.2 Possible Route of Poddle_010 (red line highlights surface water sewer)

If this alignment of the Poddle_010 is correct, then the Proposed Scheme does not cross the water body. If the EPA is correct, the Poddle_010 is crossed by the Proposed Scheme at Thomas Street, as it travels from Harold's Cross towards its confluence with the Liffey Estuary Upper. In this scenario, the Poddle_010 is culverted for approximately 3km up to its outfall to the Liffey Estuary Upper, including at the crossing point with the Proposed Scheme. For the purposes of this assessment, and to take a reasonable worst case scenario whereby the Proposed Scheme does cross the Poddle_010, the EPA alignment has been used. The EPA alignment is also the published data which should be used in any assessment of impacts on WFD water bodies in the WFD Assessment.

The Poddle_010 has a Poor status and is At Risk of not achieving Good Status by 2027. Significant pressures include urban runoff from diffuse sources causing nutrient and organic pollution, as well as hydro-morphological impacts as a result of significant culverting.

The most recent Biological Q Value assessment of the River Poddle was in 2007. Only one station upstream of the study area at Kimmage, was assessed and assigned Q3. The assessment stated:

'*The Poddle stream was moderately polluted at Kimmage (0400) in 2007. The lack of sensitive macroinvertebrate species and the abundance of tolerant species indicated severe ecological disruption. Excessive siltation and the presence of Cladophora sp. a filamentous algae indicative of enrichment were noted. Recent excavation works on the bank noted*.'

The station mentioned above is not present within the study area for the Proposed Scheme.

In terms of assigning sensitivity, a poor status water body which is highly culverted would normally be considered to be a low sensitivity water body. However, the ultimate destination of the Poddle_010 is the Liffey Estuary Upper, which is good WFD status and a Nutrient Sensitive Area (NSA). Given its short, direct hydrological connection with an NSA, it is assigned High sensitivity.

13.3.9.4 Liffey Estuary Upper

Liffey Estuary Upper is a transitional water body and is within the Liffey Nutrient Sensitive Area (refer to Figure 13.2 in Volume 3 of this EIAR). It is fed by the Camac_040, Liffey_190 and Poddle_010 and flows into Liffey Estuary Lower before reaching Dublin Bay. Liffey Estuary Upper has a Good WFD status and is At Risk of not achieving Good Status by 2027. The main risk is urban wastewater from SWOs.

In terms of assigning sensitivity, the WFD Good Status of the Liffey Estuary Upper means that it would be of High sensitivity. It is greater than 5km (approximately 46m) from South Dublin Bay and Tolka Estuary SPA and greater than 5km (6.5km) from North Dublin Bay SAC. However, it is in the Liffey Nutrient Sensitive Area and therefore it is assigned Very High sensitivity.

13.3.9.5 Grand Canal Main Line (Liffey and Dublin Bay)

The Grand Canal Main Line (Liffey and Dublin Bay) (hereafter referred to as the Grand Canal) is an artificial waterbody (AWB), primarily used for recreation. Constructed in the 18th Century, the canal traverses the country from Dublin to the River Shannon for approximately 131km. Waterways Ireland is responsible for the monitoring of this waterbody. As stated in the EPA report Water Quality in Ireland 2013 - 2018 (EPA 2019), assessments of the canals using macroinvertebrates indicates generally good biological conditions. Similarly, positive results were identified in terms of macrophyte assessment. Grand Canal achieved good ecological potential in the period from 2013 to 2015. The Grand Canal has been included at this stage because it is within 500m of the Proposed Scheme; however, there is no hydrological connection shown in the existing drainage and so it will not be part of the assessment in this chapter and will not be assigned a sensitivity.

13.3.9.6 Summary of Baseline Receptor Sensitivity

Table 13.11: Baseline Receptor Sensitivity

Waterbody Section ID	Attributes	Indicator / Feature	Sensitivity
Liffey_180	River	Designated Nutrient Sensitive Area Indirect hydrological connection with South Dublin Bay and River Tolka Estuary SPA and North Dublin Bay SAC Moderate WFD Status	Very High
Liffey_190	River	Designated Nutrient Sensitive Area Indirect hydrological connection with South Dublin Bay and River Tolka Estuary SPA and North Dublin Bay SAC Good WFD Status	Very High
Camac_040	River	Direct hydrological connection with Designated Nutrient Sensitive Area (Liffey Estuary Upper) Indirect hydrological connection with South Dublin Bay and River Tolka Estuary SPA and North Dublin Bay SAC Poor WFD Status	High
Poddle_010	River	Direct hydrological connection with Designated Nutrient Sensitive Area (Liffey Estuary Upper) Indirect hydrological connection with South Dublin Bay and River Tolka Estuary SPA and North Dublin Bay SAC Poor WFD Status	High
Liffey Estuary Upper	Transitional waterbody	Designated Nutrient Sensitive Area Indirect hydrological connection with South Dublin Bay and River Tolka Estuary SPA and North Dublin Bay SAC Good WFD Status	Very High

13.3.10 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.

The FRA has been prepared in accordance with the Department of the Environmental, Heritage and Local Government (DEHLG) and the Office of Public Works (OPW) Planning System and Flood Risk Management Guidelines for Planning Authorities (hereafter referred to as the FRM Guidelines) (DEHLG and OPW 2009). A copy of the FRA 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 years 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 years for river flooding and between 0.1% AEP or 1 in 1,000 year and 0.5% AEP or 1 in 200 years 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 Zone B.

13.3.10.1 Estuarine and Coastal Flood Risk

There is a low risk of estuarine or coastal flooding to the Proposed Scheme.

13.3.10.2 Surface Water Flood Risk

The following reaches of the Proposed Scheme are at risk from fluvial flooding from the Camac River:

- Emmet Road Ch B05+600 – B05+800;
- Emmet Road Ch B06+350 – B06+450; and
- Old Kilmainham Road, Ch B06+750 – B07+250.

13.3.10.3 Pluvial Flood Risk

Fonthill Road and Sarsfield Avenue are at risk of flooding for 0.5% AEP storm events. Widescale improvement to the existing drainage network to alleviate this risk is considered to be beyond the scope of the Proposed Scheme.

13.3.10.4 Groundwater Flood Risking

There is a low risk of groundwater flooding to the Proposed Scheme.

13.3.10.5 Climate Change

Climate change will result in an increased risk of flooding from the existing surface water drainage network due to:

- Increased river flows;
- Increased rainfall depths and intensity; and
- Increased sea levels.

Increased rainfalls depths and intensities will increase the risk of pluvial flooding from the existing surface water drainage network. New drainage measures which installed as part of the scheme, including any SuDS, are designed to allow for future climate change.

There will be an increased risk of fluvial flooding to the Proposed Scheme as a consequence of climate change. As noted, it is not possible to reduce the current risk of fluvial flooding to the Proposed Scheme as the existing road levels need to be maintained. The Proposed Scheme will not exacerbate the impacts of climate change on the risk of fluvial flooding.

The impact of climate change on coastal flooding is not applicable to the Proposed Scheme as the current and future risk is so low.

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 (Proposed Scheme Description) but elements of relevance to the surface water impact assessment are provided below.

13.4.1.1 Impermeable Areas and Drainage Design

The drainage design includes principles relating to SuDS. A SuDS drainage design has been developed as a first preference and in accordance with the SuDS hierarchy as described in the CIRIA SuDS Manual (CIRIA 2015). The CIRIA SuDS Manual recommends that when considering SuDS solutions, the preferred approach is a hierarchy whereby runoff using source control solutions (e.g. pervious surfacing) are considered first; where source control is not possible or cannot fully address an increase in runoff from a development, residual flows are

then managed using site controls (e.g. bioretention / infiltration basins); if this is not practical or residual flows remain above existing runoff rates, regional controls (e.g. attenuation ponds or tanks) are used. SuDS provide the dual benefits of controlling flows and treating water quality. In areas where the catchment is proposed to remain unchanged as no additional impermeable areas are proposed, the design consists of relocating existing gullies (where possible) to new locations.

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

The proposed drainage design includes the relocation and addition of drainage gullies.

In a number of areas along the Proposed Scheme, there will be either no increase or a reduction in impermeable areas. Where there is an increase in impermeable area is proposed, the following interventions are proposed:

- Oversized pipes (OSP) (attenuation);
- Swales;
- Bio retention systems;
- Rain Gardens;
- Underground attenuation Tanks (UAT);
- Attenuation Ponds;
- Dry Detention Basins; and
- Filter drains (FD).

These 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 details of drainage measures proposed for each catchment and subsequently each waterbody are provided in Table 13.12. No new outfalls are proposed.

Table 13.12: Proposed SUDs and changes to Impermeable Areas

Chainage	Existing Catchment Reference	Water Body	Approximate Surface Area m2			SuDS Measures Proposed
			Existing	Additional Impermeable	% Change	
A500-B2000	2	Liffey_180	90,849	9,188	10	Swales, UAT, Bio retention systems, OSP, Dry Detention Basins, Rain Garden
B2100-B4700	2	Liffey_190	56,879	5,847	10	OSP, UAT, Attenuation Pond, FD
B4400-B9308 & E0000-E0464	3	Camcor_040 and Ringsend WwTP	72,564	0	0	None

No additional impermeable area is proposed for catchments 1 and 3.

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 (see Section 13.3) includes a description of the current status of the environment in and around the area in which the Proposed Scheme will be located and identifies the existing pressures on the water bodies within the study area. These are identified and categorised under the RBMP process under baseline conditions (i.e. what is there at present) and reported by the EPA. The RBMP 2018-2021 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 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. RBMP 2018-2021 includes a measure for further investigation under the Local Authority Water Programme (LAWPRO) (See www.lawaters.ie) to determine the nature and extent of the impacts. The Draft RBMP proposes six separate measures to address Urban Runoff pressures, including the development of strategies and guidance for nature-based solutions, including SuDS and the preparation of integrated urban drainage management plans.

Urban Runoff which relates to a mixture of misconnections, leakage from sewers and runoff from paved and unpaved areas, has been identified as a significant pressure to all water bodies, with the exception of Liffey Estuary Upper. Measures are underway by South Dublin County Council and Dublin City Council within the Poddle_010 and Camac_040 to investigate diffuse urban sources and pressures in the area. Additional measures and actions are in place including a Hydromorphological Risk Assessment. All of these measures should reduce these pressures. Further investigation is required to determine the nature and extent of the impacts.

Urban waste-water discharges from WwTPs and agglomeration networks have been identified as pressures to all water bodies within the study area. These include urban waste water discharges from SWOs. There are planned improvements to Urban Waste-Water Discharges and their contribution to achieving WFD objectives across the country. Recent regulation for authorising and regulating urban waste-water discharges, and licensing for those in areas where the population is over 500 should contribute to reducing the pressures.

A programme of WwTP upgrades across the country is scheduled to take place between 2021 and 2024 with some upgrade works already underway.

Hydromorphology has also been identified as a significant pressure as the Poddle_010 and Camac_040 is heavily culverted downstream towards the city centre. Hydromorphology is the second most common pressure on water bodies in Ireland identified in the current RMBP. The RBMP details '*it anticipated that as our knowledge and understanding of hydromorphological pressures improves, so too will the extent of the impacts identified across the country*'.

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

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

13.4.3 Do Minimum

The potential for changes in traffic loading on side roads, as set out in Section 13.2.4.5 of this Chapter, means that the assessment of potential operational impacts from the Proposed Scheme is required to consider an additional future baseline scenario (as well as Do Nothing), i.e. 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 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 30 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. The Construction Compounds will be located at the following sites:

- Construction Compound LV1: Fonthill Road;
- Construction Compound LV2: Coldcut Road; and
- Construction Compound LV3: Con Colbert Road.

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 in the absence of mitigation could occur during the construction of the Proposed Scheme in relation to hydrology, water quality and hydromorphology. The potential for any of these types of impacts are considered for different construction activities for each waterbody within the study area. These potential Construction Phase impacts include:

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 because of a spillage or leakage of oils and fuels stored on site or direct from construction machinery; and the storage of materials or waste near to water bodies or drains connected to the water bodies; and
- Re-exposure of historically settled contaminants within or near to water bodies because of working within or near to the waterbody.

13.4.4.2.3 Hydromorphology

- Increased sediment loading due to silty water runoff or dewatering activities, introducing a sediment plume, potentially leading to the smothering of bed substrate and changes to existing morphological features; and
- Modifications to the morphological characteristics of the water body such as alterations to banks for construction of over bridges or other works.

13.4.4.3 Assessment of Potential Impacts on Receptors

Detailed assessment of the potential impacts on receptors is provided here and a summary table for all receptors provided in Table 13.13.

13.4.4.3.1 Liffey_180

There are potentially significant impacts to the Liffey_180 as a result of road widening between:

- The M50 Overbridge and Liffey Valley Shopping Centre;
- The M50 Overbridge and the Kennelsfort Road Junction;
- The Kennelsfort Road Junction and Cherry Orchard Service Station; and
- Cherry Orchard Service Station and Le Fanu Road.

The surface water drainage system on these sections of road outfalls to the Liffey_180, approximately 350m from the proposed works. There is potential for increased runoff, and the transport of sediment laden runoff and anthropogenic contaminants from the construction works reaching the Liffey_180 via this pathway. However, due to the distance from these activities for the Proposed Scheme to the water body (0.75 to 1.4km), potential impacts will be Short-Term, Adverse and of Small magnitude. Therefore, the impacts will be of Moderate significance.

13.4.4.3.2 Liffey_190

The Proposed Scheme includes proposals for the conversion of a roundabout to a signalised junction and the upgrade of a road to include cycle tracks between Le Fanu Road and Kylemore Road. The surface water drainage system from this area outfalls to the Liffey_190. The works are concentrated in a small, localised area at one roundabout. The proposed works are not intrusive enough to result in significant hydrological, water quality or hydromorphological impacts. Potential impacts will be Short-Term, Adverse and of Negligible magnitude. Therefore impacts will be of Imperceptible significance.

There are two further construction activities which could potentially result in impacts to the Liffey_190: the road widening and associated works including cycle track and footway improvements between Kylemore Road and St Laurence's Road; and the road widening, junction reconfiguration, retaining wall construction between St

Laurence's Road and Sarsfield Road Junction. The construction work at the sites may increase the potential for fine sediment runoff into the waterbody which could result in potential impacts which will be Short-Term, Adverse impacts and of Small magnitude. Therefore impacts will be of Moderate significance.

The closest compound to any of the water bodies is LV3 at Liffey Gaels Park, between the R833 Con Colbert Road and the Chapelizod Bypass. The proposed site is currently greenfield and there is potential for silty water runoff due to topsoil stripping. It has some potential to reach surface water drains in the road; the site is currently bounded by a short concrete wall, however the site rises behind the wall. If the wall is breached for access or other reasons, there is the potential for a steep drop to the footpath and roadside gullies and an increased risk of runoff which will be hard to control in a wet weather event. Surface water in this location discharges directly to the Liffey_190. Similarly, any spillages of fuel or other substances have similar potential pathways and pose risks in this location. Water drains in this section of road discharge to the Liffey_190 approximately 500m from the proposed site. Potential impacts will be short to medium, adverse and of small to medium magnitude. Therefore, impacts will be Very Significant.

13.4.4.3.3 Camac_040

The Proposed Scheme includes road widening works, including reconfiguration of a junction and cycle track improvements between Sarsfield Road Junction and Emmet Road, and junction reconfiguration and construction of bus gate between South Circular Road Junction and Bow Lane West Junction. The surface water drainage system in the area around the proposed construction works outfalls to the Camac_040. As a result, these activities have the potential to result in increased runoff of fine sediment into the waterbody. This has the potential to lead to Short-Term, Adverse impacts of Small magnitude, resulting in impacts of Slight significance.

The provision of segregated cycle lanes at Bow Lane West Junction to Cornmarket, and the road lane reconfiguration between Emmet Road and South Circular Road Junction are not considered to be intrusive enough to result in large increases in runoff or to generate increased fine sediment runoff. Potential impacts will be Short-Term, Adverse impacts of Negligible magnitude. Therefore, impacts of Imperceptible significance.

No changes are proposed to the short culvert where Emmet Road crosses the water body.

13.4.4.3.4 Poddle_010

There are no significant impacts anticipated on the Poddle_010. With respect to the route of the Proposed Scheme, the worst case scenario in terms of the alignment of the Poddle_010 is the EPA alignment. In this scenario the construction works will be located above the culverted river. However, there will be no change to this culverted section of the Poddle_010. The surface water drainage system in this location is not connected to the Poddle_010, but to a combined sewer. Therefore, there is no hydrological pathway from the construction site to the waterbody. As a result, there will be no impacts on the Poddle_010.

13.4.4.3.5 Liffey Estuary Upper

There are no significant impacts anticipated on Liffey Estuary Upper. The construction activities will not result in large increases in silty water runoff and the waterbody is over 200m away from the proposed works. The surface water drainage system close to the construction sites is not directly connected to the Liffey Estuary Upper. Therefore, there is a limited pathway for pollution.

This has the potential to lead to Short-Term, Adverse impacts of Negligible magnitude, resulting in impacts of Imperceptible significance.

Table 13.13: Summary of Potential Construction Phase Impacts on Water Bodies within the Study Area

Water Body Name	Project Activity	Potential Impacts			
		Description of Predicted Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Effects
Liffey_180	Widening, cycle track construction, reconfigurations, junction improvements and retaining walls	• Increased surface water runoff and sediment in runoff via surface water drains; and • Anthropogenic sources (fuel etc.).	Very High	Small	Moderate Short-term, Adverse
Liffey_190	Roundabout upgrade and new cycle tracks at Le Fanu Road to Kylemore Road	• Increased surface water runoff and sediment in runoff via surface water drains; and • Anthropogenic sources (fuel etc.).	Very High	Negligible	Imperceptible Short term Adverse
	Widening and cycle / footway improvements, junction reconfiguration, retaining walls.	• Increased surface water runoff and sediment in runoff via surface water drains; and • Anthropogenic sources (fuel etc.).	Very High	Small	Moderate Short-term, Adverse
	Construction compound	• Increased sediment in runoff; and • Anthropogenic sources (fuel etc.).	Very High	Small to Medium	Moderate to Very Significant Short Term Adverse
Camac_040	Widening, junction upgrade, cycle track, junction reconfiguration and bus gate bypass	• Increased surface water runoff and sediment in runoff; and • Anthropogenic sources (fuel etc.).	Medium	Small	Slight Short-term, Adverse
	Road Lane reconfiguration, segregated cycle lanes	• Increased surface water runoff; • Increased sediment in runoff; and • Anthropogenic sources (fuel etc.)	Medium	Negligible	Imperceptible Short-term Adverse
Liffey Estuary Upper	Segregated cycle lanes, junction reconfiguration	• Increased surface water runoff and increased sediment in runoff; • Anthropogenic sources (fuel etc.); and • Limited pathway for pollution.	Very High	Negligible	Imperceptible Short-term Adverse

13.4.5 Operational Phase

13.4.5.1 Overview of Potential Impacts

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

Potential impacts that could occur include:

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

13.4.5.2 Assessment of Potential Impacts – Surface Water Runoff

Assessments for each receptor are provided below, with a summary of impacts at Table 13.14.

13.4.5.2.1 Liffey_180

The impermeable area is predicted to increase by 9,188m^2, which equates to a 10% increase.

An increase in impermeable area will result in an increase in the rate and amount runoff to the receiving watercourse. This can change flow regimes and morphology of the watercourse. However, a number of SuDS measures will be implemented to ensure there is no net increase in runoff and some level of treatment will be provided (see Section 13.4.1.1). Therefore, the increase in impermeable area is considered to be of Permanent, Beneficial impact of Negligible magnitude, resulting in an impact of Imperceptible significance.

13.4.5.2.2 Liffey_190

The impermeable area is predicted to increase by 5,847m^2, which equates to a 10% increase. As for Liffey_180, a number of SuDS measures will be implemented to ensure there is no net increase in runoff and some level of treatment will be provided (see Section 13.4.1.1). Therefore, the increase in impermeable area is considered to be of Permanent, Beneficial impact of Negligible magnitude, resulting in an impact of Imperceptible significance.

13.4.5.2.3 Camac_040

There is no increase in impermeable area draining to the Camac_040 and so there will be no impacts.

13.4.5.2.4 Poddle_010

There is no hydrological connection from the Proposed Scheme to the Poddle_010.

13.4.5.2.5 Liffey Estuary Upper

There is no direct hydrological connection from the Proposed Scheme to the Liffey Estuary Upper.

Table 13.14: Summary of Potential Operation Phase Impacts on Water Bodies within the Study Area

WFD Water Body Name	Project Activity	Potential Impacts			
		Description of Potential Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Effects
Liffey_180	Increase in impermeable area draining to the waterbody	• Increased treatment of water quality through the use of SuDS • No net increase in runoff	High	Negligible	Imperceptible Permanent Beneficial
Liffey_190	Increase in impermeable area draining to the waterbody	• Increased treatment of water quality through the use of SuDS • No net increase in runoff	High	Negligible	Imperceptible Permanent Beneficial

13.4.5.3 Assessment of Potential Impacts – Traffic Redistribution

Surface water drainage on the route of the Proposed Scheme will continue to discharge to existing catchments; a reduction in traffic numbers along this route is anticipated and it would lead to a reduction in the routine contaminants discharging to the Liffey_180 and Liffey_190. Potential impacts will be permanent, beneficial and of negligible magnitude. Therefore impacts will be of Imperceptible significance.

Traffic modelling (see Chapter 6 (Traffic & Transport)) was carried out for two scenarios, Do Minimum and Do Something, for the years 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 the local road network would not lead to AADTs being above 10,000. However, in three locations AADTs were predicted to increase to above 10,000 in both the 2028 and 2043 Do Something scenarios. Details of these locations are presented in Table 13.15.

Table 13.15: Road sections where Traffic Flows have increased >10,000 in 2028 and/or 2043

Road Name	A_B (GIS)	Length of Section (km)	2028 Do Minimum	2028 Do Something	% Increase	2043 Do Minimum	2043 Do Something	% Increase	Closest Existing Drainage Route	Likely Change in Drainage Catchment	Significant Impact?
R111 between Kilmainham Lane and R148	7148_ 7230	0.12	7576	10637	40	7728	10839	40	Camcor_040 / Ringsend WwTP	No	No
R111 between Kilmainham Lane and R148	7187_ 7163	0.13	8143	12334	51	8273	12416	50	Camcor_040 / Ringsend WwTP	No	No
R111 between Kilmainham Lane and R148	7230_ 7233	0.04	7576	10637	40	7728	10839	40	Camcor_040 / Ringsend WwTP	No	No

For the three on the R111, these all drain to the same catchment as existing and so there is no significant impact.

13.4.5.4 Summary of Flood Risk Assessment

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

13.4.5.4.1 Coastal Flood Risk

There is no impact from or to the Proposed Scheme as it is not at risk of coastal flooding.

13.4.5.4.2 Groundwater Flood Risk

There is no impact from or to the Proposed Scheme as below-ground elements of the works are localised and will not impact ground water movements.

13.4.5.4.3 Pluvial Flood Risk

The Proposed Scheme will result in the creation of additional impermeable surfaces for local sections of road widening. SuDS measures will be implemented to ensure that there is no change in existing runoff rates as a consequence of the Proposed Scheme. This will ensure no increase in the risk of pluvial flooding.

The package of SuDS measures for the Proposed Scheme are detailed in Chapter 4 (Proposed Scheme Description).

13.4.5.4.4 Fluvial Flood Risk

The Proposed Scheme will not affect the hydraulic capacity of the Camac River or any structures which cross it. No works are proposed to modify any existing bridges that would reduce its hydraulic capacity. The existing level of the road will also be maintained. The Proposed Scheme will therefore not result in any change to the existing risk of fluvial flooding.

As noted, the Proposed Scheme typically comprises local widening of the existing road. It is not possible to raise the level of the road to reduce the existing level of flood risk. It is beyond the scope of the Proposed Scheme to reduce the risk of fluvial flooding from the above watercourse.

13.4.5.4.5 Justification Test

Parts of the Proposed Scheme are located in Flood Zones A and B. An assessment of the Proposed Scheme in the spirit of a justification test was undertaken to demonstrate that the development was compatible with the existing level of flood risk.

'The Planning System and Flood Risk Management, Guidelines for Planning Authorities' (2009)', 5.15, Box 5.1 as amended by PL 2/2014 sets out the criteria for the Justification Test. Following an assessment against these criteria, it was concluded that the Proposed Scheme meets them and is compatible with the existing level of flood risk.

13.4.5.4.6 Climate Change

The impact of climate change on coastal flooding is not considered to be significant as the current risk to the Proposed Scheme is so low.

Increased rainfalls depths and intensities will increase the risk of pluvial flooding from the existing surface water drainage network. New drainage measures which installed as part of the Proposed Scheme, including any SuDS, will be designed to allow for future climate change.

There will be an increased risk of fluvial flooding to the Proposed Scheme as a consequence of climate change. As noted, it is not possible to reduce the current risk of fluvial flooding to the Proposed Scheme as the existing road levels need to be maintained. The Proposed Scheme will not exacerbate the impacts of climate change on the risk of fluvial flooding.

The impact of climate change on coastal flooding is not applicable to the Proposed Scheme as the current and future risk is so low.

13.4.5.4.7 Stage 3 FRA

A Stage 3 Detailed Risk Assessment is not considered necessary as there will be no change in existing flood risk patterns or processes as consequence of the Proposed Scheme.

13.5 Mitigation and Monitoring Measures

13.5.1 Introduction

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

13.5.2 Construction Phase

13.5.2.1 Mitigation Measures

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

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

- A requirement for a Pollution Incident Response Plan;
- Construction Compounds management including the storage of fuels and materials
- Control of Sediment;
- Use of concrete;
- Management of Vehicles and Plant, including refuelling and wheel wash facilities; and
- Monitoring

13.5.2.2 Site Specific Mitigation Measures

Construction compounds LV1 and LV2 have limited ability to impact upon nearby water bodies. The general measures for the Construction Compounds as set out in the SWMP are sufficient to control these potential impacts and no additional measures are required.

Activities within construction compound LV3 will be largely controlled as set out in the general measures in the SWMP. In addition, all surface water drains in the vicinity will be identified and either stopped up or bunded on the side closest to the Construction Compound. The perimeter wall along the pavement significantly reduces the risk of any silty water runoff or spillages reaching the surface water drains in the road; this will be retained in so far as is reasonably practicable. Where it is required to be removed, for example to facilitate access to the site, this will be done as far from the surface water gullies as is practicable. Protection measures as set out above will reduce the risk of contaminants reaching the surface water system. The appointed contractor will ensure that appropriate spill control equipment is available, to control any spillages to the gullies should a spillage occur. The CEMP includes an Environmental Incident Response Plan, which will apply for the management of any incidents that may occur.

13.5.3 Operational Phase

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

In the Operational Phase the infrastructure (including the maintenance regime for SuDS) will be carried out by the Local Authorities 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 SWMP within the CEMP (Appendix A5.1 in Volume 4 of this EIAR), there are no significant impacts predicted on any of the receptors in this study area. Residual impacts are presented in Table 13.16.

Table 13.16: Summary of Residual Construction Phase Impacts on Water Bodies within the Study Area

Water Body Name	Project Activity	Predicted Impacts		
		Description of Predicted Impacts	Potential Impact (Pre-Mitigation and Monitoring)	Predicted Impact (Post-Mitigation and Monitoring)
Liffey_180	Widening, cycle track construction, reconfigurations, junction improvements and retaining walls	• Increased surface water runoff and sediment in runoff via surface water drains; and • Anthropogenic sources (fuel etc.).	Moderate Short-term Adverse	Imperceptible Short-term Adverse
Liffey_190	Roundabout upgrade and new cycle tracks at Le Fanu Road to Kylemore Road	• Increased surface water runoff and sediment in runoff via surface water drains; and • Anthropogenic sources (fuel etc.).	Imperceptible Short term Adverse	Imperceptible Short-term Adverse

Water Body Name	Project Activity	Predicted Impacts		
		Description of Predicted Impacts	Potential Impact (Pre-Mitigation and Monitoring)	Predicted Impact (Post-Mitigation and Monitoring)
Liffey_190	Widening and cycle / footway improvements, junction reconfiguration, retaining walls.	• Increased surface water runoff and sediment in runoff via surface water drains; and • Anthropogenic sources (fuel etc.).	Moderate Short-term Adverse	Imperceptible Short-term Adverse
Liffey_190	Construction Compound	• Increased surface water runoff and sediment in runoff via surface water drains; and • Anthropogenic sources (fuel etc.).	Moderate to Very Significant Short to Medium term Adverse	Imperceptible Short-term Adverse
Camac_040	Widening, junction upgrade, cycle track, junction reconfiguration and bus gate bypass	• Increased surface water runoff and sediment in runoff; and • Anthropogenic sources (fuel etc.).	Slight Short-term Adverse	Imperceptible Short-term Adverse
Camac_040	Road Lane reconfiguration, segregated cycle lanes	• Increased surface water runoff; • Increased sediment in runoff; and • Anthropogenic sources (fuel etc.)	Imperceptible Short term Adverse	Imperceptible Short-term Adverse
Liffey Estuary Upper	Segregated cycle lanes, junction reconfiguration	• Increased surface water runoff and increased sediment in runoff; • Anthropogenic sources (fuel etc.); and • Limited pathway for pollution.	Imperceptible Short term Adverse	Imperceptible Short-term Adverse

13.6.2 Operational Phase

Mitigation for the Operational Phase has been built into the design of the Proposed Scheme. As a result, no residual significant impacts are anticipated for any water body in the study area. This is summarised in Table 13.17.

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

Water Body Name	Project Activity	Predicted Impacts		
		Description of Predicted Impacts	Potential Impact (Pre-Mitigation and Monitoring)	Predicted Impact (Post-Mitigation and Monitoring)
Liffey_180	Increase in impermeable area draining to the waterbody	• Increased treatment of water quality through the use of SuDS • No net increase in runoff	Imperceptible Permanent Beneficial	Imperceptible Permanent Beneficial
Liffey_190	Increase in impermeable area draining to the waterbody	• Increased treatment of water quality through the use of SuDS • No net increase in runoff	Imperceptible Permanent Beneficial	Imperceptible Permanent Beneficial

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.

13.6.3.1 Overview

Taking into consideration the anticipated impacts of the Proposed Scheme on the biological, physico-chemical and hydromorphological quality elements, following the implementation of design and mitigation measures, it is concluded that it will not compromise progress towards achieving Good Ecological Status (GES) or cause a deterioration of the overall Good Ecological Potential (GEP) of any of the water bodies that are in scope. Therefore, the Proposed Scheme does not require assessment under Article 4.7 (Table 13.18).

Table 13.18: 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 water bodies 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 and indirect impacts. 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 an Appropriate Assessment Screening Report and the Natura Impact Statement (NIS) submitted with the application.

The Nitrates Directive (1991) aims to protect water quality by preventing nitrates from agricultural sources polluting ground and surface waters and by promoting the use of good farming practices. The 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 none less than 2km from the Proposed Scheme. It is therefore compliant with the revised Bathing Water Directive.

13.6.3.2 Conclusion

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

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

13.7 References

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