Chapter 13
Water

Contents

13. Water

13.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the impact of the Kimmage to City Centre Core Bus Corridor Scheme (hereafter referred to as the Proposed Scheme), on the surface water environment during the Construction and Operational Phases. The following attributes of each surface water body (receptor) are considered: hydrology, hydro-morphology 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, 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.

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 the Proposed Scheme's compliance with Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (hereafter referred to as the Water Framework Directive (WFD)) requirements is provided in Appendix 13.1 (Water Framework Directive (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 Site-Specific Flood Risk Assessment (FRA) report in Appendix A13.2 in Volume 4 of this EIAR. The results of this assessment have been summarised in Section 13.3.11 and Section 13.4.6 of this Chapter.

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

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

13.2 Methodology

13.2.1 Study Area

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

The nearest surface water abstraction point is Leixlip Reservoir, which is approximately 15km (kilometres) north-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 has not been considered further in the assessment.

13.2.2 Relevant Guidelines, Policy and Legislation

13.2.2.1 Water Framework Directive (WFD)

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

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

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

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

The Water Policy Regulations require the assessment of permanent impacts of a scheme / project on WFD water bodies (rivers, lakes, estuaries, coastal waters and groundwater). Typically, the permanent impacts include all operational impacts, but can also include impacts from construction depending on the length and / or nature of the works etc. of the Proposed Scheme, as some potential construction impacts could be considered permanent in the absence of mitigation. An assessment of the compliance of the Proposed Scheme with WFD requirements is provided in Appendix A13.1 (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 United Kingdom (UK) Environment Agency's Water Framework Directive assessment: estuarine and coastal waters (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 Eighteen: The Water Framework Directive (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, River Basin Management Plan for Ireland 2018 – 2021 (hereafter referred to as the RBMP 2018 – 2021) was published by the Department of Housing, Planning and Local Government (DHPLG) in April 2018 and covers Ireland as a whole (DHPLG 2018). For the second cycle, the Eastern, South-Eastern, South-Western, Western and Shannon River Basin Districts have been merged to form one national River Basin District (RBD). For 'At Risk' water bodies, the RBMP 2018 - 2021 identified the frequency of significant pressures impacting these receptors as follows: agriculture (53%), hydro-morphology (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 (DHLGH), published the draft River Basin Management Plan for Ireland 2022 – 2027 (hereafter referred to as the draft RBMP) for public consultation (DHLGH 2021). The consultation period closed on 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, and for other water bodies, the changes are more mixed with some reductions and 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.

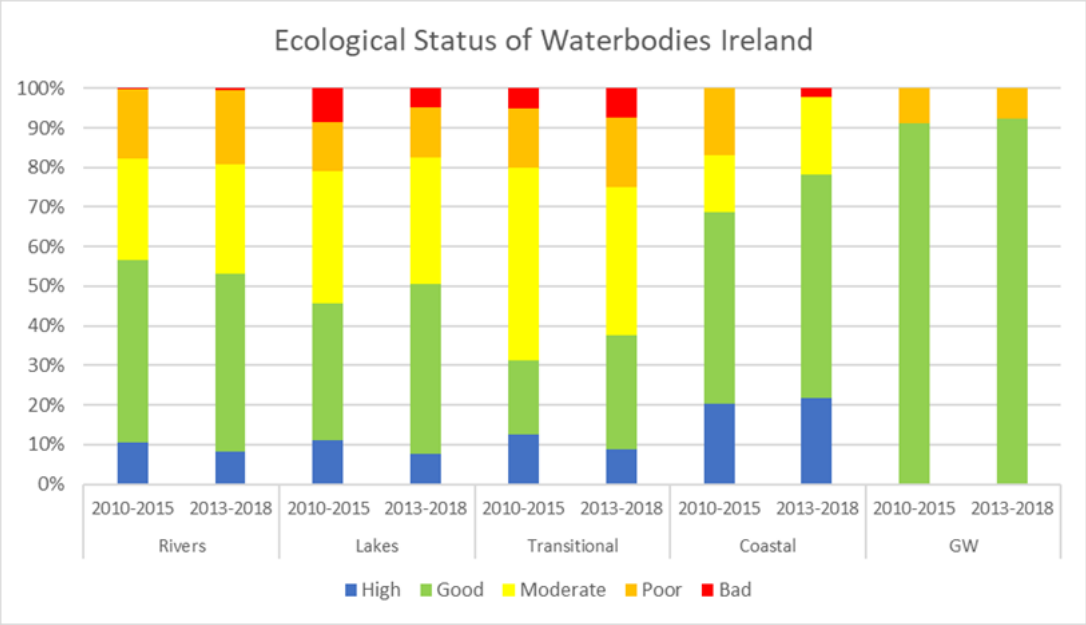

Image 13.1: Ecological Status of Water Bodies in Ireland

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 hydro-morphology, forestry and urban wastewater. There has been an increase in water bodies impacted by agriculture since the second cycle RMBP.

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

13.2.2.3 Guidelines

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

Table 13.1: Guidelines

EIA Topic	Guidance
EIA / General	• Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022a); and • Environmental Impact Assessment of Projects. Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission 2017).
Water	• Transport Infrastructure Ireland (TII) Road Drainage and the Water Environment (DN-DNG-03065) (TII 2015); • National Road Authority (NRA) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (NRA 2005)*; • Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2009)*; 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 (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 Hydro-morphology	• WFD Ireland Database; • EPA - Water quality monitoring database and reports (various); • EPA Water Environment Maps (EPA 2023); • National Parks and Wildlife Service (NPWS) - designated sites (NPWS 2020); and • Inland Fisheries Ireland (IFI) - fishery resources.
Hydrology	• Catchment Summaries; • RBMP 2018 – 2021 (DHPLG 2018); and • EPA - flow and water level measurements (EPA 2023).
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 2020, all watercourse crossings within the study area were visited to inform the determination of baseline conditions in order to identify the likely impacts of the Proposed Scheme. In March 2022, visits were carried out at four locations where the potential for impacts has been identified, to further inform the assessment (see Figure 13.2 in Volume 3 of this EIAR). Further details of the locations and the results of the survey are provided in Section 13.3.4.

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

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

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

13.2.4 Appraisal Method for the Assessment of Impacts

13.2.4.1 General Approach

The method for the assessment of impacts has been adapted from the Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (hereafter referred to as the TII Assessment Guidelines) (NRA 2009), specifically Section 5.6. The assessment also took account of the guidance set out in the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2022a). In addition, the relevant provisions of the

EU's Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017) have been considered in preparing this Chapter of the EIAR.

The surface water environment is intrinsically linked to flood risk, ecological receptors and groundwater, which are considered in Appendix 13.2 Site-Specific Flood Risk Assessment in Volume 4 of this EIAR), Chapter 12 (Biodiversity) and Chapter 14 (Land, Soils, Geology & Hydrogeology), respectively. Commercial and recreational use of the water environment is not included in the scope of this Chapter, as commercial and recreational interests are considered and assessed in Chapter 10 (Population) and Chapter 19 (Material Assets).

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

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

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

13.2.4.2 Sensitivity of Receptor

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

Table 13.3: Criteria Used to Evaluate the Sensitivity of Surface Water Receptors (NRA 2009 (Adapted to include WFD Guidance (Environment Agency 2016))

Sensitivity	Criteria	Typical Example
Extremely High	Receptor (or receptor attribute) has a very high quality or value on an international scale	• Any WFD water body which is protected by EU legislation (e.g., Designated 'European Sites' (Special Areas of Conservation (SACs) 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 Status; • A Moderate WFD Status (2013 to 2018) water body with some hydrological connection (<2km) to European Sites or protected ecosystems of international status (SAC / SPA or Salmonid Waters) further downstream; • 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 to 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 to 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 2022a):

- Nature of the impacts;

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

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

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

Nature of Impact	Description	Scale and Nature of Impacts
High Adverse	Results in loss of attribute and/or quality and integrity of the attribute	• Loss or extensive change to a fishery; • 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; and • 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; and • 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; and • 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; and • 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 2022a)

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

13.2.4.5 Methodology for Operational Phase Traffic Impact Assessment

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

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

To help determine this, the Road Drainage and the Water Environment (DN-DNG003065) guidance document (TII 2015) was consulted. It states that roads carrying less than 10,000 Annual Average Daily Traffic (AADT) are lightly trafficked and therefore pollutants occur in lower concentrations. Therefore, this was used as a threshold point to determine whether there was the potential for impacts on water bodies.

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

In order to determine which water body drainage from side roads carrying displace traffic would discharge to Catchment Maps ((see Proposed Surface Water Drainage Works (BCIDD-ROT-DNG_RD-0011_XX_00-DR-CD-9001) in Volume 3 of this EIAR).

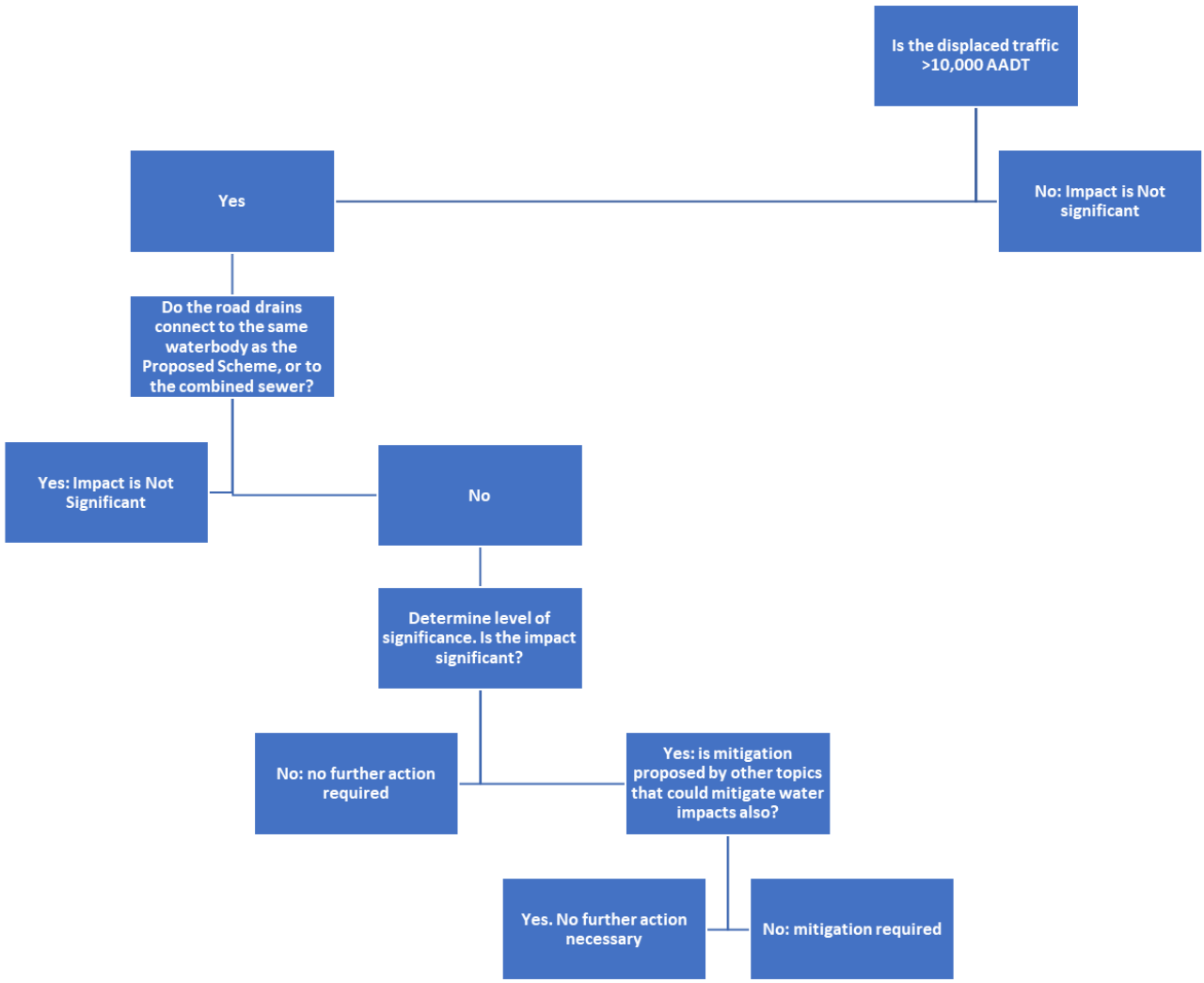

Diagram 13.1: Traffic Assessment Decision Tree

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 Highways Agency Water 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 is <100m, the magnitude is negligible;
- If AADT is <10,500, the magnitude is small;
- If AADT is >10,500 and <11,000, the magnitude is medium; and
- For AADT >11,000, the 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 Third Cycle Draft Liffey and Dublin Bay Catchment Report 2021 (HA 09) (EPA 2021) 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 (squared kilometres). There are two main water bodies within the study area in this catchment; the Poddle_010 and the Grand Canal Main Line (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 Kimmage, Harold's Cross, Perrystown and Crumlin. 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 waterbodies (HMWB) and artificial surface waterbodies (AWB). The WFD requires HMWB and AWB to achieve Good Ecological Potential rather than Good Status.

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

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

13.3.3 Surface Water WFD Status

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

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

- Poddle_010; and
- Grand Canal Main Line (Liffey and Dublin Bay).

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

Table 13.7: Surface Water WFD Status

WFD Sub-Catchment	WFD Water body Name	Heavily Modified?	Type	Status (2016 to 2021)	Key Pressures: Elements Causing or with Potential to Cause Less Than Good Status	Risk Categorisation
Dodder_SC_010	Poddle_010	Unknown	River	Poor	Urban runoff; Hydro-morphology	At Risk
N/A	Grand Canal Main Line (Liffey and Dublin Bay)	Yes - AWB	Canal	Good Ecological Potential	N/A	Not at Risk

13.3.4 Field Survey

The Proposed Scheme was surveyed in March 2020 and March 2022. The water bodies surveyed were the Poddle_010 and the Grand Canal Main Line. Weather conditions were recorded as sunny, with clear skies for all sites of the survey.

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

Table 13.8: Survey Information for Sites Along the Proposed Scheme (March 2022)

Location	K1	K2	K3	K4
Survey Attribute	**Construction Compound Sundrive Road**	**Mount Argus Way**	**Mount Argus View/Park**	**Grand Canal Crossing at Harold's Cross**
Date	10/03/2022	10/03/2022	10/03/2022	10/03/2022
Climate Observations	Sunny, clear skies	Sunny, clear skies	Sunny, clear skies	Sunny, clear skies
Water Body Crossed	No	Yes	Yes	Yes
Construction Compound	Yes	No	No	No
Closest Water Body	Poddle_010	Poddle_010	Poddle_010	Grand Canal Mainline
Distance to Water Body	Waterbody culverted, construction compound over water body.	5m	5m	Bridge is over water body
River Flow	-	Moderate	Low	Low
Water Quality	-	Very clear	Slightly discoloured with some waste in the pond.	Poor quality, with vegetation debris, discoloured water
Runoff Pathway	Surface water drains present in construction compound.	Run-off is likely due to the steep slopes along the banks.	Low run-off from road. Potential pathway from flooding.	Potential runoff pathway from bridge extension and adjacent roads
Runoff Risk	High	High	Low	Medium
Riverbed Observations	-	Very fine sediment at base or river.	Fine grade sediment along base of concrete pond. No pebbles or cobbles present.	River bed contains a mixture of cobbles and intermittent boulders
Riverbank Observations	N/A	Steep slopes present from residential properties.	Concrete pond with walkways and multiple bridges across pond.	Man-made canal with concrete banks. Grass verge between road and river.
Features	N/A	Footbridge over waterbody. River runs under survey point k1 to k2. The river looks culverted under the road	Man-made waterfall, concrete banks to modify flow direction. Some vegetation features in middle of pond	Concrete banks
Barriers	N/A	Metal fence between residential properties and river bank.	Shrubs and trees present alongside of pond. Concrete banks	Wooden fence separating fuel depot from canal. Footpath separating road from canal
Riparian Detail	N/A	Banks comprise of grass. Over grown vegetation visible on other side of bridge	Shrubs and multiple trees along edge of bond. Vegetation feature in the middle of the pond.	Grass verge along bank footpath. Trees located equally spaced along footpath

Location	K1	K2	K3	K4
Comments	The area is gently sloping. There are a series of gullies which direct run off to surface water drains. The area is entirely paved with impermeable ground. The site is designed so run off is directed to one area.	The river bank is steep on the area where the proposed footbridge will be constructed. There is a high run off risk	None present	Fuel depot located close to canal and separated from canal by a wooden fence.

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 Special Areas of Conservation (SACs), Special Protection Areas (SPA), proposed Natural Heritage Areas (pNHAs), Natural Heritage Areas (NHAs), Nutrient Sensitive Areas, salmonid rivers, shellfish areas and marine bathing waters.

A review of the Natura 2000 network was conducted to determine those European sites which are within the study area and / or hydrologically connected to the water bodies detailed in Section 13.3.9. 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) in Volume 2 of this EIAR and Figure 12.2 in Volume 3 of this EIAR, respectively. The following European sites were identified to be relevant to this assessment:

- North Dublin Bay SAC (site code: 000206) (approximately 9km from the Proposed Scheme);
- South Dublin Bay SAC (site code: 000210) (approximately 11.5km from the Proposed);
- North Bull Island SPA (site code: 004006) (approximately 9.5km from the Proposed Scheme) ; and
- South Dublin Bay and River Tolka Estuary SPA (site code: 004024) (approximately 8km from the Proposed Scheme).

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

- Liffey Valley pNHA (site code: 000128) (approximately 7.5km from the Proposed Scheme);
- Dolphins, Dublin Docks pNHA (site code: 000201) (approximately 8km from the Proposed Scheme);
- North Dublin Bay pNHA (site code: 000206) (approximately 9km from the Proposed Scheme);
- South Dublin Bay pNHA (site code: 000210) (approximately 11.5km from the Proposed Scheme); and
- Grand Canal pNHA (site code: 002104) (approximately 0km from the Proposed Scheme).

There are three Nutrient Sensitive Areas in the study area. They are the River Liffey, Liffey Estuary and Tolka Estuary designated as per Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment (hereafter referred to as the UWWT Directive) (refer to Figure 13.2 in Volume 3 of this EIAR).

There is one designated shellfish area in Malahide. The shellfish area is compliant with the relevant standards and there are no water quality issues of concern (as per the Sea Fisheries Protection Authority (SFPA) and Marine Institute Monitoring Programme). It is approximately 25km from the Proposed Scheme at its closest point.

There are seven designated marine bathing waters downstream of the Proposed Scheme. The EPA published its Bathing Water Quality - A Report for the Year 2021 in May 2022 (EPA 2022b) and the website beaches.ie keeps this information regularly updated. The beaches and the most up to date assessment (checked March 2023) of their quality is provided below:

- Dollymount Strand – Good Quality (approximately 10km from Proposed Scheme at its nearest point);
- North Bull wall – Good Quality (approximately 9km from Proposed Scheme at its nearest point);
- Half Moon Beach – Excellent quality (approximately11km from Proposed Scheme at its nearest point);
- Shelley Banks – Good Quality ((approximately 12km from Proposed Scheme at its nearest point)
- Sandymount Strand – Good Quality (beach was closed for the Summer 2021 bathing season) (approximately 13.5km from Proposed Scheme at its nearest point) ; and
- Merrion Strand – Poor Quality (approximately 14.5km from Proposed Scheme at its nearest point)
- Seapoint – Excellent Quality (approximately 15km from Proposed Scheme at its nearest point)

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 2023) was reviewed to identify the pressures on water bodies and the presence of point source discharges from EPA licenced activities in 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. For details on these for each water body are provided in Section 13.3.9. There are no wastewater treatment plant (WwTP) or Industrial Emissions Licence (IEL) / Integrated Pollution Control (IPC) licenced sites in the study area. However, there are nine SWOs in the study area, five of which discharge to water bodies in the study area. The remainder go to Ringsend 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 the 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.

The surface water along the route of the Proposed Scheme currently drains to a combination of surface water sewer discharging to the Poddle_010 and combined sewer. For the most part, surface water drains to combined sewer from St Martin's Drive north to the Grand Canal, with the exception of catchments 6, 9 and 11 which drain to the Poddle_010 at the western section of Sundrive Road, Mount Argus Park and west of R137 Harold's Cross Road, up to Mount Jerome Cemetery, but not including R137 Harold's Cross Road or roads to the immediate west (see Table 13.9).

Table 13.9: Existing Drainage

Catchment	Existing Network Type	Proposed Scheme Section ID	Water Body
K_22	Surface water	Terenure Road West to Sundrive Road	Poddle_010
K_21	Surface water	Terenure Road West to Sundrive Road	Poddle_010
K_20	Surface water	Terenure Road West to Sundrive Road	Poddle_010
K_19	Surface water	Terenure Road West to Sundrive Road	Poddle_010
K_18	Surface water	Terenure Road West to Sundrive Road	Poddle_010
K_17	Surface water	Terenure Road West to Sundrive Road	Poddle_010
K_16	Combined / surface water	Terenure Road West to Sundrive Road	Combined Sewer / Ringsend WwTP, Surface water into the Poddle_010
K_15	Combined	Terenure Road West to Sundrive Road	Combined Sewer / Ringsend WwTP
K_14	Combined / surface water	Terenure Road West to Sundrive Road	Combined Sewer / Ringsend WwTP, (Surface water outfall not clear)
K_13	Combined	Terenure Road West to Sundrive Road	Combined Sewer / Ringsend WwTP
K_12	Combined	Sundrive Road to Harold's Cross Road	Combined Sewer / Ringsend WwTP
K_11	Surface water	Sundrive Road to Harold's Cross Road	Poddle_010
K_10	Combined / surface water	Sundrive Road to Harold's Cross Road	Combined Sewer / Ringsend WwTP, (Surface water outfall not clear)
K_9	Surface water	Sundrive Road to Harold's Cross Road	Poddle_010
K_8	Combined	Sundrive Road to Harold's Cross Road	Combined Sewer / Ringsend WwTP
K_7	Combined	Sundrive Road to Harold's Cross Road	Combined Sewer / Ringsend WwTP
K_6	Surface water	Sundrive Road to Harold's Cross Road	Poddle_010 (culverted)
K_5	Combined	Sundrive Road to Harold's Cross Road	Combined Sewer / Ringsend WwTP
K_4	Combined	Sundrive Road to Harold's Cross Road	Combined Sewer / Ringsend WwTP
K_3	Combined	Harold's Cross Road to Kevin Street Upper	Combined Sewer / Ringsend WwTP
K_2	Combined	Harold's Cross Road to Kevin Street Upper	Combined Sewer / Ringsend WwTP
K_1	Combined	Harold's Cross Road to Kevin Street Upper	Combined Sewer / Ringsend WwTP

13.3.9 Surface Water Features

The two main water bodies within the study area are discussed further in this Section. The Poddle_010 flows into the Liffey Valley Estuary Upper and subsequently Dublin Bay, while the Grand Canal flows into the Liffey Valley Estuary Lower and subsequently Dublin Bay (refer to Figure 13.1 in Volume 3 of this EIAR). None of these water bodies are contained within the RBMP 2018 - 2021 ‘Priority Areas for Action’ (DHPLG 2018).

In addition, the desk study assessment 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 heavily modified canalised banks and highly vegetated riparian zones. 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 detailed the distances and number of crossings of each of water body within the study area.

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

Water Body	Nearest Proposed Scheme Section	Approx. Distance from Proposed Scheme (m)	Number of Crossings
Poddle_010	Lower Kimmage Road from Kimmage Cross Roads to Junction with Harold's Cross Road	0	4
Grand Canal Main Line (Liffey and Dublin Bay)	Harold's Cross Road from Harold's Cross Park to the Grand Canal	0	1

13.3.9.1 Poddle_010

The Poddle_010 rises in Bancroft Park in Tallaght and flows towards Dublin City via Tymon Park and Mount Argus. It is constrained by significant culverting along its length or is within concrete channels. It is considered to probably be one of the best examples of an underground hidden river in Dublin (Sweeney 1991). Land use within the catchment is primarily urban / industrial. The Poddle_010 is approximately 10.13km, joining the Liffey Estuary Upper at Wellington Quay, upstream of Father Mathew Bridge.

The Proposed Scheme will directly cross the water body four times; these are existing road crossings of the Poddle_010. The Poddle_010 is culverted for approximately 3km from Mount Jerome up to its outfall to the Liffey Estuary Upper.,

According to EPA online mapping (EPA 2023) (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 at Wellington Quay in Dublin City Centre.

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 hydromorphological 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 has a Good WFD status and is a Nutrient Sensitive Area. Given its short, direct hydrological connection with a Nutrient Sensitive Area, it is assigned a High sensitivity.

13.3.9.2 Grand Canal Main Line (Liffey and Dublin Bay)

The Grand Canal is an AWB, primarily used for recreation, although originally designed for transportation purposes. Constructed in the 18th century, the Grand Canal traverses the country from Dublin to Shannon for approximately 131km. Waterways Ireland are responsible for the monitoring of this water body. The Grand Canal will be crossed by the Proposed Scheme at Robert Emmet Bridge.

As stated in the EPA Water Quality in Ireland 2016 - 2021 Report (EPA 2022c), assessments of the canal using macroinvertebrates indicates generally good biological conditions. Similarly, positive results were identified in terms of macrophyte assessment.

The Grand Canal has the WFD status of Good Ecological Potential. It is not At Risk of maintaining this status.

In terms of assigning sensitivity, the Good Ecological Potential status of the Grand Canal means that it would be of High sensitivity. its connection into the Liffey Estuary Upper and ultimate hydrological connection to Dublin Bay SAC is also considered. However, without a direct connection, sensitivity would remain as High.

13.3.10 Summary of Baseline Receptor Sensitivity

A summary of water body sensitivity is provided in Table 13.11.

Table 13.11: Baseline Receptor Sensitivity

Water Body Name	Attributes	Indicator / Feature	Sensitivity
Poddle_010	Partially culverted river	Direct hydrological connection with designated Nutrient Sensitive Area (Liffey Estuary)	High
Grand Canal Main Line (Liffey and Dublin Bay)	AWB	Good Ecological Potential pNHA Site	High

13.3.11 Flood Risk

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

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

The FRM Guidelines define three Flood Zones:

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

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

13.3.11.1 Coastal Flood Risk

The Catchment Flood Risk Assessment and Management Programme (CFRAM) and Irish Coastal Protection Strategy Study (ICPSS) maps do not indicate any risk of coastal flooding. The Proposed Scheme is too remote of any sources of coastal flooding. As a result, further assessment is not required with regard to coastal flood risk. Therefore, the risk of coastal flooding is considered low, and no further assessment is required.

13.3.11.2 Fluvial Flood Risk

CFRAM maps indicate that the route of the Proposed Scheme is at risk of fluvial flooding in the 1% AEP event or less. Sections of the route have been identified to be within Flood Zone A as per the FRM Guidelines (DEHLG and OPW 2009).

13.3.11.3 Surface Water Flood Risk

Surface water flooding occurs when the local drainage system cannot convey stormwater flows from extreme rainfall events. The rainwater does not drain away through the normal drainage pathways or infiltrate into the ground but instead ponds on or flows over the ground instead. Surface water flooding is unpredictable as it depends on a number of factors including ground levels, rainfall and the local drainage network. The drainage network for any development on the Proposed Scheme route will incorporate SuDS for the purpose for managing surface water in terms of both flow and quality. Therefore, the risk of surface water flooding is considered low, and no further assessment is required.

13.3.11.4 Pluvial Flood Risk

Pluvial flooding results from heavy rainfall that exceeds ground infiltration capacity, or more commonly in Ireland, where the ground is already saturated from previous rainfall events. This causes ponding and flooding at localised depressions. Pluvial flooding is commonly a result of changes to the natural flow regime such as the implementation of hard surfacing. CFRAM maps indicate that the site is at risk of pluvial flooding. The implementation of SuDS (including infiltration trenches, oversized pipes, permeable paving and tree pits) will mitigate against potential pluvial flooding. Therefore, the risk of pluvial flooding is considered low, and no further assessment is required.

13.3.11.5 Groundwater Flood Risk

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

13.4 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 is based on a number of general principles, which are set out in the document BusConnects Core Bus Corridor Drainage Design Basis (National Transport Authority 2020). This includes principles relating to SuDS. A SuDS drainage design has been developed as a first preference and in accordance with the SuDS hierarchy, as described in the SUDS Manual C753 (hereafter referred to as the SuDS Manual) (CIRIA 2015). The 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. oversized pipes) 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.

There is an existing drainage system along the Proposed Scheme which will remain unchanged and will continue to discharge through existing surface water outfalls to the Poddle_010 water body in the southern part of the Proposed Scheme, and for the northern part through the existing combined sewer system to Ringsend WwTP (which ultimately discharges to Liffey Estuary Lower, Dublin Bay). The proposed drainage design will include for the relocation of and addition of drainage gullies as necessary for changes in the positions of kerbs, as well as the installation of a new 400m length of surface water sewer on R137 Harold's Cross Road, which will outfall to the combined sewer system as there is no alternative suitable outfall available. Attenuation will be in the form of oversized pipe, tree pits, permeable paving in a new car park and infiltration trenches in new soft landscaped areas. These SuDS measures will allow a level of treatment and / or attenuation to be provided before discharging to the network, slightly reducing the impact on water quality as well as preventing an increase in runoff rates.

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

Table 13.12: Proposed SuDs or Attenuation and Impermeable Areas

Catchment Ref	Chainage	Water Body	Impermeable Surface Area			SUDs Proposed	Catchment Outfall
			Existing	Additional	% change		
K_01	A3100 - A3700	Ringsend WwTP	7,603	0	0	None	Existing combined sewer (DCC)
K_02	A2680 - A3710	Ringsend WwTP	13,982	77	0.55	Permeable paving on bridge	No outfall
K_03	A2680 - A3100	Ringsend WwTP	7,192	34	0.47	Permeable paving on bridge	No outfall
K_04	A2470 - A2680	Ringsend WwTP	5,094	-86	-1.69	None	Existing combined sewer (DCC)
K_05	A2010 - A2650	Ringsend WwTP	1,960	485	24.7	Attenuation / oversized pipe, ca. 29m^3	Existing combined sewer (DCC)
K_07	B10050&A1950-A2480	Ringsend WwTP	14,975	731	4.88	Attenuation / oversized pipe linked to K_05	Existing combined sewer (DCC)
K_08	A1740 - A2000	Ringsend WwTP	1,855	0	0	None	Existing combined sewer (DCC)
K_09	H70090 - A1740	Poddle_010	5,074	285	5.62	Permeable paving on boardwalk	No outfall
K_10	A1250 - A 1420	Ringsend WwTP	2,342	0	0	None	Existing combined sewer (DCC)
K_11	G60600-H70030	Poddle_010	7,765	-86	-1.1	None	Existing combined sewer (DCC)
K_12	A900 - A1160	Ringsend WwTP	6,727	-132	-1.96	None	Existing combined sewer (DCC)
K_13	Derravaragh Road	Ringsend WwTP	646	-75	-11.6	None	Existing combined sewer (DCC)
K_14	J90000 - J90130 & A1420 - A 1940	Ringsend WwTP	10,748	0	0	None	Existing combined sewer (DCC)
K_15	G60140 - G60250	Ringsend WwTP	1,391	0	0	None	Existing combined sewer (DCC)
K_16	A60 - A900	Ringsend WwTP	15,967	-320	-2	None	Existing combined sewer (DCC)

Catchment Ref	Chainage	Water Body	Impermeable Surface Area			SUDs Proposed	Catchment Outfall
			Existing	Additional	% change		
K_17	A10 - A210	Poddle_010	392	0	0	None	Into Poddle River
K_18	G60000 - G60140	Poddle_010	2,564	0	0	None	Into Poddle River
K_19	A0 - A60	Poddle_010	1,098	0	0	None	Into Poddle River
K_20	A0 - A60	Poddle_010	903	0	0	None	Into Poddle River
K_21	G60140 - G60450	Poddle_010	213	0	0	None	Into Poddle River
K_22	G60230 - G60590	Poddle_010	4,365	0	0	None	Into Poddle River

Table 13.13: Changes in Impermeable Areas by Water Body

Water Body	Approx. Impermeable Surface Area			SuDS Proposed
	Existing Impermeable Area	Additional Impermeable Area	Percentage Change	
Poddle_010	22,374	199	0.89	Permeable paving on boardwalk
Ringsend WwTP	90,482	714	0.8	Permeable paving in car park and bridge, attenuation / oversized pipe - note a very small catchment area at the Hospice car park amplifies the % changes when the car park is added

13.4.1.2 Key Infrastructure Proposed

Key Infrastructure elements for the Proposed Scheme are described in detail within Chapter 4 (Proposed Scheme Description). 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 highway infrastructure, so infrastructure provision for buses, pedestrians and cyclists would remain the same.

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

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

The Poddle_010 is the only water body 'At Risk' of achieving Good Status in the study area. The most significant pressures to the Poddle_010 are urban runoff and hydromorphology.

Urban runoff including misconnections and wash off from car washes have been identified as significant causes. 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 (DHLGH 2021) 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. Tymon Park upstream has 'ponds' which attract contaminants which may cause issues for the downstream elements of the water body. A gulley maintenance project has been underway since 2002 to resolve some of the issues with urban runoff.

Hydromorphology has also been identified as a significant pressure as the Poddle_010 is heavily culverted downstream towards the City Centre. Hydromorphology is the second most common pressure on water bodies in Ireland identified in the draft RMBP. The draft RBMP details that '*it anticipated that as our knowledge and understanding of hydro-morphological pressures improves, so too will the extent of the impacts identified across the country*'. Therefore, improving knowledge and understanding of hydromorphological pressures has been identified as a priority.

The Urban Wastewater Treatment in 2021 report (published in 2022) (EPA 2022d) recommends two actions for Irish Water:

- Upgrade deficient wastewater treatment systems in as timely a manner as possible. This requires increased investment and efficient delivery of infrastructure improvements; and
- Get the best performance from the existing treatment systems by continuing to improve how they are operated, managed and maintained.

This report also underlines the fact that the reliable information through monitoring is essential to identify environmental risks and to plan and complete improvements to mitigate those risks. A number of actions are on Irish Water to complete assessments of their assets to target where future works are required.

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

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

13.4.3 Do Minimum

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

The 'Do Minimum' scenario (Opening Year (2028) and 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 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 RMBP 2018 – 2021 (DHPLG 2018) and the draft RBMP (DHLGH 2021) (once agreed) will be

implemented and improvements to water bodies in terms of their biological, water quality and hydromorphology will continue to enable as many water bodies as possible to achieve 'Good' status by 2027.

13.4.4 Construction Phase

13.4.4.1 Introduction

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

In addition to a detailed description of the works involved, Chapter 5 (Construction) also details the location of the three 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 approximately 18 months. Construction Compound K1 at Sundrive Road is likely to be in operation for 12 months, Construction Compound K3 at R137 Clanbrassil Street Lower also for 12 months, and Construction Compound K2 at Our Lady's Hospice will be in place for the full 18 months' duration and will be removed following the completion of the works they support.

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

13.4.4.2 Potential Construction Phase Impacts

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

13.4.4.2.1 Hydrology

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

13.4.4.2.2 Water Quality

- Silty water runoff containing high loads of suspended solids from construction activities. This includes the stripping of topsoil / road surface during site preparation, the construction of widened roads, the dewatering of excavations and the storage of excavated material;
- Contamination of 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 directly 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 in or near to water bodies, as a result of working within or near to the water body.

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;
- In-stream working which can lead to localised changes in the flow and sediment processes within the channel; and
- Modifications to the morphological characteristics of the water body such as alterations to banks for construction of over bridges or other works.

13.4.4.3 Assessment of Potential Impacts on Receptors

A detailed assessment of the potential impacts on receptors is provided in this Section and a summary table for receptors is provided in Table 13.14.

13.4.4.3.1 Poddle_010

The majority of the proposed works from Kimmage Cross Roads to Ravensdale Park will not be intrusive and will comprise junction improvements, the installation of cycle tracks, traffic signals and changes to lanes, all within the existing road. The proposed works will not be intrusive enough to result in significant hydrological, water quality or hydromorphological impacts. Potential impacts will be Adverse and Short-Term, and of negligible magnitude. Therefore, impacts will be of Imperceptible significance.

Construction Compound K1, which will be small, will be located in the public car park off the northern side of Sundrive Road. The Poddle_010 is culverted under this car park and emerges immediately into Mount Argus View north-east of the car park. Surface water drains in this area drain to the Poddle_010 and so there is the potential for impacts on water quality as a result of spillages of fuel or chemicals at Construction Compound K1. It is likely that surface water drains in the car park drain directly to the water body. No materials or aggregate crushing will occur at Construction Compound K1, but it will house a small set of welfare facilities which will be contained within a mobile trailer or similar. No discharges to any drains will occur here. As a result, no impacts are likely to occur.

Construction of the new 45m long Stone Boat Boardwalk over the bank of the Poddle_010 at Mount Argus View will be supported on bored piles inserted in the riverbanks. No piling will occur within the water body itself. However, intrusive works in soft banks alongside the Poddle_010 at this location have the potential for Adverse and Short-Term impacts on water quality, with a moderate magnitude, as a result of silty water runoff, resulting in Significant impacts.

The construction sequence on R137 Harold's Cross Road will include road widening of 2m, through the encroachment into 18 private gardens and the grounds of one office building. Whilst these works are potentially quite intrusive and could give rise to silty water runoff or spillage of noxious substances into the surface water system, all surface water here drains to the combined sewer, and so, no impacts are likely.

Construction Compound K2 is proposed in this area. The Construction Compound will be on a greenfield site at the entrance at Our Lady's Hospice and Care Service off R137 Harold's Cross Road, which will eventually become a car park. It is likely that topsoil will be stripped, and gravel laid to facilitate welfare facilities, storage of materials, and some crushing and reuse of materials. There are potential pollution impacts associated with establishment and use of Construction Compounds. This includes silty water runoff and spillage of noxious materials. The local surface water system is the combined sewer, and the permeable surface of the site reduces the likelihood of any spillages reaching local drains. There will be no impacts on surface water as a result of the Proposed Scheme in this section. Potential impacts to ground and groundwater may occur, and these are assessed in Chapter 14 (Land, Soils, Geology & Hydrogeology).

The Proposed Scheme at Robert Emmet Bridge and R137 Clanbrassil Street Upper will include major works of the proposed new cycle / pedestrian bridges on either side of the existing Robert Emmet Bridge across the Grand Canal. No works in this location will impact the Poddle_010.

From the R137 on Clanbrassil Street Upper to Clanbrassil Street Lower, there will be minor works involving pavement repairs and new road markings. Construction Compound K3 will be located on the western side of

R137 Clanbrassil Street Lower in an area which drains to the combined sewer, and so, there will be no impacts on the water body from this source.

The proposed works on R137 New Street South will include moderate works including pavement repairs, revised road markings and new cycle tracks. This area drains to the combined sewer, and so, no impacts are likely to occur.

13.4.4.3.2 Grand Canal (Liffey and Dublin Bay)

New cycle / pedestrian bridges will be installed on each side of the existing Robert Emmet Bridge at the Grand Canal and will be supported by piled foundations. An alternative access route will be provided at Gordon's Fuel, and the existing retaining wall adjusted. At this location, the road will be widened by 2m, and a replacement retaining wall up to 4.5m high will be constructed on piled foundations. Structural fill will be required to allow for road widening. Full pavement reconstruction is expected over the full road width.

These works have the potential to have a number of impacts on the Grand Canal. The banks of the Grand Canal are partially comprised of pavement and partially soft banks. Construction will require works in an existing fuel storage yard. There is a high voltage (220kV (kilovolt)) oil-filled underground cable in this location and this is installed on the north bank of the Grand Canal, close to the canal's edge (which is soft in this location). It then crosses the Grand Canal on Robert Emmet Bridge before turning to the west along the south bank of the Grand Canal. The cable is known to have leaked a number of times in recent years and is highlighted in the EPA report Environmental Protection Agency Investigation into Electricity Supply Board (ESB) Networks Fluid Filled Underground Electricity Cable Leaks (EPA 2020), possibly into the Grand Canal. There is a high risk that oil would reach the Grand Canal, should the cable be damaged during the construction works. In such a case, the impacts would be Adverse, of large magnitude and the duration would be Short to Medium-Term. The Grand Canal is a high sensitivity receptor, and so, significance of impact would be Profound.

The installation of the new cycle / pedestrian bridges could also result in increased sediment loads to the Grand Canal as a result of intrusive works on the banks and the potential provision of a hydrological pathway for ground contaminants to reach the Grand Canal. The piling at this location is proposed to be within existing hardstanding associated with the existing bridge structure and so the disturbance to the soft canal bank on the northern side will be minimal. Any dewatering to facilitate the piling would only impact the Grand Canal if directly discharged to it, which will not be the case. Works on Robert Emmet Bridge and to the roads north and south of the bridge have the potential to cause silty water runoff. However, all surface water in this location drains to the combined sewer, and so, no impacts are likely to occur.

13.4.4.4 Summary of Potential Construction Phase Impacts

Table 13.14 presents a summary of the potential impacts on the water bodies as a result of the Construction Phase of the Proposed Scheme.

Table 13.14: Summary of Potential Construction Phase Impacts on Waterbodies Within the Study Area

Water Body Name	Proposed Scheme Activity	Potential Impacts			
		Description of Potential Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts
Poddle_010	New Stone Boat Boardwalk over Poddle_010 at Mount Argus View	• Increased sediment in runoff; and • Anthrophonic sources (fuel etc.).	High	Moderate	Adverse, Significant and Short-Term
Poddle_010	Construction Compound K1 at Sundrive Road	• Anthrophonic sources (fuel etc.).	High	No impact	No impact
Poddle_010	Junction improvements, installation of cycle tracks, traffic signals and changes to lanes within the existing roads from Kimmage Cross Roads to Ravensdale Park	• Minimal surface water runoff; • Minimal sediment in runoff; • Minimal anthropogenic sources (fuel etc.); and • Culverted water body therefore little potential for impacts.	High	Negligible	Adverse, Imperceptible and Short-Term
Poddle_010	Road widening at Harold's Cross Road	• Increased silty water runoff	High	No impact (combined sewer)	No impact
Poddle_010	Construction Compound K2	• Increased silty water runoff • Spillage of noxious materials	High	No impact (combined sewer)	No impact
Poddle_010	New pedestrian bridge at Robert Emmet Bridge	• Minimal surface water runoff	High	No impact	No impact
Poddle_010	Construction Compound K3	• Minimal surface water runoff; • Minimal sediment in runoff; • Minimal anthropogenic sources	High	No impact (combined sewer)	No impact
Poddle_010	Pavement repairs, revised road markings and new cycle tracks at R137 New Street South	• Minimal surface water runoff; • Minimal sediment in runoff; • Minimal anthropogenic sources	High	No impact (combined sewer)	No impact
Grand Canal (Liffey and Dublin Bay)	New cycle / pedestrian bridges, widening and retaining wall at Robert Emmet Bridge / R137 Clanbrassil Street Upper	• Hydrocarbon release through damage to high voltage Oil Filled Cable.	High	Large	Adverse, Profound and Short to Medium Term -Term
Grand Canal (Liffey and Dublin Bay)	New cycle / pedestrian bridges, widening and retaining wall at Robert Emmet Bridge / R137 Clanbrassil Street Upper	• Increased sediment in runoff and in the Grand Canal .	High	No impact	No impact

13.4.5 Operational Phase

13.4.5.1 Potential Operational Phase 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 will ensure that there will be 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 increases in pollution and sediment loads 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.
- There is the potential for 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

Detailed assessments of the potential impacts on each receptor during the Operational Phase are provided below, with a summary of impacts in Table 13.15.

13.4.5.2.1 Poddle_010

The Poddle_010 receives surface water from a number of surface water discharge points along its course with the southern section of the Proposed Scheme mainly draining to the Poddle_010. There would be an increase of approximately 199m^2 in the impermeable area of the Poddle_010 catchment as a result of the proposed pedestrian and cycleway over the Stone Boat in Mount Argus Park. This is proposed to be constructed of a mesh material to allow views of the Stone Boat and reduce the run off rate There will, therefore, be no impact on the Poddle_010 from this footpath. The remaining impermeable area will be managed using infiltration trenches. The potential impact on the Poddle_010 will be of negligible magnitude with this high sensitivity receptor and the resultant significance of impact will be Adverse, Imperceptible and Short Term

13.4.5.2.2 Grand Canal Main Line (Liffey and Dublin Bay)

There will be no hydrological connection from the Proposed Scheme to the Grand Canal during operation. Therefore, there will be no impacts.

13.4.5.3 Summary of Potential Operational Phase Impacts

Table 13.15: Summary of Potential Operational Phase Impacts on Water Bodies within the Study Area

Water Body Name	Proposed Scheme Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts
Poddle_010	Increase in impermeable area draining to the water body	• Increased surface water runoff; • Increased sediment in runoff; • Anthropogenic sources (fuel etc.); and • Increased scouring of watercourse.	High	Negligible	Adverse, Imperceptible and Short-Term.
Grand Canal	No hydrological connection	• N/A	High	No impact	No impact

13.4.5.4 Assessment of Potential Impacts – Traffic Redistribution

Traffic modelling (see Chapter 6 (Traffic & Transport)) was carried out for two scenarios, the Do Minimum and Do Something scenarios for 2028 and 2043. The review of changes in AADT provides a mechanism to understand if the Proposed Scheme could result in traffic redistribution onto the surrounding local road network. A review of the data identified that, for most cases, any increases in traffic on side roads would not lead to AADTs being above 10,000. However, two sections of road were identified as having increased traffic of >10,000 under the 2028 and / or 2043 Do Something scenarios (see Table 13.16). However, these roads drain to existing catchments, and so, there is no potential significant impact.

In addition, as a reduction in traffic numbers is anticipated along this route, it would lead to a reduction in the routine contaminants discharging to the Poddle_010, where all surface water drains to existing catchments. Such impacts are considered to be of negligible magnitude, and therefore, the significance of impact is considered to be Positive, Imperceptible and Permanent.

Table 13.16: Section of Road with Increased AADT to > 10,000 under the Do Something Scenario

Road Name	A_B (GIS)	Length of Section (km)	2028 DM*	2028 DS**	%	2043 DM*	2043 DS**	%	Closest Existing Drainage Route	Likely Change in Drainage Catchment?	Significant Impact?
Pembroke Street Lower	6279_6443	0.09	9874	10078	2	9720	9928	2	Combined Sewer	No	No
Winetavern Street	6200_6289	0.11	7633	11810	55	7648	11267	47	Combined Sewer	No	No

13.4.6 Summary of Flood Risk Assessment

Summary text from the FRA (Appendix A13.2 Site Specific Flood Risk Assessment in Volume 4 of the EIAR) is provided in this Section.

The primary source of flood risk identified for the Proposed Scheme corridor is from fluvial flooding from the adjacent River Poddle. Sections of the Proposed Scheme have been identified to be within Flood Zone A. The Proposed Scheme is categorised as local transport infrastructure according to the FRM Guidelines (DEHLG and OPW 2009). The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of particular developments that, are being considered in areas of moderate or high flood risk (i.e. Zone A and B). The assessment undertaken as part of the FRA indicates that the Proposed Scheme will have a negligible impact on flooding and the surface water drainage network within the catchment. SuDS will be provided, where applicable, to manage runoff quantity and quality.

The Proposed Scheme will not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities and will be flood resilient in design. As per Circular PL 2/2014 Flooding Guidelines (hereafter referred to as Circular PL 2/2014) (Department of Environment, Community and Local Government 2014) it does not require a Justification Test. Thus, the Proposed Scheme will be suitable for the associated flood risk, as per the FRM Guidelines.

13.4.6.1 Fluvial and Coastal Flood Risk

CFRAM maps indicates that the Proposed Scheme is at risk of fluvial flooding in the 1% AEP event or less. Sections of the Proposed Scheme route have been identified to be within Flood Zone A as per the FRM Guidelines (DEHLG and OPW 2009). Nonetheless, the Proposed Scheme will require minimal changes to land cover and will likely have a negligible impact on the existing fluvial flood regime. The Proposed Scheme will run within an existing dense urban area. There are no proposed changes to the contributing catchment areas and all discharge will be attenuated to existing runoff rates.

Although the Proposed Scheme has been identified as liable to flooding from fluvial sources, the nature of the Proposed Scheme means the impact will likely be negligible. As per Circular PL 2/2014 (Department of Environment, Community and Local Government 2014), minor proposals in areas of flood risk (such as the

Proposed Scheme) are unlikely to raise significant flooding issues as long as they do not increase flood risk. The Proposed Scheme will not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities and will be flood resilient in design. As per Circular PL 2/2014, the Proposed Scheme does not require a Justification Test and is suitable for the associated flood risk. Therefore, no further assessment is required with regard to fluvial flood risk.

13.4.6.2 Surface Water Flooding

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

13.4.6.3 Pluvial Flooding

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

13.4.6.4 Groundwater Flooding

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

13.4.6.5 Conclusion

The assessment undertaken as part of the FRA indicates that it will have negligible impact on flooding and the surface water drainage network within the catchment. SuDS will be provided, where required and appropriate, to manage runoff quantity and quality.

As per Circular PL 2/2014 (Department of Environment, Community and Local Government 2014), minor proposals in areas of flood risk (such as the proposed scheme) are unlikely to raise significant flooding issues as long as they do not increase flood risk. It will not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities and will be flood resilient in design. As per Circular PL 2/2014, the Proposed Scheme does not require a Justification Test. Thus, it is suitable for the associated flood risk as per the FRM Guidelines.

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 impacts 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 works will take place in accordance with Appendix A5.1 Construction Environmental Management Plan (CEMP) 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 Appendix A5.1 CEMP 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, 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 Compound management including the storage of fuels and materials;
- Control of sediment;
- Use of concrete;
- Management of vehicles and plant including refuelling and wheel wash facilities; and
- Monitoring.

13.5.2.2 Site-Specific Mitigation Measures

Following implementation of the mitigation measures in the SWMP within Appendix A5.1 CEMP in Volume 4 of this EIAR, the majority of impacts will be Not Significant. However, two construction activities with the potential for impacts have been highlighted for further mitigation. They are:

- Construction of the new Stone Boat Boardwalk over the Poddle_010 at Mount Argus View; and
- Construction of new cycle / pedestrian bridges across the Grand Canal to either side of the existing Robert Emmet Bridge.

Considering the works to the lands directly adjacent to the banks of the Poddle_010 and the Grand Canal, the following mitigation measures, which are in line with Inland Fisheries Ireland (IFI) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016), will be implemented by the appointed contractor to minimise and avoid impacts

- All necessary consents will be obtained from the relevant regulator (such as IFI, OPW or the local authority), as appropriate;
- Bank stabilisation and erosion protection, if required, will be designed in consultation with the IFI and NPWS;
- The area of disturbance of the bank will be the absolute minimum required;
- Works within and adjacent to watercourses will be conducted during forecast low flow periods (for Poddle_010), where possible;
- Operation of machinery in-stream will not be permitted. All construction machinery operating near to the water body will be mechanically sound to avoid leaks of oils, hydraulic fluid, etc.;
- A suitable bund will be installed by the appointed contractor along the bank downhill of any piling in the banks (Poddle_010 and Grand Canal), for example, silt fence, sandbags or straw bales to direct silty water runoff away from the water body. Any silty water will be collected and treated through the use of a silt-buster tank or similar, to be decided upon by the appointed contractor;
- Any dewatering flows will be directed to the construction drainage system and to the settlement pond (or other) treatment system;
- Reinstatement of any banks affected during construction works near a watercourse will be reinstated back to pre-development conditions; and
- Any bank-side clearance in the immediate area of a crossing / works will be kept to a minimum and adequate measures will be put in place to control or minimise the risk of siltation. This may include such measures as:
    - Bunding and diversion of site runoff to settlement ponds / tanks;
    - Stripping of topsoil will be in accordance with the soils requirements outlined in A Guide to Landscape Treatments for National Road Schemes in Ireland (NRA 2005b), and where necessary, the site will be surfaced with granular material; and
    - Covering of temporary stockpiles.

In addition to this, specific measures will need to be put in place to prevent the mobilisation of pollutants in potentially contaminated ground from reaching the Grand Canal. The appointed contractor in consultation with the National Transport Authority will engage with ESB Networks to locate their oil-filled cable in the context of the Proposed Scheme. A ground investigation, where construction works are to take place near to the ESB oil-filled cable, will be carried out prior to construction commencing, and following this, an appropriate suite of mitigation

measures will be confirmed and deployed, which could for example result in the removal of all contaminated material from site as outlined in Chapter 14 (Land, Soils, Geology & Hydrogeology). Any hazardous material to be removed from site will be removed in accordance with measures outlined in Chapter 18 (Waste & Resources).

Following implementation of the mitigation measures outlined in Section 13.5, no significant residual impacts are anticipated on any of the receptors in this study area (see Table 13.17).

Table 13.17: Summary of Predicted Construction Phase Impacts, Following the Implementation of Mitigation Measures

Water Body Name	Proposed Scheme Activity	Predicted Impacts		
		Description of Predicted Impacts	Potential Impact (Pre-Mitigation and Monitoring)	Predicted Impact (Post-Mitigation and Monitoring)
Poddle_010	New Stoneboat Boardwalk over Poddle_010 at Mount Argus View	• Increased surface water runoff; • Increased sediment in runoff; and • Anthropogenic sources (fuel etc.).	Adverse, Significant and Short-Term	Imperceptible
Poddle_010	Junction improvements, installation of cycle tracks, traffic signals and changes to lanes within the existing roads from Kimmage Cross Roads to Ravensdale Park	• Minimal surface water runoff; • Minimal sediment in runoff; • Minimal anthropogenic sources (fuel etc.); and • Culverted water body therefore little potential for impacts.	Adverse, Imperceptible and Short-Term	Imperceptible
Grand Canal (Liffey and Dublin Bay)	New cycle / pedestrian bridges, widening and retaining wall at Robert Emmet Bridge / R137 Clanbrassil Street Upper	• Hydrocarbon release through damage to high voltage Oil Filled Cable	Adverse, Profound and Short-Term	Imperceptible

13.5.3 Operational Phase

Mitigation for the Operational Phase has been built into the design of the Proposed Scheme and is set out in Section 13.4.1. As a result, 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.

Table 13.18: Summary of Predicted Operational Phase Impacts, Following the Implementation of Mitigation Measures

Water Body Name	Proposed Scheme Activity	Predicted Impacts		
		Description of Impacts	Potential Impact (Pre-Mitigation and Monitoring)	Predicted Impact (Post-Mitigation and Monitoring)
Poddle_010	Increase in impermeable area draining to the water body	• Increased surface water runoff; • Increased sediment in runoff; • Anthropogenic sources (fuel etc.); and • Increased scouring of watercourse.	Adverse, Imperceptible and Short-Term.	Imperceptible

13.6 Residual Impacts

13.6.1 Construction Phase

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

13.6.2 Operational Phase

Mitigation for the Operational Phase has been built into the design of the Proposed Scheme . As a result, no significant residual impacts are anticipated for any water body in the study area. Therefore, impacts remain as identified in Section 13.4.5.

13.6.3 Summary of WFD Assessment

The full WFD assessment can be found in Appendix A13.1 (WFD Assessment) in Volume 4 of the EIAR. A summary is provided in this Section for ease of reference.

13.6.3.1 Overview

Taking into consideration the anticipated impacts of the Proposed Scheme on the biological, physico-chemical and hydromorphological quality elements, following the implementation of design and mitigation measures, it is concluded that it will not compromise progress towards achieving Good Ecological Status (GES) or cause a deterioration of the overall Good Ecological Potential (GEP) (in the case of an AWB) of any of the water bodies that are in scope (refer to Table 13.19).

Table 13.19: 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 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 of the WFD.

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*'.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (hereafter referred to as the Habitats Directive) 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 Habitats Directive at a favourable conservation status, introducing robust protection for those habitats and species of European Importance. No impact is anticipated as there are no designated areas within 2km of the Proposed Scheme. There are European designated sites in the wider vicinity of the Proposed Scheme which have been assessed and are presented in the Appropriate Assessment Screening Report and Natura Impact Statement (NIS) submitted with this application.

Council Directive of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (hereafter referred to as the Nitrates Directive) aims to protect water quality by preventing nitrates from agricultural sources polluting ground and surface waters and by promoting the use of good farming practices. The Proposed Scheme will not influence or moderate agricultural land use or land management.

The revised Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC (hereafter referred to as the rBWD) was adopted in 2006, updating the microbiological and physico-chemical standards set by the original Council Directive 76/160/EEC of 8 December 1975 concerning the quality of bathing water (hereafter referred to as the original BWD) 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 original 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 that are less than 2km from the Proposed Scheme. It is therefore compliant with the rBWD.

13.6.3.2 Conclusion

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

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

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

Council Directive of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources

Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC

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

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

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