



Chapter 13
Water

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13. Water

13.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the impact of the Bray 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, hydromorphology and water quality. Hydrogeology is dealt with specifically in Chapter 14 (Land, Soils, Geology & Hydrogeology).

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

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

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

An assessment of the Proposed Scheme's compliance with the requirements of 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)) is provided in Appendix A13.1 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 and a summary of the conclusions of the WFD assessment is provided in Section 13.6.3.

Flooding has been assessed within a Scheme Specific Flood Risk Assessment (FRA) report in Appendix A13.2 in Volume 4 of this EIAR. The results of this assessment have been summarised in Section 13.3.10 and Section 13.4.5.5 of this Chapter.

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

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

13.2 Methodology

13.2.1 Study Area

The baseline study area for this assessment is 500m (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 water bodies that are susceptible to significant impacts. Therefore, any identified surface water bodies within that area have been considered as receptors including those classified under the WFD, including riverine, transitional water bodies, lake (water) bodies and coastal water bodies, and also non-WFD classified water bodies. Artificial drainage features such as existing Sustainable Drainage Systems (SuDS) have not been considered as receptors within the baseline assessment.

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 (river, lakes, groundwater, transitional, coastal) to attain 'Good Water Status' (qualitative and quantitative) by 2027.

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

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

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

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

In the absence of WFD assessment guidance specific to Ireland, the assessment has been carried out using the 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 Planning Inspectorate (PINS) Advice 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 (RBMP) provide the mechanism for ensuring an integrated approach to the protection, improvement and sustainable management of the water environment, and are published every six years.

The second cycle 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%), hydromorphology (24%), urban wastewater (20%), forestry (16%), domestic wastewater (11%), urban runoff (9%), peat (8%), extractive industry (7%) and mines and quarries (6%).

In September 2021, the Minister for Housing, Local Government and Heritage, published the draft River Basin Management Plan for Ireland 2022 – 2027 (hereafter referred to as the draft RBMP) for public consultation (Department of Housing, Local Government and Heritage (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; for other water bodies the changes are more mixed; some reductions, some improvements. The draft RBMP cites a 4.4% net decline in the status of water bodies, and notes that this is mostly driven by a decline in the status of river water bodies.

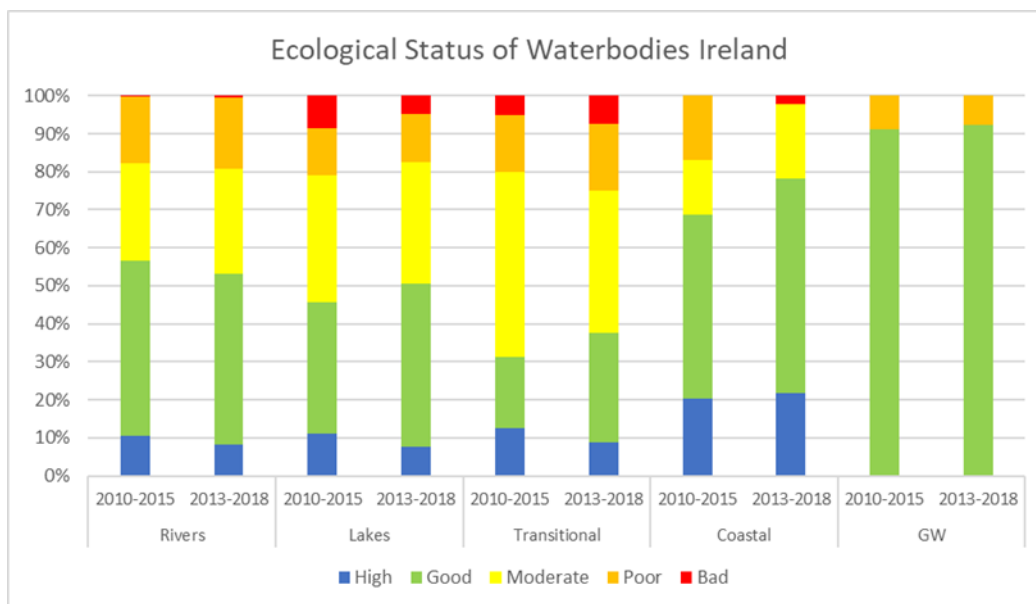


Image 13.1: Ecological Status of Water Bodies in Ireland

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

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

13.2.2.3 Guidelines

The 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	<ul style="list-style-type: none"> Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022); and Environmental Impact Assessment of Projects. Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission (EC) 2017).
Water	<ul style="list-style-type: none"> 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)*; NRA Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2009a)*; 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 Railway 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	<ul style="list-style-type: none"> Ordnance Survey of Ireland (OSI) - current and historic mapping; and Aerial photographs (i.e. Google Maps).
Surface Water Quality and Hydromorphology	<ul style="list-style-type: none"> WFD Ireland Database; EPA - water quality monitoring database and reports. EPA Water Environment Maps; EPA Environmental Data Maps; National Parks and Wildlife Service (NPWS) - designated sites (NPWS 2020); and Inland Fisheries Ireland (IFI) - fishery resources.
Hydrology	<ul style="list-style-type: none"> Catchment Summaries; RBMP 2018-2021; EPA - flow and water level measurements.
Water / Flood Risk	<ul style="list-style-type: none"> OPW National Flood Information Portal (OPW 2020).

13.2.3.2 Field Surveys

Field walkover assessments were carried out in March 2020 and August 2022. In March 2020, watercourse crossings deemed potentially high risk within the study area were visited to inform the determination of baseline conditions in order to identify the likely impacts of the Proposed Scheme. In August 2022, return visits were carried out at three locations where the potential for impacts has been identified, to further inform the assessment.

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 2009a), specifically Section 5.6. The assessment also took account of the guidance set out in the Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2022). In addition, the relevant provisions of the EU's Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (EC 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 A13.2 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 interest are considered and assessed in Chapter 10 (Population) and Chapter 19 (Material Assets).

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

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

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

13.2.4.2 Sensitivity of Receptors

The sensitivity of surface water attributes to changes as a result of the Proposed Scheme is 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 2009a) adapted to Include WFD Guidance (Environmental Agency 2016))

Sensitivity	Criteria	Typical Example
Extremely High	Receptor (or receptor attribute) has a very high quality or value on an international scale	<ul style="list-style-type: none"> Any WFD water body which is protected by EU legislation e.g. a Designated European Sites (Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)) 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> A WFD water body with High or Good Status; A Moderate WFD Status (2016 - 2021) 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 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	<ul style="list-style-type: none"> WFD water body with Moderate WFD Status (2016 - 2021); 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	<ul style="list-style-type: none"> Water body with Bad to Poor WFD Status (2016 - 2021); and A WFD water body with >5km (or no) hydrological connection to European Sites or national designated sites. <p>Or</p> <ul style="list-style-type: none"> A non-WFD water feature with minimal hydrological importance to sensitive or protected ecosystems; and/or economic and social uses; A highly modified watercourse that has been changed by channel modification, culverting or other anthropogenic pressures. The watercourse exhibits no morphological diversity and has a uniform channel, showing no evidence of active fluvial processes and not likely to be affected by modification. Highly likely to be affected by anthropogenic factors. Heavily engineered or artificially modified and could dry up during summer months; and Many existing pressures which are adversely affecting biodiversity.

13.2.4.3 Magnitude of Impact

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

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

- Nature of the impacts;
- Intensity and complexity of the impacts;

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

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

Nature of Impact	Description	Scale and Nature of Impacts
Large Adverse	Results in loss of attribute and/or quality and integrity of the attribute	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.
Small Adverse	Results in some measurable change in attributes, quality or vulnerability	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.
Small Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring	<ul style="list-style-type: none"> • Has some potential to results in minor improvement WFD quality element(s).
Medium Beneficial	Results in moderate improvement of attribute quality	<ul style="list-style-type: none"> • Contribution to improvement in water body WFD classification.
Large Beneficial	Results in major improvement of attribute quality	<ul style="list-style-type: none"> • Improvement in water body WFD classification.

13.2.4.4 Significance of Impacts

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

Table 13.5: Categories of Environmental Impacts (EPA 2022)

Importance of Attribute	Magnitude of Impact			
	Negligible	Small	Medium	Large
Extremely High	Imperceptible	Significant	Very Significant to Profound	Profound
Very High	Imperceptible	Significant / Moderate	Very Significant	Very Significant to Profound
High	Imperceptible	Moderate / Slight	Significant / Moderate	Profound / 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-DNG-03065) guidance document (TII 2015) was consulted. It states that roads carrying less than 10,000 Annual Average Daily Traffic (AADT) are lightly trafficked and therefore pollutants occur in lower concentrations. As such, no significant impacts on receptors are considered likely. This figure, therefore, 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 Image 13.2) for the assessment of impacts from displaced traffic.

In order to determine which water body the drainage from side roads carrying displaced traffic would discharge to, the Proposed Scheme Catchment Plans were consulted (see Proposed Surface Water Drainage Works (BCIDB-JAC-DNG_RD-0013_XX_00-DR-CD-9001) in Volume 3 of this EIAR).

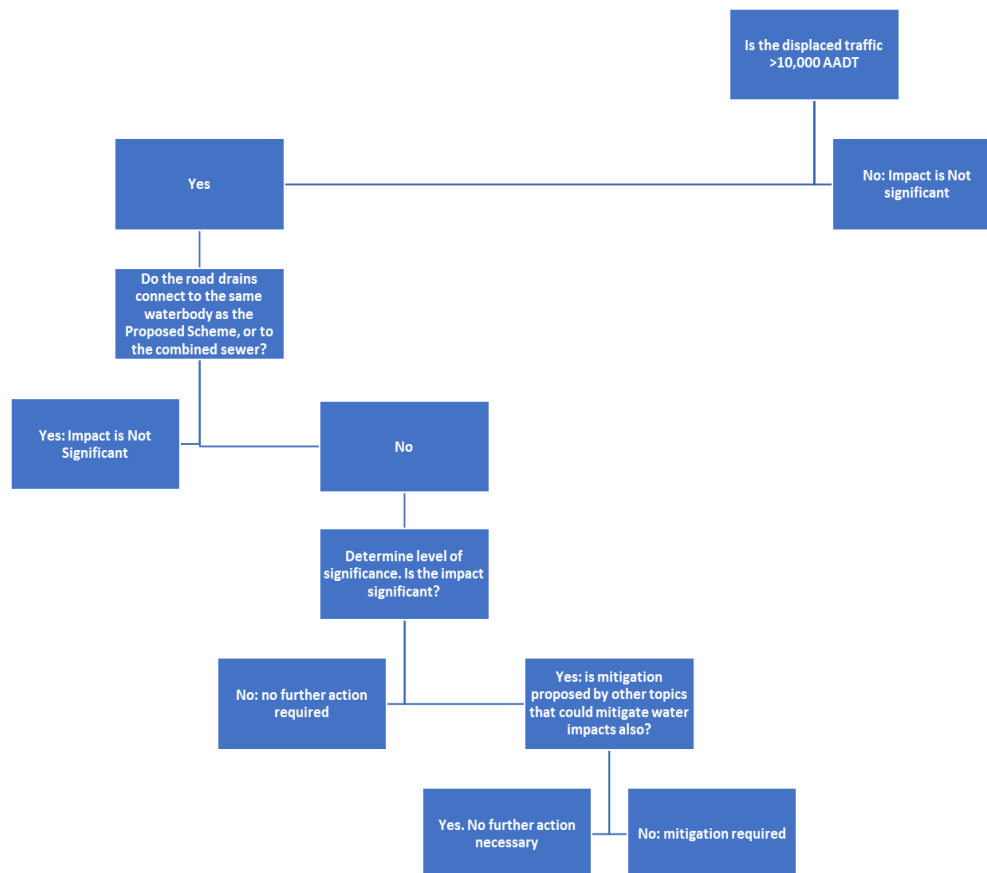


Image 13.2: Traffic Assessment Decision Tree

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 (HEWRAT) 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 the 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 Catchment) and Hydrometric Area HA10 (Ovoca-Vartry Catchment). The Liffey and Dublin Bay Catchment Summary (EPA 2021a) describes this catchment as including the area drained by the River Liffey and by all streams entering tidal water between Sea Mount and Sorrento Point, County Dublin, draining a total area of 1,616km². There are three main water bodies within the study area in this catchment; Dodder_050, Grand Canal Main Line (Liffey and Dublin Bay) and Brewery Stream_010 (refer to Figure 13.1 Surface Water Study Area in Volume 3 of this EIAR). The largest urban centre in the catchment is Dublin City. 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.

The Ovoca-Vartry Catchment Summary (EPA 2021b) describes this catchment as including the area drained by the River Avoca and River Vartry and by all streams entering tidal water between Sorrento Point, Co. Dublin and Kilmichael Point, Co. Wexford, draining a total area of 1,247km². There are four main water bodies in this catchment; Dargle_040, Shanganagh_010, Carrickmines_010 and the Kill of the Grange Stream_010. The largest urban centre in the catchment is Bray. The other main urban centres in this catchment are Dun Laoghaire-Rathdown, Arklow, Wicklow Town, Rathnew, Newtown Mount Kennedy, Greystones, Delgany and Kilcoole. The total population of the catchment is approximately 179,100 with a population density of 144 people per km². The higher areas of the Wicklow Mountains are underlain by granite bedrock while metamorphic slates and quartzites underly the eastern coastal part of the catchment.

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 2021a). The EPA assigns biological river quality (biotic index) ratings Q5 to Q1 to watercourse sections (refer to Table 13.6). Q5 denotes a watercourse with high water quality and high community diversity, whereas Q1 denotes very low community diversity and a bad water quality. This data will be used to inform baseline receptor importance.

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

Table 13.6: EPA Scheme of Biotic Indices or Quality (Q) Values (EPA 2021a)

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

13.3.3 Surface Water WFD Status

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

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

- Grand Canal Main Line (Liffey and Dublin Bay);
- Dodder_050;
- Brewery Stream_010 (Elm Park Stream);
- Brewery Stream_010 (Priory Stream);
- Brewery Stream_010 (Brewery Stream);
- Dublin Bay;
- Kill of the Grange Stream_010;
- Carrickmines Stream_010 (Cabinteely Stream);
- Carrickmines Stream_010 (Carrickmines Stream);
- Shanganagh_010;
- Dargle_040 (River Rathmichael);
- Dargle_040 (River Dargle);
- Dargle Estuary; and

- South Western Irish Sea – Killiney Bay.

The WFD status of the water bodies within the 500m study area of the Proposed Scheme are detailed in Table 13.7. Three additional water bodies are included which are further away, namely Dublin Bay, Dargle Estuary and South Western Irish Sea – Killiney Bay. These are included in the initial review of baseline because of their protected status (Dublin Bay SAC) or hydrological connections to a designated site.

Table 13.7: Surface Water WFD Status

WFD Sub-Catchment	Water Body Section ID	Heavily Modified ?	Type	Status (2016 to 2021)	Key Pressures: Elements Causing Less Than Good Status	Risk Categorisation (3 rd Cycle RBMP)
N/A	Grand Canal Main Line (Liffey and Dublin Bay)	Yes – Artificial Water Body (AWB)	Canal	Good Ecological Potential	N/A	Not at Risk
Dodder_SC_010	Dodder_050	No	River	Moderate	Anthropogenic Pressures, urban wastewater, urban runoff	At Risk
Dodder_SC_010	Brewery Stream_010	No	River	Poor	Anthropogenic pressures	Review
Dargle_SC_010	Kill of the Grange_010	No	River	Poor	Urban runoff, urban wastewater and culverts	At Risk
N/A	Dublin Bay	N/A	Coastal	Good	N/A	Not at Risk
Dargle_SC_010	Carrickmines Stream_010	No	River	Good	Urban runoff	At Risk
Dargle_SC_010	Shanganagh_010	No	River	Good	Not Available	Not at Risk
Dargle_SC_010	Dargle_040	No	River	Good	N/A	Not at Risk
N/A	Dargle Estuary	No	Transitional	Moderate	Anthropogenic Pressures, urban wastewater,	Review
N/A	South Western Irish Sea – Killiney Bay	N/A	Coastal	High	N/A	Not At Risk

13.3.4 Field Survey

The results of the March 2020 and 2022 field surveys are detailed in Table 13.8. The water bodies surveyed were the Dargle_040, Shanganagh_010, Dodder_050 and the Grand Canal. Weather conditions were recorded as dry for all sites of the survey.

Table 13.8: Survey Information for Sites Along the Proposed Scheme (March 2020)

Survey Attribute	Survey Location 1	Survey Location 2	Survey Location 3	Survey Location 4	Survey Location 5	Survey Location 6	Survey Location 7
Location	Dodder_050 at Donnybrook	Shanganagh_010 crossing N11	Shanganagh_010 crossing N11 west side	Carrickmines Stream_010 crossing N11 beside tyre service centre.	Shanganagh_010 crossing N11	Dargle_040	Grand canal crossing at Leeson Street
Visual Flow	Low water level, medium fast flow.	Initially slow, almost stagnant. Joins fast moving water body. Low water level. Some areas of ripple potentially due to change in bed sediment or structure.	Fast flow, medium water level.	Low to medium water level, fast flow.	Low to medium water level, fast flow.	Low water level, fast flow.	Altered, slow flow. High water line.
Visual Water Quality	Significant ragging from possible urban pollution source. Brown water colour. Clear in parts due to turbidity.	Clear but seems stagnant at time of survey. Rubbish on bed is visible. Other water body not visible.	Clear but small foam line.	Rubbish present. Clear. No other indicators of water quality.	Significant ragging along riparian zone, indicating possible urban pollution. Foul odour detected.	Brown in colour, clear, foam line.	Opaque, litter present.
Bed Observation	Pebbles and small boulders.	Fine sediment initially. Other not visible from survey location. Assume some pebble or small boulders.	Coarse sediment, pebbles, boulders.	Artificial cement.	Fine sediment, medium rocks or boulders.	Fine sediment.	Bed not visible, presumably artificial.
Bank Stability	Mixed. High sloping banks to the east with noxious weeds and grass and brush. To the west stone walls and butterfly bush.	Stable but low. Bramble, standing trees, ivy and hawthorn.	Medium to high stability, consisting of dense rock, soil and vegetation on one side. On the other side there is ground vegetation, standing trees and ivy.	Stone wall or stone verge with ground vegetation and standing tree.	Banks susceptible to erosion as tree roots exposed.	Stone wall	Low grass verge
Features	None	Culvert exit and guard rail	None	None	None	None	Lock and quay
Modifications	None	None recorded	None	Unidentifiable instream cement structure or object. Narrows path of flow.	None	None	Canal / artificial water body
Runoff Pathway	Possible direct route via street gully / sewer.	Potential from sewer. Otherwise, no significant pathways.	None, unless direct road gully pathway.	Direct route	Direct route from the road.	Likely direct runoff via pipeline from road.	Via low verge

Survey Attribute	Survey Location 1	Survey Location 2	Survey Location 3	Survey Location 4	Survey Location 5	Survey Location 6	Survey Location 7
Runoff Risk	Medium to high	Medium to low	Low, unless direct sewer link present.	Medium to high	High in some sections as no natural barriers and downhill. However, dense scrub in upper section and close to road.	Medium to high	Medium to high
Riparian Detail	Mixed stone walls. High grass verges, standing tree and bush.	Complex. Mixed species. Standing trees. Ground vegetation and bramble.	One high sloping bank (at least 20 degrees), with mature ash and winter heliotrope, ground ivy. The other bank is flat with one section of residential grassland and another section of scrubland containing bramble, butterfly bush, ground ivy and buttercup.	Stone wall with some standing trees and mixed ground vegetation.	Scrub land, brambles, standing trees, some sections of almost bare ground.	Stone wall	Areas of rushes in stream, low grass verge.
Natural Barriers	Stone wall	Stone wall	Stone wall	Stone wall	None recorded	Stone wall	Stone wall
Discharges	Present but inactive at time of site visit.	None visible	None visible	Possible, not active at time of site visit. Could be rubbish.	Present along river	High number of outfalls, all inactive at time of site visit.	None visible
Culverted	No	Partial	Partial	Partial	Partial	No	No

Table 13.8: Survey Information for Sites Along the Proposed Scheme (Continued) March 2020

Survey Attribute	Survey Location 8	Survey Location 9	Survey Location 10	Survey Location 11	Survey Location 12
Location	Northern end of UCD interchange	To the north of interchange where stream / river meets pond.	UCD pond on biodiversity trail	UCD Lake	Golf course opposite UCD
Visual Flow	Slow flow, medium to low water level.	Low water level. Low flow almost stagnant.	Lake / pond	N/A	No access to determine
Visual Water Quality	No visual indicators of poor water quality .	Pond weed type spp. indicating low oxygen levels hence less than good status possible.	No visual indicators of poor water quality	No visual indicators of poor water quality	No access to determine
Bed Observation	Small gravel	Fine sediment covered by local leaf detritus.	Fine sediment	Not visible	No access to determine
Bank Stability	Mixed, some very steep areas to the west with flat low lying to the east. Vertical concrete culverted edge as water enters into culvert.	Low to the east. Exposed mud and bramble and juncus spp. To the west dense scrub and high sloping bank.	Low grass in most locations with some juncus or rush spp. or bramble etc.	Vertical concrete	No access to determine
Features	Culverted with vertical course trash screen. Culverted from pedestrian view and from direction of flow into the culvert	Culverted	Bridge pedestrian - between ponds	N/A	No access to determine
Modifications	Culverted	Culverted	Possibly man-made pond	Man-made	No access to determine
Runoff Pathway	From the southern direction (i.e. the interchange) there is a man-made sink which would act as a runoff barrier. However from the western side there is a direct runoff pathway. In addition it seems there is also a possible outfall of surface water.	None. Flow from this point is towards the interchange. Surface water would likely be intercepted before this point.	Not applicable due to location and direction of flow.	N/A upstream flow direction	No access to determine
Runoff Risk	Low to south. High to west. High from direct outfall.	Low / medium	Low	Low	No access to determine
Riparian Detail	Water heliotrope. Ground icy. Some Juncus spp. Some woodland as part of UCD pine trail. Maple and beech spp. primarily.	Vegetation noted in bank stability	Vegetation noted in bank stability	N/A	No access to determine
Natural Barriers	Depression or dip in landscape to the south. However, note the possible direct link.	N/A	Distance and direction of flow	Buildings	No access to determine
Discharges	Present, not active	None visible.	Possible drainage connection	None visible	No access to determine
Culverted	Partial	No	No	No	Partial

Table 13.9: Survey Information for Sites Along the Proposed Scheme August 2022

Survey Attribute	Survey Location 1	Survey Location 2	Survey Location 3
Location	Dargle_040 crossing at Beavor Row	Shanganagh_010 crossing at R116	Dodder_050 crossing at R138
Water body crossed	Yes	Yes	Yes
Construction Compound	No	No	No
Closest Water body	Dargle_040	Shanganagh_010	Dodder_050
Distance to Water body	Directly adjacent to water body	10m from survey point	Directly on top of the water body
River Flow	Moderate	Low	Low
Water Quality	Slight sheen noted on the surface of the water body.	Good water quality, visually clear, some debris noted within the river.	Water quality was slightly discoloured, with a light brown colour.
Runoff Pathway	Potential pathway from impermeable surface on road and surface water drains.	Potential pathway from road due to steep slopes. Surface water drains are present along the N11.	Potential pathway from impermeable surface on the R138. Several drains were present on the road, with an inlet feature in the water body.
Runoff Risk	Moderate, the topography is flat	Low / medium	Medium
Riverbank observations	Channelised, man-made banks	Natural banks, heavily modified, no evidence of erosion detected.	There are man-made stone banks at both sides of the water body which have become vegetated.
Features	Two active discharges noted along the banks of the river.	Water body is culverted under road. Metal fence separating road from river.	Several active discharge features are present on the river.
Barriers	Concrete wall separating road from water body.	Metal fence, thick vegetation.	Stone walls along bridge and river banks.
Riparian Detail	Minor vegetation growth located along the river banks.	Thick vegetation	Thick vegetation cover along the river banks.

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 and the Ovoca-Vartry catchment. The sites described comprise Nutrient Sensitive Areas (NSAs), shellfish areas, coastal bathing waters, Special Areas of Conservation (SACs), Special Protection Areas (SPAs), proposed Natural Heritage Areas (pNHA), salmonid rivers, shellfish areas and marine bathing waters.

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

- South Dublin Bay SAC (site code: 000210) (approximately 1km from the closest point of the Proposed Scheme);
- North Dublin Bay SAC (site code: 000206) (approximately 2km from the closest point of the Proposed Scheme);
- Rockabill to Dalkey Island SAC (site code: 00300) (approximately 4km from the closest point of the Proposed Scheme); and
- Howth Head SAC (site code: 000202) (approximately 10.5km from the closest point of the Proposed Scheme).

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

- Dolphins, Dublin Docks pNHA (site code: 000201);
- North Dublin Bay pNHA (site code: 000206);
- South Dublin Bay pNHA (site code: 000210);
- Bray Head pNHA (site code: 000714);
- Booterstown Marsh pNHA (site code: 001205); and
- Dalkey Coastal Zone and Killiney Hill pNHA (site code: 001206).

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

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

There are twelve designated marine bathing waters downstream and potentially hydrologically linked to the Proposed Scheme, as listed below. The EPA published its Bathing Water Quality in Ireland – A Report for the Year 2022 in May 2023 (EPA 2023b) and the website 'www.beaches.ie' keeps this information regularly updated. The beaches and the most up to date assessment (checked May 2023) of their quality is provided below:

- Dollymount Strand - Good Quality (approximately 8km from the closest point of the Proposed Scheme);
- North Bull Wall - Good Quality (approximately 6km from the closest point of the Proposed Scheme);
- Half Moon - Excellent Quality (approximately 5km from the closest point of the Proposed Scheme);
- Shelley Banks - Good Quality (approximately 3.5km from the closest point of the Proposed Scheme);
- Sandymount Strand – Good Quality (approximately 2km from the closest point of the Proposed Scheme);
- Seapoint – Excellent Quality (approximately 3km from the closest point of the Proposed Scheme);

- Sandycove Beach – Good Quality (approximately 3.8km from the closest point of the Proposed Scheme);
- Forty Foot Bathing Place – Excellent Quality (approximately 4km from the closest point of the Proposed Scheme);
- White Rock Beach – Excellent Quality (approximately 2.8km from the closest point of the Proposed Scheme);
- Killiney – Excellent Quality (approximately 2km from the closest point of the Proposed Scheme);
- South of Bray Harbour – Excellent Quality (approximately 0.75km from the closest point of the Proposed Scheme); and
- Bray South Promenade – Good Quality (approximately 1km from the closest point of the Proposed Scheme).

There are two designated salmonid rivers within the Ovoca-Vartry catchment, the River Dargle and River Vartry.

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. The Shanganagh_010 is the only water body that is designated as a Drinking Water River, within the study area.

13.3.7 Known Pressures

The EPA online interactive map and database for water (EPA 2023a) was reviewed to identify the pressures on water bodies and the presence of point source discharges from EPA licensed activities within the study area. Pressures common to all water bodies in the study area are discharges from urban wastewater systems (via Storm Water Overflows (SWOs) and urban surface runoff. Further details on these for each water body are provided in Section 13.3.9.

The following Industrial Emissions (IE) / Integrated Pollution Prevention Control (IPPC) licensed sites were identified as being within the study area:

- IE Licensed Facility Sytheses Limited, Woodbine Road, Blackrock, Reg No: P0216-01; and
- IPPC Licensed Facility Nypro Limited, Corke Abbey, Bray, Reg No: P0567-02.

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 discharges to a combination of combined sewers and surface water sewers which discharge to local water bodies. From the City Centre to Brendan Road, the surface water discharges to combined sewer. Thereafter, it drains to surface water sewers for the entirety of the route. The route is split into catchments (1 to 12) and the water bodies to which these discharge are set out in Table 13.9.

The Proposed Scheme is described in detail in Chapter 4 (Proposed Scheme Description); to aid understanding it is split into four sections and has been further subdivided as follows:

- Section 1: Leeson Street to Donnybrook (Anglesea Road Junction):
 - Section 1a: Leeson Street to Wellington Place; and
 - Section 1b: Wellington Place to Donnybrook (Anglesea Road Junction).
- Section 2: Donnybrook (Anglesea Road Junction) to Loughlinstown Roundabout:
 - Section 2a: Donnybrook (Anglesea Road) to Whites Cross (Leopardstown Road); and
 - Section 2b: Whites Cross (Leopardstown Road) to Loughlinstown Roundabout.

- Section 3: Loughlinstown Roundabout to Bray North (Wilford Roundabout):
 - Section 3a: Loughlinstown Roundabout to Shanganagh Road;
 - Section 3b: Shanganagh Road to Quinn’s Road; and
 - Section 3c: Quinn’s Road to Bray North (Wilford Roundabout).
- Section 4: Bray North (Wilford Roundabout) to Bray South (Fran O’Toole Bridge):
 - Section 4a: Bray North (Wilford Roundabout) to Old Connaught Avenue;
 - Section 4b: Old Connaught Avenue to Upper Dargle Road; and
 - Section 4c: Upper Dargle Road to Bray South (Fran O’Toole Bridge).

Table 13.9: Existing Drainage

Existing Catchment Reference	Existing Network Type	Proposed Scheme Section	Existing Outfalls	Water Body
Catchment 1	Foul/combined	Section 1	Foul/combined network drains to Ringsend WwTP with sewer overflows to the River Liffey	Ringsend
Catchment 2	Surface water (storm)	Section 1	Network outfalls to the River Dodder	Dodder_050
Catchment 3	Surface water (storm)	Section 2a	Network outfalls to the Elm Park Stream	Brewery Stream_010
Catchment 4	Surface water (storm)	Section 2a	Network outfalls to the Booterstown Stream	Brewery Stream_010
Catchment 5	Surface water (storm)	Section 2a	Network outfalls to the Priors Stream	Brewery Stream_010
Catchment 6	Surface water (storm)	Section 2a	Network outfalls to the Brewery Stream	Brewery Stream_010
Catchment 7	Surface water (storm)	Section 2b	Network outfalls to the Kill Of The Grange Stream	Kill Of The Grange Stream_010
Catchment 8	Surface water (storm)	Section 2b	Network outfalls to the Cabinteely Stream	Carrickmines Stream_010
Catchment 9	Surface water (storm)	Section 2b	Network outfalls to the Carrickmines Stream	Carrickmines Stream_010
Catchment 10	Surface water (storm)	Section 3a and 3b	Network outfalls to the Shanganagh Watercourse	Shanganagh_010
Catchment 13	Surface water (storm)	Section 3c	Network outfalls to the Irish Sea	Southwestern Irish Sea
Catchment 11	Surface water (storm)	Section 3c	Network outfalls to the Rathmichael Watercourse	Dargle_040
Catchment 12	Surface water (storm)	Section 4	Network outfalls to the River Dargle	Dargle_040

13.3.9 Surface Water Features

The water bodies within the study area are discussed in this Section. For the Ovoca-Vartry catchment, the Dargle_040, Shanganagh_010, Carrickmines Stream_010, Cabinteely Stream_010 and Kill of the Grange_010 are discussed. While for the Liffey and Dublin Bay catchment, Brewery Stream_010, Dodder_050 and the Grand Canal are discussed (refer to Figure 13.1. Surface Water Study Area in Volume 3 of this EIAR).

The Dodder_050, the Dargle_040 and Carrickmines Stream_010 are identified within the RBMP 2018-2021 ‘Priority Areas for Action’. The Shanganagh_010 is designated as a Drinking Water River (under the Drinking Water Directive).

Hydromorphological characteristics were assessed during the field survey. The study area is large and includes a wide variety of features, including culverted rivers and partially modified water bodies with walled riparian zones.

Table 13.10 details the distances and number of crossings of each 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

WFD Water Body (EPA Name)	Nearest Scheme Section	Approx. Distance from Proposed Scheme (m)	Number of Crossings
Grand Canal Main Line (Liffey and Dublin Bay)	Section 1	0	1
Dodder_050	Section 1	0	1
Brewery Stream_010	Section 2	0	2
Dublin Bay	Section 2	1250	0
Kill of the Grange_010	Section 3	200	0
Carrickmines Stream_010	Section 3	20	0
Shanganagh_010	Section 3	0	1
Dargle_040	Section 3 and 4	0	1
Dargle Estuary	Section 4	620	0
South Western Irish Sea – Killiney Bay	Section 3 and 4	820	0

13.3.9.1 Grand Canal Main Line (Liffey and Dublin Bay)

The Grand Canal Main Line (Liffey and Dublin Bay) (hereafter referred to as the Grand Canal) is an artificial water body (AWB), primarily used for recreation. Constructed in the 18th Century, the canal traverses the country from Dublin to Shannon for a distance of approximately 131km. The Grand Canal is crossed by the Proposed Scheme at Leeson Street.

As stated in the EPA report Water Quality in Ireland 2013-2018 (EPA 2019a), assessments of the canals 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.

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

13.3.9.2 Dodder_050

The EPA segment of the River Dodder within the study area is Dodder_050. It is 29.6km and includes the lower segment of the river from Templeogue to where it joins the Liffey Estuary Lower at Ringsend. The River Dodder has a total catchment area of 167.7km² and rises on the northern flanks of the Dublin Mountains, flowing 26km north through the Upper and Lower Glenasmole reservoirs and onward through south Dublin, becoming tidal near Lansdowne Road before entering the Liffey at Ringsend.

The land surrounding the River Dodder consists of agricultural land in the upstream reaches and urban within the mid to lower stream extents, for more than 15km. The Dodder_020 in the upper catchment is a protected Drinking Water area. Although the River Dodder is not a designated Salmonid River, there is an important brown trout fishery and there are sea trout and salmon in the lower, tidal reaches of the river with ongoing work to remove weirs opening up more of the river for improved fish passage.

Dodder_050 flows north towards the Liffey Estuary Lower. The Proposed Scheme crosses it at Donnybrook. Dodder_050 has Moderate WFD Status and is At Risk of not achieving the WFD objective of Good Status by 2027. The main risks are anthropogenic pressures, diffuse urban runoff and urban wastewater

In terms of assigning sensitivity, a moderate WFD status would normally result in a Medium to High Status, however there is an indirect connection to South Dublin Bay SAC via the Liffey Estuary and this leads to it being confirmed as High sensitivity. The presence of salmonid species also supports this (if the water body was designated as a salmonid river it would be Very High sensitivity).

13.3.9.3 Brewery Stream_010

Brewery Stream_010 is made up of a number of segments:

- Brewery Stream;
- Priory Stream;
- Booterstown Stream; and
- Elm Park Stream.

Each segment outfalls to Dublin Bay without any hydrological connection to the other segments:

- Brewery Stream (EPA segment) rises on the N31 Brewery Road adjacent to the Leopardstown Tennis Club and has a segment length of 3.2km.
- Priory Stream (EPA segment) rises in Stillorgan Park, has a segment length of approximately 2.4km and travels through a culvert, from the Frascati Centre, under Blackrock Park.
- Booterstown Stream, also known as Trimlestown Stream (EPA segment), has a segment length of 191m and flows along the northern boundary of Booterstown Marsh, before joining Nutley Stream (non WFD surface water feature) and then into Booterstown Marsh.
- Elm Park Stream (EPA segment) rises north of the Health Sciences Centre in UCD and flows north-east for approximately 1.3km before flowing into Dublin Bay. The land use along the majority of the watercourse is recreational (golf course) before flowing north-east through Elm Park Business Campus. The land use along Brewery Stream_010 is mainly urban residential.

The Proposed Scheme crosses the water body at the following locations:

- Stillorgan Road, immediately west of Saint John of God Hospital; and
- Belfield Road, immediately north of UCD campus.

In terms of assigning sensitivity to this water body, it is of Poor WFD status and there is no possibility of hydromorphological impacts on this water body where it is culverted. However, the water body segments connect directly to the Dublin Bay SAC as such it is of Medium Sensitivity.

13.3.9.4 Dublin Bay

Dublin Bay is a United Nations Educational, Scientific and Cultural Organization (UNESCO) Biosphere extending over 300km². The core zone of Dublin Bay Biosphere comprises 50km² of areas of high natural value. Key areas include the Tolka and Baldoyle Estuaries, Booterstown Marsh, Howth Head, North Bull Island, Dalkey Island and Ireland's Eye. The coastal water body has Good WFD status and is not At Risk of not meeting the WFD objectives.

In terms of assigning sensitivity, this is a UNESCO and European designated site; it is of Good status. It is assigned as being 'Extremely Sensitive'.

13.3.9.5 Kill of the Grange Stream _010

Kill of the Grange Stream is assigned a single EPA segment; Kill of the Grange Stream _010. Kill of the Grange Stream_010 rises at the Deansgrange Business Park and has a total length of 5.4km. It flows south and to the east, parallel to Bray Road (N11) for most of its extent, crossing Clonkeen Park, Kilbogget Park and Ashlawn Park. Land use along the stream is urban. It outfalls to the Irish Sea at Killiney Bay. It is not crossed by the Proposed Scheme, being approximately 200m from it at its closest point.

Kill of the Grange Stream_010 has Poor WFD Status and is At Risk of not achieving Good Status by 2027. The main pressures on the water body are diffuse urban runoff, urban wastewater as a result of combined sewer overflows and hydro-morphological impacts due to culverting.

The Kill of the Grange Stream_010 was last assessed in 2020 at two monitoring stations. The Q values were both unsatisfactory, Q3. The EPA River Quality survey (EPA 2021b) reported that:

'Poor ecological conditions continue at the two sites surveyed on the Kill O'Grange stream in June 2020.'

Neither of the two stations assessed in 2020 are located within the Proposed Scheme study area.

In terms of assigning sensitivity, the water body is of Poor WFD status and it is culverted for parts of its lengths. As such it is of Low sensitivity.

13.3.9.6 Carrickmines Stream_010

Carrickmines Stream is assigned a single EPA segment, Carrickmines Stream_010, which includes Cabinteely Stream. Carrickmines Stream_010 rises in Sandyford, near Woodside Road and has a total length of 27.1km. The EPA maps identify five tributaries: the River Barnacullia, River Jamestown, Glenamuck_North, Loughlinstown River and Cabinteely Stream. Cabinteely Stream is the only tributary within the 500m study area of the Proposed Scheme. It rises in Cornelscourt Hill Road and flows for 2.5km parallel to the N11 Bray Road before flowing into the main channel of Carrickmines Stream_010. The land use along the Carrickmines Stream_010 is predominantly agricultural and suburban towards the upstream extent with the mid to low stream extents being predominantly urban.

Carrickmines Stream_010 flows from west of the Proposed Scheme, runs alongside for a short distance flowing south and then flows under it, before meeting with the Shanganagh_010 immediately downstream of the Proposed Scheme in Cherrywood. The water body has a Good WFD Status and is At Risk of not achieving Good Status by 2027. The main pressure on it is diffuse urban runoff causing nutrient and organic pollution.

The most recent Biological Q Value Assessment of Carrickmines Stream_010 was in 2020 at just one monitoring location approximately 100m from the Proposed Scheme. The Q value 4 was satisfactory. The EPA River Quality survey (EPA 2021b) reported that:

'The macroinvertebrate fauna indicated a welcome improvement to good ecological conditions in June 2020 the first time since monitoring commenced at this site in 2006, however excessive siltation of the substratum was observed.'

In terms of assigning sensitivity, this water body is of Good WFD status and as such is of High sensitivity.

13.3.9.7 Shanganagh_010

River Shanganagh is assigned a single EPA segment; Shanganagh_010. The Shanganagh_010 drains the eastern slopes of the Dublin Mountains, flowing east through South Dublin and into the sea at Killiney Bay. Land use along the Shanganagh_010 is predominantly agricultural and suburban towards the upstream extent with the mid to low stream extents being predominantly urban.

Shanganagh_010 is crossed by the Proposed Scheme at Loughlinstown Commons. Shanganagh_010 then flows east and discharges into the Irish Sea at Killiney Bay, just north of Shanganagh Wastewater Treatment Plant (WwTP). The water body has a Good WFD Status and is Not At Risk of not achieving Good Status by 2027. The Shanganagh_010 is designated as a Drinking Water River.

The most recent Biological Q Value assessment of the Shanganagh_010 was in 2020. Two stations were monitored. Both stations had a Q value of 4. The EPA River Quality survey (EPA 2021b) reported that:

'The macroinvertebrate fauna indicated satisfactory ecological conditions at the two sites surveyed on the Shanganagh river in June 2020.'

Only the station at Commons Road Bridge (0600) is located within the Proposed Scheme study area.

In terms of assigning sensitivity, this water body is of Moderate WFD status and as such is of Medium sensitivity.

13.3.9.8 Dargle_040

The EPA segment of the River Dargle within the study area is Dargle_040 which includes the River Rathmichael. The Dargle_030 rises on the northern side of Djouce Mountain, in the Wicklow Mountains National Park and flows east, over Powerscourt Waterfall and meets the Glencree River from the west. It then continues east, before being

joined by the Glencullen River and changing to the Dargle_040, which flows into the sea at Dargle Estuary. EPA mapping was used to determine the land use within the Dargle which consists of agricultural and forestry land in the upstream reaches and urban within the mid to lower stream extents. The Dargle is a designated salmonid river.

The Proposed Scheme ends in Bray on the northern bank of the main Dargle_040 water body, which is a designated salmonid river, flowing east through Bray to the Dargle Estuary which itself is wholly contained within Bray Harbour. North of the end of the Proposed Scheme it crosses another segment of the Dargle_040 which flows under the R119 at Woodbrook College. Dargle_040 has a Good WFD Status and is Not At Risk of not achieving Good Status by 2027.

The most recent Biological Q Value assessment of the Dargle_040 was in 2022 The EPA River Quality survey stated (EPA 2021b):

'The macroinvertebrate community continues to indicate good ecological conditions at Riverdale (0250) in 2022.'

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

This water body has two distinct segments to it which are not hydrologically connected. It is composed of the main channel, which flows through Bray, and the Rathmichael Stream which outfalls directly into the Southwestern Irish Sea and does not connect to the River Dargle. The River Dargle segment is separately designated a salmonid water body and is therefore Extremely High sensitivity. The Rathmichael segment would be High sensitivity only, based on its characteristics. For the purposes of this assessment, the two segments of the water body are considered separately.

13.3.9.9 Dargle Estuary

Dargle Estuary is entirely within Bray Harbour; Dargle_040 outfalls into the estuary at the town side of the harbour and the estuary outfalls to the South Western Irish Sea - Killiney Bay at the opening of the harbour walls. It is bounded by harbour walls and is subject to tidal fluctuations. It is classified as a transitional water body. It is likely that surface water in the town of Bray discharges to the estuary via discharges to Dargle_040.

In terms of assigning status, it is Moderate and flows directly into the South Western Irish Sea - Killiney Bay which is of Good Status. Given the status of the water body and that it is within an SPA it is assumed High Sensitivity.

13.3.9.10 South Western Irish Sea – Killiney Bay

This water body stretches from 8km south of Wicklow town, to Killiney in the north where it meets Dublin Bay. It receives surface water from a number of water bodies draining the east Wicklow mountains, which flow directly east to it. Towns along this stretch of coastline include Wicklow, Greystones and Bray. The water body is of High WFD Status and is a WFD Protected Area.

In terms of assigning sensitivity, as a High WFD status and WFD Protected Area, it is considered to have Extremely High Sensitivity.

13.3.9.11 Non WFD Water Features

13.3.9.11.1 UCD Pond

There is a pond north of the UCD campus which is approximately 100m west of the Proposed Scheme. The pond sits on the UCD biodiversity trail and is approximately 700m².

It does not have a WFD status and is likely to be effectively a storage / settlement pond for surface water on the campus. It is likely to discharge into nearby surface water sewers which ultimately outfall into Brewery Stream_010.

In terms of sensitivity, this water body has Low sensitivity.

13.3.9.11.2 UCD Lake

There is a lake in the centre of the UCD campus which is approximately 200m west of the Proposed Scheme. The lake is a man-made feature and is approximately 6,000m².

It does not have a WFD status and is likely to be effectively a storage / settlement pond for surface water on the campus. It is likely to discharge into nearby surface water sewers which ultimately outfall into Brewery Stream_010.

In terms of sensitivity, this water body has Low sensitivity.

13.3.9.12 Summary of Baseline Receptor Sensitivity

Table 13.11: Baseline Receptor Importance

Water Body	Attributes	Indicator/Feature	Sensitivity
Grand Canal Main Line (Liffey and Dublin Bay)	AWB	Good Ecological Potential pHNA Site	High
Dodder_050	Stone-walled river	Direct hydrological connection with Designated Nutrient Sensitive Area (Liffey Estuary). Salmonid fish present. Moderate WFD Status.	High
Brewery Stream_010	Heavily culverted river	Poor WFD Status. Anthropogenic Pressures	Medium
Dublin Bay	Coastal water body	Water body protected by EU legislation (SAC).	Extremely High
Kill of the Grange_010	Partially culverted river	Poor WFD Status	Low
Carrickmines Stream_010	Partially culverted river	Good WFD Status	High
Shanganagh_010	Partially culverted river	Good WFD Status	High
Dargle_040 (Rathmichael)	Stone-walled river with fine sediment bed	Good WFD Status	High
Dargle_040 (Dargle)	Stone-walled river with fine sediment bed	Salmonid River Good WFD Status	Extremely High
Dargle Estuary	Bray Harbour	Moderate WFD Status. In WFD Protected Area	High
South Western Irish Sea – Killiney Bay	Coastal water body	High status coastal, receives input from numerous water bodies. WFD Protected Area	Extremely High
UCD Pond	Partially natural water body	Aquatic features, macrophytes, banks.	Low
UCD Lake	Man-made water body	Entirely artificial. No natural features.	Low

13.3.10 Flood Risk

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

The FRA has been prepared for the Proposed Scheme in accordance with the Department of Environment, Heritage and Local Government (DEHLG) and the Office of Public Works (OPW) Planning system and Flood Risk Management Guidelines for Planning Authorities (hereafter referred to as the FRM Guidelines) (DEHLG and OPW 2009). A copy of the FRA 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, namely:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% Annual Exceedance Probability (AEP) or 1 in 100 year for river flooding or 0.5% AEP or 1 in 200 for coastal flooding);

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

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

13.3.10.1 Coastal Flood Risk

There is a low risk of coastal flooding to the Proposed Scheme. The 0.1% AEP tide levels are a minimum 6m below the level of the road along the Proposed Scheme.

13.3.10.2 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. There is a high risk of pluvial flooding along the entire Proposed Scheme. This is a function of the capacity of the existing surface water network, which is typically designed to contain a 20% AEP storm.

13.3.10.3 Fluvial Flooding

The Proposed Scheme is at risk from fluvial flooding from the Dodder_010, two segments of Brewery Stream_010, Shanganagh_010, Carrickmines Stream_010 and the northernmost segment of the Dargle_040. It is also potentially at risk from a third segment of Brewery Stream_010 and the Dargle_040 in Bray, although this cannot be confirmed given the available information. Where it is crossed by these watercourses, the Proposed Scheme is located in Flood Zone A or B. A justification test will therefore need to be completed on the final scheme design.

All watercourses that are crossed by the Proposed Scheme are in existing culverts or made by existing bridges.

13.4 Potential Impacts

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

13.4.1 Characteristics of the Proposed Scheme

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

13.4.1.1 Impermeable Areas and Drainage Design

The drainage design includes principles relating to Sustainable Drainage Systems (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 (CIRIA 2015) (hereafter referred to as the SuDS Manual). 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 is discharged to these receptors.

The proposed drainage design includes the relocation and addition of drainage gullies and connections to the existing drainage system. Attenuation will be in the form of swales, filter drains, and attenuation ponds and tanks. In total it is proposed that there will be two swales, six attenuation ponds, three underground attenuation tanks and one filter drain along the Proposed Scheme. These SuDS measures allow a level of treatment and/or attenuation to be provided before discharge to the network, reducing the impact on water quality as well as preventing an increase in runoff rates.

The following drainage types are proposed:

- Sealed Drainage (SD) which collects, conveys and discharges runoff via a sealed pipe network;
- Filter Drains (FD) are provided as road edge channels;
- Tree Pits (TP) are provided in close proximity to the road;
- Attenuation Tanks (AT) – where there is insufficient attenuation volume provided by the proposed SuDS drainage measures, an attenuation tank is required to provide the required volume;
- Pavement Capping Layer Attenuation is used under the UCD Bus Interchange. Gullies discharge directly to the capping layer under the pavement. The capping layer discharges at its lowest point to the nearby drainage system; and
- Oversized pipes (OSP) – Where there is insufficient space available for SuDS measures it is proposed to provide some attenuation volume online using oversized pipes.

The drainage system for the Proposed Scheme will discharge to eight surface water bodies and one WwTP. Details of the proposed drainage treatment for each catchment and subsequently each water body are provided in Table 13.12. This table also includes details of the changes to impermeable areas. No new outfalls are proposed. Discharges from new drainage design will be to existing surface water systems and outfalls.

Table 13.12: Proposed SuDS and Changes to Impermeable Area

Main Catchments	Existing Catchment Reference	Water Body	Road Corridor Area (m ²)	Net Change (m ²)	Percentage Change (%)	SuDS Measures
C1/C2	Catchment 67	Ringsend	94582	-535	-0.57%	None
Subtotal			94582	-535	-0.57%	
C2	Catchment 65	Dodder_050	8300	-31	-0.37%	None
	Catchment 66	Dodder_050	3844	23	0.60%	None
Subtotal			12144	-8	-0.07%	
C3	Catchment 61	Brewery Stream_010	6902	46	0.67%	None
	Catchment 62a (North)	Brewery Stream_010	8671	428	4.94%	TP
	Catchment 62b (South)	Brewery Stream_010	22100	4,291	19.42%	AT
	Catchment 63	Brewery Stream_010	6579	85	1.29%	TP
	Catchment 64	Brewery Stream_010	5060	-236	-4.66%	None
C4	Catchment 50a (North)	Brewery Stream_010	2180	21	0.96%	None
	Catchment 50b (South)	Brewery Stream_010	2180	-26	-1.19%	None
	Catchment 51	Brewery Stream_010	16304	-1	-0.01%	None
	Catchment 52	Brewery Stream_010	3820	27	0.71%	None
	Catchment 53	Brewery Stream_010	2021	95	4.70%	TP
	Catchment 54a (North)	Brewery Stream_010	12440	313	2.52%	OSP
	Catchment 54b (South)	Brewery Stream_010	12440	448	3.60%	OSP, AT
	Catchment 55a (North)	Brewery Stream_010	2414	-143	-5.92%	None
	Catchment 55b (South)	Brewery Stream_010	2414	125	5.18%	OSP
	Catchment 56a (North)	Brewery Stream_010	6092	-37	-0.61%	None
	Catchment 56b (South)	Brewery Stream_010	6092	-74	-1.21%	None
	Catchment 57a (North)	Brewery Stream_010	13637	297	2.18%	OSP
	Catchment 58b (South)	Brewery Stream_010	13637	476	3.49%	OSP
	Catchment 59a (North)	Brewery Stream_010	19849	678	3.42%	OSP
Catchment 59b (South)	Brewery Stream_010	19849	240	1.21%	None	

Main Catchments	Existing Catchment Reference	Water Body	Road Corridor Area (m ²)	Net Change (m ²)	Percentage Change (%)	SuDS Measures
	Catchment 60a (North)	Brewery Stream_010	8280	364	4.40%	OSP, TP, FD
	Catchment 60b (South)	Brewery Stream_010	8280	296	3.58%	OSP
C5	Catchment 44a (South)	Brewery Stream_010	13369	267	2.00%	OSP
	Catchment 44b (North)	Brewery Stream_010	11046	733	6.64%	OSP
	Catchment 45	Brewery Stream_010	3532	-124	-3.51%	None
	Catchment 46	Brewery Stream_010	4182	170	4.07%	FD, AT
	Catchment 47a (North)	Brewery Stream_010	10137	479	4.73%	OSP
	Catchment 47b (South)	Brewery Stream_010	10137	202	1.99%	OSP
	Catchment 48a (North)	Brewery Stream_010	7383	602	8.15%	OSP
	Catchment 48b (South)	Brewery Stream_010	7829	626	8.00%	OSP
	Catchment 49a (North)	Brewery Stream_010	5020	34	0.68%	OSP
	Catchment 49b (South)	Brewery Stream_010	5020	27	0.54%	TP
	C6	Catchment 37a (North)	Brewery Stream_010	7109	197	2.77%
Catchment 37b (South)		Brewery Stream_010	7109	88	1.24%	None
Catchment 38		Brewery Stream_010	9600	-90	-0.94%	None
Catchment 39		Brewery Stream_010	9880	-1	-0.01%	None
Catchment 40a (North)		Brewery Stream_010	3416	157	4.60%	None
Catchment 40b (South)		Brewery Stream_010	3416	42	1.23%	None
Catchment 41a (North)		Brewery Stream_010	6945	213	3.07%	OSP
Catchment 41b (South)		Brewery Stream_010	6945	166	2.39%	OSP
Catchment 42		Brewery Stream_010	4137	117	2.83%	None
Catchment 43		Brewery Stream_010	11858	-147	-1.24%	None
Subtotal			349311	11471	3.28%	
C7	Catchment 28	Kill of The Grange Stream_010	15263	136	0.89%	None
	Catchment 29	Kill of The Grange Stream_010	6276	52	0.83%	None
	Catchment 30	Kill of The Grange Stream_010	11121	177	1.59%	TP, FD
	Catchment 31	Kill of The Grange Stream_010	8135	112	1.38%	TP, FD
	Catchment 32a (North)	Kill of The Grange Stream_010	12623	229	1.81%	TP, FD
	Catchment 32b (South)	Kill of The Grange Stream_010	12500	-22	-0.18%	None
	Catchment 33	Kill of The Grange Stream_010	11162	156	1.40%	None
	Catchment 34	Kill of The Grange Stream_010	15068	323	2.14%	TP
	Catchment 35	Kill of The Grange Stream_010	4400	45	1.02%	None
	Catchment 36	Kill of The Grange Stream_010	22449	1,344	5.99%	OSP, TP, FD
Subtotal			118997	2552	2.14%	
C9	Catchment 23	Carrickmines Stream_010	13125	247	1.88%	OSP
	Catchment 24	Carrickmines Stream_010	15220	534	3.51%	OSP
	Catchment 25	Carrickmines Stream_010	15272	4	0.03%	None
	Catchment 26	Carrickmines Stream_010	6922	38	0.55%	None
	Catchment 27	Carrickmines Stream_010	3646	60	1.65%	None
Subtotal			54185	883	1.63%	
C11/C10	Catchment 13	Shanganagh_010	6017	107	1.78%	None
C10	Catchment 14	Shanganagh_010	3833	117	3.05%	None
	Catchment 15	Shanganagh_010	2617	109	4.17%	None
	Catchment 16	Shanganagh_010	7391	596	8.06%	None
C10	Catchment 18	Shanganagh_010	2299	718	31.23%	FD, AT
	Catchment 19	Shanganagh_010	2956	414	14.01%	OSP, AT
	Catchment 20	Shanganagh_010	11936	-94	-0.79%	None

Main Catchments	Existing Catchment Reference	Water Body	Road Corridor Area (m ²)	Net Change (m ²)	Percentage Change (%)	SuDS Measures
	Catchment 21	Shanganagh_010	7298	474	6.49%	OSP
	Catchment 22	Shanganagh_010	7197	351	4.88%	OSP
Subtotal			51544	2792	5.42%	
C11	Catchment 3	Dargle_040	7191	874	12.15%	TP, FD
	Catchment 4	Dargle_040	3888	271	6.97%	TP
	Catchment 5	Dargle_040	5573	1,259	22.59%	TP
	Catchment 6	Dargle_040	9861	535	5.43%	FD, AT
	Catchment 7	Dargle_040	2200	183	8.32%	OSP
	Catchment 8a (North)	Dargle_040	8440	2,332	27.63%	TP
	Catchment 8b (North)	Dargle_040	5630	647	11.49%	OSP
	Catchment 9a (South)	Dargle_040	15734	1,486	9.44%	OSP
	Catchment 10	Dargle_040	13372	2,717	20.32%	OSP,FD
	Catchment 11	Dargle_040	2440	388	15.90%	TP, FD
C11	Catchment 17	Dargle_040	867	673	77.62%	OSP
C12	Catchment 1	Dargle_040	1937	90	4.65%	None
	Catchment 2	Dargle_040	6071	195	3.21%	None
Subtotal			83204	11650	14.00%	
C13	Catchment 12	Southwestern Irish Sea	2737	116	4.24%	None
Subtotal			2737	116	4.24%	

Table 13.13: Impermeable Area Changes by Water Body

Water Body	Approx. Impermeable Surface Area			SuDS Measures Proposed
	Existing	Additional	% change	
Ringsend	94582	-535	-0.57%	None
Dodder_050	12144	-8	-0.07%	None
Brewery Stream_010	349311	11471	3.28%	TP,FD,AT,OSP
Kill of The Grange Stream_010	118997	2552	2.14%	TP,FD,OSP
Carrickmines Stream_010	54185	883	1.63%	OSP
Shanganagh_010	51544	2792	5.42%	FD, AT, OSP
Southwestern Irish Sea	2737	116	4.24%	None
Dargle_040	83204	11650	14.00%	TP,FD,AT,OSP

13.4.1.2 Key Infrastructure Proposed

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

13.4.2 'Do Nothing' Scenario

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

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

measurable in the short to medium-term in relation to water quality, whereas hydrological and hydromorphological changes are subject to more long-term trends.

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

The most significant pressures on water bodies 'At Risk' of not achieving Good status within the Carrickmines Stream _010, Kill of the Grange Stream _010 and Dodder_050 sub-catchments are urban runoff from diffuse urban sources, urban wastewater as a result of combined sewer overflows, anthropogenic pressures, and hydromorphological impacts due to culverting.

Diffuse urban pressures, caused by misconnections, leaking sewers and runoff from paved and unpaved areas, have been identified as a significant pressure on Kill of the Grange Stream _010, Carrickmines Stream _010 and the Dodder_050. Kill of the Grange Stream _010 is primarily impacted by misconnections and SWOs from both Sandymount and Deansgrange.

The Dodder_050 is impacted by urban wastewater from combined sewer overflows which is a significant pressure. The Kill of the Grange Stream_010 receives the stormwater overflow for the Shanganagh WwTP.

There are planned improvements to urban wastewater discharges and their contribution to achieving WFD objectives across the country.

Other Anthropogenic impacts include golf courses which have been identified as a significant pressure for the Dodder_050. There was a fish kill in 2014 on the Dodder_050 and the suspected cause was the release of pesticides from a local golf course.

Hydromorphology has also been identified as a significant pressure for the Carrickmines Stream_010. Hydromorphology is the second most common pressure on water bodies in Ireland identified in the RBMP. The RBMP details:

'it anticipated that as our knowledge and understanding of hydromorphological pressures improves, so too will the extent of the impacts identified across the country'.

With these further assessments and investigations in place to learn more about existing pressures, and programmes and actions in place to locate and improve deficient wastewater infrastructure, it is anticipated that pressures from urban wastewater and urban runoff and other anthropogenic 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' Scenario

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

The 'Do Minimum' scenario (Opening Year 2028, Design Year 2043) represents the likely traffic and transport conditions of the direct and indirect study areas including for any transportation schemes which have taken place, been approved or are planned for implementation, without the Proposed Scheme in place. This scenario forms the reference case by which to compare the Proposed Scheme ('Do Something') for the quantitative assessments. Further detail on the Proposed Scheme and demand assumptions within this scenario is included in Chapter 6 (Traffic & Transport).

The outputs of the transport modelling for these future scenarios are used in the operational impacts assessment in Section 13.4.5.4 of this Chapter. In terms of the potential future baseline of the surface water environment under these two scenarios, there is a great deal of uncertainty, however it is reasonable to assume that the measures set out in the RBMP 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, where relevant.

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

The duration of the Construction Phase is estimated to be 36 months. The Construction Compounds will be in place for the full duration of the extent of the works they support and will be removed following completion of the works they support.

Construction compounds will be at the following locations:

- Construction Compound BR1: southwest of Wilford Junction; and
- Construction Compound BR2: east of Stillorgan Road (with access / egress from Fosterbrook).

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 potential Construction Phase impacts include:

13.4.4.2.1 Hydrology

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

13.4.4.2.2 Water Quality

- Silty water runoff containing high loads of suspended solids from construction activities. This includes the stripping of topsoil / road surface during site preparation; the construction of widened roads; the dewatering of excavations and the storage of excavated material;
- Contamination of water bodies with anthropogenic substances such as 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 in close proximity to water bodies or drains connected to the water bodies; and
- Re-exposure of historically settled contaminants within or near to water bodies because of working within or near to the 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; and
- Modifications to the morphological characteristics of the water body such as alterations to banks for construction of over bridges or other works.

13.4.4.3 Assessment of Potential Impacts on Receptors

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

13.4.4.3.1 Grand Canal Main Line (Liffey and Dublin Bay)

The proposed works in Section 1 of the Proposed Scheme, near to and across the Grand Canal, include new kerbs, cycleway refurbishment and new layouts on the roads. These works are not deep or require extensive earthworks. There are no direct discharges of surface water to the Grand Canal so any impacts could only be via overland flows at or in close proximity to the crossing of this water body. Potential impacts will be Short-term, Adverse and of Negligible magnitude, resulting in impacts of Imperceptible significance.

13.4.4.3.2 Dodder_050

Construction works are proposed in Section 1 of the Proposed Scheme up to the Anglesea Bridge which spans the Dodder_050. The proposed works include refurbishment of cycleways, kerb realignment, and revised layouts to accommodate bus lanes and improve junction interfaces. These works are not deep or require extensive earthworks. Potential impacts will be Short-term, Adverse and of Negligible magnitude, resulting in impacts of Imperceptible significance.

13.4.4.3.3 Brewery Stream_010

In Section 2a of the Proposed Scheme, the proposed works are refurbishment of cycleways, the construction of the proposed UCD Bus Interchange, kerb realignment, and the widening of the St. Lawrence subway. Although the water body is in culvert for much of its length, there are hydrological pathways to it via surface water sewers along the route of the Proposed Scheme. The proposed construction activities in this section of the Proposed Scheme (Section 2a) are somewhat intrusive and will require some earthworks (e.g. reconstruction and resurfacing of roads, extension to the St Lawrence subway and the construction of the proposed UCD Bus Interchange). Potential impacts include silty water runoff, silty water in dewatering of construction works, and accidental releases of anthropogenic substances such as hydrocarbons. No in-stream or bankside works are proposed. Potential impacts will be Short-term, Adverse and of small magnitude, resulting in impacts of Slight significance.

Construction Compound BR2 will be located east of R138 Stillorgan Road, accessed from Fosterbrook. This is an existing greenfield site which gently slopes down to Fosterbrook. There are surface water gullies in the road at the access / egress point. There is no retaining wall on the Fosterbrook side of the site, however there is a short retaining wall on the Stillorgan Road side. The compound is proposed to be located close to Stillorgan Road which will limit the potential for impacts. Such impacts could include silty water run-off during site preparation and accidental releases of anthropogenic substances. Potential impacts will be Short-term, Adverse and of medium magnitude, resulting in impacts of Moderate significance.

13.4.4.3.4 Dublin Bay

There is no direct hydrological connection to Dublin Bay from the Proposed Scheme. However, a number of the water bodies along the route outfall to Dublin Bay within a short distance. There is therefore potential for indirect impacts on Dublin Bay. However, none of the water bodies that discharge to Dublin Bay is predicted to have significant impacts and so there would be no impact on Dublin Bay from the Proposed Scheme.

13.4.4.3.5 Kill of the Grange_010

The proposed works in this part of the Proposed Scheme (Section 2b) are a combination of upgrades to kerbing, cycleways and reconfiguration of junctions and roundabouts. These works are not deep or require extensive earthworks. Potential impacts will be Short-term, Adverse and of negligible magnitude, resulting impacts of Imperceptible significance.

13.4.4.3.6 Carrickmines Stream_010

The proposed works in this part of the Proposed Scheme (Section 2b and 3a) are a combination of upgrades to kerbing, cycleways and reconfiguration of junctions and roundabouts. No significantly intrusive work is proposed. As a result, these works are not deep or require extensive earthworks. Potential impacts are anticipated to be Short-term, Adverse and of negligible magnitude, resulting impacts of Imperceptible significance.

13.4.4.3.7 Shanganagh_010

Construction activities in Section 3a are intrusive and will require substantial earthworks (e.g. reconstruction and resurfacing of roads, footpaths, cycle tracks and new kerbs as well as the removal of a roundabout. A number of existing retaining walls will be strengthened and a number of new retaining walls constructed. This has the potential for silty-water run-off and accidental releases of hydrocarbons. This is especially the case where the Proposed Scheme crosses the water body, but also for the other parts of the water body which receive surface water flows from the route of the Proposed Scheme. No in-stream works are proposed nor are any alterations to the culverted section of the water body under the N11 proposed. Potential impacts will be Short-term, Adverse and of medium magnitude, resulting in impacts of Moderate significance.

13.4.4.3.8 South Western Irish Sea – Killiney Bay

A short section of the Proposed scheme within Section 3a drains directly to the Southwestern Irish Sea. As for the Shanganagh_010 assessment, construction activities in Section 3a are intrusive and will require substantial earthworks. All impacts will be via the surface water system in this case however and the section of the Proposed Scheme which drains to this water body is short. Potential impacts will be Short-term, Adverse and of small magnitude, resulting in impacts of Moderate significance.

Potential indirect impacts are also possible as a result of potential impacts on the Shanganagh_010 and the Dargle_040. These would be lower in magnitude than the impacts on those water bodies. Potential impacts will be Short-term, Adverse and of small magnitude, resulting in Imperceptible impacts.

13.4.4.3.9 Dargle_040

Construction activities in Section 3c and Section 4a are intrusive and will require substantial earthworks This has the potential for silty-water run-off and accidental releases of hydrocarbons. This is especially the case where the Proposed Scheme crosses the water body, but also for the other parts of the water body which receive surface water flows from the main route of the Proposed Scheme. No in-stream works are proposed nor are any alterations to the culverted section of the water body under the R119 proposed.

This water body has two distinct segments to it which are not hydrologically connected. It is composed of the main channel, which flows through Bray, and the Rathmichael Stream which outfalls directly into the Southwestern Irish Sea and does not connect to the River Dargle. The River Dargle segment is separately designated a salmonid water body and is therefore of Extremely High sensitivity. The Rathmichael segment would be High sensitivity only, based on its characteristics.

For the Rathmichael stream segment, a long stretch of road is subject to portions of full depth construction works. Potential impacts will be Short-term, Adverse and of Medium magnitude resulting in Significant impacts.

For the River Dargle segment, the stretch of road subject to extension excavation is much smaller. Potential impacts will be Short-term, Adverse and of small magnitude, resulting in Significant impacts. Construction Compound BR1 in Section 4a is on land which is currently scrub land. There are no water bodies within the proposed site. Hydrological connection to the Dargle_040 would be via surface water sewers in the nearby road

network. There is some potential for silty water runoff as a result of soil stripping of the site to prepare for the compound. As a result of measures proposed to protect this water body from any spillages of fuel along this length of the Proposed Scheme (from approximately Chainage A16500 to A18100), all refuelling of mobile plant will be carried out at this compound. There is limited connectivity from the compound area to surface water drains in the adjoining road. Dense vegetation surrounding the site would reduce overland flows to a very low level of risk. Potential impacts will be Short-term, Adverse and of negligible magnitude, resulting in impacts of Imperceptible significance.

13.4.4.3.10 Dargle Estuary

There are no direct hydrological connections to the Dargle Estuary from the Proposed Scheme. Any impacts would be as a result of an impact in the Dargle_040. A potentially Very Significant adverse impact is predicted for the Dargle_040 due to the proposed construction works in Section 3c. However, these works are most significant in the area which drains to the northernmost segment of the Dargle_040 which discharges directly to South-Western Irish Sea – Killiney Bay and does not have a hydrological connection to the Dargle Estuary. As a result no impacts are predicted to arise in the Dargle Estuary.

13.4.4.3.11 Non-WFD water features

There are no significant impacts anticipated on the two non-WFD water features in the UCD campus. There is no hydrological connection and therefore there will be no impacts.

13.4.4.4 Summary of Potential Construction Phase Impacts

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

Water Body	Project Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts
Grand Canal Main Line (Liffey and Dublin Bay)	Cycle track construction and associated kerb construction. Junction layout changes.	<ul style="list-style-type: none"> Increased sediment in run off; 	High	Negligible	Imperceptible, Adverse, Short- term
Dodder_050	Relocation of cycle tracks, removal of car parking and junction upgrades.	<ul style="list-style-type: none"> Increased sediment in run off. 	High	Negligible	Imperceptible, Adverse, Short-term
Brewery Stream_010	Road widening and associated works, new UCD Bus Interchange	<ul style="list-style-type: none"> Increased surface water runoff; Increased sediment in run off; Anthropogenic sources (fuel etc.) 	Medium	Small	Slight, Adverse, Short-term
Brewery Stream	Construction Compound BR2	<ul style="list-style-type: none"> Increased sediment in run off; Anthropogenic sources (fuel etc.) 	Medium	Medium	Moderate, Adverse, Short-term
Dublin Bay	Road widening and associated works	<ul style="list-style-type: none"> No impacts anticipated 	Extremely High	No impact	No impact
Kill of the Grange_010	Non-intrusive reconfiguration of road and layout	<ul style="list-style-type: none"> Increased sediment in run off. 	Low	Negligible	Imperceptible, Adverse, Short-term

Water Body	Project Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts
Carrickmines Stream_010	Non-intrusive reconfiguration of road and layout	<ul style="list-style-type: none"> Increased sediment in run off. 	Medium	Negligible	Imperceptible, Adverse, Short-term
Shanganagh_010	Road widening and associated works	<ul style="list-style-type: none"> Increased surface water runoff; Increased sediment in run off; Anthropogenic sources (fuel etc.) 	Medium	Medium	Moderate, Adverse, Short-term
South Western Irish Sea – Killiney Bay	Road widening and associated works	<ul style="list-style-type: none"> Increased surface water runoff; Increased sediment in run off; Anthropogenic sources (fuel etc) 	Extremely High	Negligible	Moderate, Adverse, Short-term
South Western Irish Sea – Killiney Bay	Road widening and associated works	<ul style="list-style-type: none"> Increased surface water runoff; Increased sediments in run off; Anthropogenic sources (fuel etc) 	Extremely High	Negligible	Imperceptible, Adverse, Short-term
Dargle_040 (Rathmichael)	Road widening and associated works	<ul style="list-style-type: none"> Increased surface water runoff; Increased sediment in run off; Anthropogenic sources (fuel etc.) 	High	Medium	Significant, Adverse, Short-term
Dargle_040 (Dargle)	Road widening and associated works	<ul style="list-style-type: none"> Increased surface water runoff; Increased sediment in run off; Anthropogenic sources (fuel etc.) 	Extremely High	Small	Significant, Adverse, Short-term
Dargle_040 (Dargle)	Construction Compound BR1	<ul style="list-style-type: none"> Increased sediment in run off. 	Extremely High	Negligible	Imperceptible, Adverse, Short-term
Dargle Estuary	Road widening and associated works	<ul style="list-style-type: none"> No anticipated impacts 	High	No impact	No impact
Non-WFD	No works	<ul style="list-style-type: none"> No anticipated impacts 	Not assessed	No impact	No impact

13.4.5 Operational Phase

13.4.5.1 Overview of Potential Impacts

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

Potential impacts that could occur include:

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

13.4.5.2 Assessment of Potential Impacts – Surface Water Runoff

Assessments for each receptor are provided in the following sections, with a summary of impacts provided in Table 13.15.

13.4.5.2.1 Grand Canal Main Line (Liffey and Dublin Bay)

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

13.4.5.2.2 Dodder_050

The Proposed Scheme will result in a decrease in impermeable area of 8m² in the catchment area draining to the Dodder_050. This will equate to a 0.7% reduction in impermeable area, and will result in a decrease in the volume and rate of runoff of the Dodder_050 as a result. As there is no increase in impermeable area proposed, no new SuDS measures are proposed. The very small reduction in impermeable area will be of some benefit but will not be significant. Potential impacts will be Permanent, Beneficial and of negligible magnitude, resulting in impacts of Imperceptible significance.

13.4.5.2.3 Brewery Stream_010

The Proposed Scheme will result in an increase in impermeable area of 11,471m² in the catchment area draining to the Brewery Stream_010. The increase in impermeable area equates to a percentage increase of 3.3%. The implementation of the SuDs measures set out in Section 13.4.1.1 will ensure that this does not result in an increase in surface water runoff rates. Potential impacts will be Permanent, Beneficial and of negligible magnitude, resulting in impacts of Imperceptible significance.

13.4.5.2.4 Dublin Bay

There will be no change to the level of impermeable area discharging to Dublin Bay as a result of the Proposed Scheme. Therefore, there will be no potential impacts.

13.4.5.2.5 Kill of the Grange_010

The Proposed Scheme will result in an increase in impermeable area of 2,552m² in the catchment area draining to the Kill of the Grange_010. This will equate to a 2.1% increase in impermeable area. The implementation of the SuDs measures set out in Section 13.4.1.1 will ensure that this does not result in an increase in surface water

runoff rates. Potential impacts will be Permanent, Beneficial and of negligible magnitude, resulting in impacts of Imperceptible significance.

13.4.5.2.6 Carrickmines Stream_010

The Proposed Scheme will result in an increase in impermeable area of 883m² in the catchment area draining to the Carrickmines Stream_010. This will equate to a 1.6% increase in impermeable area. The implementation of the SuDs measures set out in Section 13.4.1.1 will ensure that this does not result in an increase in surface water runoff rates. Potential impacts will be Permanent, Beneficial and of negligible magnitude, resulting in impacts of Imperceptible significance.

13.4.5.2.7 Shanganagh_010

The Proposed Scheme will result in an increase in impermeable area of 2,729m² across the Shanganagh_010 catchment, which equates to an 5.4% increase in impermeable area within the existing boundary of the catchment. The implementation of the SuDs measures set out in Section 13.4.1.1 will ensure that this does not result in an increase in surface water runoff rates. Potential impacts will be Permanent, Beneficial and of negligible magnitude, resulting in impacts of Imperceptible significance.

13.4.5.2.8 Southwestern Irish Sea-Killiney Bay

The small increases in impermeable areas (114m²) for the catchments draining to this water body as a result of the Proposed Scheme would have no measurable impact on it during the Operational Phase. Therefore, there will be no potential impacts.

13.4.5.2.9 Dargle_040

At the Rathmichael section the Proposed Scheme will result in an increase of 11,365m² of impermeable area in the catchment discharging to the Dargle_040. This equates to an increase of 15.11%. The implementation of the SuDs measures set out in Section 13.4.1.1 will ensure that this does not result in an increase in surface water runoff rates. Potential impacts will be Permanent, Beneficial and of negligible magnitude, resulting in impacts of Imperceptible significance.

For the River Dargle segment the Proposed Scheme will result in an increase of 285m² of impermeable area in the catchment area discharging to the Dargle_040. This equates to an increase of 3.56%. No SuDs are proposed at this section as a result of the limited space available for the SuDs measure. Potential impacts will be Permanent, Imperceptible and Adverse.

The Proposed Scheme will result in an increase of 11,650m² of impermeable area in the catchment discharging to Dargle_040, which equates to a 14% increase. The implementation of the SuDs measures set out in Section 13.4.1.1 will ensure that this does not result in an increase in surface water runoff rates. Potential impacts will be Permanent, Beneficial and of negligible magnitude, resulting in impacts of Imperceptible significance.

13.4.5.2.10 Dargle Estuary

There will be no changes to impermeable areas draining to the Dargle Estuary as a result of the Proposed Scheme. Therefore, there will be no potential impact on the Dargle Estuary.

13.4.5.2.11 Non-WFD water features

There will be no hydrological connection from the Proposed Scheme to the two non-WFD water features on the UCD campus during operation. Therefore, there will be no potential 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

WFD Water Body Name	Project Activity	Potential Impacts			
		Description of Potential Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts
Grand Canal Main Line (Liffey and Dublin Bay)	No hydrological connection	<ul style="list-style-type: none"> No impacts anticipated 	N/A	N/A	No Impacts
Dodder_050	Decrease in impermeable area draining to the water body	<ul style="list-style-type: none"> Decreased surface water runoff 	High	Negligible	Imperceptible Permanent Beneficial
Brewery Stream_010	Increase in impermeable area draining to the water body	<ul style="list-style-type: none"> Increased surface water run off; Decreased pollutant loading 	Medium	Negligible	Imperceptible Permanent Beneficial
Dublin Bay	No hydrological connection	<ul style="list-style-type: none"> No impacts anticipated 	N/A	N/A	No Impacts
Kill of the Grange_010	Increase in impermeable area draining to the water body	<ul style="list-style-type: none"> Increased surface water run off; Decreased pollutant loading 	Low	Negligible	Imperceptible Permanent Beneficial
Carrickmines Stream_010	Increase in impermeable area draining to the water body	<ul style="list-style-type: none"> Increased surface water run off; Decreased pollution loading 	Medium	Negligible	Imperceptible Permanent Beneficial
Shanganagh_010	Increase in impermeable area draining to the water body	<ul style="list-style-type: none"> Increased surface water run off; Decreased pollution loading 	Medium	Negligible	Imperceptible Permanent Beneficial
South Western Irish Sea – Killiney Bay	No hydrological connection	<ul style="list-style-type: none"> No impacts anticipated 	N/A	N/A	No impacts
Dargle_040 (Rathmichael)	Increase in impermeable area draining to the water body	<ul style="list-style-type: none"> Increased surface water run off; Decreased pollution loading 	High	Negligible	Imperceptible Permanent Beneficial
Dargle_040 (Dargle)	Increase in impermeable area draining to the water body	<ul style="list-style-type: none"> Increased surface water run off 	Extremely High	Negligible	Imperceptible Permanent Adverse
Dargle Estuary	No hydrological connection	<ul style="list-style-type: none"> No impacts anticipated 	N/A	N/A	No impacts
Non-WFD	No hydrological connection	<ul style="list-style-type: none"> No impacts anticipated 	N/A	N/A	No impacts

13.4.5.4 Assessment of Potential Impacts – Traffic Redistribution

Traffic modelling (see Chapter 6 (Traffic & Transport)) has been undertaken 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 of greater than 10,000.

Where the AADT is predicted to be greater than 10,000 in either 2028 and/or 2043 (see Table 13.16), a further assessment was carried out to determine whether there may be a significant impact. All of the road sections where

an increase above 10,000 AADT is predicted drain to the same surface water system as the existing. Therefore, there will be no significant impact associated with increased traffic on side roads.

Table 13.16: Analysis of Road Sections >10,000 AADT

Road Name	A_B (GIS)	Length of Section (m)	2028 Do Min	2028 Do Sthg	%+	2043 Do Min	2043 Do Sthg	%+	Closest Existing Drainage Route	Change in drainage from existing?	Sig Impact ?	Reason
Ranelagh Road Charleston Ave to Elmpark Ave	11251_11250	75	9375	11537	23	9334	11393	22	Combined Sewer	No	No	No change
Ranelagh Road Elmpark Ave to Charleston Av	11250_11251	75	9825	11596	18	10072	11740	17	Combined Sewer	No	No	No change
Ranelagh Road - Elmpark Avenue to Beechwood Avenue Lower	11261_11251	47	8874	10733	21	8571	10926	27	Combined Sewer	No	No	No change
Ranelagh Road - Beechwood Avenue Lower to Ashfield Rd	11233_11261	52	8897	10398	17	8594	10256	19	Combined Sewer	No	No	No change
Ranelagh Road - Sallymount Ave to Cullenswood Pk	11252_11301	144	9698	11228	16	9474	11162	18	Combined Sewer	No	No	No change
Sandford Rd - Cullenswood Pk to Sandford Terrace	11301_19995	107	9072	10670	18	8824	10621	20	Combined Sewer	No	No	No change
Sandford Rd - Sandford Terrace to Cullenswood Pk	19995_11301	107	8057	10112	26	7863	9921	26	Combined Sewer	No	No	No change
Sandford Rd - Sandford Terrace	11306_11248	100	9914	10101	2	9700	10210	5	Combined Sewer	No	No	No change
Milltown Road	11316_11400	460	9312	10370	11	9239	10333	12	Dodder_050	No	No	No change
Taney Road - Sydenham Rd to Taney Rise	19263_19397	72	9261	10080	9	9230	10122	10	Dodder_050	Yes	No	Road section <100m
Taney Road - Taney Rise to Stoney Rd	19397_19262	121	9349	10212	9	9340	10195	9	Dodder_050	Yes	No	<10,500 - small mag; slight sig
Foster's Ave - Callary Road to Owenstown Pk	19577_19488	139	9650	10350	7	9620	10192	6	Brewery Stream_010	No	No	No change
Kill Lane - Foxrock Ave to Foxrock Gr	20547_20215	200	9976	12696	27	9902	13074	32	Kill Of the Grange_010	No	No	No change
Kill Lane - Foxrock Gr to Dean's Grange Rd	20277_20547	197	9976	12696	27	9902	13074	32	Kill Of the Grange_010	No	No	No change
Kill Lane - Dean's Grange Rd to Dean's Court	20647_20278	110	8677	12468	44	8351	12285	47	Kill Of the Grange_010	No	No	No change
Kill Lane - Kill Abbey to Abbey Rd	20543_20647	178	7342	11595	58	7106	11367	60	Kill Of the Grange_010	No	No	No change

Road Name	A_B (GIS)	Length of Section (m)	2028 Do Min	2028 Do Sthg	%+	2043 Do Min	2043 Do Sthg	%+	Closest Existing Drainage Route	Change in drainage from existing?	Sig Impact ?	Reason
Kill Lane - Dean's Court to Kill Abbey	20275_20543	200	7342	11595	58	7106	11367	60	Kill Of the Grange_010	No	No	No change
Abbey Rd - Rochestown Ave to Kill Lane	20283_20275	87	8633	12080	40	8414	12260	46	Kill Of the Grange_010	No	No	No change
Glenamuck Rd North	20504_20474	451	8184	11399	39	9012	12939	44	Carrickmines Stream_010	No	No	No change
Sallyglen Rd	20534_20532	1354	8802	10195	16	9121	10895	19	Kill Of the Grange_010	No	No	No change
Rochestown Ave to Rochestown Domain roundabout	20165_20535	-	8067	10339	28	8039	10707	33	Kill Of the Grange_010	No	No	No change

13.4.5.5 Summary of Flood Risk Assessment

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

13.4.5.5.1 Coastal Flooding

There is a low risk of coastal flooding to the scheme. The 0.1% AEP tide levels are a minimum 6m below the level of the road along the Proposed Scheme.

13.4.5.5.2 Pluvial Flooding

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

13.4.5.5.3 Fluvial Flooding

Risk from fluvial flooding has yet to be confirmed at Ch. A03 + 900 from Elm Park Stream by a Stage 3 Flood Risk Assessment and risk from fluvial flooding around Ch A18 + 500 from River Dargle has yet to be confirmed by the reviewed OPW CFRAM maps as they are currently under review at this location. These reviewed maps should provide the water levels for the different fluvial AEP events between Ch A16 + 850 and A17 + 100 from Rathmichael Stream as they are currently under review.

The Proposed Scheme will not affect the hydraulic capacity of Dodder River, Elm Park Stream, Brewery Stream, Carrickmines Stream & Shanganagh River, Rathmichael Stream, River Dargle or any structures which cross it. No works are proposed to modify any existing bridges that would reduce their hydraulic capacity. The existing level of the road will also be maintained. The Proposed Scheme will therefore not result in any change to the existing risk of fluvial flooding.

As noted, the proposed works typically comprise local widening of the existing highway. It is not possible to raise the level of the highway to reduce the existing level of flood risk. It is also beyond the scope of the Proposed Scheme to implement a wider flood relief scheme for the Dodder River, Elm Park Stream, Brewery Stream, Carrickmines Stream & Shanganagh River, Rathmichael Stream, River Dargle.

13.4.5.5.4 Climate Change

Climate change will result in an increased risk of flooding to the Proposed Scheme due to:

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

The impact of climate change on coastal flooding is not considered to be significant as the current risk to the Proposed Scheme is so low. Increased rainfall depths and intensities will increase the risk of pluvial flooding from the existing surface water drainage network. New drainage measures which will be installed as part of the Proposed Scheme, including any SuDS, will be designed to allow for future climate change.

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

13.5 Mitigation and Monitoring Measures

13.5.1 Introduction

This Section sets out the measures envisaged to avoid, prevent or reduce any potential significant adverse effects on the environment identified in Section 13.4 and, where appropriate, identify any proposed monitoring of the efficacy of implementing those mitigation measures. This Section covers both the Construction and Operational Phases. Construction 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 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(s), immediately following appointment, must detail in the SWMP how it is intended to effectively implement all the applicable measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval.

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

- A requirement for a Pollution Incident Response Plan;
- Construction 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 general mitigation measures, the majority of impacts will be not significant. However Significant impacts are predicted for the Dargle_040, a segment of which is a designated salmonid river, as a result of the extensive road construction works proposed in Section 4c of the Proposed Scheme.

Approximately 600m of the Proposed Scheme in this section has some surface water connection to the River Dargle as it flows through Bray, the segment of the Dargle_040 which is designated a salmonid river. The existing drainage system in this location also includes some combined sewer connections, however as a precautionary measure it is assumed that all of the gullies in this location drain to the River Dargle. In order to prevent any silty water or hydrocarbons entering the water body during construction it is proposed to use 'silt sacs' or the equivalent in every gully along the entire length of the Proposed Scheme in this catchment (Chainage A17900 to A18500) as construction progresses. These will capture any silt in the surface water. During the connection of the new kerbside edge drains into the existing surface water system, there is a higher risk of contamination. This connection will only be carried out in dry weather. All refuelling here will be carried out at the Construction Compound BR1 only and adhere to the control measures outlined in the SWMP.

In Section 3c of the Proposed Scheme, which drains to the other segment of the Dargle_040 (Rathmichael River), silt sacs will also be deployed for up to 250m north and south of the point at which the water body is crossed (between Chainage A16850 to A17350). As hydrocarbons can be carried long distances in surface water drains, whereas silt in water tends to drop out of suspension in a shorter distance, no mobile plant will be refuelled within 500m of the crossing (between Chainage A16600 to A17600). Any refuelling needed in this section must be carried out within Construction Compound BR1.

13.5.3 Operational Phase

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

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

13.6 Residual Impacts

13.6.1 Construction Phase

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

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

WFD Water Body Name	Project Activity	Predicted Impacts		
		Description of Impacts	Potential Impact (Pre-Mitigation and Monitoring)	Predicted Impact (Post-Mitigation and Monitoring)
Grand Canal Main Line (Liffey and Dublin Bay)	Cycle track construction and associated kerb construction. Junction layout changes.	<ul style="list-style-type: none"> Increased sediment in run off. 	Imperceptible, Adverse, Short-term	Imperceptible, Adverse, Short-term
Dodder_050	Relocation of cycle tracks, removal of car parking and junction upgrades.	<ul style="list-style-type: none"> Increased sediment in run off. 	Imperceptible, Adverse, Short-term	Imperceptible, Adverse, Short-term
Brewery Stream_010	Road widening and associated works, new UCD interchange	<ul style="list-style-type: none"> Increased surface water runoff; Increased sediment in run off; Anthropogenic sources (fuel etc) 	Slight Adverse, Short-term	Imperceptible, Adverse, Short-term
Brewery Stream	Construction Compound BR2	<ul style="list-style-type: none"> Increased sediment in run off; Anthropogenic sources (fuel etc.) 	Moderate, Adverse, Short-term	Imperceptible, Adverse, Short-term
Dublin Bay	Road widening and associated works	<ul style="list-style-type: none"> No impacts predicted 	No impacts	No impacts
Kill of the Grange_010	Road widening and associated works	<ul style="list-style-type: none"> Increased sediment in run off. 	Imperceptible, Adverse, Short-term	Imperceptible, Adverse, Short-term
Carrickmines Stream_010	Non-intrusive reconfiguration of road and layout	<ul style="list-style-type: none"> Increased sediment in run off. 	Imperceptible, Adverse, Short-term	Imperceptible, Adverse, Short-term
Shanganagh_010	Road widening and associated works	<ul style="list-style-type: none"> Increased surface water runoff; Increased sediment in run off; Anthropogenic sources (fuel etc) 	Moderate, Adverse, Short-term	Imperceptible, Adverse, Short-term
Dargle_040 (Rathmichael)	Road widening and associated works	<ul style="list-style-type: none"> Increased surface water runoff; Increased sediment in run off; Anthropogenic sources (fuel etc) 	Significant Adverse, Short-term	Slight, Adverse, Short-term
Dargle_040 (Dargle)	Road widening and associated works	<ul style="list-style-type: none"> Increased surface water runoff; Increased sediment in run off; Anthropogenic sources (fuel etc) 	Significant Adverse, Short-term	Slight, Adverse, Short-term

WFD Water Body Name	Project Activity	Predicted Impacts		
		Description of Impacts	Potential Impact (Pre-Mitigation and Monitoring)	Predicted Impact (Post-Mitigation and Monitoring)
Dargle_040	Construction Compound BR1	<ul style="list-style-type: none"> Increased sediment in run off. Anthropogenic sources (fuels etc) 	Imperceptible, Adverse, Short-term	Imperceptible, Adverse, Short-term
Dargle Estuary	Road widening and associated works	<ul style="list-style-type: none"> Increased sediment in run off. 	No impact	No impact
South Western Irish Sea – Killiney Bay	Road widening and associated works	<ul style="list-style-type: none"> Increased surface water runoff; Increased sediment in run off; Anthropogenic sources (fuel etc) 	Imperceptible, Adverse, Short-term	Imperceptible, Adverse, Short-term
Non-WFD	No hydrological connection	<ul style="list-style-type: none"> No impact 	N/A	N/A

13.6.2 Operational Phase

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

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

WFD Water Body Name	Project Activity	Predicted Impacts		
		Description of Impact	Potential Impact (Pre-Mitigation and Monitoring)	Predicted Impact (Post-Mitigation and Monitoring)
Grand Canal Main Line (Liffey and Dublin Bay)	Increase in impermeable area draining to the water body	<ul style="list-style-type: none"> No impacts 	No impacts	N/A
Dodder_050	Decrease in impermeable area draining to the water body	<ul style="list-style-type: none"> Decreased surface water run off 	Imperceptible Permanent Beneficial	N/A Mitigation embedded and included in primary assessment.
Brewery Stream_010	Increase in impermeable area draining to the water body	<ul style="list-style-type: none"> Increased surface water run off; Decreased pollutant loading 	Imperceptible Permanent Beneficial	N/A Mitigation embedded and included in primary assessment.
Dublin Bay	No hydrological connection	<ul style="list-style-type: none"> No impacts 	No impacts	N/A
Kill of the Grange_010	Increase in impermeable area draining to the water body	<ul style="list-style-type: none"> Increased surface water run off; Increased sediment in run off; Anthropogenic sources (fuel etc); Increased scouring of watercourse. 	Imperceptible Permanent Beneficial	N/A Mitigation embedded and included in primary assessment.
Carrickmines Stream_010	Increase in impermeable area draining to the water body	<ul style="list-style-type: none"> Increased surface water run off; Increased sediment in run off; Anthropogenic sources 	Imperceptible, Permanent, Beneficial	N/A Mitigation embedded and included in primary assessment.
Shanganagh_010	Increase in impermeable area draining to the water body	<ul style="list-style-type: none"> Increased surface water run off; Increased sediment in run off; Anthropogenic sources (fuel etc); Increased scouring of watercourse. 	Imperceptible Permanent Beneficial	N/A Mitigation embedded and included in primary assessment.

WFD Water Body Name	Project Activity	Predicted Impacts		
		Description of Impact	Potential Impact (Pre-Mitigation and Monitoring)	Predicted Impact (Post-Mitigation and Monitoring)
South Western Irish Sea – Killiney Bay	Small increase in impermeable area draining to the water body	<ul style="list-style-type: none"> Increased surface water run off; Increased sediment in run off; Anthropogenic sources 	Imperceptible, Permanent, Beneficial	N/A Mitigation embedded and included in primary assessment.
Dargle_040 (Rathmichael)	Increase in impermeable area draining to the water body	<ul style="list-style-type: none"> Increased surface water run off; Increased sediment in run off; Anthropogenic sources (fuel etc); Increased scouring of watercourse. 	Imperceptible Permanent Beneficial	N/A Mitigation embedded and included in primary assessment.
Dargle_040 (Dargle)	Increase in impermeable area draining to the water body.	<ul style="list-style-type: none"> Increased surface water run off; Increased sediment in run off; Anthropogenic sources (fuel etc); 	Imperceptible, Permanent, Adverse	N/A
Dargle Estuary	No hydrological connection	<ul style="list-style-type: none"> No Impacts 	No Impacts	N/A
Non-WFD	No hydrological connection	<ul style="list-style-type: none"> No Impacts 	No Impacts	N/A

13.6.3 Summary of WFD Compliance Assessment

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

13.6.3.1 Overview

Taking into consideration the anticipated impacts of the Proposed Scheme on the biological, physico-chemical and hydromorphological quality elements, following the implementation of design and mitigation measures, it is concluded that it will not compromise progress towards achieving Good Ecological Status (GES) or cause a deterioration of the overall Good Ecological Potential (GEP) (in the case of an AWB) of any of the water bodies that are in scope. Therefore, the Proposed Scheme does not require assessment under Article 4.7 (see 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 500m of the Study Area. This concludes that in combination with other proposed developments, the Proposed Scheme will not compromise the achievement of the objectives of the WFD for any water body. Therefore, the Proposed Scheme complies with Article 4.8.

Article 4.9 of the WFD requires that:

'Member States shall ensure that the application of the new provisions guarantees at least the same level of protection as the existing Community legislation'.

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 Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance. There are European designated sites in the vicinity of the Proposed Scheme which have been assessed and are presented in the Natura Impact Statement (NIS). The NIS is a standalone document included in the planning application for the Proposed Scheme. It concludes that the Proposed Scheme will not lead to a deterioration in the features of any designated site. The Proposed Scheme is not considered to be a risk to designated habitats and therefore is compliant with the Habitats Directive.

Council Directive of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (91/676/EEC) (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 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 rBWD) was adopted in 2006, updating the microbiological and physico-chemical standards set by the original Council Directive of 8 December 1975 concerning the Quality of Bathing Water (76/160/EEC) and the process used to measure / monitor water quality at identified bathing waters. The rBWD focuses on fewer microbiological indicators, whilst setting higher standards, compared to those of the original directive. 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). Following implementation of measures set out in the CEMP, the Proposed Scheme will not have any significant adverse impact on any Bathing Waters. It is therefore compliant with the revised Bathing Water Directive.

13.6.3.2 Conclusion

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

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

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

13.7 References

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

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

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

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