Bonneagar Iompair Éireann
Transport Infrastructure Ireland

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National Transport Authority

Luas Finglas

Environmental Impact Assessment Report 2024

Chapter 10: Water

BARRY TRANSPORTATION
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Project Ireland 2040
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GLOSSARY OF FREQUENTLY USED TERMS

Term	Definition
DCC	Dublin City Council
DEHLG	Department of the Environment, Heritage and Local Government (now the Department of Housing, Local Government and Heritage)
FCC	Fingal County Council
FRM	Flood Risk Management
GSI	Geological Society of Ireland
ICW	Integrated Constructed Wetland
pNHA	Proposed Natural Heritage Areas
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SPA	Special Protection Area
SuDS	Sustainable Urban Drainage Systems
WFD	Water Framework Directive
TII	Transport Infrastructure Ireland
NRA	National Roads Authority
SI	Statutory Instrument
RBMP	River Basin Management Plan
EPA	Environmental Protection Agency
HA	Hydrometric Area
NHA	National Heritage Area
pNHA	Proposed National Heritage Area
ZoI	Zone of Influence

SECTION 10: WATER

10.1 Introduction

10.1.1 Purpose of this Report

This chapter of the Environmental Impact Assessment Report (EIAR) assesses the impact of the Luas Finglas Scheme (hereafter referred to as the proposed Scheme) on the surface water environment during both the Construction and Operational Phases. The following attributes of each surface waterbody (receptor) are considered: hydrology, hydro-morphology and water quality. Hydrogeology is dealt with specifically in Chapter 11 (Land & Soils: Soils, Geology and Hydrogeology).

The potential surface water impacts associated with the construction of the proposed Scheme have been identified (see Section 10.4.6), including potential impacts from construction runoff and watercourse disturbance due to site clearance, earthworks, utility diversions, road resurfacing, junction realignments, construction of the proposed Scheme, construction of watercourse and canal crossing structures, alterations to existing footpaths together with new footpaths and cycleways, and remediation works to the existing Integrated Constructed Wetland in Tolka Valley Park. For further detail of the works associated with the Construction Phase of the Proposed Development, refer to Chapter 6 (Construction Activities) of this EIAR.

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 10.4.7).

An assessment of the proposed Scheme's compliance with the Water Framework Directive (WFD) (Directive 2000/60/EC) requirements is provided in Volume 5 - Appendix A10.1 of this EIAR. A summary of the WFD Assessment is presented in Section 10.4.4.

Flooding has been assessed within a scheme-specific Flood Risk Assessment report (Volume 5 - Appendix A10.2 of this EIAR). The findings of this assessment are summarised in Section 10.4.4.

The objective of the proposed Scheme is to provide a high-capacity, high-frequency light rail running from Broombridge to Charlestown, connecting Finglas and the surrounding areas with Dublin's wider public transport network by providing a reliable, and efficient public transport service to the city centre via Broombridge. The proposed Scheme, which is described in Chapter 5 (Description of Proposed Scheme), has been designed to meet this objective.

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 non-statutory consultation programme undertaken throughout the option selection and design development process have been incorporated, where appropriate.

10.1.2 Outline Scheme Description

The proposed Scheme comprises a high-capacity, high-frequency light rail running from Broombridge to Charlestown, connecting Finglas and the surrounding areas with Dublin's wider public transport network by providing a reliable, and efficient public transport service to the city centre via Broombridge.

As shown in Volume 4 - Map Figure 1-1, starting from Broombridge, the proposed Scheme travels northwards, crossing the Royal Canal and the Maynooth railway line adjacent to Broome Bridge. It then runs adjacent to the east of Broombridge Road and the Dublin Industrial Estate. It then crosses the Tolka Valley Park before reaching the proposed St Helena's Stop and then proceeds northwards towards the proposed Luas Finglas Village Stop. From here, the route passes through a new corridor created within the Finglas Garda Station car park, making its eastern turn onto Mellowes Road. The route then proceeds

through Mellowes Park, crossing Finglas Road, towards the proposed St Margaret's Road Stop. Thereafter, the proposed line continues along St Margaret's Road before reaching the terminus Stop proposed at Charlestown.

The proposed Scheme has been designed to integrate with the existing and future transport network, providing connections with bus services at all new Stops, mainline rail services at Broombridge, and a Park & Ride facility to intercept traffic on the N/M2. In addition, the proposed Scheme through the inclusion of integrated cycle lanes and cycling infrastructure sets out to facilitate multimodal "cycle- light rail transit (LRT) trips" as a key aspect of the Luas Finglas scheme.

The proposed Scheme will comprise a number of principal elements as outlined in Table 10-1 and Table 10-2. A full description of the proposed Scheme is provided in the following chapters of this Environmental Impact Assessment Report (EIAR):

- Chapter 1 (Introduction);
- Chapter 5 (Description of the proposed Scheme); and
- Chapter 6 (Construction Activities).

Table 10-1: Overview of the Key Features of the proposed Scheme

Scheme Key Features	Outline Description
Permanent Scheme Elements	
Light Rail track	3.9km extension to the Luas Green Line track from Broombridge to Finglas (2.8km of grass track, 700m of embedded track and 360m of structure track)
Depot Stabling facility	A new stabling facility (with stabling for 8 additional LRVs) will be located just south of the existing Broombridge terminus, as an extension of the Hamilton depot area.
Luas Stops	Four Stops located at: St Helena's, Finglas Village, St Margaret's Road and Charlestown to maximise access from the catchment area including the recently re-zoned Jamestown Industrial Estate.
Main structures	Two new LRT bridges will be constructed as part of the proposed Scheme, consisting of a bridge over the River Tolka within the Tolka Valley Park and a bridge over the Royal Canal and the Iarnród Éireann (IÉ) railway line at Broombridge. A number of existing non-residential buildings shall be demolished to facilitate the scheme. In addition, the existing overbridge at Mellowes Park will be demolished.
At grade signalised junctions	10 at grade signalised junctions will be created at: Lagan Road, Ballyboggan Road, Tolka Valley Road, St. Helena's Road, Wellmount Road, Cappagh Road, Mellowes Road, North Road (N2), McKee Avenue, Jamestown Business Park entrance. Note: The junction at Charlestown will be reconfigured but does not have a LRT crossing.
Uncontrolled crossings	13 at grade uncontrolled crossings (11 pedestrian/cycle crossings and 2 local accesses located at: Tolka Valley Park, St Helena's, Farnham pitches, Patrickswell Place, Cardiff Castle Road, Mellowes Park, St Margarets Road, and ESB Networks.
Cycle facilities	Approximately 3km of segregated cycle tracks and 100m of non-segregated cycle tracks along the route. Covered cycle storage facilities will be provided at Broombridge Terminus, Finglas Stop and St. Margaret's Stop and within the Park & Ride structure. "Sheffield" type cycle stands will be provided at all stop locations.
Power substations	Two new traction power substations for the proposed Scheme will be located near Finglas Village Stop behind the existing Fire Station and near the N2 junction before St Margaret's Road Stop where the current spiral access ramp to the pedestrian overbridge is located. A third substation is required for the Park & Ride facility.
Park & Ride facility	A new Park & Ride facility, with e-charging substation, located just off the M50 at St Margaret's Stop will be provided with provision for 350 parking spaces and secure cycle storage. The building will feature photovoltaic (PV) panel roofing and is the

Scheme Key Features	Outline Description
	location for an additional radio antenna. This strategic Park & Ride connecting the N2/M50 to the city centre will increase the catchment area of the proposed Scheme.
Temporary Scheme Elements	
Construction compounds	There will be three principal construction compounds, two located west of Broombridge Road and one located at the northern extents of Mellowes Park. In addition, there are other secondary site compound locations for small works/storage. Details can be found in Chapter 6 (Construction Activities) of this EIAR.

Table 10-2: Summary of New Bridges of the proposed Scheme

Identity	Location	Description
Royal Canal and Rail Bridge	Approximately 10m east of the existing Broome Bridge and then continuing north, parallel with Broombridge Road on its east side	The proposed bridge is an eight-span structure consisting of two main parts: a variable depth weathering steel composite box girder followed by a constant depth solid concrete slab. The bridge has the following span arrangement: 35 + 47.5 + 30 + 17 + 3x22 + 17m. Steel superstructure extends over the first three spans. The bridge deck is continuous over the full length of 212.5m and has solid approach ramps at both ends.
Tolka Valley Park Bridge	Approximately 30m west of the existing Finglaswood Bridge	A three-span structure with buried end spans, thus appearing as a single span bridge. End spans as well as part of the main span consist of post-tensioned concrete variable depth girder, the central section of the main span is a suspended weathering steel composite box girder. The overall length of the bridge is 65m with spans 10m, 45m, 10m.

10.2 Methodology

10.2.1 Study Area

The baseline study area for this assessment is 500m from the boundary of the proposed Scheme. It is anticipated that any likely significant impacts from the proposed Scheme would occur in local waterbodies and based on professional judgement, given the nature and extent of the proposed Scheme, a study area of 500m is considered to encompass all waterbodies that may be susceptible to significant impacts.

All waterbodies within this Zone of Influence (ZoI) have been considered as part of this assessment. The Finglas River passes within 765m of Area 30 and 780m of Area 31: as it is outside the ZoI and no connection was identified, this watercourse was not considered further.

Hydrological connections (e.g., drainage ditches, canals, wetlands and rivers) often have the most far-reaching impacts due to their lotic or semi-lotic nature, meaning impact on their water quality can extend far downstream. It becomes increasingly difficult to precisely predict the likely significance of adverse water-borne pollutants as they travel downstream from the pollution point source, given potential dilution and retention factors along the course of the impacted watercourse.

In addition to the sites within 500m of the proposed Scheme, under the precautionary principle any designated sites (Dublin Bay Natura 2000 and proposed NHA sites which includes North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, North-West Irish Sea SPA, Royal Canal pNHA, North Dublin Bay pNHA, South Dublin Bay pNHA, Dolphins, Dublin Docks pNHA and Booterstown Marsh pNHA), located downstream of watercourses that pass through the footprint of the proposed Scheme, namely the River Tolka and Royal Canal, were considered to be within the hydrological ZoI of this scheme, and were assessed.

Leixlip Reservoir is approximately 12.5km west of the proposed Scheme. This is a major public water supply abstraction point (approximately 195,000 m^3/day) and which supplies approximately 600,000 people, serving Fingal, Kildare and North Dublin. However, due to separation from the proposed Scheme and the fact that it is upstream of the study area, it is considered that there is no potential for the proposed Scheme to interact with this abstraction point.

Dunboyne Public Water Supply Scheme is approximately 11.4km from the proposed Scheme and due to its separation, it is considered there is no potential for the proposed Scheme to interact with the abstraction point.

Groundwater is assessed separately in Chapter 11 (Land and Soils: Soils, Geology & Hydrogeology), which concludes that there are no likely significant residual impacts on the land, soils, and hydrogeological environments as a result of the proposed Scheme, from either the construction or operational phase.

10.2.2 Relevant Guidelines, Policy and Legislation

10.2.2.1 Guidance

The following documents detailed in Table 10-3 have been consulted during the preparation of this Chapter.

Table 10-3: Guidance

Reference Material	Legislation, Standards and Guidelines
Legislation	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for the Community action in the field of Water Policy (as amended) (hereafter referred to as the "WFD"); Directive 2011/92/EU of the European Parliament and the Council of 13 December 2011 on the Assessment of the Impacts of Certain Public and Private Projects on the Environment (hereafter referred to as the Environmental Impact Assessment (EIA) Directive); S.I. No. 722/2003 – European Communities (Water Policy) Regulations 2003, as amended; S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009, as amended; and S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended.
Standard	Transport Infrastructure Ireland (TII) Road Drainage and the Water Environment guidance document (Transport Infrastructure Ireland, 2015).
Guidelines	The Planning System and Flood Risk Management Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DEHLG)) * and the Office of Public Works (OPW); Guidelines on protection of fisheries during construction works in and adjacent to waters (Inland Fisheries Ireland, 2016); 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); National Road Authority (NRA) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (National Roads Authority, 2005)**; NRA Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (hereafter referred to as the TII Assessment Guidelines (NRA, 2009)*; Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas - Best Practice Interim Guidance Document (Department of Housing, Local Government and Heritage, 2022); Carrying out a Water Framework Directive (WFD) Assessment of EIA Developments (Northern Ireland Environmental Agency Water Management Unit, 2012); Sustainable Drainage Design and Evaluation Guide 2021 (Dublin City Council, 2021);

Reference Material	Legislation, Standards and Guidelines
	UK Environmental Agency's 'Water Framework Directive assessment: Estuarine and Coastal waters' 2016 (updated 2017) (Environment Agency, 2016); and UK's Planning Inspectorate (PINS) Advisory Note 18 'Water Framework Directive' June 2017 (Planning Inspectorate, 2017).

* Now the Department of Housing, Local Government and Heritage.

**The National Roads Authority merged with the Railway Procurement Agency and is known as Transport Infrastructure Ireland (TII) since 1 August 2015. All references to guidance documents and standards within this EIAR will retain the NRA reference until such time as these documents are updated.

In the absence of Light Rail Transit (LRT) specific guidelines, the assessment has been undertaken in accordance with the 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' (NRA (now TII), 2009). These guidelines are considered appropriate due to the commonalities of road and LRT schemes such as their predominantly linear geometry, their construction methodologies and integration with existing transport infrastructure.

10.2.2.2 Water Framework Directive (WFD)

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

There are several WFD objectives under which the quality of water is protected. The key objectives at European 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 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 Volume 5 - Appendix A10.1 and summarised in Section 10.4.5 of this chapter.

In the absence of WFD assessment guidance specific to Ireland, the assessment has been carried out using the UK Environment Agency's 'Water Framework Directive assessment: Estuarine and Coastal waters' 2016 (updated 2017) (Environment Agency, 2016). No specific guidance exists for freshwater water bodies; however, this guidance was used as the basis of the UK's Planning Inspectorate (PINS)

Advisory Note 18 'Water Framework Directive' June 2017 (Planning Inspectorate, 2017) in which it sets out the stages of an assessment. On this basis it is considered appropriate for the assessment of the proposed Scheme. In addition, the guidance document 'Carrying out a Water Framework Directive (WFD) Assessment of EIA Developments as published by the Northern Ireland Environmental Agency Water Management Unit (Environmental Agency, 2012), was also reviewed.

10.2.2.3 River Basin Management Plans

River Basin Management Plans (RBMPs) provide the mechanism for implementing an integrated approach to the protection, improvement and sustainable management of the water environment and are published every six years. The second cycle RBMP 2018 - 2021 was published by the Department of Housing, Planning and Local Government (DHPLG) in April 2018 and applies to the Republic of Ireland.

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

The Third Cycle Draft River Basin Management Plan was published in July 2022. Until the draft RBMP has been consulted upon and finalised, the existing 2018 - 2021 RBMP has been used as a reference point for this assessment with respect to proposed measures as these have yet to be agreed; however, where waterbodies' 'At Risk' status has already been updated by the EPA online for the third cycle RBMP, this has been used in the assessment. This draft addresses the submissions received during the 6-month public consultation process from September to 2021 to March 2022. This draft RBMP notes 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. As a result, 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.

Figure 10-1 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.

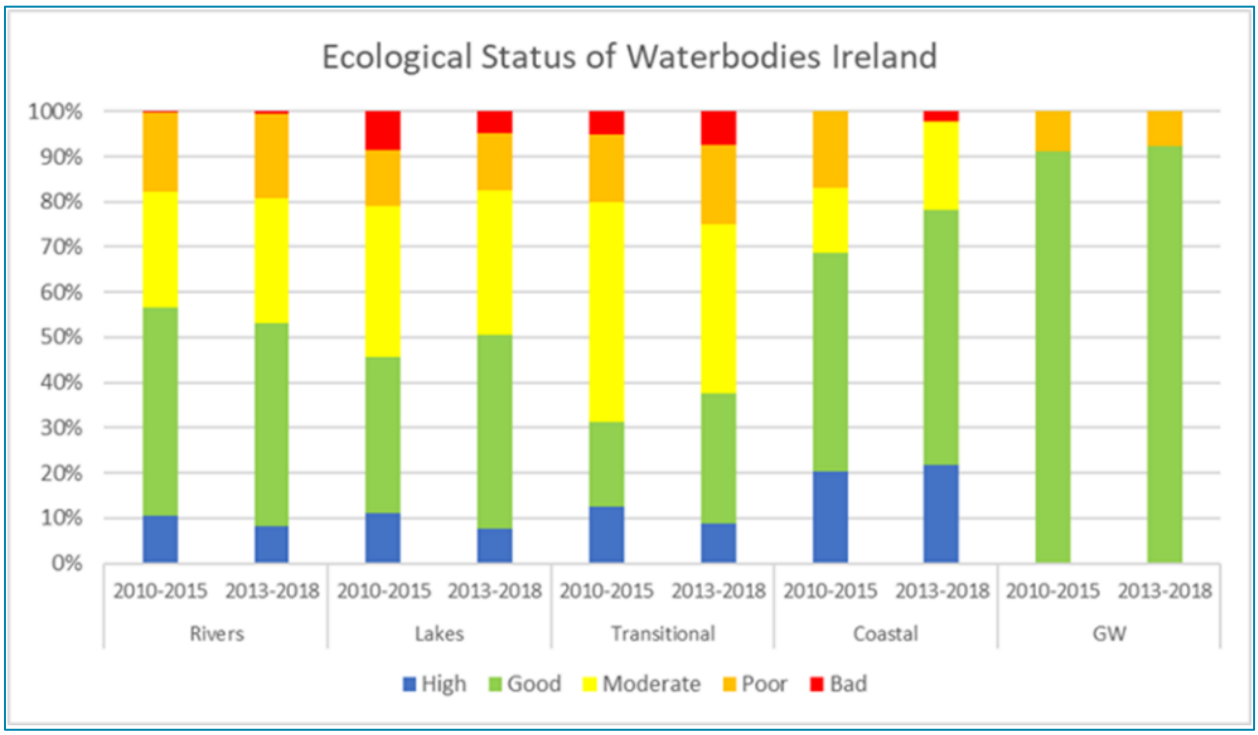

Figure 10-1: Ecological Status of Water bodies in Ireland (Source: RBMP)

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

10.2.3 Data Collection and Collation

Information on the baseline environment including hydrology, hydromorphology and water quality of the receptors within the study area has been compiled by undertaking a desktop review and field surveys.

10.2.3.1 Data Sources

Table 10-4 details the data sources consulted during the assessment.

Table 10-4 Data Sources

Categorisation of Reference Material	Title
General	Ordnance Survey of Ireland (OSI): Discovery Mapping (1:50,000), Six Inch Raster Maps (1:10,560), Six Inch and 25 Inch OS Vector Mapping, Orthographic Aerial Mapping (Geohive); EPA: Online mapping resource (Envision and www.catchments.ie): Teagasc subsoil classification mapping, WFD Mapping, Water Quality Monitoring Database; National Parks and Wildlife Service (NPWS): Designated Areas Mapping (www.npws.ie); Geological Survey of Ireland (GSI)-Online Mapping; and National Development Plan 2021 – 2030 – Project Ireland 2040 (Department of Public Expenditure and Reform).
Hydrology/Flooding	River Basin Management Plan 2018-2021 (including regional plans by Local Authorities Waters Programme (Waters and Communities 2020); Greater Dublin Strategic Drainage Strategy (GDSDS); OPW: Online Mapping Resources: Hydrometric data (floodinfo.ie), OPW CFRAM Flood Risk

Categorisation of Reference Material	Title
	and Flood mapping (www.epa.ie/hydronet); Reports including Hydrometric Data System/EPA Catchments, 'Water Quality in Ireland, 2013 to 2018' as published in 2019; and The Liffey and Dublin Bay Catchment Summary (Liffey Catchment Assessment 2010 – 2015 HA 09) (EPA 2018).
Development Plans	Dublin City Development Plan (2022-2028); Fingal Development Plan (2023-2029); and National Planning Policy-Project Ireland 2040-National Planning Framework (2018).

10.2.3.2 Field Surveys

Field walkover assessments were carried out on 28th September 2022. All watercourses within the study area were visited to inform the baseline conditions and identify the likely impacts of the proposed Scheme. During the field survey, the Finglaswood Stream could not be inspected as this watercourse is culverted along its entire length. However, a review of the CCTV survey for the stream was undertaken, providing reliable information on manhole depths and the route of the culvert for the purpose of this assessment.

Observations for the remaining watercourses were made from bridges and from the top of riverbanks. During the inspection, surveyors were considerate of the characteristics as outlined below. These features can be an indicator of a waterbody's susceptibility to potential impacts from the proposed Scheme.

- Flow conditions;
- Condition of the riverbed;
- Water quality;
- Potential sources of pollution;
- Riverbank characteristics;
- Existing structures / crossings;
- Outfalls/discharges; and
- Riparian vegetation.

The field survey findings are presented in Section 10.3.11 of this Chapter.

Water quality sampling data was obtained from the EPA's water quality monitoring programme and gathered during the Ground Investigation programme as detailed in Volume 5 – Appendix A10.3. CCTV and Ground Penetrating Radar (GPR) surveys were carried out to determine the extent of the existing surface water systems within the study areas.

Baseline water sampling was conducted by the GI contractor on identified surface waterbody receptors (Royal Canal and River Tolka) that could be impacted during the Construction and/or Operational Phases of the proposed Scheme. Samples were also sourced from within groundwater monitoring standpipes which were installed as part of the Ground Investigation (GI). Groundwater level readings within standpipes are recorded monthly, while samples and testing are undertaken quarterly. The monitoring programme began following completion of the GI works in January 2022. Refer to Section 10.3.12 and Volume 5 - Appendix A10.3 for more detail on water sampling and testing.

It is anticipated that the proposed Scheme will directly impact the River Tolka and some of its minor tributaries. The Royal Canal is located approximately 360m south of the River Tolka and generally runs in parallel with the river, and is also considered to be impacted. It should be noted that the drainage design for the proposed Scheme does not include any new outfalls to existing watercourses. All new drainage infrastructure will connect into existing surface water networks.

Within the Study Area, there is an Integrated Constructed Wetland (ICW) present alongside the River Tolka which has provided flood attenuation, amenity, and increased biodiversity within Tolka Valley Park

since its establishment in 1999. Due to concerns raised by DCC Parks Department, a separate assessment of the existing ICW (Integrated Constructed Wetland) was conducted by VESI Environmental to assess the schemes impact on the ICW and to ensure mitigation measures were developed. This assessment included additional field surveys undertaken by VESI Environmental on the 14th December 2022. To summarise, the site walkover included an inspection of the ICW, infrastructure, layout, condition of the ICW and the vegetation species therein, as well as the open-water pond and elements within the park which relate to the underlying conditions of the park. Further detail of this assessment is presented in Volume 5 - Appendix A10.4 of this EIAR.

10.2.3.3 Non-Statutory Consultation

The baseline and impact assessments for hydrology have included the review of all responses received in respect of stakeholder submissions and concerns about the water environment. The compiled feedback from engagement with both public bodies and private individuals, with regard to surface water, has been considered within the overall design and reviewed as part of the assessment.

Key concerns from stakeholders with regard to hydrology and drainage design included the following;

- Iarnród Éireann / Irish Rail: The existing rail line adjacent to the Royal Canal at Broombridge flooded previously on the 24th of October 2011. As the proposed Luas Finglas was going to cross both the Royal Canal and the existing Rail Line at this location, there were concerns that any development could increase the likelihood of this previous flood event reccurring;
- Dublin City Council (Drainage Department), Finglas County Council and Dublin City Council (Parks, Biodiversity and Landscaping Services): the developing drainage design was presented to Dublin City Council's Drainage Department and Dublin City Council's Parks Department on several occasions, and during these presentations, the design methodology and the details of the proposed Scheme were discussed. After each of the meetings the design was modified, as appropriate, to consider the comments and concerns raised during the meetings. Of particular concern was the proposed Scheme's impact on the ICW in Tolka Valley Park, adjacent to the River Tolka, and the maintenance regime required for the SuDS features. The suggestions, comments and concerns were adopted into the design as appropriate. Due to the concerns raised by DCC and the Parks department relating to the ICW, a specialist Subcontracor, VESI Environmental, was engaged to assess the scheme's impact on the ICW and to develop mitigation measures. Subsequent to the meetings described above, the scheme drawings and details were submitted to Dublin City Council's Drainage and Parks Departments for comment. Any comments raised were subsequently addressed as appropriate within the design and EIAR;
- Waterways Ireland was consulted with regard to the LRT bridge crossing of the Royal Canal. The main aspects discussed included clearance for the bridge, maintenance of the navigation channel, access for maintenance vehicles to the tow path, impacts on the historic bridge, construction impacts, greenway impacts, impacts on flora and fauna, property and issues around dewatering;
- IFI (Inland Fisheries Ireland) was consulted with regard to the River Tolka Valley Park Bridge Crossing and communicated that the new bridges must be fish passable structures and a preference for clear span designs was expressed; and
- The OPW was consulted with regard to the River Tolka Valley Park Bridge Crossing. A Section 50 application was submitted to the OPW demonstrating how the proposed design of the bridge crossing satisfies the requirements under Section 50 of the Arterial Drainage Act, 1945, as it can safely convey the peak design flows and not increase flood risk. This consent was granted by the OPW on the 9th February 2024.

10.2.4 Methodology for the Assessment of Impacts

10.2.4.1 General Approach

In line with the Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII 2009), an assessment of attribute importance has been undertaken in order to provide a basis for the assessment of impact provided.

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 the significance of the impacts.

10.2.4.2 Sensitivity of Receptors

The criteria for assessing the sensitivity of surface water receptors to change is presented in Table 10-5 below, with typical examples also included.

Table 10-5: Criteria for Rating the Sensitivity of Surface Water Receptors

Sensitivity	Criteria	Typical Example
Extremely High	Attribute has a very high quality or value on an international scale	Any water body which is protected by EU legislation (e.g. Designated European Sites (Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) or 'Salmonid Waters'; and A waterbody that appears to be in natural equilibrium and exhibits a natural range of morphological features (such as pools and riffles). There is a diverse range of fluvial processes present, free from any modification or anthropogenic influence.
Very High	Attribute has a high quality or value on an international scale or very high quality or value at a national scale	Any waterbody (specific EPA segment) which has a direct hydrological connection (<2km) to European Sites or protected ecosystems of international status (Special Areas of Conservation (SAC) / Special Protected Areas (SPA) or Salmonid Waters); A waterbody ecosystem protected by national legislation (Natural Heritage Area (NHA) status); A waterbody that appears to be largely in natural equilibrium and exhibits a diverse range of morphological features (such as pools and riffles). There is a diverse range of fluvial processes present, with very limited modifications; and Nutrient Sensitive Areas.
High	Attribute has a moderate value at an international scale or high quality or value on a national scale	A WFD water body with High or Good WFD Status; A Moderate WFD Status (2016 - 2021) waterbody with some hydrological connection (<2km) to European Sites or protected ecosystems of international status (SAC/SPA or Salmonid Waters) further downstream; A waterbody which has a direct hydrological connection to sites/ecosystems protected by national legislation (NHA status); A waterbody that appears to be in some natural equilibrium and exhibits some morphological features (such as pools and riffles). There is a diverse range of fluvial processes present, with very limited signs of modification or other anthropogenic influences; and Direct hydrological connectivity to Nutrient Sensitive Areas.
Medium	Attribute has some limited value at a national scale	A WFD waterbody with Moderate WFD Status (2016 - 2021); A WFD waterbody with limited (>2km - <5km) hydrological importance for sensitive or protected ecosystems (much further downstream); A waterbody showing signs of modification or culverting, recovering to a natural equilibrium, and exhibiting a limited range of morphological features (such as pools and riffles). The watercourse is one with a limited range of fluvial processes and is affected by modification or other anthropogenic influences; Evidence of historical channel change through artificial channel straightening and re-profiling; and Some hydrological connection downstream Nutrient Sensitive Areas.

Sensitivity	Criteria	Typical Example
Low	Attribute has a low quality or value on a local scale	A waterbody with Bad to Poor WFD Status (2016 – 2021); A waterbody with (>5km or no) hydrological connection to European Sites or national designated sites; or A non-WFD water feature with minimal hydrological importance to sensitive or protected ecosystems; and/or economic and social uses; A highly modified watercourse that has been changed by channel modification, culverting or other anthropogenic pressures. The watercourse exhibits no morphological diversity and has a uniform channel, showing no evidence of active fluvial processes and not likely to be affected by modification. Highly likely to be affected by anthropogenic factors. Heavily engineered or artificially modified and could dry up during summer months; and Many f which are adversely affecting biodiversity.

10.2.4.3 Magnitude of Impacts on Waterbody Attributes

The magnitude of potential impacts (both beneficial and adverse) depends on 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 projects impacts; and
- Possibility of effectively reducing the impacts.

The criteria for assessing the magnitude of impact on hydrology attributes are presented in Table 10-6 below.

Table 10-6: Criteria for Determining the Magnitude of Impact on Surface Water Receptors

Magnitude of Impact	Criteria	Typical Examples
Major Adverse	Results in loss of attribute and/or quality and integrity of attribute	Loss or extensive change to a waterbody or water dependent habitat; Reduction in waterbody WFD classification or quality elements; Extensive loss of fishery; Major increase in predicted peak flood level; Calculated risk of serious pollution incident >2% annually; Extensive reduction in amenity value; or An impact, with a high likelihood of occurrence that has some potential to alter the character of a small part or element of the receptor in the medium-long term. This could be on a frequently or consistently in occurrence, and result in an impact which may alter the existing or emerging trends.
Moderate Adverse	Results in impact on integrity or loss of part of attribute	Partial loss of fishery; Moderate increase in predicted peak flood level; Contribution to reduction in waterbody WFD classification; Calculated risk of serious pollution incident >1% annually; Partial reduction in amenity value; or An impact, with reasonable likelihood of occurrence that has some potential to alter the character of a small part or element of the receptor in

Magnitude of Impact	Criteria	Typical Examples
		the medium term. This could be intermittently or occasionally, and result in an impact which may be consistent with existing or emerging trends.
Minor Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Measurable impact but no change to WFD classification or the status of supporting quality elements; Minor increase in predicted peak flood level; Minor loss of fishery; Calculated risk of serious pollution incident >0.5% annually; Slight reduction in amenity value; or An impact, with low likelihood of occurrence 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 in an impact which may be consistent with existing or emerging trends.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable impact on integrity of the attribute; Negligible change in predicted peak flood level; or Calculated risk of serious pollution incident <0.5% annually.
Minor Beneficial	Results in minor improvement of attribute quality	Minor reduction in predicted peak flood level; Calculated reduction in pollution risk of 50% or more where existing flood risk is <1% annually; or Potential for minor improvement to WFD quality element(s).
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate reduction in predicted peak flood level; Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually; or Contribution to improvement in waterbody WFD classification.
Major Beneficial	Results in major improvement of attribute quality	Major reduction in predicted peak flood level: or Improvement in waterbody WFD classification.

10.2.4.4 Significance of Impacts

The sensitivity of the receptors combined with the magnitude of the potential impacts associated with the proposed Scheme are used to determine the significance of the impacts in question, as outlined in Table 10-7 below.

Table 10-7: Significance of Environmental Impacts

Sensitivity of Receptor	Magnitude of Impact			
	Negligible	Minor	Moderate	Major
Extremely High	Imperceptible	Significant	Very Significant to Profound	Profound
Very High	Imperceptible	Significant/Moderate	Very Significant	Very Significant to Profound
High	Imperceptible	Moderate/Slight	Significant/Moderate	Very Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

10.2.5 Flood Risk Assessment Methodology

The methodology used for the Flood Risk Assessment is based on 'The Planning System and Flood Risk Management, Guidelines for Planning Authorities' (2009). Under the sequential approach identified in the FRM Guidelines a three-step approach is required to confirm the appropriateness of the development in terms of flood risk. The sequential approach in flood risk management requires the following three steps to identify the necessity for the justification test for a development:

- Step 1: Identification of the Flood Zone at the proposed development site;
  - Using the Flood Zone criteria from the FRM Guidelines, the flood zones for each of the sites were determined.
- Step 2: Identification of the vulnerability of the type of the proposed development (Table 3.1 of the FRM Guidelines); and
  - The different types of proposed infrastructure are then assigned a vulnerability classification according to the definitions in 'Table 3.1 – Classification of vulnerability of different types of development' of the FRM Guidelines. The proposed development consists of 'primary transport infrastructure'. This is classified as 'highly vulnerable development'.
- Step 3: Using the matrix of vulnerability versus Flood Zone (Table 3.2 of the FRM Guidelines), identify the necessity for the justification test for the proposed development.
  - If the proposed development is located in Flood Zone A, for example, it is categorised as a Highly Vulnerable Development. Table 3.2 of the FRM guidelines – Sequential approach mechanism in the planning process (FRM guidelines) stipulate that a justification test is required for such a development. Flood Zone designations are described further in sub-section 10.3.13.

10.3 Baseline Environment

10.3.1 Introduction

The following section describes the hydrological environment in relation to the proposed Scheme. The description is based on the detailed design and engineering documents for the proposed Scheme.

10.3.2 WFD Catchment Overview

The study area lies within Hydrometric Area (HA) 09 (Liffey and Dublin Bay) and is within the River Liffey catchment. The Liffey and Dublin Bay Catchment Summary (Liffey Catchment Assessment 2010 – 2015 HA 09) (EPA 2018) describes this catchment as including the area drained by the River Liffey and by all streams entering tidal waters between Sea Mount and Sorrento Point in County Dublin, draining a total area of 1,616km^2. 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.

Table 10-8 provides the details of the Liffey and Dublin Bay catchment. Whilst the major catchment Hydrometric Area is 09, the study area lies within Sub-catchment 09_4. The WFD designation for this Sub-catchment is Tolka SC_20. The sub-catchments are further sub-divided into River basins, with the study area located in River Basin Tolka_050, which has an area of 19.92km^2.

Table 10-8: WFD Catchments

WFD Catchment Reference (Hydrometric area)	Area (km²)	WFD Sub-catchment ID	WFD Sub-catchment Name	WFD River Basin	River Basin Area (km²)
09	1,616	09_4	Tolka_SC_20	Tolka_050	19.92

10.3.3 WFD Watercourse Overview

The study area runs from North to South and crosses the River Tolka, the Royal Canal, the Finglaswood stream and runs close to Bachelors Stream. All of these watercourses are classified under the WFD in terms of risk and status.

The Finglaswood Stream is culverted for its entire length and is crossed by the Luas Finglas at several locations while Bachelors Stream is only partially culverted. Both of these streams drain to the River Tolka.

The WFD also considers artificial surface waterbodies (AWB). The Royal Canal, which is an AWB, is hydrologically separate from the River Tolka and drains into the River Liffey approximately 5.6km downstream from the study area.

The Finglaswood Stream, Bachelors Stream, the River Tolka and the Royal Canal are within the WFD Sub-catchment Tolka_SC_020.

10.3.4 WFD Water Quality

The EPA assesses the water quality of rivers and streams across Ireland using a biological assessment method (EPA, 2018). The EPA assigns biological river quality (biotic index) ratings from Q5 to Q1 to watercourse sections. Q5 denotes a watercourse with high water quality and high community diversity, whereas Q1 denotes very low community diversity and bad water quality (refer to Table 10-9 for further details).

Table 10-9: Biotic Index and WFD Status

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

The water quality ratings and the risk categorization for the watercourses within the study area are provided in Table 10-10 below.

Table 10-10: Water Quality and Risk Categorisation

WFD Sub-catchment	Waterbody EPA Name (WFD Name)	Type	Status 2016 to 2021	Latest river Q Values	Key Pressures: Elements Causing or with Potential to Cause Less than Good Status	Risk Categorisation	River Waterbody Code or European Code (Royal Canal)
Tolka_SC_020	Tolka (Tolka_050 and _060)	River	Poor	Q Value 3 recorded upstream within Segment Code 2128. Q Value 3 recorded downstream in Segment Code 2140.	Urban Runoff and Urban Wastewater	At Risk	IE_EA_09T011100
Tolka_SC_020	Finglaswood Stream (Tolka_050)	Culverted Stream	Poor	None available*	Urban Runoff and Urban Wastewater	At Risk	IE_EA_09T011100
Tolka_SC_020	Bachelors Stream (Tolka_050)	Partially Culverted Stream	Poor	None available*	Urban Runoff and Urban Wastewater	At Risk	IE_EA_09T011100
Tolka_SC_020	Royal Canal Main Line (Liffey and Dublin Bay)	Canal	Good	None available*	Urban Runoff	Review	IE_09_AWB_RCMLE

*As part of the Water Framework Directive (WFD) Monitoring Programme, approximately one third of the major rivers in Ireland and their more important tributaries are surveyed and assessed each year by EPA ecologists. Watercourses are assigned an ecological status rating based on a range of quality elements, even if a specific Q value (which refers to the biological assessment of macroinvertebrates) is not available, the rating process can proceed without a Q Value using other assessment methods, such as assessment of hydromorphological quality elements, chemical status and physio-chemical quality elements.

10.3.5 Non-WFD Waterbodies

The Integrated Constructed Wetland located the River Tolka Valley is not considered to be a WFD waterbody as it is an engineered, artificial system designed for specific environmental management purposes, rather than a natural or heavily modified water body that falls under the scope of the WFD.

It is also noted that only the downstream portion of the Finglaswood Stream is a WFD waterbody. The upper section of the culverted watercourse has not been classified under the WFD.

10.3.6 Designated Sites

Designated Sites comprise Special Areas of Conservation (SAC), Special Protection Areas (SPAs), Nutrient Sensitive Areas, shellfish areas, proposed Natural Heritage Areas (pNHAs), salmonid rivers 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 waterbodies listed in Table 10-10.

The following designated sites were identified to be relevant to this assessment due to downstream hydrological connectivity:

Table 10-11: Designated Sites

European: Natura 2000 Sites (total = 6)	Location Relative to the proposed Scheme	National: Proposed Natural Heritage Areas (total = 5)	Location Relative to the proposed Scheme
North Dublin Bay SAC [000206]	7.1km	Royal Canal pNHA [002103]	Within site
South Dublin Bay SAC [000210]	6.4km	North Dublin Bay pNHA [000206]	3.9km
Rockabill to Dalkey Island SAC [003000]	13.2km	South Dublin Bay pNHA [(000210]	6.4km
South Dublin Bay and River Tolka Estuary SPA [004024]	4.1km	Dolphins, Dublin Docks pNHA [000201]	6.8km
North Bull Island SPA [004006]	7.1km	Booterstown Marsh pNHA [001205]	8.7km
North-West Irish Sea SPA [004236]	9.6km		

A full assessment of potential impacts on designated European Sites, including hydrological links and water dependent species or habitats, is contained within Chapter 9 (Biodiversity) and the Natura Impact Statement (NIS) Report for the Scheme. The NIS concludes that subject to the implementation of the mitigation measures proposed for the scheme, the QI's of Natura 2000 sites will not suffer any adverse effects as a result of the proposed Scheme.

10.3.7 Drinking Water Supply (Surface Water)

There are no Geological Survey Ireland (GSI) Public Supply Source Protection Areas or National Federation of Group Water Schemes (NFGWS) Source Protection Areas within the study area. None of the river extents within the study area are designated as a source for drinking water.

10.3.8 Known Pressures

Finglaswood stream is a culverted stream that crosses the proposed Scheme. Surface water monitoring indicates that there may be historical domestic foul sewer connections into this culvert. Prior to

discharging into the River Tolka, the Finglaswood Stream flows into an Integrated Constructed Wetland (ICW).

In addition, there is a historical landfill within Tolka Park which has the potential to produce leachate. Surface water monitoring has indicated that this leachate is not hazardous.

As with all old sewerage systems, there are instances of combined sewers along the scheme. These combined sewers take a combination of foul and surface waters, meaning that during times of intense rainfall flows from stormwater overflows could result in sewage discharge to the River Tolka via storm overflows.

Surface water runoff off from hardstanding areas contains silt and hydrocarbons which will make their way to the surface water sewers and watercourses within the study area. These pollutants can then make their way to the watercourses within the region.

10.3.9 Existing Drainage

The existing roads within the region are drained via a surface water network that collects the pavement runoff mainly through gully pots and surface water pipework. The majority of the drainage networks within the study area drain to the River Tolka. The existing pedestrian walkways within Tolka Park drain to the adjacent soils. As described above, the two culverted streams affecting the study area are the Finglaswood Stream and Bachelors Stream. The ICW adjacent to the River Tolka provides a form of treatment for the Finglaswood Stream. The flow direction of the waters within the wetland is from East to West and opposite to the flow direction of the River Tolka. For further detail in relation to the existing drainage in the region refer to Volume 5 - Appendix A10.5 of this EIAR.

The Luas Track and Station at Broombridge have a modern drainage system which was installed during the construction of the Luas Line and the Station. A proposed attenuation pipe and flow control measure will limit flows into the existing drainage system. The older Broombridge Railway Track, which is adjacent to the Luas track, drains via infiltration into the tracks' ballast. There was a flooding incident previously on the Broombridge Railway Track. This was caused by blockage of the Royal Canal which caused water to flood onto the Broombridge Railway Track.

10.3.10 Surface Water Features

The main surface water features located within the study area are presented in Table 10-12. As previously discussed, the ICW and the upper extents of the Finglaswood Stream are not classified as WFD waterbodies.

Table 10-12: Distance of the Waterbodies within the study area to the proposed Scheme

Watercourse	Distance from the proposed Scheme
Finglaswood Stream	Traverses the proposed Scheme along its entire length from Tolka Valley Park to St Helena's Road. The stream is culverted in this region and discharges into the Tolka Valley, upstream of Finglaswood Bridge. A number of surface water drainage networks within the region connect into the Finglas wood Stream.
River Tolka	Traverses the proposed Scheme in the Tolka Valley Park close to Ballyboggan Road.
Bachelors Stream	Passes in the vicinity of the proposed Scheme.
Integrated Constructed Wetland*	Proposed Scheme is crossed by the ICW.
Royal Canal	Crossed by the proposed Scheme adjacent to Broombridge Station.
*The Integrated Constructed Wetland is not a WFD waterbody.	

Table 10-13 details the attributes and sensitivities of the six waterbodies within the study area that inform the baseline receptor importance.

Table 10-13: Baseline Receptor Importance

Waterbody	Attributes	Indicator/Feature	Sensitivity
River Tolka	Modified river	A WFD waterbody with hydrological importance for downstream SPA site (>2km - <5km).	Medium
Finglaswood Stream	Culverted stream	>5km from SPA Site. Poor WFD Status 2016 – 2021. Entirely culverted watercourse.	Low
Bachelors Stream	Partially culverted stream	>5km from SPA Site. Poor WFD Status 2016 – 2021. Partially culverted watercourse.	Low
Royal Canal	Human made waterbody	Royal Canal is proposed NHA.	Very High
ICW	Integrated Constructed Wetland	>5km from SPA Site. Non-WFD waterbody.	Low

10.3.11 Field Survey Observations

As outlined in Section 10.2.3.2, waterbodies within the study area were inspected on the 28th September 2022 to determine baseline conditions of the surrounding waterbodies, allowing the Luas Team to assess the potential impact of the proposed Scheme on the hydrological environment.

Noteworthy observations for each of the respective waterbodies are presented below:

- Finglaswood Stream: This watercourse was culverted along its length. The outfall adjacent to the ICW was assessed. Low flow was observed, with some sediments noted in surface water. No recent erosion was noted adjacent to headwall. A very slight foam line was observed at the outfall to the ICW;
- River Tolka: There was low flow in this river on the day of inspection. In terms of existing infrastructure, a bridge, two weirs and a multi-arch bridge were observed along the study length. Water quality was clear with some suspended sediment observed in places. On the day of the inspection, some connecting pipes were noticed into the river, but there was no flow observed;
- Bachelors Stream: The short open channel was inaccessible on the day of inspection due to dense vegetative growth. A second visit was undertaken in June 2024 and similar conditions meant the channel of the stream was not visible on either occasion. The remainder of this stream is heavily culverted along its length; and
- Royal Canal: Water was clear on the day of inspection. Grass and some rush growth was noted along the banks. Some floating vegetation was noted midstream, which looked to be in poor condition.

A separate site walkover was undertaken by VESI Environmental on 14th December 2022 as part of the assessment for the existing ICW (Integrated Constructed Wetland). The surveyor noted that the ICW presented well, with water flowing between cells and vegetative cover being healthy despite winter dieback. Further detail of this assessment is presented in Volume 5 - Appendix A10.4 of this EIAR.

10.3.12 Water Sampling

A 2-year programme of water sampling and testing began, following completion of the GI works in January 2022. Samples were taken from the Royal Canal and River Tolka and from within groundwater monitoring standpipes which were installed as part of the Ground Investigation. The laboratory results are as follows:

- Seven rounds of Surface water samples [five sampling locations – Refer to Sampling Location Map and testing results in Appendix A10.3]; and
- Seven rounds of Groundwater samples [six sampling locations – Refer to Sampling Location Map and testing results in Appendix A10.3].

The samples of surface and groundwater were tested for the determinants listed in Table 10-14.

Table 10-14: Water Determinants

Determinants (Surface Water)	Determinants (Groundwater)
Biochemical Oxygen Demand	Arsenic
Chemical Oxygen Demand	Boron
Total Hardness	Cadmium
Total Suspended Solids	Chromium (III)
Total Dissolved Solids	Chromium (VI)
Nitrate	Copper
Nitrite	Lead
Ammoniacal Nitrogen	Mercury
Orthophosphate	Nickel
Chlorophyll	Zinc
Total Coliforms and	pH
Faecal Coliforms (E. coli)	Water soluble sulphate (as SO_4)
pH	Organic matter
Conductivity	Total petroleum hydrocarbons
Turbidity	Speciated polyaromatic hydrocarbons (ESEPA 16, including coronene)
Calcium	Phenol
Alkalinity	Cyanide (total)
Ammonia	
Total Nitrogen	
Phosphate	
Total Phosphorus	

In order to gain insight into the baseline conditions of the surrounding surface water features, laboratory test results for surface waters were compared with S.I. No. 272 of 2009 [and amendments thereof including Surface Water Amendment Regulations S.I. No. 386 of 2015]. S.I. No. 77/2019 - European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019. Elevated levels of ortho-phosphate were noted in the River Tolka (SWS003 and SWS004).

10.3.13 Flood Risk

The various sources of flooding (fluvial, tidal, pluvial and groundwater sources) were assessed, and it was determined that the site, at least in part, is at risk of flooding from fluvial and groundwater sources.

In terms of existing flood risk, the portion of the proposed Scheme within Tolka Valley Park has a high risk of fluvial flooding from the River Tolka (Flood Zone A). Parts of Finglas village also have a high risk of fluvial flooding from the Bachelors stream. The remainder of the site have a low probability of fluvial flooding. The proposed Scheme site has a low probability of tidal, groundwater or pluvial flooding.

A separate Flood Risk Assessment (FRA) has been prepared in accordance with the Department of the Environmental, Heritage and Local Government (DEHLG) and the Office of Public Works (OPW) Planning System and Flood Risk Management Guidelines for Planning Authorities (hereafter referred to as the FRM Guidelines) (DEHLG and OPW, 2009). A copy of the FRA Report is included in Volume 5 - Appendix A10.2 of this EIAR and a summary of the Flood Risk Assessment is presented as Section 10.5.

The FRM Guidelines define three Flood Zones, namely:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% Annual Exceedance Probability (AEP) or 1 in 100 years for river flooding or 0.5% AEP or 1 in 200 years for coastal flooding);
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% AEP or 1 in 1,000 year and 1% AEP or 1 in 100 years for river flooding, and between 0.1% AEP or 1 in 1,000 year and 0.5% AEP or 1 in 200 years for coastal flooding); and
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% AEP or 1 in 1,000 for both river and coastal flooding). Flood Zone C covers all areas which are not in Flood Zone A and Zone B.

According to the definitions in 'Table 3.1 – Classification of vulnerability of different types of development' of the FRM Guidelines, as the proposed development consists of 'primary transport infrastructure', this is classified as 'highly vulnerable development'. If the work areas are within Flood Zone A or B and the development being classed is "Highly Vulnerable", a Justification Test is required to be passed for the development proposal to go ahead. The Justification Test for the Proposed Scheme is presented as Table 5.1 of the Flood Risk Assessment Report.

10.4 Potential Impacts

10.4.1 Introduction

This section sets out the potential impacts that may occur as a result of the proposed Scheme, taking the proposed drainage design (summarised below) in account, but in the absence of any further mitigation.

The predicted residual impacts, which are cognisant of the proposed mitigation measures (outlined in Section 10.5) are then presented in Section 10.6 below.

10.4.2 Characteristics of the Proposed Scheme

Full details of the proposed Scheme are provided in Chapter 5 (Description of the Proposed Scheme) but elements of relevance to the surface water environment, such as impermeable areas and drainage design are provided below.

10.4.2.1 Impermeable Areas and Drainage Principles

The drainage design is based on a number of principles, as set out in Appendix A10.5 – Drainage Design Basis, and summarised below:

- Where possible, SuDS-based systems are used to dispose of surface water runoff generated by the proposed development;
- Alleviate pressure on the existing drainage networks in the vicinity of the scheme through the use of attenuation systems, SuDS systems and changing of hardstanding areas to grassed areas;
- Base outfall rates from the attenuation areas on greenfield and brownfield assessments;
- A design objective is to minimise health and safety risks of construction and maintenance personnel wherever possible, in accordance with the Principles of Prevention; and
- The design has to take into consideration the sensitive habitats which are impacted by the proposed route, the River Tolka, the Royal Canal, and Integrated Constructed Wetland.

Where feasible, drainage features incorporating SuDS are used. The design of these SuDS features is in accordance with the principles and details outlined in the CIRIA SuDS manual and in the Dublin City Council produced document 'Sustainable Drainage Design and Evaluation Guide 2021'. SuDS provides 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.

Attenuation will be provided in the form of filter drains, tree pits and bioretention systems. 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 aim of the design is to reduce the surface water loading on the existing surface water drainage networks in the regions. This has been achieved by adoption of the following techniques:

- Replacement of hardstanding areas with grassed areas: In keeping with the principles of the circular economy, where possible paved areas are converted to grass. The absorptive capacities of the grass and subsoil cause a reduction in the volume of surface water reaching the existing piped surface water sewers. The grass and subsoil also provide a measure of treatment to the surface water runoff, reducing the quantity of silt and contaminants that enter the piped surface water sewers;
- Provision of bioretention areas: These are SuDS features incorporating grass and planting, and provide attenuation and treatment to surface water runoff;
- Tree Pits: These are SuDS features which provide attenuation and treatment to surface water runoff. The tree pits incorporate soil pits, which promote attenuation and treatment;
- Online Storage: Where necessary, online storage is provided in the form of oversized attenuation pipes which incorporate flow control devices; and
- Attenuation Pond: An attenuation pond is proposed adjacent to the ICW. This will provide attenuation and treatment to the surface water from the Luas trackbed drainage system and connecting filter drains.

10.4.2.2 Key Infrastructure Proposed

There is a detailed description of the proposed Scheme (Section 5.7 of Chapter 5) and a section describing key infrastructural elements associated with the proposed Scheme (Section 5.8 of Chapter 5). These sections should be read in their entirety in order to gain a full understanding of the proposed Scheme and its associated key infrastructural elements. Chapter 6 (Construction Activities) describes the Construction Phase for the works related to these key infrastructure elements.

10.4.3 Do Nothing Scenario

The ‘Do Nothing’ Scenario represents the conditions in the event that the proposed Scheme is not constructed. Section 0 summarises the current status of surface waterbodies, as well as existing pressures on the surrounding water environment.

Changes to the hydrological baseline would occur due to climate change and the likely increase in hardstanding areas as greenfield areas are developed. Where greenfield areas are developed, developers will be required to reduce runoff rates to greenfield levels, however time of concentrations will have altered. As future development will therefore be mitigated by the requirement of developers and Local Authorities to provide attenuation, it is considered the largest potential impact will be increased rainfall intensity and occurrence of rainfall events due to climate change.

With respect to water quality, it is the case that river waterbodies within the study area are currently ‘At Risk’ and have a ‘Poor’ status, based on the 2016-2021 records. The Draft RBMP includes an action for Irish Water (now Uisce Éireann) to continue investment in water infrastructure. Over time, it is expected that the status of the river bodies within the study area will improve and there should be a progression towards ‘Good’ status. This will occur as existing treatment plants within the catchment are approved and leaks from foul pipes are repaired, amongst other works.

10.4.4 Flood Risk Assessment

10.4.4.1 Introduction

A Site-Specific Flood Risk Assessment has been undertaken and is included as Appendix A10.2 (Volume 5 of this EIAR). A summary of the flood risk sources, and potential impacts is provided below.

10.4.4.2 Coastal Flood Risk

The subject site is not at risk from coastal flooding.

10.4.4.3 Groundwater Flood Risk

The subject site is not at risk from groundwater flooding.

10.4.4.4 Pluvial Flood Risk

There are no recorded instances of pluvial flooding along the route. It is considered that flooding of Broombridge Railway Station, which occurred on 24th October 2011, was due to blockage of the Royal Canal at Glasnevin.

Existing hardstanding areas along the route are currently drained by surface water networks. As part of the proposed works, a proportion of the existing hardstanding areas is to be converted to grassed areas. These grassed areas will incorporate SuDS features such as tree pits and bioretention areas. These will reduce the surface water loadings on the existing storm water networks. The replacement of hardstanding areas with grassed areas incorporating SuDS features will reduce the probability and severity of potential pluvial flooding when compared with the pre-development condition.

In addition to the SuDS features mentioned above, the proposed Scheme will incorporate attenuation measures such as retention ponds and online attenuation storage. These measures will reduce the probability and severity of potential pluvial flooding, when compared with the pre-development condition.

10.4.4.5 Fluvial Flood Risk

There are no recorded instances of either Finglaswood Stream or Bachelors Stream flooding. As both of these watercourses are relatively deep in comparison with the levels of adjacent residential properties, commercial properties and public infrastructure within the region, it is considered they present a low risk. The piped section of the Finglaswood Stream has significant hydraulic conveyance capacity relative to the contributory surface water flows. The proposed Scheme will not result in any increase in the surface water flows within either the Bachelors Stream or the Finglaswood Stream.

The River Tolka has flooded previously. A flood extents map for the 1 in 100-year Flood Event (plus 20%) has been provided as part of Volume 5 - Appendix A10.2 of this EIAR. During previous flood events, the Integrated Constructed Wetland was under water. In accordance with the OPW criteria, the soffit of the proposed bridge crossing is a minimum of 300mm above the 1 in 100-year Flood Event (and which includes 20% for Climate Change). The bridge abutments have been set back, behind the top of the riverbank, so the impact on the flood regime is kept to a minimum. A hydraulic model of the pre- and post-development hydraulic regimes of the river has confirmed that the proposed bridge crossing will have negligible impacts on the river's flood levels. Refer to Volume 5 - Appendix A10.2 for further details. The proposed Scheme will not result in any increase in surface water flows within the River Tolka.

The Royal Canal is a human-made watercourse, and its water levels are controlled by locks. As already indicated in this chapter, there was a flooding event on 24th October 2011, where the rail track at Broombridge Station flooded, and it is now understood that this was due to a blockage of the Royal Canal at Glasnevin. The proposed Scheme will not result in the discharge of any additional surface waters to the Royal Canal. The clearance of the proposed bridge structure above the water surface of the Royal Canal has been agreed with Waterways Ireland. The levels of the proposed Luas trackbed are above the flood levels observed on the 24th of October 2011.

10.4.4.6 Justification Test

The proposed Scheme is categorised by the Planning System and Flood Risk Management Guidelines for Planning Authorities (DEHLG and OPW 2009) as a 'highly vulnerable development' and is required to pass the justification test. The proposed development has passed the justification test - refer to the Site-Specific Flood Risk Assessment (Volume 5 - Appendix A10.2 of this EIAR).

10.4.5 WFD Assessment

10.4.5.1 Introduction

The full WFD Assessment is provided in Volume 5 - Appendix A10.1 of the EIAR. A summary is provided here for ease of reference.

10.4.5.2 Overview

Taking into consideration the anticipated impacts of the proposed Scheme on the biological, physio-chemical and hydromorphological quality elements, following the implementation of design and mitigation measures, it is concluded that it will not compromise progress towards achieving Good Ecological Status (GES) or cause a deterioration of the overall Good Ecological Potential (GEP) of any of the waterbodies that are in the scope. The compliance of the proposed Scheme with the environmental objectives of the WFD is presented in Table 10-15.

Table 10-15: 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 changes to waterbodies identified as high status.	Yes
No changes that will cause failure to meet surface water GES or GEP or result in a deterioration of surface water GED or GEP	After consideration as part of the detailed compliance assessment, the proposed Scheme will not cause deterioration in the status of the waterbodies 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 waterbodies	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

Considering all requirements for compliance with the WFD, the proposed Scheme will not cause a deterioration in status in any waterbody, nor prevent it from achieving GES or GEP; the WFD Assessment concludes that the proposed Scheme in combination with other proposed developments within 500m of the study area will not compromise the achievement of the objectives of the WFD for any of the surrounding waterbodies; and it complies with other environmental legislation. It can be concluded that the proposed Scheme complies with all requirements of the WFD.

10.4.6 Construction Phase

10.4.6.1 Introduction

During the Construction Phase, there are a number of construction activities with the potential to result in surface water impacts, including site clearance, earthworks, utility diversions, road resurfacing, junction realignments, construction of the proposed Scheme, construction of watercourse and canal crossing structures, alterations to existing footpaths, establishment of new footpaths and cycleways, and

remediation works to the existing Integrated Constructed Wetland in Tolka Valley Park. Chapter 6 (Construction Activities) provides further detail on the principal activities associated with the Construction Phase of the Proposed Scheme.

There will be a number of construction compounds and haul roads introduced temporarily in order to support the Construction Phase. These compounds will be put in place in advance of construction works as it progresses along the scheme. Compound locations have been identified along the route of the proposed Scheme and these are shown on drawing in Volume 4 – Map Figure 6-1. Construction compounds and haul roads are summarised in Section 10.4.6.3 of this Chapter, with further detail presented in Chapter 6 (Construction Activities) Section 6.5.7 and 6.5.8.

This section considers the potential impacts of the Construction Phase of the proposed Scheme, without consideration for mitigation or control measures.

10.4.6.2 Potential Construction Impacts Overview

There are a number of potential construction-related impacts which, in the absence of mitigation, would impact the existing water regime 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 and for each waterbody within the study area. These potential construction phase impacts include:

Hydrology

In the absence of mitigation, the potential impacts on hydrology are as follows;

- Disruption to local drainage systems due to diversions required to accommodate the construction works;
- Temporary increase in hardstanding areas and/or soil compaction during construction works which could result in temporary increased runoff rates to waterbodies; and
- Dewatering activities could alter the groundwater regime, affecting the baseflow to a surface water receptor.

Water Quality

In the absence of mitigation, the potential impacts on water quality are as follows;

- River Tolka and Royal Canal polluted by construction debris during construction of bridge crossings;
- Silty water runoff containing high loads of suspended solids from construction activities. This includes the stripping of topsoil / road surface during site preparation; the construction of widened roads; the dewatering of excavations and the storage of excavated material;
- Contamination of waterbodies with anthropogenic substances such 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 waterbodies or drains connected to the waterbodies;
- Re-exposure of historically settled contaminants within or near to waterbodies because of working within or near Tolka Park which has a historic landfill. Activation of new flow paths through Tolka Park historic landfill resulting in release of contaminants; and
- Release of accumulated contaminants contained within the ICW adjacent to the River Tolka.

Hydromorphology

In the absence of mitigation, the potential impacts on hydromorphology are as follows;

- Disruption to the hydromorphology of the River Tolka due to the construction of the structural abutments of the bridge crossing; and
- Increased sediment loading as a result of silty water runoff or dewatering activities, introducing a sediment plume, potentially leading to the smothering of bed substrate and changes to existing morphological features.

10.4.6.3 General Construction Phase Impacts

Introduction

There are several aspects of the proposed Scheme that could result in potential impacts to more than one waterbody receptor during the construction phase. For example, flood risk can temporarily increase due to altered drainage and changes in land use which both alter the dynamics of a flood regime. Similarly, the construction compounds, haul roads and the historical landfill have the potential to pose impacts to numerous receptors (see below).

Construction Compounds

As part of preparatory works, the construction compounds will be set up in advance of progressing the construction works in the associated areas and will provide facilities both for the Contractor and the Employer's Representatives and facilities for the temporary storage of materials. Site compounds will also include offices, welfare facilities and plant as well as limited parking for construction personnel.

Compound locations have been identified along the route of the proposed Scheme and these are shown on drawing in Volume 4 – Map Figure 6-1. Please refer to Table 10-16 for the locations of the proposed construction compounds.

Table 10-16: Location of Site Compounds

No.	Location	Use (Primary / Secondary)	Compound Size
C-31A	West of Broombridge Road – on southern side of rail and canal crossing adjacent depot entrance	S	2,036m^2
C-31B	West of Broombridge Road – use of green area to north of railway	P	3,427m^2
C-31C	West of Broombridge Road – use of unit 124 Broombridge Close in the Glen Industrial estate prior to demolition	P	1,522m^2
C-31D	Tolka Park – The Parks Building	S	2,519m^2
C-32A	Adjacent to St Helena's Stop	S	5,448m^2
C-32B	Northwest corner of Wellmount Road crossing	S	1,034m^2
C-33A	Old Park Superintendent's House and land to north next to Finglas Fire station	S	1,829m^2
C-33B	Northern extents of Mellowes Park	P	2,017m^2
C-33C	St Margaret's / McKee's Avenue Junction	S	948m^2

As shown above, construction compounds are identified as either Primary or Secondary. The primary compounds will contain a main site office, and welfare facilities for both the Employer's and Contractor's personnel. An area for materials to be stored for reuse will be provided, as necessary. Items of plant and equipment will also be stored within the compound. Limited parking for construction vehicles will be allowed at the construction compound. The secondary compounds will contain some local site office and welfare facilities. They will also be localised storage for material, plant and equipment within the compound. Limited parking for construction vehicles will also be available.

Materials for reuse such as topsoil, subsoil, concrete, rock etc., may also be stored at the construction compounds for reuse as necessary where space permits. Measures will be put in place at the compounds to ensure surface run-off is properly managed and treated in accordance with industry standards.

Haul Roads

Where the proposed Scheme will be constructed off existing roads and in parks, haul roads for the transport of excavated material and the movement of construction materials, equipment and plant to and from the proposed Scheme will be required.

Proposed haul roads have been identified along the route of the proposed Scheme and these are shown in Volume 4 – Map Figure 6-1 and further assessed in Chapter 18 (Material Assets: Traffic and Transport) of this EIAR. These will follow the cycle lanes/footpath provisions adjacent to the track where possible, meaning that the materials and formations used can ultimately be used for the cycle lanes and thus minimise environmental impacts.

The construction of the haul roads through the parks will entail a 6m wide hydraulically bound compacted layer of granular aggregate materials, constructed parallel and offset from the track alignment. The topsoil will be stripped and set aside in bunds for reuse. A geotextile material will be installed followed by the installation and compaction of a suitable layer of granular material. Wheel cleaning facilities will be provided where necessary.

The main proposed haul roads through the park areas are further described in Table 10-17 below.

Table 10-17: Haul Roads through Park Areas

Location	Access Arrangements	Length
Tolka Valley Road	A haul route is required to access / egress the Works in Tolka Valley Park and for the Construction of the Tolka Valley Park Bridge from the north at Tolka Valley Road. This will also facilitate access to the construction compound. A turning area will be provided north of the bridge. A separate access to the Tolka Valley Park Bridge from Ballyboggan Road will also be required for the construction works.	254m
Tolka Valley Road to St Helena's Road	A haul road will be provided the length of St Helena's Park to facilitate the construction works with access / egress at either end. This will follow to the west of the proposed track alignment and along the proposed cycle lane. This will provide two-way access to the construction works.	545m
Farnham Pitches to Wellmount Road	A haul road will be provided adjacent to Farnham pitches. It will be constructed post repositioning of the pitches and used for construction of the Luas infrastructure. This will follow to the west of the proposed track alignment and to the east of the repositioned pitches. This will provide two-way access to the construction works.	440m
Mellowes Road to Casement Road	A haul road will be provided along the length of Mellowes Park. The road will follow the proposed footpath route to the west of the track alignment. This will provide two-way access to the construction works.	757m

Tolka Valley Park Historical Landfill

Tolka Valley Park is the site of a historical landfill. Testing has revealed the leachate to not be hazardous, but due to the topography of the region, any leachate emerging from the subsoil will flow in the direction of the ICW and the River Tolka. During the construction of the drainage works within Tolka Valley Park some of the excavated material could potentially be contaminated with leachate from the historical landfill. If not correctly stored / disposed of, runoff from the contaminated material could enter watercourses. For further details, refer to Chapter 11 (Land and Soils: Soils, Geology & Hydrogeology) of this EIAR.

10.4.6.4 Assessment of Impacts on Receptors during the Construction Phase

A detailed assessment of the potential impacts is provided below, and a summary table is provided as Table 10-18.

Finglaswood Stream

The proposed route of the Luas crosses the culverted Stream at several locations. CCTV surveying has revealed the culvert to be at a depth of greater than 7m beneath existing ground level in places, with deep manholes provided where the stream changes direction. It is not proposed to alter the route of Finglaswood Stream as part of construction works. It is considered there is no flood risk to the scheme from the Finglaswood stream, mainly due to the depth and alignment of the existing culvert.

The stream discharges directly to the River Tolka in the vicinity of the ICW and includes an overflow into the ICW. During construction, the overflow to the ICW will be repositioned as part of the enabling works as the existing location will be impacted by the proposed Tolka Valley Park Bridge. There is some potential for pollution during the installation of the new overflow from silt, concrete and construction-related debris if not installed correctly. In this scenario, potential impacts will be Adverse, Short-Term, and of Minor magnitude, resulting in impacts of Imperceptible significance.

The construction work on the road sections discharging to the Finglaswood Stream consist of the realignment of existing roads, adjustment of kerbs and new road layouts. If construction works resulted in silt or debris getting washed into these connecting networks, it would enter the Finglaswood Stream culvert indirectly. Potential impacts will be Adverse, Short-term, and of Minor Magnitude, resulting in impacts of Imperceptible significance.

Potential also exists for the construction-related debris to enter the Finglaswood Stream during the construction of the surrounding haul roads. The potential impacts include increased surface water run-off and sediment loading. There is also increased potential for hydrocarbons to enter the Finglaswood Stream as a result of minor fuel leaks from machinery, etc. Potential impacts will be Adverse and Short-Term, and of Minor magnitude, resulting in impacts of Imperceptible significance.

As part of the proposed Scheme, it is necessary to relocate two football pitches at Erin's Isle GAA Club. The main ancillary works required to facilitate the relocation of both pitches will include site clearance, topsoil stripping, installation of drainage network and associated outfall pipes, installation of stone sub-base, floodlight ducting and all associated works. The pitch relocation will require alteration and expansion of the existing drainage system. An attenuation pipe will be installed along the perimeter of the new pitches, connecting to the existing surface water network. While the Finglaswood Stream is culverted in this area, a potential indirect pathway for pollutants, such as silt and hydrocarbons, exists via the surrounding drainage network. There is also potential for an increase in run-off due to the compaction of soils. This will reduce the infiltration capacity and increase the rate and volume of direct surface run-off. The nature of these works would also increase the likelihood for sediment loading or an accidental spill, however, such an event would be a rare occurrence and would only have the potential to alter the character of a small element of the receptor in the short term. Potential impacts will be Adverse and Short-Term, and of Minor magnitude, resulting in impacts of Imperceptible significance.

Construction compounds C-31D, C-32A and C32B will be established in the vicinity of the flow path of the Finglaswood Stream. Impacts associated with construction compounds include increased surface water run-off and/or increased sediment in run-off. Other sources of pollutants include cement, fuel or oil spills from within the compound. Given the culverted nature of the watercourse, contaminants will only reach the waterbody indirectly via the local surface water drainage network. Potential impacts will be Adverse, Short-term and of Minor Magnitude, resulting in impacts of Imperceptible significance.

The works will also include the repositioning of the existing gullies, together with new connection pipes between these gullies and the existing surface network within the region. The Luas line itself is to be installed at ground level with excavation works kept to a minimum. Testing has indicated that the stream contains foul sewer connections and there are also a number of drainage networks and surface water

collection systems which connect into the culverted Finglaswood Stream. If silt or debris reaches the Finglaswood Stream, potential impacts will be Adverse, Short-term, and of Minor Magnitude, resulting in impacts of Imperceptible significance.

River Tolka

The construction of the LRT will cause soil compaction within the park areas which will result in increased runoff rates to the River Tolka. Surface water run-off in this instance would contain high loads of suspended solids from construction activities. As a result, potential impacts will be Adverse and Short-Term, and of Minor magnitude, resulting in impacts of Slight significance.

A bridge structure will cross the river at skew connecting Broombridge Road and Tolka Valley Park. As shown in Figure 10-2, the abutments will be set back from the top of the riverbanks, however, it is noted that the abutments remain within the flood plain of the river. During the construction of the abutments there will be a temporary disturbance of the flood plain adjacent to the river channel as excavation and construction works are carried out. This disturbance could result in material being washed into the river during topsoil stripping and during the excavation of the abutments themselves, where there will be the potential for the river to become contaminated by the excavated material.

During the construction of the abutments, there is also potential for the river to become polluted with concrete, or by fuel / oil in the event of a spillage in the vicinity. During the construction of the abutment, groundwater will be lowered by pumping. The pumped groundwater may contain sediments, and, if pumped directly to the Tolka this has the potential to cause pollution within the River Tolka. Overall, potential impacts from the construction of the bridge will be Adverse and Short-Term, and of Moderate magnitude, resulting in impacts of Moderate significance.

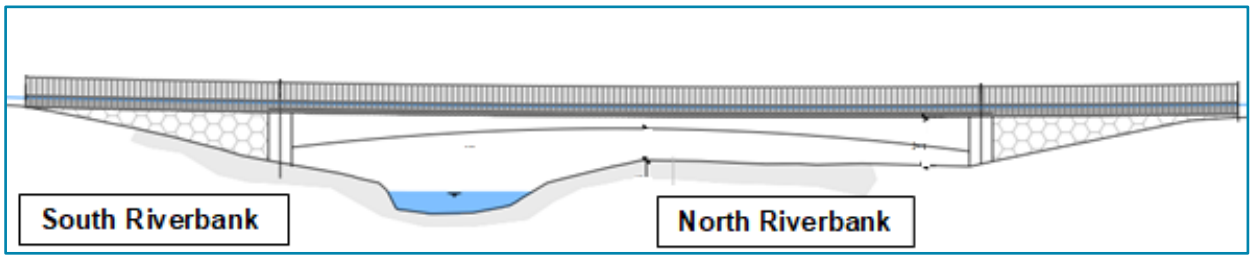

Figure 10-2: Tolka Valley Park Bridge

The FRA found that the main obstruction on the watercourse was the existing downstream bridge, which has limited conveyance capacity. The risks of flooding of the proposed development due to groundwater and pluvial flooding are moderate and can be managed during construction of the proposed Scheme and therefore comply with the Department of the Environment, Climate and Communications (DoECC) / OPW requirements. The Contractor will maintain awareness of rainfall event and weather forecasts by Dublin City Council (DCC), Finglas County Council (FCC) and Met Éireann, as appropriate during construction, and as is current standard practice.

The Tolka Valley Park Bridge will require the initial construction of a haul road from Tolka Valley Road to the north of the bridge. Construction compound C-31D to the north of the River Tolka will facilitate the bridge construction and the machinery and material storage. The haul road will provide access to this compound. The haul road through this section will be located in the park from Tolka Valley Road to the west of the track. This will provide access to the north abutment and to the proposed construction compound at the Parks Building. A separate access will also be required off Ballyboggan Road to the south abutment of the bridge. Potential impacts from haul roads will be Adverse and Short-Term, and of Minor magnitude, resulting in impacts of Slight significance.

Topsoil and subsoil stored at construction compounds C-31C and C-31D may get washed into the River Tolka via existing surface water drainage networks in the region. Construction compounds also pose a potential risk in terms of cement and hydrocarbons reaching surrounding waterbodies due to accidental

spillages or leaks. Potential impacts will be Adverse and Short-Term, and of Minor magnitude, resulting in impacts of Slight significance.

Royal Canal

The proposed bridge is to facilitate the provision of the Luas alignment over the existing railway line and Royal Canal, and with the approaches along Broombridge Road to the north, and to Broombridge Stop to the south. The set back distance between the waterbody and the abutments has been agreed with Waterways Ireland. As this is a canal, there is no measurable flood plain. Groundwater pumped to allow the construction of the abutments has the potential to pollute the Royal Canal.

The Royal Canal and Rail bridge is an eight-span structure. The first three spans have a steel composite superstructure with variable depth box girder, the following five have an in-situ concrete slab deck. The construction activities will entail:

- Installation of piled foundations and parts of substructure components. Temporary working platforms will be formed directly adjacent to the pier and abutment foundations with aggregate material;
- Preparation of detailed method statements, where piers are being constructed adjacent to the Royal Canal, to minimise risk to the waters of the Canal. These will be agreed as part of the consultation process with Waterways Ireland;
- Reinforced concrete abutments while the bespoke piers will be of in-situ reinforced concrete construction;
- Installation of steel box girder;
- After the steelwork installation, pouring of the concrete deck slab including use of a mobile concrete pump; and
- Construction of remaining piers, approach ramps behind the abutments, an erection of falsework for the concrete deck section, the pour of the concrete section of the bridge deck as well as the concrete slab on top of the steel box girder.

There is a probability that concrete, silt and other construction-related debris may get washed into the Royal Canal. Any potential impact from the construction of bridges will be Adverse and Short-Term, and of Moderate magnitude, resulting in Very Significant impacts.

The clearance above the water level of the Royal Canal and the tow paths has been agreed with Waterways Ireland. The construction of the crossing will not impact the water levels in the canal and will be subject to a Section 50 Consent from the OPW. There is a small likelihood that flooding could occur during the construction of the bridge, similar to what happened at Broombridge Depot previously. The construction of the crossing will not impact the water levels in the canal.

The proposed construction methodology for the canal works will include temporary acquisition of Waterways Ireland property (along a section of the Royal Canal), damming, electrofishing, dewatering, installing through flow pipes, temporary infilling, associated measures to facilitate the works and full reinstatement. Dewatering will be required with pumps running 24 hours a day, and settlement tanks discharging water back into the canal. As the construction works directly impact on the canal, there is the potential of contamination to the waters of the canal from concrete and construction-related debris.

Construction compound C-31A is present to the south of Broome Bridge, while C-31B and C-31C are present on lands to the northwest of the bridge. The locations of these compounds can be reviewed in Figure 6-1 (Sheet 1 of 4). Without mitigation measures, fuels and aggregates stored at these locations have the potential to pollute watercourses directly and indirectly through the surface water networks. Potential impacts will be Adverse and Short-Term, and of Minor magnitude, resulting in Moderate to Significant impacts.

There will also be a new surface water pipe along the full length of Broombridge Road, which will collect runoff from the new drainage infrastructure. At the Eastern end of Broombridge road, a new oversized attenuation pipe incorporating a “Hydro-Brake” flow control unit (or equivalent) will control the rate at which water is discharged to the existing public sewer. This attenuation pipe receives flows from Broombridge

Road and the Royal Canal Bridge Structure. To facilitate the new drainage infrastructure and the other elements of the scheme, the majority of the utility diversions will be constructed in excavated trenches. However, the utilities design has identified the requirement for horizontal directional drilling (HDD) trenchless methodologies to be used so as to divert an existing 600mm watermain and several ducting utilities under the existing railway and Royal Canal, and away from the proposed Royal Canal and Rail Overbridge pier foundation located to the north of the canal. The construction of these utilities will entail the provision of a launch pit area at the southern side where the HDD rig will be set up and a reception pit to the north, at the end of the crossing. Whilst it may be possible that some silt or construction-generated gravel and debris may enter the canal, it would be a rare occurrence and considered to be of Minor magnitude. Potential impacts to the Royal Canal are Adverse, Short-Term, resulting in Very Significant impacts.

Bachelors Stream

This is a minor stream that commences adjacent to the roundabout beside St Margaret's Road. The initial 500m of its length is an open stream before it is culverted for approximately 2km before outfalling to the River Tolka. There are a number of drainage networks and surface water collection systems which connect into Bachelors Stream. The highest likelihood of contamination of the stream will be in the vicinity of Mellowes Roundabout, where the existing roundabout is to be replaced by a junction, and there is the potential of silt or construction debris being washed into the stream. During this time, potential impacts are anticipated to be of Minor magnitude, resulting in Imperceptible Adverse Impacts as this section of the stream is an open channel.

During resurfacing, gully repositioning and road realignments works there is a probability that silt and debris from construction works, stored topsoil and subsoils may be washed into Bachelors Stream, via surface water drainage networks, and along the open section of the stream near Mellowes roundabout. The effect on Bachelors Stream will be localised, only occurring at locations where surface water networks connect into the culverted stream.

The establishment of the haul road in Mellowes Park and construction compounds C-33A, C-33B, C-33C and C-33D will lead to increased surface water run-off and could result in silt or oil/fuel entering the watercourse via existing drainage networks. Limited potential also exists for the construction-related debris to indirectly enter the Bachelors Stream during the construction of the Park & Ride Facility.

Worse-case potential impacts to Bachelors Stream are predicted to be Adverse, Short-Term, and of Minor magnitude, resulting in Imperceptible impacts.

Integrated Constructed Wetland

The ICW was constructed in 2000 to provide treatment to collected surface waters prior to their discharge to the River Tolka. The ICW was constructed as there was concern that some of the surface water collection systems outfalling to the River Tolka incorporated historical sewerage misconnections from domestic premises. The ICW provides treatment to the surface water from the Finglaswood Stream before discharging to the River Tolka. The ICW is composed of three sequential interconnected cells, 1, 2a and 2b, which outfall into an open lake.

There is also an existing drainage network pipe which currently outfalls into the ICW. This drainage network pipe clashes with the proposed bridge structure and will require relocation of the overflow pipe. There is the potential for pollution during the installation of the new overflow from concrete and construction-related debris, if not installed correctly. In this scenario, potential impacts will be Adverse and Short-Term, and of Moderate magnitude, resulting in impacts of Slight significance.

As part of the realignment works on the existing roads and the construction of the light rail line, silts and fines may be washed into the ICW via the existing drainage networks in the region. As the ICW provides a relatively high level of treatment, it is considered that any fines or silts washed into the ICW will become trapped there. Potential impacts will be Adverse, Short-Term, and of Minor magnitude, resulting in impacts of Imperceptible significance.

As part of the proposed Scheme, rehabilitation works are proposed on the ICW. During these proposed works, potential exists for construction debris to enter the ICW. Potential impacts will be Adverse and Short-Term, and of Minor magnitude, resulting in Imperceptible impacts.

The bridge structure crossing the River Tolka will overshadow 260m^2 of Cell 1 of the ICW. The overshadowed section of the ICW will no longer function adequately once the bridge is constructed. While the proposed Scheme will result in the loss of some of the treatment area within Cell 1, the proposed works within the ICW will offset the lost treatment area and ensure that the ICW is capable of providing improved passive treatment of through-flowing waters. Potential impacts will be Adverse and Short-Term, and of Moderate magnitude, resulting in Imperceptible impacts.

Construction compound C31-D and associated haul road are present to the north of the ICW (See Figure 6-1 Sheet 1 of 4) and have the potential to pollute watercourses directly and indirectly via overland flow or via surface water networks which discharge to the ICW. Potential impacts will be Adverse and Short-Term, and of Minor magnitude, resulting in Imperceptible impacts.

Designated Sites

As previously outlined, the designated sites within the Study Area include North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, North-West Irish Sea SPA North Dublin Bay pNHA, South Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, Booterstown Marsh pNHA.

The proposed Scheme's construction activities may lead to the introduction of pollutants, such as sediments and hydrocarbons, to local surface water and groundwater networks. Pollutants may be carried downstream to these designated sites via the Royal Canal and the River Tolka. Potential impacts include the degradation of the vegetation of Annex I habitats via hydrocarbon pollution. Due to the distance between the scheme and these designated sites, the pollutant levels reaching the designated sites will be insignificant.

Table 10-18: Summary of Potential Construction Phase Impacts

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts
Finglaswood Stream	Relocation of ICW outfall pipe	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Low	Minor	Adverse, Imperceptible and Short-term
	Resurfacing / Road realignments / Construction of Light Rail Line	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Construction of haul roads	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Relocation of Erin's Isle pitches	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Slight and Short-term
	Construction of compounds C-32A, C-32B and C-31D	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Alterations to drainage system	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
River Tolka	Resurfacing / Road realignments / Construction of Light Rail Line	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Medium	Minor	Adverse, Slight and Short-term
	Construction of River Tolka Bridge Crossing	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.) Increased flood risk Section of watercourse in shadow		Moderate	Adverse, Moderate and Short-term
	Construction of Tolka Valley Park Haul Road	Increased surface water runoff Increased sediment in runoff		Minor	Adverse, Slight and Short-term

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts
		Anthropogenic sources (fuel, etc.)			
	Construction of compounds C-31C and C-31D	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Slight and Short-term
Royal Canal	Construction of a Light Rail Line	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Very High	Minor	Adverse, Moderate to Significant and Short-term
	Construction of Royal Canal Bridge Crossing	Increased sediment in runoff Anthropogenic sources (fuel, etc.) Increased flood risk		Moderate	Adverse, Very Significant and Short-term
	Construction of compounds C-31A, C-31B and C-31C	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Moderate to Significant and Short-term
	Utility Diversions	Release of sediment Anthropogenic sources (oil, etc.)		Minor	Adverse, Moderate to Significant and Short-term
Bachelors Stream	Replacing Mellowes Roundabout with a Road Junction	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Low	Minor	Adverse, Imperceptible and Short-term
	Construction of a Light Rail Line	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Construction of Haul Road in Mellowes Park	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Imperceptible and Short-term
	Construction of Park & Ride Facility	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Negligible	Adverse, Imperceptible and Short-term

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts
	Resurfacing / Road realignments and repositioning of gullies along Finglas Road	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Construction of compounds C-33A, C-33B, C-33C and C-33D	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
ICW	Relocation of ICW outfall pipe	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Low	Moderate	Adverse, Slight and Short-term
	Resurfacing / Road realignments / Construction of Light Rail Line	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Remediation works on ICW	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Construction of River Tolka Valley Bridge Crossing	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.) Section of ICW in shadow		Moderate	Adverse, Slight and Short-term
	Construction of Tolka Valley Park Haul Road	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Construction of compound C-31D	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, North-West Irish Sea SPA	Scheme Construction	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Extremely High	Negligible	Adverse, Imperceptible and Short-Term

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts
North Dublin Bay pNHA, South Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, Booterstown Marsh pNHA	Scheme Construction	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Very High	Negligible	Adverse, Imperceptible and Short-Term

10.4.7 Operational Phase

10.4.7.1 Overview of Potential Impacts during the Operational Phase

Potential impacts that could occur during the operational stage of the Luas Finglas include:

- Changes to water quality as a result of the reduced car journeys on the surrounding road network will result in decreased levels of 'routine' road contaminants, such as hydrocarbons, metals, sediment and chloride (seasonal);
- Increase in flood risk. There are a number of ways in which the potential scheme could increase the flood risk along the route during the Operational Phase;
  - Increase in flood risk, due to an increase in the contributory hardstanding and soft landscaped areas to the existing drainage networks within the region.
  - Increase in flood risk due to the alteration of existing drainage networks in the region which were carried out during the Construction Phase of the Luas Finglas Scheme.
  - Increase in flood risk at watercourses, due to elements of the Luas Finglas scheme, i.e., River Tolka Valley Bridge Crossing and Royal Canal Luas Bridge.
  - Increase in flood risk due to inadequate maintenance of the Luas Finglas drainage infrastructure.
- Increase in erosion along banks or beds of watercourses, due to new structures; and
- Increase in erosion along banks or beds of watercourses due to an increase in flow rates at existing drainage network outfalls, or due to new drainage network outfalls.

10.4.7.2 Operational Phase Design Measures

The following measures are incorporated into the design of the scheme. The following criteria are applicable to all sections of the drainage design along the scheme. For further details in relation to the Drainage Design, refer to Appendix A10.5.

- Sealed Carrier pipes are designed so as not to generate surcharge out of the pipes during the 1 in 2-year Critical Storm Condition (This Critical Storm Condition will incorporate a 20% Climate Change Allowance);
- Filter Drains are designed so as not to generate surcharge out of the pipe during the 1 in 5-year Critical Storm condition;
- The new elements of the drainage systems have been assessed for the critical storm 1 in 100-year flood condition (the critical storm will incorporate a 20% margin for climate change). Whilst out-of-chamber flooding will be allowable during the critical 1 in 100-year condition (the critical storm will incorporate a 20% margin for climate change), the flood volume and how it will affect the adjacent infrastructure has informed provision of necessary mitigation measures;
- New attenuation storage units in the form of ponds, swales, tanks, pipes and similar methods will accommodate the critical 1 in 100-year storm (the critical storm will incorporate a 20% margin for climate change). Outfall rates from attenuation areas are based on greenfield and brownfield estimates;
- Where roads are to be realigned, at the very least, a gully will be provided for every 200 square metres of pavement. This will be an improvement on the predevelopment condition and will provide additional silt trapping and containment measures on the scheme;
- Throughout the scheme hardstanding areas are to be replaced with SuDS features such as bioretention areas and rain gardens. These will act as new attenuation for surface water falling on the scheme. This design mitigation, will result in an increase in subsurface attenuation volumes which will be utilised in the event of storm events;
- To mitigate the effect the scheme may have in causing polluted overland flow from the abandoned landfill reach the ICW and the River Tolka at a faster rate, post development, an attenuation pond is to be provided on the ground to the North of the ICW. This pond will intercept overland flow and provide an additional level of treatment before outfalling into the ICW;
- During the Operational Phase of the scheme, a number of different agencies will be responsible for the maintenance of the drainage infrastructure attached to the scheme. The design has taken into account the different agencies and their respective maintenance responsibilities, meaning the design

incorporates delineation (as much as is possible) between the different drainage elements. Prior to construction commencing, detailed maintenance plans and responsibilities for the different agencies will be prepared. The agencies responsible for the drainage elements of the scheme are as follows;

- Dublin City Council (Drainage infrastructure, gullies pipes and attenuation, within DCC catchment area;
- Finglas County Council (Drainage infrastructure, gullies pipes and attenuation, within FCC catchment area;
- Dublin City Parks Department (Drainage features incorporating SuDS elements, Tree Pits, bioretention areas, rain gardens); and
- Transdev (Responsible for maintenance of Luas track Drainage system).

- From an early stage in the design, it was clear that delineation was required between the different drainage elements of the proposed Scheme. The design takes into consideration the future maintenance regime of the proposed Scheme. A number of elements have been incorporated into the design to make maintenance operations simpler;

  - Infiltration trenches, bioretention areas and trees pits, all incorporate drainage pipes towards the base of the filter medium. These drainage pipes will help to encourage the migration of silt from between the filter medium, reducing the likelihood that the filter medium will become silted up during the lifespan of the infiltration trench, bioretention area or tree pit;
  - Catchpit manholes which incorporate a 300mm deep sump have been provided on drainage lines. Gully pots and collection gullies for the track drainage systems also incorporate sumps. Silt and gravel will accumulate in these sumps, which can be cleaned out by maintenance crews. The sumps help to prevent the accumulation of silt within the drainage pipes, the removal of which requires more complex maintenance operations;
  - Access chambers have been provided at all changes in direction of drainage pipe runs. Access has also been provided at all pipe junctions. These measures will make the clearance of any blockages within the pipes easier; and
  - SuDS features in the form of tree pits, bioretention areas, rain gardens, infiltration trenches and an attenuation pond have been incorporated into the design of the scheme. The grass and planting incorporated into these features will trap silts and gravels and prevent them becoming washed into the piped drainage infrastructure where they can cause siltation which will require clearance by maintenance operatives.

- Due to the overshadowing of the bridge, without mitigation the ICW will experience a loss in useable habitat. To offset this loss, a number of mitigation measures are to be carried out. These works consist of expanding Cell 1 of the ICW to the north and south. This will provide an additional area which will act as an offset against the section of the ICW that has been extinguished by the Tolka Bridge. Additional rehabilitation works will also be carried out on the ICW cells consisting of desilting, removal of plant species which are not appropriate, and replanting with appropriate species. For more detail refer to Appendix A10.4. All these works will improve the cells functionality and treatment capacity, and mitigate the impact on the ICW from the proposed bridge;
- For the Tolka Valley Park Bridge, the abutments have been set back 5 metres from the edge of the river to provide adequate space for flood flow. The bridge is designed to accommodate the 1% AEP (+20% for Climate Change) in accordance with the OPW's requirement. The bridge design also incorporates freeboard;
- The proposed drainage system through Tolka Park incorporates bioretention areas, infiltration trenches, filter trenches and an attenuation pond. Whilst testing has revealed that the landfill material is inert, the design measures will provide a level of treatment to any surface or subsurface runoff from the landfill material;
- The Park & Ride will accommodate an attenuation storage tank so that surface water from the roof and parking area attached to the facility will be attenuated before discharging to the existing drainage network at greenfield runoff rates; and

- Where nature-based SuDS features are not considered adequate for attenuating surface water runoff from hardstanding areas, attenuation in the form of tanks or pipes has been provided, i.e. adjacent to the existing Broombridge Luas Stop and along Broombridge Road.

10.4.7.3 Assessment of Impacts on Receptors during Operation Phase

Introduction

Assessments for each receptor are provided below, with a summary of impacts provided in Table 10-19. The pollutant load delivered to the surface water bodies within the Study Area is expected to reduce as a result of the reduced car journeys on the surrounding road network. Furthermore, the design does not result in any additional flows arising from the proposed Scheme.

Finglaswood Stream

There will be a minor change in the flow regimes and times of concentration within the Finglaswood Stream. This will be due to the alteration to the existing surface water networks, which will impact how the ground level flows. The proposed track largely drains towards a number of bioretention areas and infiltration trenches, alleviating pressure on the surrounding drainage network and ultimately the culverted watercourse. Potential impacts will be Minor, Beneficial and Permanent, resulting in impacts of Imperceptible significance.

Changes to hardstanding areas will not be significant, meaning flow rates will not substantially increase. The reconfiguration of St Helena's Resource Centre will result in minor additional hardstanding. It has not been confirmed whether the associated surface water drainage will discharge to this waterbody. This assessment has conservatively assumed it as so and considers the potential impact to be negligible as any such discharge from additional hardstanding will be limited to the greenfield runoff rate.

The new attenuation pipe installed as a result of the pitch relocation will provide sufficient attenuation to limit surface water discharge to the predevelopment run-off rate, limiting the flow using a "Hydro--Brake" (or equivalent) before discharging to the existing surface water network. Potential impacts will be Minor, Negligible and Permanent, resulting in impacts of Imperceptible significance.

River Tolka

The River Tolka Bridge Crossing will alter the flow regime within the waterbody due to the siting of the soffit and abutments, however, the FRA found that the increase in water level due to the construction of the bridge was negligible. The risks of flooding of the proposed development due to groundwater and pluvial flooding can be managed during operation of the proposed Scheme and therefore comply with the Department of the Environment, Climate and Communications (DoECC) / OPW requirements. Overall, based on the proposed crossing impeding the flow regime and casting a permanent shadow on the waterbody, the impact is regarded as Minor, Permanent and of Slight significance.

Tolka Valley Park is the site of a historical landfill. Testing has revealed the leachate to not be hazardous, but due to the topography of the region, any leachate emerging from the subsoil will flow in the direction of the ICW and the River Tolka. The new works have the potential to increase the connectivity between the historical landfill and the River Tolka. The proposed SuDS design measures will provide a level of treatment to any surface or subsurface runoff from the landfill material and reduce pollutants reaching the River Tolka. Potential impacts from surface or subsurface run-off from the historical landfill will be Adverse and Permanent, resulting in impacts of Negligible significance to the locality. In addition to the water quality impact, the section of the River Tolka beneath the Bridge will be in shadow once the proposed Scheme is established.

Without mitigation, there will a minor change in the flow regimes and times of concentration within the River Tolka. This will be due to the alteration to the existing surface water networks, which will impact how the ground level flows. New gully locations have the potential to reduce the amount of silt reaching the River Tolka. The proposed changes to hardstanding areas will not be significant, meaning flow rates will not substantially increase. As the Finglaswood Stream and Bachelors Stream both outfall into the River Tolka, potential exists for indirect impact from these watercourses on the River Tolka water. The impact on

the Tolka is a cumulative impact, as it is an impact driven by the impacts from the Finglaswood Stream and Bachelors Stream.

Royal Canal

As there are no new outfalls from the development discharging into the Royal Canal, there will be no alteration to the water quality or hydrology of the Royal Canal. Therefore, there will be no impact to the hydrology or water quality of the canal during the Operational Phase.

The proposed bridge over the Royal Canal will impact on the hydromorphology of the waterbody through the removal of a portion of soft canal bank. The removal of 100m of bankside habitat from the Royal Canal (which stretches over 145km) is considered unlikely to have a significant impact on the biological conditions, or the watercourse overall. The potential impact is considered to be Negligible, Adverse and Permanent, resulting in impacts of Imperceptible significance.

Bachelors Stream

There will be a minor change in the flow regimes and times of concentration within the Bachelors Stream (Tolka_050). This will be due to the alteration to the existing surface water networks, which will impact how the ground level flows. New gully locations have the potential to result in silt increases in the connecting drainage networks. Changes to hardstanding areas will not be significant, meaning flow rates will not substantially increase. Alterations to the stream's water quality are not considered significant.

Overall, the potential impact to Bachelors Stream is considered to be Negligible, Permanent and of Minor magnitude, resulting in Imperceptible impacts.

Integrated Constructed Wetland

As the ICW is to be impacted by the Tolka Valley Park Bridge Crossing, there will be some loss in area of the ICW. There will also be some overshadowing of the ICW, which will impact on its functionality. Without mitigation post development, there will be a loss in the functionality of the ICW, which is considered an Adverse impact of Major magnitude, with the potential to cause impacts of Slight to Moderate significance.

Surface or subsurface runoff from the historical landfill in Tolka Valley Park flowing into the ICW is considered to pose a Moderate, Adverse Impact of Slight significance.

Alterations to the surrounding drainage network, including the introduction of nature-based SuDS solutions, will provide treatment for surface water runoff. These drainage attributes will be beneficial for the ICW, with Minor, Imperceptible impacts that will be permanent in nature.

Designated Sites

The designated sites within the Study Area include: North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, North-West Irish Sea SPA North Dublin Bay pNHA, South Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, Booterstown Marsh pNHA.

SuDS measures introduced as part of the scheme are expected to reduce the potential for pollutants to reach the designated sites. Surface water operational impacts are not anticipated on the Natura 2000 sites' Qis, given the operational nature and emission outputs from the proposed development. Designated sites are predicted to experience negligible impacts as a result of the proposed Scheme.

Table 10-19: Summary of Potential Operational Phase Impacts

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts
Finglaswood Stream	Introduction of additional drainage measures, including SuDS	Decreased surface water runoff Decreased sediment in runoff Decreased anthropogenic sources (fuel, etc.)	Low	Minor	Beneficial, Imperceptible and Permanent
	Increase in impermeable surfacing	Increased surface water runoff Decreased sediment in runoff Decreased anthropogenic sources (fuel, etc.)		Negligible	Negligible, Imperceptible and Permanent
	Alterations to drainage system at Erin's Isle	Alteration to hydraulic regime within piped section of Finglaswood Stream		Minor	Negligible, Imperceptible and Permanent
River Tolka	River Tolka Bridge Crossing	Section of watercourse in shadow Soffit and abutments impacting flow regime within River Tolka Increased flood heights due to River Tolka Bridge Crossing	Medium	Minor	Adverse, Slight and Permanent
	Surface water drainage and overland flow from the historical landfill	Reduction in pollutants reaching the River Tolka due to SuDS measures, settlement pond and ICW measures		Negligible	Adverse, Imperceptible and Permanent
	Introduction of additional drainage measures, including SuDS	Increased surface water runoff Decreased sediment in runoff Decreased anthropogenic sources (fuel, etc.)		Negligible	Negligible, Imperceptible and Permanent
Royal Canal	Royal Canal Bridge Crossing	Section of watercourse in shadow Loss of soft bank habitat due to Construction of bridge	Very High	Negligible	Adverse, Imperceptible and Permanent

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts
Bachelors Stream	New gully locations	Decreased sediment in runoff	Low	Minor	Beneficial, Imperceptible and Permanent
	Increase in impermeable area	Increased surface water runoff Decreased sediment in runoff Decreased anthropogenic sources (fuel, etc.)		Negligible	Negligible, Imperceptible and Permanent
ICW	Alteration to ICW due to construction of Tolka Park Bridge crossing	Loss of habitat due to Construction of Tolka Valley Park Bridge crossing	Low	Major	Adverse, Slight to Moderate and Permanent
	Surface water drainage from the historical landfill	Surface or subsurface runoff from the historical landfill in Tolka Valley Park flowing into the ICW		Moderate	Adverse, Slight and Permanent
	Introduction of additional drainage measures, including SuDS	Decreased sediment in runoff Decreased anthropogenic sources (fuel, etc.)		Minor	Beneficial, Imperceptible and Permanent
North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, North-West Irish Sea SPA	Operation of the Scheme	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Extremely High	Negligible	Negligible, Imperceptible and Permanent
North Dublin Bay pNHA, South Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, Booterstown Marsh pNHA	Operation of the Scheme	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Very High	Negligible	Negligible, Imperceptible and Permanent

10.5 Mitigation and Monitoring Measures

10.5.1 Construction Phase

10.5.1.1 Introduction

The proposed mitigation measures to be implemented during the Construction Phase to avoid, prevent or reduce significant adverse impacts on the environment are presented in the following sections.

In terms of mitigation, a Surface Water Management Plan (SWMP) (Volume 5 - Appendix A6.4) and CEMP (Volume 5 - Appendix A6.1) have been prepared. These detail the 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. The implementation of the SWMP will be a condition within the construction contract Work's Requirements. The successful contractor(s), immediately following appointment, must detail 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 on any grant of approval.

At a minimum, all the control and management measures set out in the CEMP and 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 (if necessary); and
- Monitoring.

The CEMP and SWMP have taken into consideration the risks and work area and will reduce the risk to the waterbodies within the region.

The appointed Contractor shall carry out visual monitoring of surface water (settlement tanks, silt fences, fuel storage areas etc.) on a daily basis. In addition, weekly visual inspections of the Royal Canal and the River Tolka will be carried out.

Furthermore, surface water quality sampling will be undertaken at four locations: at stream outlets of the Finglaswood Stream, Bachelors Stream, and at the River Tolka (upstream and downstream), and Royal Canal (upstream and downstream). Surface water sampling will be undertaken throughout the length of the construction phase, with the first round to align with the commencement of the Geotechnical Ground Investigation works, and at intervals of 2 / 3 months thereafter.

10.5.1.2 Finglaswood Stream Construction Phase Mitigation Measures

Surface water run-off collected in excavations will be diverted to settlement tanks / bags and will not be allowed to discharge directly to the existing drainage system.

10.5.1.3 River Tolka Construction Phase Mitigation Measures

The mitigation measures during the Construction of the Tolka Bridge will be as follows (Refer to Figure 10-3);

- During excavation of the abutments, pumped groundwater shall not discharge directly to the River Tolka;
- Excavation of the abutments shall only be carried out during the summer months (April to September);
- Following the treatment and removal of the invasive species from this section of the works, this section will require the installation of silt fences and geotextile sandbag barriers to protect the Tolka Valley Park, the ICW and the River Tolka;

- The pile cap and abutment stem construction will utilize sheet pile protection with top of sheet piles set above the 1 in 5-Year Flood level; abutment construction will take approx. 8 – 10 weeks, a short enough period to lower the risk of flooding;
- For the construction of the Tolka Valley Park Bridge, there are no piers proposed within the river channel and both abutments are offset a minimum of 5m from the riverbank to minimise risk to waters during abutment construction; and
- The Contractor will maintain awareness of rainfall event and weather forecasts by Dublin City Council (DCC) and Met Éireann.

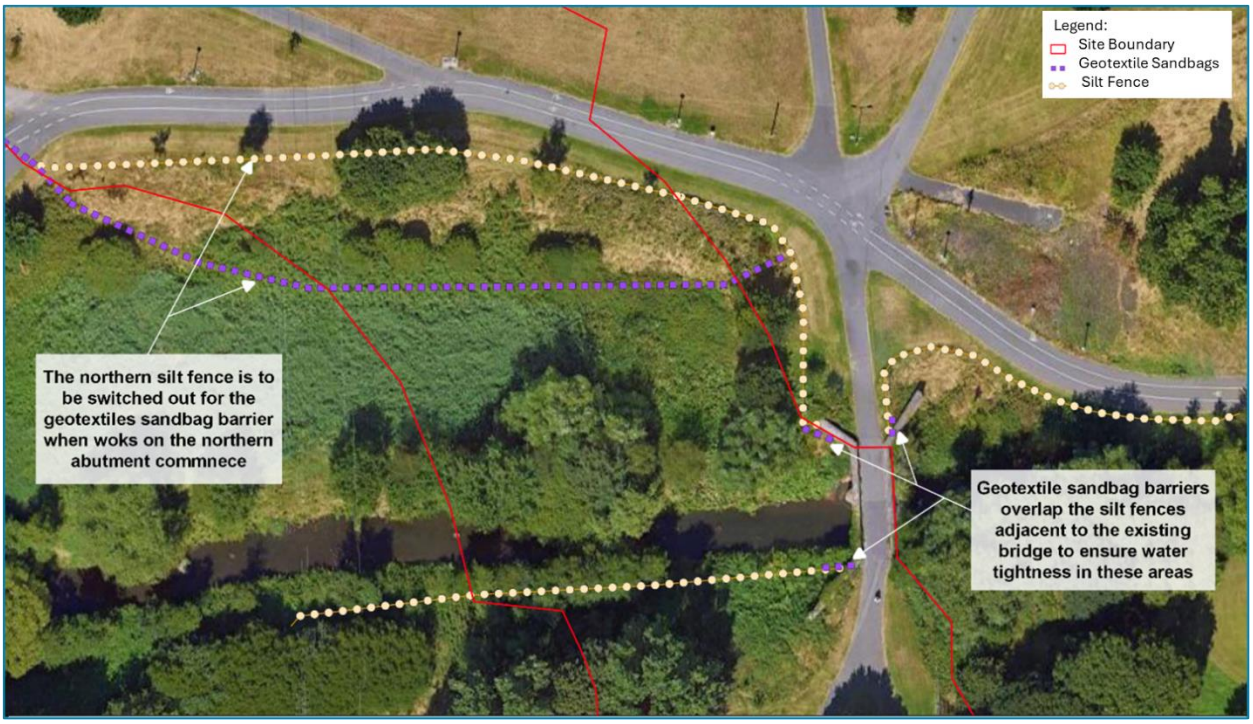

Figure 10-3: Location of Silt Fences and Geotextile Sandbags Adjacent to River Tolka

10.5.1.4 Royal Canal Luas Bridge Construction Phase Mitigation Measures

The mitigation measures of the Royal Canal Luas Bridge will be as follows:

- An Ecological Clerks of Works (ECoW) will be present and surface water run-off control measures will be implemented throughout the enabling and construction works in this area given the sensitivity of the habitats at this location, and the Royal Canal's status as a surface water pathway connecting the site to the Natura 2000 sites downstream;
- This section will require the installation of geotextile sandbag barriers to protect the Royal Canal and its bankside vegetation (refer to Figure 10-4);
- Topsoil stripping and storage of topsoil and other excavated material are to be carefully managed and stored correctly, to ensure fines and debris are not washed into the Royal Canal;
- Groundwater pumping will not be discharged directly to the Royal Canal; and
- The Contractor will maintain awareness of rainfall event and weather forecast by Dublin City Council and Met Éireann.

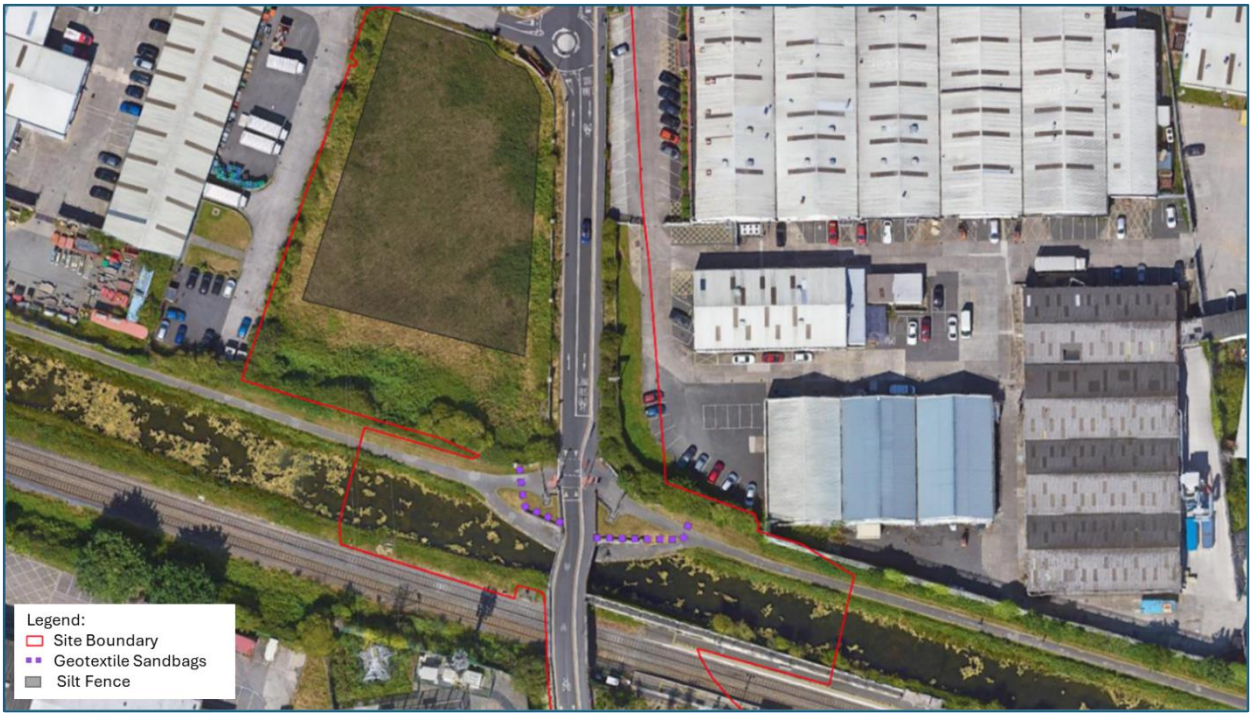

Figure 10-4: Location of Sandbag Barriers Adjacent to Royal Canal

10.5.1.5 Bachelors Stream Construction Phase Mitigation Measures

The mitigation measures for Bachelors Stream will be as follows:

- In addition to the measures in the SWMP, silt screens are to be provided on the open sections of Bachelors Stream; and
- Fine screens or grilles to be placed across gullies to ensure that silt is caught before becoming washed into piped networks.

10.5.1.6 ICW Construction Phase Mitigation Measures

A number of permanent mitigation works are proposed to offset the loss of habitat and functionality to the ICW due to the bridge construction. These works consist of expanding Cell 1, together with removing trees, silt and unsuitable plant species from the pond. The construction program for the rehabilitation works to the ICW is as indicated below. These works will form part of an advance works contract which will be completed prior to the main works commencing on the proposed Luas Finglas Scheme.

With reference to Figure 10-5, cell remediation works will include:

- Location and repositioning of surface water connection between the Finglaswood Stream and the ICW;
- Overpumping of feed waters from ICW inlet. Waters to be pumped from inlet to open water section of pond which is downstream of ICW cell 2B;
- Expansion of Cell 1 to the North and South, with associated extension of clay liner;
- Removal of unsuitable plant species within the ICW and replanting with appropriate species;
- Removal of accumulated silt within three cells of ICW;
- Clearing of pipes connecting Cells 1 to 2A and 2A to 2B, and 2B to open water pond;
- Removal of trees and root networks within cell 2B, together with associated repair of clay liner;
- Reconstruction of embankment and pipe connection between Cell 2B and open water pond;
- Reinstatement of minimal flows to ensure vegetation success. The majority of the flows coming from the Finglaswood Stream will continue to be overpumped, meaning only a minimal flow will pass through the ICW; and
- Monitoring of ICW establishment.

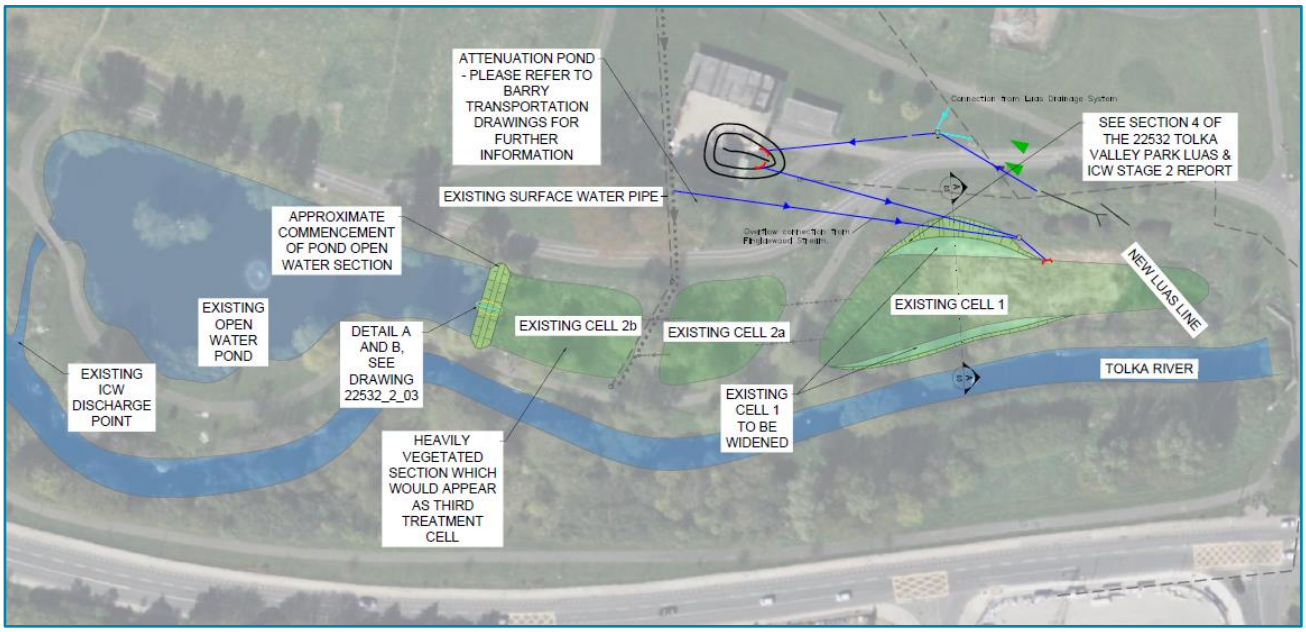

Figure 10-5: Integrated Constructed Wetland

With reference to Figure 10-6, the mitigation measures for the Integrated Constructed Wetland will be as follows;

- Silt screens to be provided adjacent to the section of the ICW which is to be impacted by the construction of the abutments;
- Sheet piling will be used during the construction of the abutments. This will limit the excavation extents, and hence impacts on the ICW; and
- Prior to works commencing on the ICW, the inlet pipe into the ICW is to be relocated away from the location of the abutment. Refer to details in Appendix A10.2 of the EIAR.

Figure 10-6: Location of Silt Fences and Geotextile Sandbags Adjacent to the ICW

10.5.1.7 Construction Compound Mitigation measures

The locations of the construction compounds have been described in Section 10.4.6.3. Mitigation measures for the construction compounds will be as listed below, for further details refer to Appendix A6.4.

- All chemical and fuel filling locations will be contained within signposted, designated bunded areas, a minimum of 10m from any surface water drain;
- At the construction compound, where the site is pervious, an area of hardstanding will be installed in a demarcated area for refuelling, and vehicle / plant cleaning and service areas. This area will be drained via a hydrocarbon interceptor trap to a soakaway if possible, or to local surface water drains, with the permission of the asset owner;
- Procedures and contingency plans will be in place at each work area to address cleaning up small spillages as well as dealing with an emergency incident. An Environmental Incident Response Plan is set out in Appendix A6.6;
- The storage of fuels, other hydrocarbons and other chemicals within the construction compound shall be in accordance with relevant legislation and with best practice; and
- Storage areas will be covered, wherever possible, to prevent rainwater filling the bunded areas.

10.5.1.8 Construction Phase Haul Road Mitigations

Mitigations for the haul roads include the following:

- Through grassed areas, shallow land drains will be provided adjacent to haulage roads. The land drains will be provided with check dams which will allow infiltration of the collected surface water to ground. These will not be provided in the vicinity of the historical landfill in Tolka Valley Park to avoid re-exposure of historically settled contaminants. Surface water runoff from haulage roads will be allowed to runoff onto adjacent parklands. Overland flow, when properly managed, can reduce the likelihood of contaminants spreading beyond the immediate vicinity of the haul roads and containing the potential exposure. Overall, overland flow is a safer and more environmentally sound method for managing haul road drainage in contaminated areas;
- Silt screens will be provided running alongside the haulage roads through grassed areas to prevent silt and fines from impacting on the adjacent landscape; and
- Procedures and contingency plans will be in place at each work area to address cleaning up small spillages as well as dealing with an emergency incident. An Environmental Incident Response Plan is set out in Appendix A6.6.

10.5.1.9 Park & Ride Construction Phase Mitigation Measures

Mitigation for the construction of the Park & Ride includes the following:

- During the Construction Phase of the Park & Ride, surface water will be collected and controlled on site. At no point during the Construction Phase will treated water be discharged to local surface water networks without the water quality meeting the statutory limits as set under the environmental quality standards referenced in the Surface Water Management Plan (SWMP) Appendix A6.4

10.5.1.10 Tolka Valley Park Historical Landfill Mitigation Measures

Mitigation measures for the treatment of contaminated material have been provided in the Chapter 11 – (Land & Soils: Soils, Geology and Hydrogeology) and in the CEMP and the SWMP. In accordance with Chapter 11, the appointed Construction Contractor will be responsible for the compliant management of all waste generated by construction activities and will be responsible for updating and implementing the CEMP, where modifications to the prepared CEMP will not give rise to any impacts more significant than those already identified and assessed in this EIAR or the NIS. The updated CEMP will identify construction methodologies for the proposed Scheme and standard operating procedures that will be implemented to minimise the impact. The appointed contractor (s) will implement in full all of the measures set out in the CEMP; and the Contractor will be responsible for regular testing of excavated soils to monitor the suitability of the soil for re-use. Samples of ground suspected of contamination will be tested

for contamination by the Contractor and ground excavated from these areas will be disposed of to a suitably licensed or permitted site, in accordance with the current Irish waste management legislation.

10.5.2 Operational Phase

Operational mitigation measures have been built into the design of the proposed Scheme and are outlined in Section 10.4.7.2. The proposed SuDS measures have been designed to mimic natural drainage and will provide a range of environmental benefit, encouraging infiltration, attenuation and passive treatment.

During the Operational Phase of the scheme, a number of different agencies will carry out maintenance of SuDS features in accordance with their respective management procedures. No additional mitigation measures are required.

Pre-emptive mitigation measures are to be implemented for the sustained performance of the ICW in advance of the bridge construction. It is programmed that works on the ICW will be progressed as part of the proposed enabling works.

10.6 Residual Impacts

10.6.1 Construction Phase

There will be no likely significant residual impacts from the Construction Phase of the Scheme, as shown in Table 10-20 below. Whilst it may be possible that some silt or construction-generated gravel and debris from the Construction Phase becomes trapped in surface water networks in the region, any significant accumulation of construction debris within surface water systems (piped surface water systems or steams/rivers), will be cleared as part of the schemes commissioning.

Table 10-20: Summary of Potential Residual Impacts during Construction

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts Post-Mitigation
Finglaswood Stream	Relocation of ICW outfall pipe	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Low	Minor	Adverse, Imperceptible and Short-term
	Resurfacing/Road realignments/ Construction of Light Rail Line	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Construction of Haul Roads	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Negligible	Adverse, Imperceptible and Short-term
	Relocation of Erin's Isle pitches	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Construction of compounds C-32A, C-32B and C-31D	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Altered drainage system	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
River Tolka	Resurfacing / Road realignments / Construction of Light Rail Line	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Medium	Minor	Adverse, Slight and Short-term
	Construction of River Tolka Bridge Crossing	Impact on flow regime during flood Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Slight and Short-term
	Construction of Tolka Valley Park Haul Road	Increased surface water runoff Increased sediment in runoff		Negligible	Adverse, Imperceptible and

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts Post-Mitigation
		Anthropogenic sources (fuel, etc.)			Short-term
	Construction of compound C-31C and C-31D	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Negligible	Adverse, Imperceptible and Short-term
Royal Canal	Construction of a Light Rail Line	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Negligible	Adverse, Imperceptible and Short-term
	Construction of Royal Canal Bridge Crossing	Increased sediment in runoff Anthropogenic sources (fuel, etc.) Increased flood risk	Very High	Negligible	Adverse, Imperceptible and Short-term
	Construction of compounds C-31A, C-31B and C-31C	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Negligible	Adverse, Imperceptible and Short-term
	Utility Diversions	Release of sediment Anthropogenic sources (fuel, etc.)		Negligible	Adverse, Imperceptible and Short-term
Bachelors Stream	Replacing Mellowes Roundabout with Road Junction	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Low	Minor	Adverse, Imperceptible and Short-term
	Construction of Light Rail Line	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Negligible	Adverse, Imperceptible and Short-term
	Construction of Haul Road in Mellowes Park	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Negligible	Adverse, Imperceptible and Short-term
	Construction of Park & Ride Facility	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Negligible	Adverse, Imperceptible and Short-term
	Resurfacing/Road realignments and	Increased surface water runoff		Negligible	Adverse,

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts Post-Mitigation
	repositioning of gullies along Finglas Road	Increased sediment in runoff Anthropogenic sources (fuel, etc.)			Imperceptible and Short-term
	Construction of compound C-33A, C-33B, C-33C and C-33D	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
ICW	Relocation of ICW outfall pipe	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Low	Minor	Adverse, Imperceptible and Short-term
	Resurfacing/Road realignments/ Construction of Light Rail Line	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Remediation works on ICW	Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Construction of River Tolka Bridge Crossing	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
	Construction of Tolka Valley Park Haul Road	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Negligible	Adverse, Imperceptible and Short-term
	Construction of compound C-31D	Increased surface water runoff Increased sediment in runoff Anthropogenic sources (fuel, etc.)		Minor	Adverse, Imperceptible and Short-term
North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, North-West Irish Sea SPA	Scheme Construction	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Extremely High	Negligible	Adverse, Imperceptible and Short-Term

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts Post-Mitigation
North Dublin Bay pNHA, South Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, Booterstown Marsh pNHA	Scheme Construction	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Very High	Negligible	Adverse, Imperceptible and Short-Term

10.6.2 Operational Phase

Mitigation measures for the Operational Phase of the proposed Scheme have been built into the design of the proposed Scheme, primarily through drainage design, bridge designs and landscaping. No significant residual impacts have been identified for the Operational Phase of the proposed Scheme whilst meeting the proposed Scheme objectives set out in Chapter 1 (Introduction).

In some cases, the impacts are positive due to the amount of newly introduced SuDS and attenuation features along the scheme. These new SuDS and attenuation features will provide treatment and attenuation to hardstanding areas which previously discharged directly to the public sewers. It is considered there is no material increase in flood risk due to the proposed Scheme.

As the completed proposed Scheme is projected to result in reduced car journeys along the adjacent roads, the pollutant load delivered to the surface water bodies by traffic in the region is expected to reduce. As part of the design, the existing surface water drainage systems in the region have been assessed and the design does not result in any additional flows being introduced which could result in flooding or pollution. In addition, there has not been any significant catchment displacements, where surface water from an existing paved surface is redirected to a different catchment. Therefore, the changes to traffic due to the proposed Scheme are considered to be neutral, with respect to the water environment.

Table 10-21: Summary of Operational Phase Residual Impacts

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts Post-Mitigation
Finglaswood Stream	Introduction of additional drainage measures, including SuDS	Decreased surface water runoff Decreased sediment in runoff Decreased anthropogenic sources (fuel, etc.)	Low	Negligible	Beneficial, Imperceptible and Permanent
	Increase in impermeable surfacing	Increase in surface water runoff Decreased sediment in runoff Decreased anthropogenic sources (fuel, etc.)		Negligible	Negligible, Imperceptible and Permanent
	Altered drainage system at Erin's Isle	Alteration to hydraulic regime within piped section of Finglaswood Stream		Negligible	Negligible, Imperceptible and Permanent
River Tolka	Introduction of additional drainage measures, including SuDS	Increased surface water runoff Decreased sediment in runoff Decreased anthropogenic sources (fuel, etc.)	Medium	Negligible	Negligible, Imperceptible and Permanent
	Tolka Valley Park Bridge Crossing	Hydromorphology of river altered during times of extreme flood events due to Bridge Crossing The set back distance of abutments (5m) from river edge will provide adequate space for flood flow, resulting in negligible impact on flood heights Section of Watercourse beneath new bridge structure to be in shadow		Minor	Adverse, Slight and Permanent
	Surface water drainage and overland flow from the historical landfill	Reduced pollutants reaching the River Tolka due to SuDS measures, settlement pond and		Negligible	Adverse, Imperceptible and Permanent

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts Post-Mitigation
		ICW measures. These design measures will provide a level of treatment to any surface or subsurface runoff from the landfill material			
Royal Canal	Royal Canal Bridge Crossing	Section of canal beneath new bridge structure to be in shadow Loss of soft bank habitat	Very High	Negligible	Adverse, Imperceptible and Permanent
Bachelors Stream	New gully locations	Decreased sediment in runoff	Low	Negligible	Beneficial, Imperceptible and Permanent
	Increase in impermeable surfacing	Due to new attenuation and SuDS measures reduced sediment content and longer times of concentration within drainage networks outfalling into Bachelors Stream		Negligible	Beneficial, Imperceptible and Permanent
ICW	Introduction of additional drainage measures, including SuDS	Decreased sediment in runoff Decreased anthropogenic sources (fuel, etc.)	Low	Negligible	Beneficial, Imperceptible and Permanent
	Surface water drainage from historical landfill	Surface or subsurface runoff from historical landfill flowing into the ICW		Minor	Adverse, Imperceptible and Permanent
	Tolka Valley Park Bridge	To offset the loss of habitat, Cell 1 will be expanded, and rehabilitation works will be carried out		Minor	Beneficial, Imperceptible and Permanent

Waterbody	Activity	Potential Impacts			
		Description of Impacts	Sensitivity of Receptor	Magnitude of Impacts	Significance of Impacts Post-Mitigation
North Dublin Bay SAC, South Dublin Bay SAC, Rockabill to Dalkey Island SAC, South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, North-West Irish Sea SPA	Operation of the Scheme	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Extremely High	Negligible	Negligible, Imperceptible and Permanent
North Dublin Bay pNHA, South Dublin Bay pNHA, Dolphins, Dublin Docks pNHA, Booterstown Marsh pNHA	Operation of the Scheme	Increased sediment in runoff Anthropogenic sources (fuel, etc.)	Very High	Negligible	Negligible, Imperceptible and Permanent

10.7 Cumulative Impacts

The cumulative assessment of relevant plans and projects has been undertaken separately in Chapter 24 (Cumulative Impacts) of this EIAR.

10.8 Difficulties Encountered in Compiling Information

No significant difficulties were encountered in undertaking this assessment. Access / visibility for field surveying was restricted along the open channel portion of Bachelors Stream due to dense treelines and overgrowth. While some residual uncertainty remains regarding the condition of this channel, the desktop studies conducted are considered to be sufficient to assess the likely significant impacts of the proposed Scheme on the water environment.

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