Chapter 09

Hydrology

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9. Hydrology

9.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) considers the impacts of the proposed development on the surface water environment. It evaluates both the construction and operational phases, identifying potential effects on water quality, hydrological regimes and hydromorphology. Mitigation measures incorporated into the proposed development are described, and the significance of residual effects following mitigation is assessed.

This chapter should be read in conjunction with the following chapters, and their appendices, which present related impacts arising from the proposed development and proposed mitigation measures to ameliorate the predicted impacts:

- Chapter 1 Introduction
- Chapter 4 Description of the Proposed Development.
- Chapter 5 Traffic & Transportation,
- Chapter 7 Biodiversity.
- Chapter 8 Soils & Geology,
- Chapter 10 Hydrogeology.

9.2 Methodology

An assessment of environmental effects has been undertaken in accordance with the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA,2022).

9.2.1 Legislation, Policy and Guidance

The following European legislation and transposing Irish regulations are of relevance to the surface water environment assessment and to the proposed development:

- European Union (EU) Water Framework Directive (WFD) (2000/60/EC), as amended in 2008 (by Directive 2008/105/EC) and in 2013 (by Directive 2013/39/EU).
- European Communities (EC) (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003), as amended in 2014 (by S.I. No. 350 of 2014), and in 2022 (by S.I. No. 166 of 2022) and in 2025 (by S.I. No. 52 of 2025).
- EU (Water Policy) (Abstractions Registration) Regulations, 2018 (S.I. No. 261 of 2018) and as amended in 2022 (by S.I. No. 166 of 2022).
- EC (Drinking Water) Regulations 2014 (S.I. 122 of 2014), as amended in 2022 (by S.I. No. 286 of 2022), and in 2023 (by S.I. No. 99 of 2023).
- EC Environmental Objectives (Surface Water) Regulations, 2009 (S.I. No. 272 of 2009 as amended'), as amended in 2012 (by S.I. No. 327/2012), 2015 (by S.I. No. 386/2015) and 2019 (by S.I. No. 77/2019).
- European Communities Environmental Objectives (Surface Water) (Amendment) Regulations, 2025 (S.I. No. 50/2025)
- EC Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010 as amended), as amended in 2016 (S.I. No. 366 of 2016).
- EC Water Environment (Abstractions and Associated Impoundments) Regulations, 2024 (S.I. No. 419 of 2024).

- EU Environmental Impact Assessment (EIA) Directive 2011/92/EU as amended by 2014w/52/EU.
- EU (Planning and Development) (EIA) Regulations S.I. No. 419 of 2012, as amended by S.I. No. 543 of 2014, 2018 (S.I. No. 296 of 2018), as amended by S.I. No. 404 of 2018 and S.I. No. 646 of 2018.
- The EU Floods Directive 2007/60/EC.
- EC (Assessment and Management of Flood Risks) Regulations, 2010 (S.I. No. 122 of 2010).
- EU (EIA) (Flood Risk) Regulations 2012 (S.I. No. 470 of 2012).
- Habitats Directive (1992/43/EEC).

The assessment undertaken in this chapter has been carried out in line with European and National legislation, which has been set out in this subsection for context.

9.2.2 European Legislation

This chapter has been prepared having regard inter alia to the Environmental Impact Assessment (EIA) as defined in Directive 2011/92/EU (as amended by Directive 2014/52/EU) and SI No 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the WFD into Irish Law.

The Water Framework Directive (WFD) establishes a framework for community action in the field of water policy and seeks to enhance the status of aquatic ecosystems, promotes sustainable water use and contributes to mitigating the effects of flood and drought.

The objective of the WFD is to achieve 'Good Status' for all water bodies which requires a waterbody to achieve good chemical and ecological status.

The WFD was transposed into Irish law by the European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003). The 2003 Regulations have been revised and extended by the subsequent statutory instruments listed below:

- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009);
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011); and
- European Union (Water Policy) Regulations 2014 (S.I. No. 350 of 2014).

9.2.3 Local Policy

The Donegal Development Plan 2024-2030 Strategic Flood Risk Assessment states that it is a policy of the Council to promote and protect the ecosystem services provided by floodplains and their native riparian vegetation along all watercourses and ensure that a suitable riparian buffer from the top of the riverbank is maintained/reinstated along all watercourses within development sites and that developments within riparian lands shall be subject to hydromorphological assessments in line with the Department of Housing, Planning and Local Government's Technical Guidance to Morphological Risk Assessment of Rivers Guidelines for Planning Authorities. The following are a range of policies relating to surface and ground water.

Table 9-1 - Policy relating to surface and ground water

Policy ID	Policy Description
WW-O-1	**Water Quality:** To maintain, improve and enhance the quality of surface and ground waters as appropriate in accordance with the requirements of: a. The EU Water Framework Directive including implementing the Programme of Measures contained with the River Basin Management Plan 2022-2027 and any subsequent plan.

Policy ID	Policy Description
	b. The European Communities (Surface Water) Regulations 2009. c. The European Communities (Ground Water) Regulations 2010.
WW-P-1	**Water and Wastewater Infrastructure:** Support and facilitate the provision of new, and the upgrading of existing, water and wastewater infrastructure in collaboration with Uisce Éireann and other stakeholders including projects associated with Uisce Éireann Capital Investment Plan and the Rural Water Programme.
WW-P-2	**New Developments Impact:** Ensure that new developments: a. do not have an adverse impact on surface and ground water quality, drinking water supplies, Bathing Waters and aquatic ecology (including Water dependent qualifying interests within Natura 2000 sites); and b. do not hinder the achievement of, and are not contrary to: i. The objectives of the EU Water Framework Directive. ii. EU Habitats and Bird Directives. iii. The associated Programme of Measures in the River Basin Management Plan 2022-2027 including any associated Water Protection or Restoration Programmes. iv. Drinking Water Safety Plan. v. The Guidelines on the Protection of Fisheries During Construction Works in and Adjacent To Waters (IFI, 2016)
WW-P-10	**Wastewater for New Developments:** In general, development proposals shall only be permitted where it is demonstrated that: a. They would not negatively impact on existing or proposed water and wastewater infrastructure including the overbuilding of network infrastructure. b. The location takes into account, and is compatible with, the operation/use or expansion of existing or proposed new wastewater treatment plants. In this regard a setback/buffer of 100m will normally be required between existing or proposed wastewater treatment facilities with a PE >50 and any sensitive developments which have a continuous or frequent public usage (e.g. residential, retail, community, educational). c. Save in exceptional circumstances: i. all new development shall provide separate foul and surface water drainage systems and the discharge of additional surface waters to combined (foul and surface water) sewers shall not be permitted; ii. the use of Water Sensitive Urban Design/Nature Based Solutions in surface water management systems within public and private developments and within the public realm shall be required to minimise the extent of hard surfacing and paving, thereby reducing flood risk and improving water quality. d. Water conservation measures (e.g. rainwater harvesting) shall be required as an integral part of developments, save in exceptional circumstances and where appropriate to do so.
WW-P-11	**Water Supplies:** Applications for proposed borehole/private wells shall only be permitted where it is demonstrated that: a. It is not feasible to connect to a public water supply or group scheme. b. A potable water supply can be provided to in accordance with EU Drinking Water standards. c. The development will not have an adverse effect on water quality.
WW-P-13	**Lough Mourne Water Supply:** Ensure that new developments do not have an adverse impact on the Lough Mourne drinking water supply. Any developments of scale in the general vicinity shall be required to identify overground and underground water sources supplying the Lough and to demonstrate that there shall be no adverse impact on these supplies.

Policy ID	Policy Description
F-P-1/3	**Flood Risk:** A precautionary approach shall be applied to the consideration of flood risk issues and shall include the application of the 'Avoid', 'Substitute', 'Justify' principles set out in the EU Floods Directive (2007/60/EC) and 'The Planning System and Flood Risk Management - Guidelines for Planning Authorities', November 2009, DoEHLG. Where appropriate, applicants/developers shall be required to submit: a. an independent 'Flood Risk Assessment' in accordance with the aforementioned Guidelines or any subsequent related publication and/or 'Surface Water Drainage Calculations', from suitably qualified persons; and b. evidence of compliance with the Justification test set out in Section 5.15 of the aforementioned Guidelines or any subsequent related publication. To support the development of long and short-term flood remediation works, including embankments, sea defences, drainage channels, and attenuation ponds and wetlands, subject to environmental considerations including potential impact on designated shellfish water and freshwater pearl mussel catchment areas, compliance with Article 6 of the Habitats Directive, best practice in Coastal Zone Management and the Marine Resource and Coastal Management policies of this Plan.
F-P-2/4	**Sustainable Drainage Systems and Storm Water Infrastructure:** a. To require the use of Sustainable Urban Drainage Systems (SUDs) including flood attenuation areas, wetlands, the controlled release of surface waters and use of open spaces and semi-permeable hard surfaces for urban development proposals. b. Support the removal of existing stormwater discharging to combined (foul and storm) sewers using nature-based solutions. c. Not to support the discharge of additional surface water to combined sewers. Not to permit developments which would hinder the maintenance of river or drainage channels.
BIO-P-1	**Protected Spaces: Sites of European, National and Local Ecological Importance:** To require all developments to comply with the requirements of the EU Habitats Directive and EU Bird Directive, including ensuring that development proposals: a. Do not adversely affect the integrity of any European/Natura 2000 site (i.e. Special Areas of Conservation and Special Protection Areas) including effects on ex-situ but functionally linked habitats, and species (e.g. Pearl Mussel) save where a plan must be carried out for imperative reasons of overriding public interest (IROPI). b. Provide for the protection of animal and plant species listed in Annex IV of the EU Habitats Directive and the Flora Protection Order. c. Protect and enhance features of the landscape (such as rivers, riverbanks, field boundaries, ponds and small woods) which are of major importance for wild fauna and flora and the ecological coherence of the Natura 2000 network.
IBO-P-2	**Natural Heritage and Biodiversity of Designated Sites, Habitats and Species:** Ensure that all developments seek to conserve/protect the qualifying interests of Ramsar Sites, Nature Reserves, Natural Heritage Areas (NHA), proposed Natural Heritage Areas (pNHA), the Cró na mBroanáin Red Grouse Sanctuary and any species protected under the Wildlife Act save to the extent necessary to provide for strategic infrastructure projects including but not restricted to the TEN-T Priority Route Improvement Project, Donegal, the Bridgend to County border project scheme, the Buncrana Inner Relief Road and Greenways, subject to such projects being in accordance with all relevant statutory and regulatory provisions. Otherwise, where no statutory or regulatory provisions apply this policy will be implemented by the Council in so far as same can be practicably and reasonably achieved within the context of such projects.
BIO-P-3	**Protect Local Biodiversity:** Protect features of local biodiversity value (e.g. hedgerows/field boundaries, trees, woodlands, wetlands, water bodies, riverbanks and peatlands) which make a significant contribution to the biodiversity, biodiversity/ecosystem services, ecological connectivity, and associated visual amenity and/or rural character of the area.
TOU-P-8	**Tourism Development:** The development will not compromise the water quality of water bodies within River Basin Districts designated under the Water Framework Directive or hinder the programme of measures contained within any associated River Basin Management Plan.

9.2.4 Guidance

The following guidance documents are of relevance to this hydrological environment assessment and the proposed development:

- Department of Environment, Housing and Local Government (DoEHLG)/ Office of Public Works (OPW) (2009), 'The Planning System and Flood Risk Management - Guidelines for Planning Authorities'.
- Environmental Protection Agency (EPA) (2022), 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EIAR)'.
- Environmental Protection Agency (EPA) (2003), 'Advice notes on current practice (in the preparation of Environmental Impact Statements)'.
- Transport Infrastructure Ireland (TII,2025), 'Water Impact Assessment for National Roads, Light Rail, Metro and Rural Cycleways – Overarching Technical Document'
- Institute of Geologists of Ireland (IGI) (2013), 'Guidelines for Preparation of Soils, Geology, Hydrogeology Chapters of Environmental Impact Statements'.
- National Roads Authority (NRA) (2008), 'Environmental Impact Assessment of National Roads Schemes – A Practical Guide'.
- Transport Infrastructure Ireland (TII) (formerly NRA) (December 2008), Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Transport Infrastructure Ireland (TII) (February 2024), Drainage Systems for National Roads DN-DNG-03022;
- Transport Infrastructure Ireland (TII) (February 2023), Environmental Planning of National Road and Greenway Projects RE-ENV-07008);
- Transport Infrastructure Ireland (TII) (November 2024), Environmental Impact Assessment of Rural Cycleways (Offline & Greenway) – A Practical Guide PE-ENV-01109;
- Inland Fisheries Ireland (2022) Planning for water courses in Urban Environments, 2020;
- Transport Infrastructure Ireland (TII) (December 2005) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes CC-ENV-01101;
- Inland Fisheries Ireland (2016) Guidelines on the protection of fisheries during construction works in and adjacent to waters;
- CIRIA (2011) 'C532 Control of water pollution from constructions sites'
- CIRIA (2011) 'Control of water pollution from linear construction projects'

9.2.5 Assessment Criteria and Significance

This section establishes the definitions of the terminology adopted within the assessment.

The value of a receptor is described using the standardised descriptive terms defined in Table 9-2.

Table 9-2 - Description of receptor value (adapted from TII (2025), Table 3.1)

Value	Criteria
Negligible	Receptor has a or no quality or value on a local scale
Low	Receptor has a low or no quality or value on a local scale
Negligible	Receptor has a low or no quality or value on a local scale
Medium	Receptor has a medium quality or value on a local or county scale

Value	Criteria
High	Receptor has a high quality or value on a local or county scale
Very High	Receptor has a high quality or value on a regional, national or international scale

The magnitude of an effect is a function of its extent, intensity, complexity, probability, duration, frequency and reversibility). The standardised descriptive terms adopted to describe the magnitude of an effect on a receptors hydrological attributes is described in accordance with the criteria outlined are defined in Table 9-3.

Table 9-3 - Criteria for the assessment of magnitude of hydrological and hydrogeological effects (Adapted from TII, 2025), Table 3.3)

Magnitude of Impact	Description
Very High	Major alteration to, or complete loss of, a receptor. Effects likely to be widespread, considered permanent and irreversible.
High	Notable permanent or longer-term change to a receptor.
Medium	Moderate or longer-term change over a restricted extent or a moderate permanent change in a receptor.
Low	Minor short- or medium-term change over a restricted extent or a minor permanent change in a receptor.
Negligible	Minor momentary change over a localised extent or imperceptible change to a receptor.

The significance of effects are a function of the effect's magnitude and the value of the affected receptor. The derivation of effect significance is in accordance with Figure 9-1. The exact derivation is subjective and requires professional judgment to arrive at a classification of significance that is reasonable and justifiable.

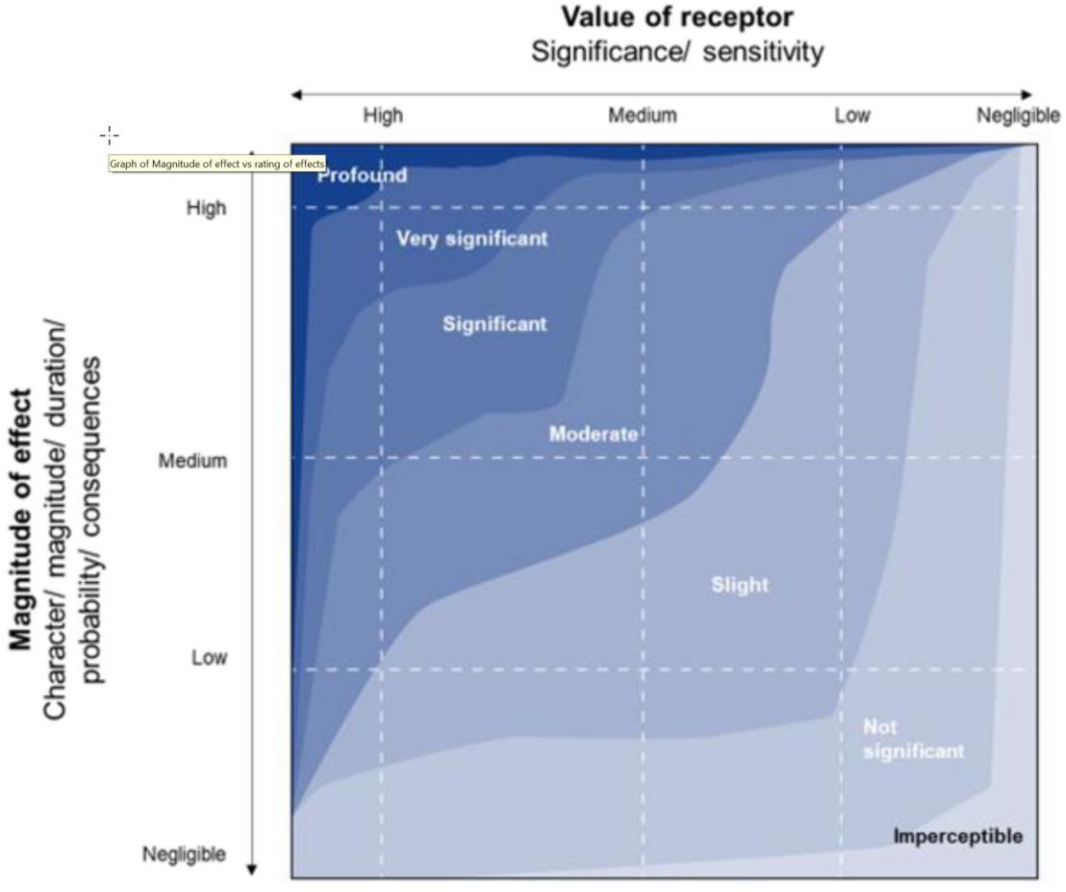

Figure 9-1 - Rating of effects (Adapted from TII, 2025)

The definitions of duration of a change adopted within the hydrology chapter are set out in Table 9-4.

Table 9-4 - Duration of significant effects definitions. Adapted from Table C1 (IGI, 2013)

Description	Duration
Temporary	Construction related, lasting less than one year.
Short-term	Lasting between one to 7 years
Medium-term	Lasting between 7 to 15 years
Long-term	Lasting between 15 to 60 years
Permanent	Lasting over 60 years

9.2.6 Study Area and Zone of Influence

An initial study area was selected by applying a 250m buffer to the proposed alignment and selecting all Water Framework Directive waterbodies (See Drainage Network 60701883-ACM-EGN-SW_ZZ_ZZ_ZZ-DR-EN-0902_0909 in Volume 3 of this EIAR).

The initial study area incorporates the surface freshwater environment along the proposed route from its start point in Donegal Town to Ballybofey/Stranorlar.

The initial study area was refined based on hydrological pathways and receptor sensitivity to define the hydrology Zone of Influence of the proposed development. This pathway-led approach incorporates surface waters that are hydraulically connected to the proposed development, including downstream receptors where a plausible pathway for effect exists.

Hydrometric Area

Hydrometric areas serve as hydrological management units based on river basins and coastal catchments. The study area is in Hydrometric Area 01 Foyle Catchment. The route will traverse the Eske, Mourne beg and Finn sub catchments (See Drawing Catchments, Sub catchments and Watercourses - *60701883-ACM-EGN-SW_ZZ_ZZ_ZZ-DR-EN-0901* in Volume 3 of this EIAR).

The Catchments Data Package retrieved from the (Environmental Protection Agency, 2025) was used within a GIS to identify rivers and lakes that could be reasonably expected to be impacted by the construction and operation of the proposed greenway route.

Protected Areas

A comprehensive review of Special Areas of Conservation (SAC), Special Protection Areas (SPA) and National Heritage Areas (NHA) that may be impacted by the proposed development has been undertaken within the Chapter 07: Biodiversity.

For the purposes of this hydrological assessment, a review of Designated Site Boundary data obtained from the National Parks and Wildlife Service (NPWS, 2026) was undertaken to identify SACs with water-dependent qualifying interests where hydrological pathways exist between the proposed development and these receptors. The Source–Pathway–Receptor (SPR) model was applied to ensure that the study area captures all hydrologically connected SACs that could be subject to direct or indirect impacts.

The Donegal Bay (Murvagh) SAC [000133] is located 1.5km southwest of the southern extent of the study area of the proposed route. A hydrological connection exists between this European site and the proposed development via the River Eske_020 waterbody. The Donegal Bay (Murvagh) SAC is designated for coastal and estuarine qualifying interests. The SAC's mapped conservation features (Maps 3–6) show that all qualifying habitats and species occur along the bay shoreline and associated intertidal areas, with no upstream extension into the River Eske corridor. The hydrological regime within the SAC is determined by marine/tidal hydrodynamics and coastal sediment processes. It was determined that the proposed development will not result in measurable changes in the freshwater inputs to the bay and

that there is not an effective pathway for impacts on the SAC's water related Qualifying Interests.

Sections of the proposed development and two new watercourse crossings are proposed within the boundaries of the Lough Eske and Ardnamona Wood SAC [000163]. The proposed development is located immediately adjacent to the Croaghonagh Bog SAC [000129]. There is a hydrological connection between the proposed development and the SAC.

The Corraber river flows through the River Finn SAC [002301] before discharging to Lough Eske to the southeast of the River Finn SAC, creating a hydrological link between the SAC's.

There are sections of the proposed route within the boundaries of the River Finn SAC. The construction of a new bridge deck on the existing piers of the old railway line within the River Finn SAC boundaries is proposed. The River Finn is a designated Salmonid River.

There is a hydraulic connection between the River Finn SAC and the River Foyle and Tributaries SAC [UK0030320]. However, due to the scale of the proposed development and the distance between the SAC boundaries it was determined that the development is unlikely to impact on the River Foyle and Tributaries SAC such that the assessment study area terminates at the Dreenan Bridge, approximately 500m downstream of the railway bridge piers.

Consideration was also given to non-conservation protected areas within the buffer in establishing the ZoI using the EPA Geoportal website (Environmental Protection Agency, 2025) and include the following attributes:

- Drinking Water Protected water bodies,
- Nutrient Sensitive areas,
- Salmonoid rivers,
- Shellfish areas,
- Bathing water protected areas.

The environmental attributes included within the ZoI are identified in Table 9-5.

Table 9-5 - ZoI Environmental attributes

Name	Type
BURN DAURNETT_010	River waterbody
FINN (DONEGAL)_060	River waterbody
Finn (Donegal)_070	River water body
MOURNE BEG_010	River waterbody
CLOGHER (DONEGAL)_010	River waterbody
ESKE_010	River waterbody
ESKE_020	River waterbody
Drumroosk_East	River waterbody
Drummeny_010	River waterbody
LOWERYMORE_010	River waterbody
LOWERYMORE_020	River waterbody
LOWERYMORE_030	River waterbody
Lough Eske	Lake waterbody
Lough Mourne DL	Lake waterbody
Lough Eske and Ardnamona Wood	SAC

Name	Type
Croaghonagh Bog	SAC
River Finn	SAC

There are numerous small lakes within the sub catchments that have not been designated as Lake waterbodies within the WFD. The EPA River Flow Direction Layer (Environmental Protection Agency, 2025) was consulted to determine if the ZoI should be extended to include lakes such as Lough Amnichen that form the headwaters of minor tributaries of the Eske river. However, given their remoteness from the proposed route and the direction of the hydrological impact pathways, it was determined that these lakes could be excluded from the ZoI for the purposes of the assessment. The lakes play a critical role in the hydrology of the river water bodies within the ZoI and have been considered as part of the environmental baseline analysis.

9.2.7 Desk Study

The published data sources outlined in **Error! Reference source not found.**have been used preferentially in establishing baseline hydrological conditions. Where necessary, the data sources listed in the table below have been supplemented with data and information from other relevant environmental studies and assessments carried out in the study area. Where this is the case, supplementary information sources are identified with inline citations and included in a bibliography.

Table 9-6 - Data Sources

Assessment Attribute	Title (sources)
General	• River Basin Management Plan for Ireland 2022-2027 • Aerial survey photography • Department of Housing, Local Government and Heritage 'MyPlan.ie' map viewer; • National Parks and Wildlife Service (NPWS) Designations Viewer; • Historic maps from the Ordnance Survey of Ireland (OSi); • Historic aerial photography from the OSi; and • Met Éireann historical weather data; • Donegal County Council Donegal Development Plan 2024 – 2028 Planning Register Water Services, Discharges & Supply Schemes
Surface water quality, protected areas, hydromorphology, abstractions and significant pressures	• EPA map viewer; Water Quality Monitoring Database and Reports Water Framework Directive Classification EPA Hydrometric Data System EPA -Protected Areas EPA Pressures and Activities • National Parks and Wildlife Service (NPWS) ○ Designated Areas Mapping ○ Site Synopsis Reports ○ Contaminants in sediments in the marine environment (Marine Institute, 2024)
Hydrology (Catchment studies, drainage and flood and flow estimation)	• Catchment summaries (Data - Catchments.ie - Catchments.ie) • Office of Public works (OPW) ○ Arterial Drainage scheme land benefitting Mapping for Ireland ○ OPW and Drainage District arterial Drainage Channels and maintained channels

Assessment Attribute	Title (sources)
	○ OPW hydrometric Data WEB Site ○ Floodmaps Site ○ OPW FSU (Flood Studies Update) Web Portal Site for Flood flow Estimation • Catchment Flood Risk Assessment Management (CFRAM) Flood Maps, and National Indicative Fluvial Mapping (NIFM) and Geological Survey of Ireland (GSI) Groundwater Flooding Probability maps and Past flood Events (OPW Website)
Flood Risk	• OPW National Flood Information Portal (OPW 2024) • Donegal Development Plan 2024-2030 Strategic Flood Risk Assessment • the Flood Risk Management Sectoral Climate Change Adaption plan (National Adaption Planning Framework, 2019)

Hydrology attributes and the pathways between the proposed greenway and these attributes have been identified primarily using the EPA's WFD Status Geodatabase. Water Quality baselines have been established using WFD Catchment Assessment data available from the Catchments.ie data and Dashboard web pages. Temporal trends in WFD status have been established using the 3rd Cycle River Basin Management Plan Catchment Assessment Reports.

9.2.8 Site-specific Surveys

A hydrology walk over survey was completed over 20th to 22nd of August 2025. The walk over survey was undertaken to investigate reports of recurrent flooding received from a member of the public and to inspect river channels at the sites of the proposed bridges at Biddy's O'Barnes (S10) and St. Francis National School (S06).

In addition to the walk over survey conducted by ROD, River Habitat Assessment Technique (RHAT) Spot Surveys were undertaken at eighteen locations on the river network by aquatic ecologists from Atkins Realis. Data from the RHAT surveys have been used to inform the hydrology impact assessment in this chapter.

9.3 Description of the Proposed Development

The development is described in full in Chapter 04: Description of the Proposed Development. The components of the proposed development that could result in potential impacts significant impacts on the hydrological environment during the construction and operational phases are discussed in this section.

The proposed development comprises the construction of a greenway and includes works which interact with the surface water environment at multiple locations.

The sections of the greenway that are built along the existing railway alignment (the mainline) will retain existing water crossing structures. The mainline sections intersect the existing surface flow paths. These are predominantly minor local drainage features; shallow field and boundary ditches that are spanned by minor water crossing structures (culverts and stone clapper bridges). These minor structures are generally less than 2m in span and will be retained without modification as part of the greenway design.

The mainline is carried over several river watercourses on masonry arch bridges (refer to Table 4-7). The table provides details for these major water crossing structures. It is proposed that minor repairs will be carried out at the major water crossing structures. Minor repairs will be carried out via concrete saddling or masonry repointing (refer to Section 4.5.8).

The proposed greenway will deviate from the existing railway alignment at several locations (refer to Section 4.2). Construction of the offline sections is within rural areas, with some road crossings required. The offline sections are predominantly aligned parallel to the existing drainage networks which are comprised of local drainage features. The offline sections will

require the construction of several river bridges to span watercourses. Culverts will be required at minor watercourses and local field drains (refer to Table 4-6).

Bridges spanning watercourses will be constructed as clear span structures using prefabricated bridge decks. Precast box or pipe culverts will be used where required, refer to Section 4.5.8 for details.

9.3.1 Surface Water Drainage

The construction of the greenway pavement will increase surface runoff rates and volumes relative to existing conditions. The greenway will include 1m wide grassed filter strips, with surface water drainage provided via over-the-edge (OTE) drainage. Surface water conveyance and attenuation features, including swales and filter drains, will be incorporated into the drainage network. Surface water runoff arising during construction and operation will be intercepted and conveyed via existing drainage ditch networks and discharged to receiving watercourses (refer to Section 4.3.8).

9.3.2 Earthworks

Earthworks will be required for the mainline and offline sections. In some locations, the mainline lies parallel to river watercourses. At certain sections, site clearance and cut and fill operations will be required within the Riparian Buffer Zone (RBZ), including works in proximity to watercourses. (refer to Section 4.3.9).

9.3.3 Car Parks and Trailheads

The proposed development includes provision of Trailheads. Trailheads are formal points of entry to the greenway and provide different Levels of Service (LoS); car parking and welfare facilities will be provided at selected locations (refer to Table 4-8). Where carparks are provided, they will be constructed using permeable paving. Dry, composting toilets will be provided at selected locations (refer to Section 4-8).

9.3.4 Construction Compounds

Construction compounds and temporary working areas will be established to facilitate the greenway construction works (refer to Section 4.5.3). Runoff from construction compounds will be discharged to existing drainage networks via conveyance and attenuation features, including swales and filter drains.

9.4 Receiving Environment

This section describes the existing surface water environment within and surrounding the proposed greenway. The baseline characterisation considers the hydrological context, key water features, and the sensitivity of identified receptors within the study area.

9.4.1 Hydrological Context

The climate in Hydrometric Area 01 (Foyle Catchment) is of Atlantic Maritime type. Annual rainfall is typically in the range 1300–1400 mm and is evenly distributed throughout the year, while humidity is characteristically high. These conditions contribute to relatively responsive catchments with sustained baseflows and limited seasonal variability in soil moisture deficits.

The proposed development is established in Donegal Town within the Eske_SC_010 Water Framework Directive (WFD) sub-catchment. The sub-catchment forms part of the Donegal North Bay WFD catchment, which has an area of approximately 804km² and drains all streams entering tidal waters between Kildoney Point and Rossan Point in County Donegal. The Eske_SC_010 sub-catchment has an area of approximately 112km². Lough Eske is the central drainage feature within this sub-catchment and has a surface area of approximately 3.6km². Major inflows to the lake include the Lowerymore River, Corabber River and Clogher

River. The lake's sole outflow is the Eske_010 River waterbody, which discharges to Donegal Bay approximately 24.5km to the southwest.

The Eske_SC_010 sub-catchment is ungauged. The EPA HydroTool is a national hydrological modelling system used to estimate flow duration curves and flow statistics for ungauged catchments. HydroTool nodes are positioned by the EPA at hydrologically significant points within a catchment, based on the national watercourse network and associated catchment descriptors. Each node represents a modelled flow estimation point where HydroTool calculates naturalised flow statistics (e.g. Q-values, FDCs, mean flows). Node locations are selected to reflect confluences, sub-catchment outlets and key drainage controls, ensuring that all upstream contributing areas are represented in the flow estimation framework. The spatial placement of nodes therefore aligns with the EPA's delineated river segments and WFD waterbody boundaries.

The flow duration curves for the HydroTool Nodes in the sub-catchment that lie within the Water ZoI are presented in Figure 9-2. The plots are characteristic of small, flashy catchments displaying steep recession from high to low flows reflecting a rapid response to rainfall and minimal baseflow contributions.

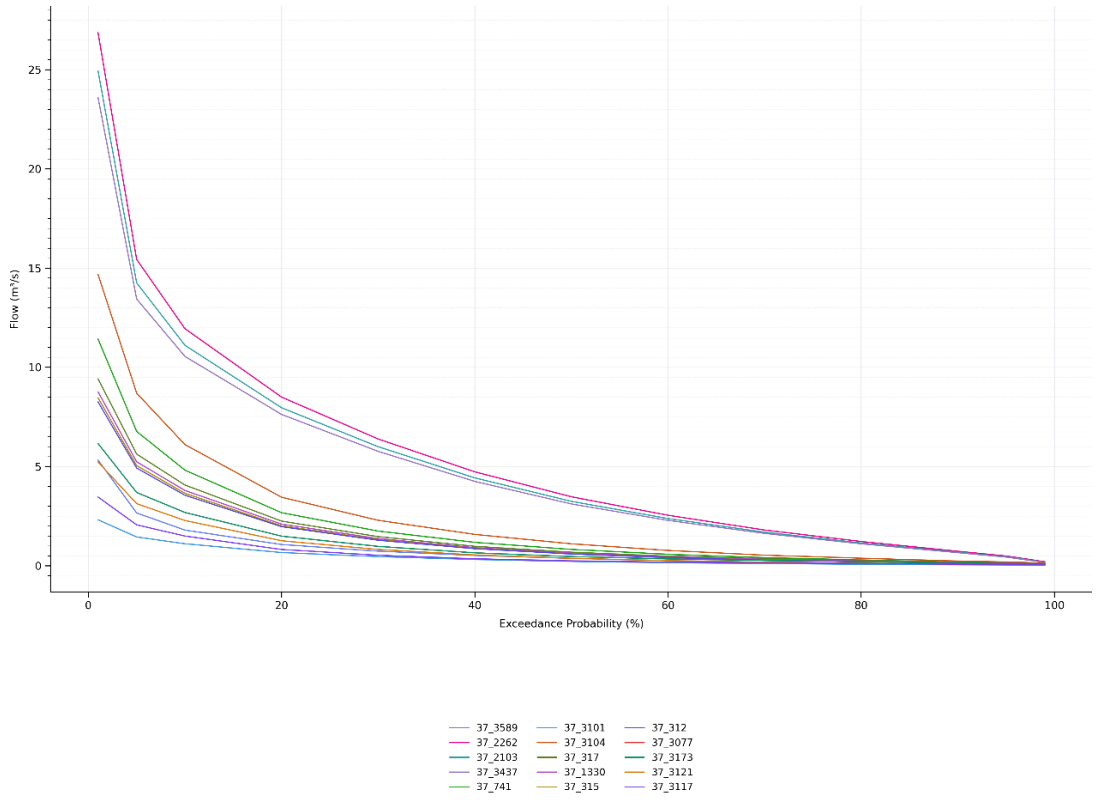

Figure 9-2 - Eske_SC_010 sub-catchment Flow Duration Curves (Adapted from EPA Hydrotool)

High seasonal variability in discharge is a characteristic of all the rivers in the sub-catchment. Lough Eske and its connected rivers are part of the Lough Eske and Ardnamona Wood SAC.

There are numerous upland lakes within the sub-catchment that lie outside the Water ZoI. The majority of these are too small (<50 hectares) to be designated as WFD waterbodies but are hydrologically important, as they regulate flows and hydrochemistry to Lough Eske and river waterbodies within the ZoI. These lakes are remote from the proposed greenway and have been included in the baseline because of their hydrological role.

The principal Significant Pressures in the sub catchment include agriculture, forestry and hydromorphological alterations (Environmental Protection Agency, 2024).

The MourneBeg_SC_10 WFD sub-catchment lies to the northeast of the Eske_SC_010 sub-catchment. The sub-catchment is part of the Foyle WFD Catchment. The Foyle catchment is transboundary, it has an area of approximately 2,919km², with 914km² in the Republic of Ireland and the remainder in Northern Ireland. Significant pressures acting at the catchment

level include agriculture, forestry and hydromorphological pressures. Urban wastewater pressure from towns and villages, including Ballybofey/Stranorlar, is also a Significant Pressure.

Lough Mourne has a surface area of approximately 0.67km^2. The lake is identified as a Drinking Water Protected Area (DWPA) and is a water source for the Donegal Town supply. The southwestern shoreline of Lough Mourne forms part of the Croaghonagh Bog Special Area of Conservation and the lake supports sensitive upland peatland habitats.

Three branches of the Mourne Beg waterbody discharge to Lough Mourne via existing structures carrying the mainline. The Burn Daurnett_010 river outflows from Lough Mourne at its northeast extent. The waterbody primarily drains rural upland areas. It discharges to the Finn (Donegal) _060 river waterbody at Ballybofey. The Finn (Donegal) _060 river waterbody intersects the sub-catchments 01_2 Finn (Donegal)_SC_030 and 01_7 Finn (Donegal)_SC_040 sub-catchments. Agriculture, forestry and peat abstraction are the principal significant pressures at the sub-catchment level. Similar to the systems in the Eske sub catchment, high seasonal variability in discharge is a characteristic of all the rivers in the sub-catchments. Significant Pressures at the sub-catchment levels include peatland disturbance and nutrient enrichment from diffuse sources and urban wastewater.

9.4.2 Surface Water Bodies

9.4.2.1 Eske_020 River Waterbody

The Eske_020 river waterbody has maintained “Good” WFD status across all RBMP cycles. There are no significant pressures identified acting on the channel reaches impacted by the proposed project. The estimated 95th percentile flow is 0.601m^3/s and the 30th percentile flow is 7.647m^3/s (EPA Hydrotool Node id 37_2588). There are no active discharge monitoring stations on the river. Water Quality surveillance monitoring is conducted by the EPA under the National WFD Monitoring Programme.

The Eske_020 is part of the Lough Eske and Ardnamona Wood SAC from approximately chainage 600m. The Eske_020 is identified as a Drinking Water Protected Area (DWPA) under Article 7 of the WFD.

9.4.2.2 Drumroosk_East River Waterbody

The Drumroosk_East is the EPA name for a second order tributary the Eske_020, the EPA name provided in the EPA Indicative Flow Network layer is adopted herein to distinguish the tributary from the Eske_020 main channel. The current WFD Status of the Drumroosk_East is Good and has been assessed based upon the National WFD monitoring programme. There are no Significant Pressures identified impacting the Drumroosk_East. Hydrotool Node Id 37_2262) is located downstream of its confluence with the Eske_020. The estimated 95th percentile flow at the node is 0.493m^3/s, and the 30th percentile flow is 6.388m^3/s. The catchment upstream of the confluence with the Eske_020 is predominantly rural and lies outside of the boundaries of the Lough Eske and Ardnamona Wood SAC, though a hydrological connection exists via the confluence with the Eske_020.

9.4.2.3 Eske_010 River Waterbody

The current WFD status is Good, assessed under the National WFD Monitoring Programme. The waterbody has maintained Good WFD status across all RBMP cycles, and no significant pressures have been identified affecting the channel reaches associated with the proposed project.

The Eske_010 waterbody forms part of a lake-controlled system, comprising both upland sub-catchments draining to Lough Eske and a regulated outlet channel downstream of the lake. These components are hydraulically and geomorphologically distinct. The upland sub-catchments to the northwest and northeast drain extensive areas of intact and semi-intact blanket bog. The northwestern catchment includes a small non-WFD designated upland lake (Lough Bannaher), while the northeastern catchment includes the WFD-designated Lough Fad (Barnesmore) and several smaller non-WFD designated lakes (Lough Guladuff, Lough

Anabawn, Lough Anabovin and Lough Aderry). In both sub-catchments, flow is constrained within narrow, topographically controlled valleys and drains peat-dominated uplands. Runoff response is therefore likely to be flashy; however, the presence of multiple upland lakes provides significant hydrological storage and moderates discharge to Lough Eske. These upland systems also generate low-alkalinity runoff typical of peat-dominated environments.

Lough Eske acts as an integrating and regulating feature within the catchment and discharges to the Eske_010 at Gauge 37071. The outlet reach exhibits a relatively low-sinuosity planform, indicative of valley confinement. Walkover surveys indicate that the channel banks comprise a mix of earth and exposed limestone outcrops. The channel flows southwest before discharging to the Eske_020, and the combined reaches form part of the Lough Eske and Ardnamona Wood SAC.

There are no active discharge monitoring stations on the Eske_010. Historical monitoring includes ESB Station 37003 (1951–1978), followed by EPA/Donegal County Council monitoring at Station 37071 at the outlet of Lough Eske, which superseded earlier records. Gauge 37001 was also operational between Water Years 1978 and 1992; however, review of this record identified periods of incomplete temporal coverage attributable to monitoring constraints. A Flow Duration Curve analysis of the available data was undertaken, and Hydrotool nodes have subsequently been used to characterise baseline flow conditions.

9.4.2.4 Carbbeagh Tributary (Eske_010) River Waterbody

Current WFD status is good, assessed under the National WFD monitoring programme. It has maintained Good WFD status across all RBMP cycles.

The tributary rises to the southeast of the Eske_010 outside the Lough Eske and Ardnamona Wood SAC and flows through the SAC to its confluence with the Eske_010 downstream of Station 37003.

The Carbbeagh is a second order tributary of the Eske_010; Carbbeagh is the EPA name provided in the EPA Indicative Flow Network layer and is adopted herein to distinguish the tributary from the Eske_010 main channel. The estimated area of the catchment is 3.1km^2. The 1% Annual Exceedance Probability (AEP) is estimated to be 9.9m^3/s

The channel has been modified by previous development; two culverts are installed on the channel which shows signs of being over deepened. Evidence from walk over surveys in the area suggests that the channel may be affected by pollution; a grey odorous film was observed on two separate occasions. This is likely indicative of minor, intermittent inputs (e.g. domestic greywater) and reflecting localised water quality conditions within the tributary.

9.4.2.5 Drumnagahan Tributary (Eske_010) River Waterbody

The Drumnagahan is a first order channel that discharges to the Eske_010; Drumnagahan is the EPA name provided in the EPA Indicative Flow Network layer and is adopted herein to distinguish the tributary from the Eske_010 main channel.

The waterbody rises within the Lough Eske and Ardnamona Wood SAC. Its confluence with the Eske_010 lies to the east and upstream of the Carbbeagh confluence. The Drumnagahan is functionally part of the Eske_010 waterbody, which has maintained Good WFD status across all RBMP cycles; current status is Good and has been assessed based on the National WFD monitoring programme.

Satellite imagery indicates that Drumnagahan is a first-order stream with a weakly defined channel, indicative of diffuse overland flow. The catchment is small and the watercourse drains an area of woodland and poorly drained grassland.

9.4.2.6 Milltown 37 Reach (Eske_010) River Waterbody

The Milltown 37 is a first order reach of the Eske_010; Milltown 37 is the EPA name provided in the EPA Indicative Flow Network layer and is adopted herein to distinguish the tributary from the Eske_010 main channel. Hydrology walkover surveys indicate that this reach is likely to be intermittent. It rises in agricultural lands to the southeast of the Lough Eske outlet.

9.4.2.7 Lowerymore_030 River Waterbody

The current WFD status of the Lowerymore_030 River is High, assessed under the National WFD monitoring programme. Its environmental objective under the WFD is Good Status. WFD status was Good under the 2010-2015 and has remained High under subsequent monitoring periods. The Lowerymore_030 discharges to Lough Eske and is part of the Lough Eske and Ardnamona Wood SAC. The network is ungauged. The estimated 95th Percentile flow is 0.149m^3/s and the 30th percentile flow is 1.747m^3/s (EPA Hydrotool Node Id 37_741). There are no significant pressures identified acting on the reach impacted by the proposed development.

9.4.2.8 Clogher (Donegal)_010 River waterbody

The current status of the Clogher (Donegal) river waterbody is Good, assessed under the National WFD monitoring programme. WFD Status was Poor under the 2010-2015 monitoring period, status has remained as Good over subsequent monitoring periods. There are no Significant Pressures identified affecting the reach interacting with the greenway.

The headwaters of the waterbody are formed by several, small, non-WFD designated upland lakes (Lough Fahina, Lough Ascolta, and Lough Ancarn) to the southeast of the N15 national route. It is a fourth order stream at its confluence with the Lowerymore_030, located just upstream of its discharge point to Lough Eske. Hydrotool Node Id 37_3101 is located at the confluence with the Lowerymore_030. The 95th percentile flow at the node is 0.037m^3/s, and the 30th percentile flow is 0.459m^3/s. The stream bank of the section of the reach within the ZoI consists of predominantly earth, and the bed substrates consist of cobble and gravel with significant areas of bedrock along the reach. The stream has a high gradient, and there is an active ford approximately 140m from the bridge location. The waterbody is wholly within the Lough Eske and Ardnamona Wood SAC.

9.4.2.9 Mullanamphry River Waterbody

The Mullanamphry is a second order tributary of the Lowerymore_030; Mullanamphry is the EPA name provided in the EPA Indicative Flow Network layer and is adopted herein to distinguish the tributary from the Lowerymore_030 main channel.

The current WFD Status of the Mullanamphry is High, assessed under the National WFD monitoring programme. WFD Status was Poor under the 2010-2015 monitoring period, status has remained as High over subsequent monitoring periods. There are no Significant Pressures identified affecting the reach interacting with the greenway.

The tributary rises to the southeast of the Lowerymore_030, draining an area of cutover upland blanket bog and conifer plantation blocks. Satellite imagery indicates that the stream exhibits sections of linear alignment indicative of localised modification.

There is a Hydrotool Node located at the confluence with the Lowerymore_030 (Node Id 37_1330). The 95th percentile flow at the node is 0.127m^3/s and the 30th percentile flow is 2.099m^3/s.

9.4.2.10 Lowerymore_020 River Waterbody

The current WFD Status of the Lowerymore_020 river is High, assessed under the National WFD monitoring programme; it has maintained this status across RBMP cycles. The WFD Environmental Objective for the waterbody is High. There are no significant identified pressures acting on the reach impacted by the proposed development.

The river is ungauged. There are multiple Hydrotool Nodes on the main channel over the reach interacted with by the greenway. Hydrotool Node Id 37_741 lies upstream of proposed project works. The estimated 95th Percentile flow is 0.102m^3/s and the 30th percentile flow is 1.285m^3/s. Satellite imagery and walkover surveys indicate that the main channel of the Lowerymore_020 is geomorphologically active. The planform is constrained by valley confinement and the N15 National Route. Walkover surveys have shown that the banks of the reach have been reinforced using hard engineering measures at several locations over its length. The reach is relatively low gradient but is fed by high gradient streams. These rise in

areas of intact or semi-intact upland blanket bog and a small, non-WFD designated Lake (Lough Namaddy) to the southeast of the main channel.

9.4.2.11 Mourne Beg_010 River Waterbody

The current WFD status of the Mourne Beg_010 is Poor, assessed under the National WFD Monitoring Programmes. It has been classified as poor status across RBMP cycles. It is at risk of not achieving its WFD environmental objective, the Significant Pressure acting on the channel reaches impacted by the project is attributed to Forestry sources.

The proposed greenway will cross reaches of the Mourne Beg_010 on existing railway bridges. The intersected reaches rise to the North of Lough Mourne. These consist predominantly of first to second order streams draining areas of shallow upland blanket bog and conifer plantations to the north of Lough Mourne and the existing railway.

South of the railway the rivers flow through the Croaghonagh Bog SAC. The network to the north drains areas of cutover blanket bog and extensive conifer plantations.

The network is ungauged and there are no Hydrotools Nodes located on the waterbody. Walkover surveys at the existing bridge locations indicate high energy streams with gravel and cobble beds. The network to the south of the lake will not be intersected by the project.

9.4.2.12 Burn Daurnett_010 River Waterbody

The current WFD status of the Burn Daurnett_010 is Moderate, assessed under the National WFD Monitoring Programme. The WFD status of the waterbody was classified as Poor under the 2010-2015 and 2013-2018 assessment periods. The waterbody is at risk of not meeting its environmental objective, due to acidification and nutrient enrichment. The significant pressures acting on the river reach affected by the project are attributed to Agriculture and Forestry sources.

The Burn Daurnett main channel rises at Lough Mourne, draining peatland and agricultural land. Tributaries to the southeast of the main channel drain extensive areas of forestry plantation and disturbed peatland, as well as a small, non-WFD designated upland lake. The main channel planform exhibits minimal sinuosity and is laterally confined.

The network is ungauged. The waterbody discharges to the Finn (Donegal)_060 river waterbody at Ballybofey. There is a Hydrotool node (Node Id 01_1360) located at the confluence between the waterbodies. The 95th percentile flow at the Node is 0.046m^3/s and the 30th percentile flow is 0.512m^3/s. The confluence occurs outside the boundary of the River Finn SAC.

9.4.2.13 Sessiagh 01 Stream

The Sessiagh 01 stream is a small first tributary of the Burn Daurnett_010. It is not designated as a WFD river waterbody. It rises at Trusk Lough and drains a rural catchment. The reach within the ZoI has a steep gradient. The bed is predominantly cobble and the banks are exposed weathered rock and earth.

9.4.2.14 Finn (Donegal)_060 River Waterbody

The Current WFD Status of the Finn (Donegal)_060 is Poor, assessed under the National WFD Monitoring Programme. The WFD status was classified as Moderate under the 2010-2015 monitoring period and has remained at poor status across subsequent monitoring cycles. The waterbody is at risk of not achieving its environmental objective. The Significant Pressures affecting the waterbody are Urban Wastewater Treatment and Urban Runoff.

The OPW operate a high frequency gauging Station (Station ID 01403). The record spans the period October 1993 to date. Periods of missing data are typically short (≤10–15 days) and occur sporadically, most commonly during winter and late summer. Notable gaps occur in Water Years 1995, 1996, and 2013–2014, where periods of up to several weeks of missing data are present. The hydrometric record at Ballybofey is not homogeneous due to rating changes and evidence of a change in channel conveyance efficiency occurring between 2001 and 2010.

The Finn (Donegal)_060 and Finn discharges to the Finn (Donegal)_070 waterbody and the River Finn SAC at Stranorlar. The confluence is located downstream of stream of the Station 01403 gauging station. Hydrotool Node Id 01_814 is located at the confluence, within the SAC. T he 95th percentile flow at the node is 0.07m^3/s and the 30th percentile flow is 0.736.

9.4.2.15 Lowerymore_010 River Waterbody

The current WFD status of the Lowerymore_010 is Moderate, assessed under the National WFD Monitoring Programme. The WFD status was classified as Poor under the 2010-2015 monitoring period and as Good under the 2013-2018 monitoring period. The waterbody is classified as at risk of not achieving its WFD environmental objective due to nutrient enrichment. The significant pressure is attributed to agriculture.

The waterbody is a tributary of the Lowerymore_020. It rises in the highlands to the northeast of the of Hydrotool Node Id 37_3117 which is located at its confluence with the Lowerymore_020. The network upstream of the confluence is geologically and topographically controlled, and the waterbody forms a third order stream by its confluence. The waterbody drains a small, non-WFD designated upland lake (Barnes Lough).

9.4.2.16 Finn (Donegal)_070 River Waterbody

The current WFD status of the Finn (Donegal)_070 is Moderate, assessed under the National WFD monitoring programme. WFD status was unassigned under the 2010-2015 monitoring period and assigned Poor Status during the 2013-2018 monitoring period.

The plan form of the waterbody downstream of gauging Station 01403 is moderately to highly sinuous. The meander wavelength is large relative to the channel width and bends are well developed; the system is active but relatively stable. There is minimal topographic confinement, and the waterbody is set within a broad, predominantly agricultural flood plain. Hydrotool Node id 01_776 is located on the channel downstream of Stranorlar within the Finn River SAC. The 95th percentile flow at the node is 0.011 m3/s and the 30th percentile flow is 0.159m^3/s.

The waterbody is protected under the European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293/1988), which implemented EU Directive 78/659/EEC:

9.4.2.17 Corraber_010 River waterbody

The current WFD Status of the Corabber_010 is Good, assessed under the National WFD Monitoring Programme. The waterbody has maintained Good status across all RBMP cycles. Its WFD environmental Objective is High Status. It is at risk of not achieving this objective due to sediment, nutrient and hydromorphology issues.

The river network rises in the highlands to the north of Lough Eske. The network drains an upland catchment of approximately 19km^2. Lough Belshade, an upland WFD designated Lake waterbody forms part of the network headwaters to the northwest. The headwaters drain several small, non-WFD designated upland lakes (Loughinisland, Lough Gulladuff, Lough Anabovin, Lough Anabawn, and Lough Aderry) prior to discharging to Lough Eske. The northern extent of the network is geologically and topographically controlled; flow is confined to narrow, steep valleys. The input from the waterbody is likely to be flashy, while the presence of the lakes in the uplands indicate significant storage within the system. The channel transitions to a low gradient, depositional regime prior to discharge to Lough Eske.

Hydrotool Node Id 37_1127 is located on the river waterbody just upstream of its discharge point on Lough Eske. The 95th percentile flow at the node is 0.145m^3/s and the 30th percentile flow is 0.182m^3/s.

In addition to the designated WFD waterbodies described above, the greenway route traverses numerous field drains and ditches that are not mapped as watercourses on the Ordnance Survey Ireland (OSI) historic 6-inch mapping (Ordnance Survey Ireland. These features are localised in nature and are not subject to WFD classification but are considered where relevant within the impact assessment.

9.4.2.18 Lough Eske Lake Waterbody

The current WFD Status of Lough Eske is Good, assessed under National WFD Monitoring Programme. WFD Status was assigned as Moderate under the 2010-015 monitoring period. It has maintained Good Status over subsequent monitoring periods.

The waterbody is a lowland, oligotrophic lake with a surface area of approximately 364 hectares, occupying a broad valley at the foot of the Bluestack and Tawnawully mountains. The immediate shoreline of Lough Eske is characterised by a mix of peatland and conifer forestry, Areas of wet, poorly drained peat soils occur along sections of the margin interspersed with plantation forestry blocks extending to the lake edge in places.

Lough Eske's hydrology is characterised year-round inflows from extensive upland peat-dominated catchments. These tributaries deliver low-alkalinity runoff containing naturally occurring humic and fulvic substances derived from blanket bog and peat soils. These inputs form part of the natural hydrochemical regime of the lake, consistent with its oligotrophic character.

9.4.2.19 Lough Mourne Lake Waterbody

The current WFD status of Lough Mourne, the Mourne DL Lake waterbody is Good, assessed under the National WFD Monitoring Programme, and the waterbody has maintained Good status across all RBMP cycles. The lake is not identified as At risk of failing to meet its WFD environmental objective.

Lough Mourne is an upland lake located within a mountainous setting to the southwest of Barnesmore Gap. The lake occupies a confined basin within the upland terrain. Land cover along the immediate shoreline is dominated by peatland and conifer forestry, reflecting the surrounding upland catchment. Areas of poorly drained peat soils occur around the lake margins. The southern west shore coincides with the boundary of the Croaghonagh Bog SAC. The lake is identified as a Drinking Water Protected Area under Article 7 of the WFD.

The hydrology of Lough Mourne is characterised by year-round inflows from small upland tributaries draining peat-dominated catchments. These tributaries deliver low-alkalinity runoff containing naturally occurring humic and fulvic substances derived from blanket bog and upland peat soils. As a result, the hydro chemical regime of the lake reflects typical upland peatland influences.

The contributing catchment is characterised by areas of intact and cutover blanket bog and commercial forestry, with drainage networks that are locally modified and responsive to rainfall. Runoff response is therefore relatively flashy; however, the storage capacity of peat soils and small upstream water bodies provides some attenuation of flows prior to discharge to the lake.

Overall, Lough Mourne represents an upland, peat-influenced system operating under natural hydro chemical conditions. The waterbody reflects catchment-scale controls, with its Good WFD status indicating that it is operating within a stable baseline condition under existing inputs.

9.4.3 Water Framework Directive Baseline

The EU Water Framework Directive 200/0/EC provides the basis for the protection of the Water environment in Ireland. The aim of the WFD is to prevent a deterioration in the status of all waterbodies.

Under the WFD the overall status of a surface waterbody is assessed against the following Quality Elements (QE):

1. Biological QE includes biological elements such as aquatic flora and fauna,
2. Hydromorphological QE includes the physical characteristics and processes that support aquatic ecosystems such as hydrological regime, substrate conditions & connectivity,

3. Physico-chemical Status include the water quality conditions of temperature, pH, turbidity, dissolved oxygen and nutrient levels).
4. Chemical Status includes the concentration of priority1 substances and other pollutants. Chemical status relates primarily to the presence and concentration of priority substances and priority hazardous substances, typically associated with industrial discharges and persistent pollutants.

The focus of this chapter is the assessment of the impacts of the proposed development on Quality Elements 2 to 4. The impacts on the Biological QE and Ecological Status are addressed in Chapter 7, Biodiversity.

The key components of the hydromorphology QE includes:

- Hydrological regime: Discharge, flow velocity and water level fluctuations, and connectivity.
- Morphology: River channel structure, substrate composition, and bank conditions.
- Connectivity: Connectivity is essential for sediment continuity, species migration nutrient exchange and flood storage.

The hydromorphology QE is treated as a supporting quality element. It is primarily used to distinguish between High and Good ecological status. For water bodies already at Good Ecological status or lower the hydromorphological condition does not influence the overall classification – only biological and physico-chemical elements do so.

At High Ecological status the Hydromorphological QE is assessed to confirm or rule out High status. If a waterbody is classified at Good or lower based on biological and physico-Chemical elements, the hydromorphology QE does not downgrade it further.

The National WFD Monitoring Programme provides a comprehensive overview of the ecological, chemical and hydromorphology status of the country's waterbodies assessing and reporting on every six years under the River Basin Management Plan (RBMP) cycle.

Status is assessed at the waterbody level. The programme monitors Physio-Chemical parameters such as pH, temperature, electrical conductivity and dissolved oxygen and nutrients at discrete points on waterbodies. In addition, specific pollutants such as heavy metals, organic compounds and industrial chemicals are monitored on a risk assessment basis. Surveillance monitoring undertaken by the program provides a long-term baseline for waterbodies nationally. The Biological QE is monitored by Environmental Protection Agency's (EPA) biological monitoring programme. Data from the monitoring programmes are combined to assign the overall status of a waterbody. The catchment assessments carried out over RBMP cycles allow a qualitative assessment of trends in the Ecological Status (refer to Table 7-12, in Chapter 07).

The WFD Status of the hydrological attributes within the study area over River Basin Management Plan (RBMP) cycles are summarised in Table 9-7. Note that the WFD nomenclature for the waterbodies has been adopted as this is the principal source of baseline data used to inform the assessment.

Table 9-7 - WFD Status by RBMP Cycle (Adapted from EPA,2024)

Waterbody	Water body Type	Status 10-15	Status 13-18	Status 16-21	Status Objective	Risk Status
BURN DAURNETT_010	River	Poor	Poor	Moderate	Good	At risk
FINN (DONEGAL)_060	River	Moderate	Poor	Poor	Good	At risk
Finn (Donegal)_070	River	Unassigned	Poor	Moderate	Good	At risk

1 Priority substances and associated Environmental Quality Standards (EQS) are defined within the Priority Substances Directive 2013/39/EU, transposed into Irish Law by the European Environmental Quality Objectives (Surface Waters) Amendment Regulations, 2015 (S.I. No. 386/2015)

Waterbody	Water body Type	Status 10-15	Status 13-18	Status 16-21	Status Objective	Risk Status
Mourne Beg_010	River	Poor	Poor	Poor	Good	At risk
CLOGHER (DONEGAL)_010	River	Poor	Good	Good	Good	Not at risk
ESKE_010	River	Moderate	Good	Good	Good	Not at risk
ESKE_010	River	Moderate	Good	Good	Good	Not at risk
Carbbeagh	River	Moderate	Good	Good	Good	Not at risk
ESKE_020	River	Good	Good	Good	Good	Not at risk
Drumroosk_East	River	Good	Good	Good	Good	Not at risk
LOWERYMORE_010	River	Poor	Good	Moderate	Good	At risk
Corraber_010	River	Good	Good	Good	High	At risk
LOWERYMORE_020	River	High	High	High	High	Not at risk
LOWERYMORE_030	River	Good	High	High	Good	Not at risk
Lowerymore_010	River	Poor	Good	Good	Good	At risk
Lough Eske	Lake	Moderate	Good	Good	Good	Review
Lough Mourne DL	Lake	Good	Good	Good	Good	Not at Risk
Lough Bellshade	Unassigned	High	High	High	Good	Not at Risk
Fad (Barnesmore)	Lake	Unassigned	Good	High	Good	Not at Risk

A review of the EPA Cycle 3 River Basin Management Plan (RBMP) WFD dashboards has been undertaken for all waterbodies within the study area. The available data indicate no evidence of significant pollution issues or acute water quality pressures affecting these waterbodies. Identified pressures are generally diffuse in nature and consistent with those described at the catchment scale in the hydrological baseline. On this basis, the WFD status classifications are considered to provide an appropriate and reliable characterisation of baseline water quality conditions for the purposes of this assessment.

9.4.4 Wastewater Treatment Plants (WWTP)

The Donegal Town, Ballybofey–Stranorlar and Killygordon Wastewater Treatment Plants (WWTPs) discharge to watercourses within the wider study area and represent existing pressures on surface water quality.

The Donegal Town and Ballybofey–Stranorlar WWTPs are currently operating within their design capacities for both hydraulic and organic loading. The Killygordon WWTP is operating at or above its design capacity, indicating potential pressure on receiving waters. However, the outfall from Killygordon WWTP is located outside the study area and downstream of the proposed development.

These existing discharges form part of the baseline environmental conditions and have been considered in the assessment of potential cumulative impacts. The proposed development will not interact with or alter the operation of these facilities.

9.4.5 Protected Areas

The receiving environment includes a number of protected areas and waterbodies of regulatory significance. The River Finn SAC is located within the wider hydrological network and supports qualifying species dependent on appropriate water quality and hydrological conditions. The River Finn is also designated as a Salmonid Water, reflecting its importance for salmonid species and the requirement to maintain suitable water quality standards. The

Eske_020 river waterbody and the Drumroosk_East are identified as a Drinking Water Protected Area under Article 7 of the Water Framework Directive and are associated with the Donegal (River Eske) Water Treatment Plant. Lough Mourne is a Lake DWPAs associated with the Meencrumlin Water Treatment Plant.

No bathing water protected areas or nutrient sensitive waters have been identified.

9.4.6 Flood Risk

Flood risk within the study area is influenced by fluvial, pluvial, and localised overland flow processes. Fluvial flood risk is associated with the main river channels and their tributaries, with flood extents defined by channel capacity, topography, and upstream catchment response. Existing flood mapping published by the Office of Public Works indicates that areas of fluvial flood risk are largely confined to low-lying valley floors adjacent to the principal watercourses. Pluvial flood risk arises from intense rainfall exceeding the capacity of drainage pathways and infiltration rates, resulting in localised surface water ponding and overland flow. These effects are primarily influenced by topography, soil conditions, and land cover, and are generally limited in extent within the predominantly rural catchment. Groundwater flood risk is low, reflecting the absence of known groundwater flooding mechanisms and the hydrogeological characteristics of the area. Overall, baseline flood risk within the study area is characterised by localised fluvial floodplains associated with river channels and limited pluvial risk, with no evidence of widespread or significant flood risk constraints outside of mapped flood extents.

9.5 Impact Assessment

9.5.1 Do Nothing Scenario

In the absence of the proposed development, no significant changes to hydrological attributes are likely to occur under the current regime. The nature or value of the study area, in terms of WFD status, water resources and designated water dependent sites, would continue unchanged.

9.5.2 Construction Phase Impacts

This section outlines the potential impacts of construction activities on water quality and hydromorphology, describing the key sources and pathways through which effects on the surface water environment may arise.

Several waterbodies that are potentially impacted by the proposed development form part of Special Areas of Conservation (SACs) designated for Freshwater Pearl Mussel (FWPM). FWPM are highly sensitive to short-term changes in water quality, hydromorphology and disturbance, such that slight or temporary changes in water-related Quality may have implications for SAC conservation objectives.

In accordance with NPWS data-handling requirements, the location and distribution of FWPM are not disclosed within this EIAR. Accordingly, this Water chapter assesses the magnitude and duration of effects on Water Quality and Hydromorphology QEs and identifies where such effects have the potential to interact with FWPM-designated waterbodies and their qualifying interests. The detailed ecological assessment of FWPM is addressed in the Ecology chapter and Appropriate Assessment.

The proposed development could give rise to impacts on the surface water environment during construction, including changes to water quality and flows. The following potential impacts are considered as part of this assessment:

- Impacts on Water quality and hydromorphology due to Greenway earthworks
- Impacts on the Water Quality and hydromorphology due to hydraulic structure construction,

- Impacts on the Water Quality and hydromorphology due to bridge repairs,
- Impacts on the Water Quality hydromorphology due to uncontrolled discharge from construction sites,
- Impacts on water quality due to accidental spillage of oils, fuels, or other construction chemicals and wastewater.

A distinction is drawn between impacts arising from earthworks within RBZs and those associated with construction compounds and crossing works. Disturbance of RBZs gives rise to diffuse pressures acting along extended reaches of a waterbody, whereas runoff from construction compounds and crossing works results in localised point-source inputs to receiving waters.

The following sections describe the principal mechanisms and pathways by which construction activities may affect water quality and hydromorphology. Site-specific impact magnitude and significance are considered subsequently.

9.5.2.1 Impacts on Water Quality and hydromorphology due to Greenway Earthworks

Greenway earthworks, including site preparation, temporary access road construction, soil stockpiling, levelling, and grading, will disturb and expose soils, increasing their susceptibility to erosion during rainfall events. Runoff containing elevated suspended sediments may be transported to receiving waterbodies, adversely affecting Water Quality and hydromorphology.

Water quality impacts

Excavation exposes metals such as iron, manganese, aluminium, copper, and zinc that are naturally sequestered within soils as organic complexes. Under the low-oxygen conditions typical of intact soil profiles, these compounds are stable and exhibit low bioavailability. Disturbance and exposure to oxygen promote oxidation, converting these complexes into more soluble inorganic forms that may be bioavailable and potentially toxic to aquatic organisms at low concentrations.

Similarly, nutrients such as nitrogen and phosphorus, which are bound in organic forms within soils, may be mineralised to inorganic forms during excavation. These inorganic species are more mobile and bioavailable and can contribute to eutrophication in receiving waters. Lakes are particularly sensitive to phosphorus enrichment, as phosphorus is typically the limiting nutrient in lacustrine systems.

Excavation and stockpiling effectively transform soils from a sink for metals and nutrients into a source. Runoff from disturbed areas provides a pathway for both suspended sediments and dissolved contaminants to enter receiving waters.

Runoff from excavated areas may also mobilise chemical pollutants from construction activities, including fuels, lubricants, and maintenance residues. In addition, earthworks along the railway corridor may mobilise legacy contaminants such as hydrocarbons, herbicides, pesticides, and heavy metals associated with historic railway operations.

Elevated suspended sediment concentrations increase turbidity within receiving waters, reducing light penetration and primary productivity. Increased turbidity can also elevate water temperature through greater solar absorption, contributing to reductions in dissolved oxygen levels. Suspended sediments may act as vectors for pollutants, transporting adsorbed contaminants and pathogens into the water column.

Hydromorphology impacts

Excavated areas and stockpiles are vulnerable to erosion and weathering. Runoff generated during rainfall events can transport sediments to nearby watercourses and lakes, increasing suspended sediment loads and promoting deposition.

Deposited sediments may blanket natural channel substrates, altering bed composition and habitat structure. Stockpiles located near watercourses also present a risk of collapse, with the potential to obstruct flow, alter the hydrological regime, and increase flood risk.

Earthworks accelerate overland flow by reducing infiltration and altering surface roughness. This can increase both the rate and volume of runoff reaching watercourses, modifying flow

regimes and potentially increasing peak discharges. Changes to flow pathways due to excavation and construction traffic may also lead to localised ponding or flooding.

Disturbance within riparian corridors increases sediment availability and enhances connectivity between disturbed areas and watercourses. This increases both sediment delivery rates and runoff velocities.

Vegetation clearance within Riparian Buffer Zones (RBZs) reduces their effectiveness in filtering sediments and nutrients from runoff. RBZs play a critical role in intercepting pollutants, and their effectiveness generally increases with width. Narrow buffers provide limited attenuation, while wider buffers significantly improve removal of suspended sediments and nutrients.

A buffer of 5m in width can remove between 50-60% of suspended sediments and between 30-40% of nitrates. Removal rates within the RBZ for sediments increase to 70-80% with nutrient removal increasing to 40-50% at 10m in width. A 20m wide buffer zone can reduce suspended sediment loads by 70-80% and nitrate concentrations by 70-80%. A 30 wide zone can remove greater than 95% and 85% of suspended sediments and nitrates respectively (Ó hUallacháin, et al., 2025).

Alteration of riparian vegetation structure can also reduce nutrient uptake efficiency. Vegetation types such as woodland and scrub are particularly effective at nutrient retention. Degradation of these communities may result in elevated nutrient inputs to receiving waters over time.

9.5.2.2 Impacts on Water Quality and Hydromorphology due to the Construction of Hydraulic Structures

The construction of hydraulic structures, including culverts and bridge repairs, requires excavation works within or near watercourses. These activities have the potential to impact both Water Quality and hydromorphology QEs.

Water quality

Dewatering of excavations is typically required to control shallow groundwater and maintain dry working conditions. Water pumped from excavations may contain elevated concentrations of suspended sediments and nutrients, particularly nitrogen, which can adversely affect Water Quality if discharged to a receiving waterbody without appropriate treatment.

Offline culvert construction may require temporary diversion of the watercourse, resulting in localised alterations to the hydrological regime. Increased turbulence at diversion inlets and outlets can lead to erosion and downstream scour, mobilising sediments and generating sediment plumes. These processes may adversely affect both Water Quality and hydromorphology QEs.

Hydromorphology

Temporary diversions can also result in habitat fragmentation and disruption of ecological continuity within the watercourse. Such works should be carefully managed and restricted to March to September seasonal window to minimise ecological impacts.

The movement of construction vehicles within riparian corridors can disturb soils and alter land cover structure, increasing sediment mobilisation. Runoff from these areas may transport suspended sediments to receiving waters, contributing to increased turbidity and sediment deposition.

Excavation works and vehicle movement in proximity to watercourses can reduce the stability of channel banks, increasing the risk of erosion or collapse. This may alter channel morphology and increase localised flood risk. In addition, the installation of culverts modifies the structure and composition of channel bed and bank materials, contributing to long-term changes in channel form and hydromorphological processes.

9.5.2.3 Impacts on Water Quality and Hydromorphology Due to Bridge Repairs

Bridge repair works involve the removal of vegetation, grout, and masonry over and adjacent to the water surface. These activities can generate dust, masonry fragments, metal particles, and organic debris, which may enter the waterbody either directly or via wind dispersal.

Water quality

Repair activities such as cutting, power washing, and dust suppression generate wastewater streams that may contain suspended solids and contaminants. I n the absence of appropriate controls, these wastewaters may provide a pathway for pollutants to enter the receiving waterbody, adversely affecting Water Quality.

The use of chemicals during repair works, including acids, alkalis, paints, bitumen, and waterproofing compounds, introduces a risk of accidental spills and leaks. Plant and equipment associated with the works further increase this risk. The introduction of such substances to a waterbody may result in increased biochemical oxygen demand and reduced dissolved oxygen levels, as well as posing a risk of acute toxicity to aquatic organisms.

In addition, newly applied materials in contact with water may leach contaminants, giving rise to localised water quality deterioration.

Hydromorphology

Deposition of demolition debris within the channel can alter the structure of the channel bed and modify flow patterns, leading to localised changes in hydromorphology. Accumulated debris may also impose an oxygen demand within benthic sediments, with potential secondary effects on aquatic habitats.

Active Travel retrofit works are proposed. The retrofits will include road resurfacing, signage and road markings and deck-mounted elements, will involve similar construction activities and give rise to the same water quality and hydromorphological impact pathways as those described for bridge repair works.

9.5.2.4 Impacts on Water Quality and Hydromorphology Due to Discharge from Construction Sites

Construction activities such as earthworks, temporary road construction, site preparation, stockpiling, levelling, and grading disturb and expose soils, increasing their susceptibility to erosion during rainfall events. These activities may also compact soils, reducing infiltration and increasing surface runoff to nearby watercourses, lakes, and hydrologically connected habitats.

Water quality

Uncontrolled runoff from construction sites can adversely affect water quality. Through both suspended sediments and contamination from site activities. Potential pollutant sources include:

- Concrete batching and washout areas
- Wheel wash systems
- Dust suppression activities
- Welfare facilities and wastewater discharges
- Waste and material storage areas
- Hydrocarbons, oils and construction chemicals from plant and materials handling
- Accidental spills and leaks
- Dewatering effluent containing suspended solids and dissolved nutrients

Runoff containing elevated suspended sediments increases turbidity in receiving waters, reducing light penetration and primary productivity. Sediments may also act as vectors for pollutants, transporting adsorbed contaminants into the water column.

Construction-related contaminants, including oils, lubricants, paints, bituminous coatings and herbicides, may be toxic to aquatic organisms. Contaminated runoff may also increase biochemical oxygen demand, reducing dissolved oxygen concentrations.

Concrete-related discharges present a particular risk. Wastewater from batching and washout operations is typically highly alkaline and may contain high suspended solids concentrations. If discharged untreated, this can elevate pH, increase turbidity, and reduce dissolved oxygen levels in receiving waters.

Uncured concrete in contact with water can cause significant water quality deterioration due to its high alkalinity, potentially resulting in acute toxicity to fish and benthic macroinvertebrates. Leaching from uncured concrete may also impact groundwater contributing to baseflow if not appropriately contained and isolated.

Hydromorphology

Where construction sites are located within riparian zones (e.g. at bridge works), disturbance of vegetation and modification of surface structure can adversely affect hydromorphology. Site clearance and grading alter runoff characteristics, potentially increasing peak discharge to receiving waterbodies. Increased sediment mobilisation from disturbed surfaces and vehicle movements may lead to elevated sediment loads and changes to channel bed structure.

Wheel wash systems may generate effluent containing suspended solids, hydrocarbons, detergents and biological contaminants. In addition, construction vehicles may act as pathways for the spread of invasive species.

9.5.2.5 Impacts on Water Quality Due to Accidental Spillage of Oils, Fuels, Construction Chemicals and Wastewater

During construction, fuels, hydraulic fluids, solvents, concrete, lime, grouts, paints, detergents, and other potentially polluting substances will be stored and/or used within the proposed development. While liquids such as oils, lubricants, paints, bituminous coatings, preservatives, and herbicides present a particular risk, fuel spillages during refuelling or from machinery operating in proximity to waterbodies represent a key pathway for contamination.

Accidental releases of these substances may be transported to receiving waterbodies via surface runoff or direct discharge. Such contaminants can adversely affect water quality through increased biochemical oxygen demand, reduced dissolved oxygen concentrations, and the introduction of toxic substances. Hydrocarbons and construction chemicals may cause acute toxicity in aquatic organisms, while cementitious materials can elevate pH and increase turbidity.

Wastewater generated during construction activities may also contain suspended solids, nutrients, and chemical contaminants, which can further degrade water quality if discharged without appropriate treatment.

9.5.3 Construction Phase Impact Assessment

Effects arising from the construction of the Greenway are assessed using a source–pathway–receptor framework, capturing the spatial relationship between construction activities and the ZoI. Indirect effects are assessed at the point at which they arise in the receiving environment, to avoid overestimating the significance of impacts associated with individual construction activities.

9.5.3.1 Assessment of construction phase impacts on the Eske_020 River waterbody

This section identifies, predicts and evaluates the likely significant effects arising from the proposed Greenway construction on the Eske_020, prior to mitigation. The Eske_020 is of very high value due to its inclusion within the Lough Eske and Ardnamona Wood SAC and its protection as a Drinking Water Protected Area under Article 7 of the WFD.

[1] Chainage 750m Bridge repairs S01

The mainline is carried across a reach of the Eske_020 by an existing railway bridge (Bridge S01). Minor repair works are proposed at Bridge S01.

Water quality

Contaminated runoff from bridge repair. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Sediment transport from Bridge repair. The effect is assessed as being negative, of low magnitude and of temporary duration. A precautionary approach has been adopted in applying the magnitude/sensitivity matrix, and the significance of the effect is assessed as moderate.

[2] Chainage 750m Greenway earthworks

Greenway earthworks at the approaches to Bridge S01 are proposed. The earthworks encroach on the banks of the Eske_020. And will create a pathway for runoff from earthworks to the Eske_020.

Water quality

Contaminated runoff from earthworks. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Sediment from earthworks. The effect is assessed as being negative, of low magnitude and of temporary duration. A precautionary approach has been adopted in applying the magnitude/sensitivity matrix, resulting in a moderate effect.

[3] Chainage 750 to 850m Greenway earthworks

As the greenway earthworks progress to the northwest from chainage 750-850m the width of the RBZ expands to greater than 30m.

Water quality

Contaminated runoff from earthworks. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Alteration of RBZ. The effect is assessed as being negative, of negligible magnitude and of temporary duration, resulting in a not significant effect.

[4] Chainage 1100 Construction Compound/S02 Construction site

A construction compound is proposed at chainage 1100 to enable the construction of the N56 underpass, Structure S02. The compound is located on grassland and is accessed from a local road off the N56. The western extent of the compound is within 20m of the Drumroosk_East.

Earthworks are proposed for the construction of Structure S02. The earthworks will impact an area of approximately 287m^2 to the north of the N56, from chainage 1050-1100m. There is a 10m wide RBZ between the earthworks along an approximately 25m long reach of the Drumroosk_East Stream, close to the location where the stream passes under the N56.

The value of the Drumroosk_East is high due to its identification as a DWPA under Article 7 of the WFD.

Water quality

Contaminated runoff from construction sites. The effect is assessed as being negative, of low magnitude and of temporary duration. Given high value of the Drumroosk_East this results in a slight effect.

Hydromorphology

Sediment transport from construction sites. The effect is assessed as being negative, of low magnitude and of temporary duration. Given high value of the Drumroosk_East this results in a slight effect.

[5] Chainage 1100 to 1150m Earthworks

Earthworks are proposed for the construction of Structure S02. The earthworks will impact an area of approximately 287m^2 to the north of the N56, from chainage 1100-1150m. There is a 10m wide RBZ between the earthworks along an approximately 25m long reach of the Drumroosk_East Stream, close to the location where the stream passes under the N56.

Water quality

Contaminated runoff from earthworks. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Alteration of RBZ. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

[6] Chainage 1150 to 1600m Greenway earthworks

From Chainage 1150m to 1600M Earthworks are proposed on an approximately 400m reach of the Drumroosk_East. The average width of the buffer zone between the proposed earthworks and the waterbody is less than 20m, at points it is less than 10m. The proposed earthworks will take place along the railway.

Water quality

Contaminated Runoff from earthworks. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Alteration of the RBZ. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

[7] Eske_020 Confluence

There is a pathway between the location of the proposed measures assessed above and the Eske_020 confluence.

Water Quality

Contaminant transport from upstream earthworks/construction. The effect is assessed as being negative, of negligible magnitude and of temporary duration. The receiving water environment is of very high value, resulting in a not significant effect.

Hydromorphology

Sediment transport from upstream earthworks/construction site. The effect is assessed as being negative, of low magnitude and of temporary duration. The receiving water environment is of very high value, and a precautionary approach has been adopted in applying the magnitude/sensitivity matrix, resulting in a moderate effect.

9.5.3.2 Assessment of Construction Phase Impacts on Eske_010

This section identifies, predicts and evaluates the likely significant effects arising from the proposed Greenway construction on the Eske_010, prior to mitigation. The Eske_010 is of very high value due to its inclusion within the Lough Eske and Ardnamona Wood SAC. The construction of the offline greenway along the Eske_010 is within the Lough Eske and Ardnamona Wood SAC.

A Pipe culvert, PC08, is proposed at chainage 4275m on a drainage ditch that discharges to the Eske_010 approximately 65m downstream of the proposed Bridge S04 location. The value of the tributary is low. The works will take place outside of the SAC boundary.

A box culvert, PC09, is proposed at chainage 4820 m on the Carbbeagh tributary of the Eske_010. The Carbbeagh discharges to the Eske_010 approximately 560m upstream of the PC08 discharge point. There is an existing culvert on the Carbbeagh at the proposed PC09 location. The value of the Carbbeagh is low. Construction will take place outside of the SAC.

A pipe culvert PC-10 is proposed a chainage 5330m on the Drumnagahan tributary of the Eske_010. The value of the Drumnagahan is low. Construction will take place within the SAC boundary.

A pipe culvert, PC11, is proposed at chainage 6420m on the Milltown 37 reach of the Eske_010. The value of the Milltown 37 is low; and construction will take place outside of the SAC boundaries.

Repairs are proposed at chainage 950 m to Bridge S05 at the mouth of the Eske_010

[8] Chainage 55m (Lough Eske Loop West) Bridge S04 construction

The offline sections cross the Eske_010 via a proposed viaduct, Bridge S04, that will be constructed at Chainage 55 (Eske Loop). The bridge will span a steep sided valley and will require 5 piers on the upper slopes of the river valley. The pier foundations will be of bored pile or micro pile construction. Two of the piers will be within 20m of the channel on the north and south banks of the river. The bridge will span a largely unmodified reach of the Eske_010 waterbody Substrates in the reach are predominantly cobble and velocities are high. The channel bank material along a 200m reach of at the Bridge S04 location the river consists of limestone and earth. Bridge S04 is of clear span design, and construction will not require instream works.

Water quality

Water pollution from foundation construction. The effect is assessed as being negative, of low magnitude and temporary duration, resulting in a moderate effect.

Hydromorphology

Sediment transport from construction site. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a moderate effect.

[9] Chainage 4275m PC08 Construction

A Pipe culvert, PC08, is proposed at chainage 4275m on a drainage ditch that discharges to the Eske_010 approximately 65m downstream of the proposed Bridge S04 location. The value of the tributary is low. The works will take place outside of the SAC boundary.

Water Quality

Water pollution from hydraulic structure construction. The effect is assessed as negative, of low magnitude and of temporary duration. The channel is of low value resulting in a slight effect.

Hydromorphology

Sediment transport from hydraulic structure construction. The effect is assessed as negative, of low magnitude and of temporary duration. The channel is of low value resulting in a slight effect.

[10] Chainage 4820m Culvert PC09 construction

A box culvert, PC09, is proposed at chainage 4820m on the Carbbeagh tributary of the Eske_010. The Carbbeagh discharges to the Eske_010 approximately 560m upstream of the PC08 discharge point. There is an existing culvert on the Carbbeagh at the proposed PC09 location. The value of the Carbbeagh is low. Construction will take place outside of the SAC.

Water Quality

Water pollution from hydraulic structure construction. The effect is assessed as negative, of low magnitude and of temporary duration. The channel is of low value resulting in a slight effect.

Hydromorphology

Sediment transport from hydraulic structure construction. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a slight effect.

[11] Chainage 5330m PC10 Construction

Water Quality

Water pollution from hydraulic structure construction. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Sediment transport from hydraulic structure construction. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a slight effect.

[12] Eske_010 receiving reach

A pathway exists between PC08 and PC09 and PC10 construction sites and a receiving reach of the Eske_010.

Water Quality

Contaminant transport from PC08, PC09 and PC10 construction. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Sediment transport from PC08, PC09 and PC10 construction. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

[13] Chainage 6450m PC11 Construction

A culvert, PC11, is proposed at chainage 6450 m on the Milltown 37 reach of the Eske_010. The value of the Milltown 37 is low; and construction will take place outside of the SAC boundaries.

Water quality

Water pollution from hydraulic structure construction. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Sediment transport from hydraulic structure construction. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a slight effect.

[14] Chainage 1680m (Eske Loop) Bridge S05 Retrofit [14] Chainage 950 m Bridge SO5 Repair

An active travel retrofit is proposed at chainage 1680m (Eske Loop) to Bridge S05 on the Eske_010.

Water quality

Bridge retrofit. The effect is assessed as negative, of negligible magnitude and of temporary duration, resulting in a not significant effect.

Hydromorphology

Bridge retrofit. The effect is assessed as negative, of negligible magnitude and of temporary duration, resulting in a not significant effect.

9.5.3.3 Description of construction phase impacts on the Lowerymore_030.

The greenway traverses between chainage 1400m to 2500m along the shores of Lough Eske. In some locations the greenway is within 20m of the lake shore. The potential impacts arising from these works are considered in the context of downstream receptors, including Lough Eske, and are assessed in the following section.

This section identifies, predicts and evaluates the likely significant effects arising from the proposed Greenway construction on the Lowerymore_030, prior to mitigation. The Lowerymore_030 is of very high value due to its inclusion within the Lough Eske and Ardnamona Wood SAC and its High WFD Status.

[15] Chainage 6700m Bridge S06 Construction

A river bridge, S06 is proposed at chainage 6700m. The bridge will span the Clogher (Donegal). The bridge is clear span and will be constructed from precast components. The Clogher Donegal is of high value due to its inclusion within the Lough Eske and Ardnamona Wood SAC.

The confluence of the Clogher (Donegal) and the Lowerymore_030 is approximately 340m downstream of the proposed Bridge S06 location. The Lowerymore_030 discharges into Lough Eske approximately 900m northwest.

Water quality

Water pollution from hydraulic structure construction. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a moderate effect.

Hydromorphology

Alteration of RBZ. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a slight effect.

[16] Chainage 6800m to 7420m PC13, PC14 and PC 15 Culvert construction

A pipe culvert PC-13 is proposed at chainage 6800m. The culvert is proposed on a minor water course that is likely to be a first order tributary of the Clogher (Donegal). The watercourse is not included in the EPA River Waterbody Indicative Flow Network shapefiles. Additional pipe culverts PC14 at chainage 6970m and PC 15 at chainage 7420m are proposed on the same minor watercourse as PC13. The value of the watercourse is low. The proposed culverts are outside of the SAC boundary.

Water Quality

Water pollution from hydraulic structure construction at PC13, PC14, and PC15. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a not significant effect.

Hydromorphology

Sediment transport from hydraulic structure construction at PC13, PC14, and PC15. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a not significant effect

[17] Lough Eske

A pathway exists between the Bridge S06 construction site and Lough Eske. The lake is also directly impacted by Greenway earthworks between chainage 1400m and 2500m along its shoreline. The value of Lough Eske is very high due to its inclusion within the Lough Eske and Ardnamona Wood SAC.

Water quality

Contaminated runoff from Greenway construction at 1400m to 2500m. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Contaminant transport from upstream Bridge S06 construction site. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Alteration of the RBZ. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Sediment transport from Bridge S06 construction site. The effect is assessed as being negative, of low magnitude and of temporary duration. A precautionary approach has been adopted in applying the magnitude/sensitivity matrix, resulting in a moderate effect.

[18] Chainage 9025m S08 Bridge repairs

Bridge repairs are proposed at Bridge S08 which carries the mainline across the Mulanamphry tributary of the Lowerymore _030 at chainage 9025m. Bridge S08 lies approximately 200m upstream of the confluence with the Lowerymore_030 which is within the borders of the SAC. The value of the Mulanamphry is high. The bridge is outside of the Lough Eske and Ardnamona Wood SAC.

Water quality

Contaminated runoff from bridge repair. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Sediment transport from bridge repairs. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

[19] Lowerymore_030

A pathway exists for effects from the construction of Bridge S06 and repairs to Bridge S08 on water quality and hydromorphology within the Lowerymore_030.

Water Quality

Contaminant transport from upstream Bridge S06 construction site. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a slight effect.

Contaminant transport from upstream Bridge S08 repairs. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Sediment transport from upstream Bridge S06 construction. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a slight effect.

Sediment transport from Bridge S08 repairs. The effect is assessed as negative, of negligible magnitude and of temporary duration, resulting in a not significant effect.

9.5.3.4 Description of Construction Phase Impacts on the Burn Daurnett_010.

This section identifies, predicts and evaluates the likely significant effects arising from the proposed Greenway construction on the Burn Daurnett_010, prior to mitigation. The value of the Burn Daurnett_010 is medium.

[20] Chainage 26720m S16 Bridge repair

Bridge repairs are proposed to Bridge S16 at Chainage 26720m. Bridge S16 carries the mainline over the Sessiagh 01 stream. The value of the stream is low.

Water quality

Contaminated runoff from bridge repairs. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Sediment transport from bridge repairs. The effect is assessed as negative, of negligible magnitude and of temporary duration, resulting in a not significant effect.

[21] Chainage 25050m PC17 construction

A culvert, PC17, is proposed at Chainage 25050m on the Burn Daurnett_010 main channel.

Water quality

Water pollution from hydraulic structure construction. The effect is assessed negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Sediment transport from hydraulic structure construction. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a slight effect.

9.5.3.5 Description of Construction Phase Impacts on the Lowerymore_020.

This section identifies, predicts and evaluates the likely significant effects arising from the proposed Greenway construction on the Lowerymore_020, prior to mitigation. The Lowerymore_020 is of high value due to its High overall WFD status and associated High Status Objective.

[22] Chainage 12200m Bridge S10 & Trailhead Construction

Construction of Bridge S10 is proposed at chainage 12200m. A trailhead with car parking facilities is also proposed at this location. An offline greenway spur will be constructed between chainage 12200m to 12350m.

Water Quality

Water pollution from Bridge S10 construction. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Contaminated runoff from Trailhead construction site. The effect is assessed as being negative, of negligible magnitude and of temporary duration, resulting in a not significant effect.

Hydromorphology

Sediment transport from Bridge S10 construction. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Sediment transport from Trailhead construction site. The effect is assessed as being negative, of negligible magnitude and of temporary durations, resulting in a not significant effect.

[23] Chainage Greenway 12200m to 12350m Earthworks

Water Quality

Contaminated runoff from earthworks. The effect is assessed as being negative, of low magnitude and of limited duration, resulting in a slight effect.

Hydromorphology

Alteration of RBZ. The effect is assessed as being negative, of low magnitude and of limited duration, resulting in a slight effect.

9.5.3.6 Description of Construction Phase Impacts on the Finn_060 (Donegal).

This section identifies, predicts and evaluates the likely significant effects arising from the proposed Greenway on the Finn_060. The value of the Finn_060 (Donegal) is very high due to its inclusion in the River Finn SAC and its designation as a salmonid river.

[24] Chainage 29470m Bridge S20 Construction

Bridge S20 will be constructed at chainage 29470m. The bridge will be constructed on existing bridge piers in the river. The bridge deck will be constructed from precast components.

Water Quality

Water pollution from hydraulic structure construction. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Sediment transport from hydraulic structure construction. The effect is assessed as negative, of low magnitude and of temporary duration, resulting in a slight effect.

9.5.3.7 Description of the Construction Phase Impacts on the Mourne Beg_010 River.

This section identifies, predicts and evaluates the likely significant effects arising from the proposed Greenway on the Mourne Beg_010. The value of the Mourne Beg_010 is high due to its poor WFD status, *indicating sensitivity to additional pressures and the requirement to achieve Good status.*

[25] Chainage 18330m S12 Bridge Repair

Bridge repairs are proposed at Bridge S12. The bridge carries the mainline over a reach of the Mourne Beg_010 river that discharges to Lough Mourne approximately 680m northeast of Bridge S12. The value of Lough Mourne is high due to its protection as a DWPA under Article 7 of the WFD. The river flows along the margins of the Croaghonagh Bog SAC. The value of the Croaghonagh Bog SAC is high.

Water quality

Contaminated runoff from bridge repair. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

Hydromorphology

Sediment transport from bridge repair. The effect is assessed as being negative, of low magnitude and of temporary duration, resulting in a slight effect.

[26] Lough Mourne and Croaghonagh Bog SAC

A pathway exists for indirect effects on Lough Mourne and the adjacent Croaghonagh Bog SAC arising from bridge repair works at Bridge S12. Lough Mourne is a DWPA and is of high value. The Croaghonagh Bog SAC is also of high value. Indirect effects are limited by distance from the source and attenuation within the Mourne Beg_010.

Lough Mourne

Water quality

Bridge repairs. The effect is assessed as negative, of negligible magnitude and of temporary duration, resulting in a not significant effect.

Hydromorphology

Bridge repairs. The effect is assessed as negative, of negligible magnitude and of temporary duration, resulting in a not significant effect

Croaghonagh Bog SAC

Water quality

Bridge repairs. The effect is assessed as negative, of negligible magnitude and of temporary duration, resulting in a not significant effect.

Hydromorphology

Bridge repairs. The effect is assessed as negative, of negligible magnitude and of temporary duration, resulting in a not significant effect

9.5.3.8 Summary of Construction Phase Impacts

The assessment of potential construction phase effects has identified a range of temporary effects on surface water quality and hydromorphological attributes associated with earthworks, bridge and culvert works, and activities undertaken in proximity to watercourses. These effects arise primarily through pathways such as sediment mobilisation, contaminated surface runoff, and localised disturbance to riparian zones and channel form. While the significance of these effects varies depending on receptor sensitivity and the nature of the works, they are generally assessed as slight to moderate prior to mitigation.

A summary of the identified effects is provided in Table 9-8.

Table 9-8 - Summary of Construction Phase effects Assessment without Mitigation

Ref	Source	Receptor	Attribute	Impact Mechanism	Magnitude	Duration	Significance
1	Bridge S01	Eske_020	Water Quality	Contaminated runoff due to bridge repair	Low	Temporary	Slight
1	Bridge S01	Eske_020	Hydromorphology	Sediment transport from bridge repair	Low	Temporary	Moderate
2	Earthworks	Eske_020	Water Quality	Contaminated runoff from earthworks	Low	Temporary	Slight
2	Earthworks	Eske_020	Hydromorphology	Sediment transport from earthworks	Low	Temporary	Moderate
3	Earthworks	Eske_020	Water Quality	Contaminated runoff from earthworks	Low	Temporary	Slight
3	Earthworks	Eske_020	Hydromorphology	RBZ alteration	Negligible	Temporary	Not significant
4	Construction Compound + Structure S02 construction site	Drumroosk_East	Water Quality	Contaminated runoff from construction site	Low	Temporary	Slight
4	Construction compound + S02 construction site Compound + Structure S02	Drumroosk_East	Hydromorphology	Sediment transport from construction sites	Low	Temporary	Slight
5	Earthworks	Drumroosk_East	Water Quality	Contaminated runoff from earthworks	Low	Temporary	Slight
5	Earthworks	Drumroosk_East	Hydromorphology	RBZ alteration	Low	Temporary	Slight
6	Earthworks	Drumroosk_East	Water Quality	Contaminated runoff from earthworks	Low	Temporary	Slight
6	Earthworks	Drumroosk_East	Hydromorphology	RBZ alteration	Low	Temporary	Slight
7	Upstream works	Eske_020	Water Quality	Contaminant transport from upstream works	Negligible	Temporary	Not significant
7	Upstream works	Eske_020	Hydromorphology	Sediment transport from upstream earthworks and construction site.	Low	Temporary	Moderate
8	Bridge S04	Eske_010	Water Quality	Water pollution from foundation construction	Low	Temporary	Moderate
8	Bridge S04	Eske_010	Hydromorphology	Sediment transport from construction site	Low	Temporary	Moderate

Ref	Source	Receptor	Attribute	Impact Mechanism	Magnitude	Duration	Significance
9	PC08	Tributary to Eske_010	Water Quality	Water pollution from hydraulic structure construction	Low	Temporary	Slight
9	PC08	Tributary to Eske_010	Hydromorphology	Sediment transport from hydraulic structure construction.	Low	Temporary	Slight
10	PC09	Carbbeagh	Water Quality	Water pollution from hydraulic structure construction	Low	Temporary	Slight
10	PC09	Carbbeagh	Hydromorphology	Sediment transport from hydraulic structure construction	Low	Temporary	Slight
11	PC10	Drumnagahan	Water Quality	Water pollution from hydraulic structure construction	Low	Temporary	Slight
11	PC10	Drumnagahan	Hydromorphology	Sediment transport from hydraulic structure construction	Low	Temporary	Slight
12	Upstream works	Eske_010	Water Quality	Contaminant transport from upstream works	Low	Temporary	Slight
12	Upstream works	Eske_010	Hydromorphology	Sediment transport from upstream works	Low	Temporary	Slight
13	PC11	Milltown 37	Water Quality	Water pollution from hydraulic structure construction	Low	Temporary	Slight
13	PC11	Milltown 37	Hydromorphology	Sediment transport from hydraulic structure construction	Low	Temporary	Slight
14	Bridge S05	Eske_010	Water Quality	Bridge retrofit	Negligible	Temporary	Not significant
14	Bridge S05	Eske_010	Hydromorphology	Bridge retrofit	Negligible	Temporary	Not significant
15	Bridge S06	Clogher (Donegal)	Water Quality	Water pollution from hydraulic structure construction	Low	Temporary	Moderate
15	Bridge S06	Clogher (Donegal)	Hydromorphology	RBZ alteration	Low	Temporary	Slight
16	Culvert construction	Minor channel	Water quality	Water pollution from hydraulic structure construction	Low	Temporary	Not significant
16	Culvert construction	Minor channel	Hydromorphology	Sediment transport from hydraulic structure construction	Low	Temporary	Not significant
17	Greenway construction	Lough Eske	Water Quality	Contaminated runoff from greenway construction	Low	Temporary	Slight

Ref	Source	Receptor	Attribute	Impact Mechanism	Magnitude	Duration	Significance
17	Bridge S06	Lough Eske	Water Quality	Contaminant transport from bridge works	Low	Temporary	Slight
17	Greenway construction	Lough Eske	Hydromorphology	Alteration of RBZ	Low	Temporary	Slight
17	Bridge S06	Lough Eske	Hydromorphology	Sediment transport from bridge works	Low	Temporary	Moderate
18	Bridge S08	Mulanamphry	Water Quality	Contaminated runoff from bridge repair	Low	Temporary	Slight
18	Bridge S08	Mulanamphry	Hydromorphology	Sediment transport from bridge repair	Low	Temporary	Slight
19	Upstream works	Lowerymore_030	Water Quality	Contaminant transport from Bridge S06 construction	Low	Temporary	Slight
19	Upstream works	Lowerymore_030	Water Quality	Contaminant transport from Bridge S08 repairs	Low	Temporary	Slight
19	Upstream works	Lowerymore_030	Hydromorphology	Sediment transport from Bridge S06 construction	Low	Temporary	Slight
19	Upstream works	Lowerymore_030	Hydromorphology	Sediment transport from Bridge S08 repairs	Low	Temporary	Not significant
20	Bridge S16	Sessiagh 01	Water Quality	Contaminated runoff from bridge repair.	Low	Temporary	Slight
20	Bridge S16	Sessiagh 01	Hydromorphology	Sediment transport from bridge repairs	Negligible	Temporary	Not significant
21	PC17	Burn Daurnett	Water Quality	Water pollution from hydraulic structure construction	Low	Temporary	Slight
21	PC17	Burn Daurnett	Hydromorphology	Sediment transport from hydraulic structure construction	Low	Temporary	Slight
22	Bridge S10	Lowerymore_020	Water Quality	Water pollution from Bridge S10 construction	Low	Temporary	Slight
22	Trailhead	Lowerymore_020	Water Quality	Contaminated runoff from Trailhead construction site.	Negligible	Temporary	Not significant
22	Bridge S10	Lowerymore_020	Hydromorphology	Sediment transport from Bridge S10 construction	Low	Temporary	Slight
22	Trailhead	Lowerymore_020	Hydromorphology	Sediment transport from trailhead construction site	Negligible	Temporary	Not significant

Ref	Source	Receptor	Attribute	Impact Mechanism	Magnitude	Duration	Significance
23	Earthworks	Lowerymore_020	Water Quality	Contaminated runoff from earthworks	Low	Temporary	Slight
23	Earthworks	Lowerymore_020	Hydromorphology	RBZ alteration	Low	Temporary	Slight
24	Bridge S20	Finn_060	Water Quality	Water pollution from hydraulic structure construction	Low	Temporary	Slight
24	Bridge S20	Finn_060	Hydromorphology	Sediment transport from hydraulic structure construction	Low	Temporary	Slight
25	Bridge S12	Mourne Beg_010	Water Quality	Contaminated runoff from bridge repair	Low	Temporary	Slight
25	Bridge S12	Mourne Beg_010	Hydromorphology	Sediment transport from bridge repair	Low	Temporary	Slight
26	Bridge S12	Lough Mourne	Water Quality	Bridge repair	Negligible	Temporary	Not significant
26	Bridge S12	Croaghonagh Bog SAC	Hydromorphology	Bridge repair	Negligible	Temporary	Not significant

The potential effects summarised in are associated with construction activities, including earthworks, bridge repair works, and the installation of hydraulic structures, which may give rise to sediment mobilisation, contaminated runoff, and localised disturbance to riparian zones and channel morphology. These effects are generally assessed as slight to moderate in significance prior to mitigation, reflecting the sensitivity of the receiving watercourses and their hydromorphological and water quality attributes.

The mitigation measures set out in Section 9.5.4 have been developed to address these impact pathways through the implementation of standard construction management practices (M1), erosion and sediment control measures (M2), construction site and runoff management controls (M3), and specific controls for works adjacent to watercourses and hydraulic structures (M4), including site-specific measures where required. The application of these measures will reduce the magnitude of effects and associated risks to the receiving environment.

The resulting residual effects, following the implementation of mitigation, are presented in Table 9-9.

9.5.4 Construction Phase Mitigation Measures

During construction, the following guidance documents for construction work on, over or near water will be adhered to:

M1 – Standard Mitigation Measures

During construction, all works in, over or adjacent to watercourses will be undertaken in accordance with relevant industry best practice guidance, including:

- CIRIA (2001) C532 Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors;
- Central Fisheries Board Channels and Challenges – The Enhancement of Salmonid Rivers CIRIA (2006) C648 Control of Water Pollution from Linear Construction Projects: Technical Guidance;
- OPW (2019) Construction, Replacement or Alteration of Bridges and Culverts:
- A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945; TII (2005) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (CC-ENV-01101);
- IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;
- Eastern Regional Fisheries Board Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites.

The following general mitigation measures shall be implemented during the construction phase:

- A Site Environmental Manager (SEM) shall be appointed prior to the commencement of works. The SEM shall be responsible for environmental monitoring and ensuring implementation of mitigation measures, including the Construction Environmental Management Plan (CEMP) and site-specific method statements.
- A suitably qualified and experienced Ecological Clerk of Works (ECoW) shall be appointed for the duration of the construction the construction phase to oversee implementation of mitigation and monitoring measures. The minimum qualifications and experience level of the ECoW are specified within Section 3.3.10 of the Construction Environmental Management Plan (CEMP).
- Prior to any site clearance, excavation or construction, a Construction Environmental Management Plan (CEMP) shall be prepared by the Contractor. The CEMP shall define the overall environmental management and control of the construction phase and ensure that all mitigation commitments are implemented.

- Site-specific method statements shall be prepared for relevant construction activities, setting out how works shall be undertaken in accordance with environmental requirements.
- Construction sites shall be clearly defined and temporarily fenced as appropriate at the outset of works.

M2 – Erosion, Sediment and Drainage Controls

Where earthworks are required within 30m of a waterbody, appropriate erosion, sedimentation and drainage controls shall be implemented.

- Ditches and drains shall be temporarily bridged or otherwise protected, where required, to avoid unnecessary vehicle movement across watercourses.
- Riparian vegetation shall be fenced to provide an appropriate stand-off distance from the waterbody.
- Where disturbance within riparian zones is unavoidable, exposed soils shall be stabilised using biodegradable geotextile or equivalent measures until vegetation is re-established.
- Areas of bank reinstatement shall be protected using biodegradable materials to promote vegetation establishment and reduce erosion potential.
- Silt fencing or equivalent sediment barriers shall be installed along the downslope perimeter of disturbed areas adjacent to watercourses to intercept sediment-laden runoff.
- Sediment control measures shall include provision of ponding areas and shall be subject to regular inspection, maintenance and removal of accumulated sediments.
- Additional measures, such as coir logs, straw bales or check dams, shall be implemented in concentrated flow paths and at outfalls, where required.
- Temporary haul roads shall be constructed and maintained to minimise erosion and sediment generation and shall incorporate appropriate surface treatment and drainage controls to direct runoff away from watercourses.
- Clean water shall be diverted around disturbed areas using interceptor drains or swales to prevent run-on.
- Perimeter bunds or equivalent measures shall be implemented where required to prevent uncontrolled discharge from excavated areas.

M3 – Construction Site and Runoff Management

At construction sites located within 50m of a watercourse, appropriate site management, drainage and pollution control measures shall be implemented.

- Prior to commencement of works, a site-specific work plan shall be prepared. This shall include details of access routes, working areas, material storage areas, environmental constraints and proposed mitigation measures, together with an emergency response plan for accidental spillages. The plan shall be approved by the Site Environmental Manager (SEM) and Ecological Clerk of Works (ECoW).
- Riparian vegetation shall be protected through appropriate fencing, with stand-off distances maintained where practicable. Where vegetation clearance is required, exposed soils shall be stabilised using appropriate measures until vegetation is re-established.
- Areas of disturbed ground shall be reinstated and stabilised as soon as practicable to minimise erosion and sediment mobilisation.
- Appropriate sediment control measures shall be implemented to intercept runoff from construction areas and shall be subject to regular inspection, maintenance and removal of accumulated sediments.
- Additional measures, such as coir logs, check dams or equivalent controls, shall be implemented in concentrated flow paths and at outfalls, where required.

- Runoff from construction areas shall be managed through appropriate drainage measures, including diversion of clean water away from working areas and routing of site runoff to settlement or treatment systems prior to discharge.
- Haul roads and delivery areas shall be constructed and maintained to minimise erosion and sediment generation and shall incorporate appropriate drainage controls.
- Wheel wash facilities shall be provided where required to prevent the tracking of sediment onto the public road network.
- Concrete batching and washout shall be carried out in designated areas on impermeable surfaces, located away from watercourses, and shall be managed to prevent uncontrolled discharge.
- Sludge and waste materials arising from site activities shall be regularly removed and disposed of at appropriately licensed facilities.
- Refuelling, maintenance and storage of fuels, oils and chemicals shall be undertaken in designated, bunded areas located away from watercourses and drainage features.
- Spill kits shall be provided at all relevant locations, and site personnel shall be trained in their use.
- Construction plant and equipment shall be regularly inspected and maintained to prevent leaks and spillages. Maintenance activities shall be undertaken in controlled areas to prevent contamination of soils and watercourses.

M4 – Works Adjacent to Watercourses and Hydraulic Structures

Works in, over, under or adjacent to watercourses shall, where practicable, be avoided. Where this is not possible, works shall be undertaken using methods that minimise disturbance to the channel and surrounding environment.

Prior to commencement of works, a site-specific method statement shall be prepared for works in proximity to watercourses. This shall include details of access, working methods, environmental controls and emergency response procedures, and shall be approved by the SEM and ECoW.

Temporary dry working conditions shall be established where required, using appropriate low-impact techniques. Measures shall be implemented to prevent the downstream propagation of sediments or contaminants during works.

For smaller scale works (e.g. outfalls or bank works), temporary flow isolation measures shall be implemented to create a dry working area.

Prefabricated elements (e.g. headwalls) shall be used where practicable to minimise the need for in-situ concrete works adjacent to watercourses.

In-stream works, including culvert installation, shall be undertaken within appropriate seasonal windows and in consultation with Inland Fisheries Ireland.

Machinery access routes shall be managed to minimise disturbance to soils and riparian areas, including the use of appropriate ground protection measures where required.

Dewatering activities shall be controlled to prevent the discharge of sediment-laden water to receiving waterbodies, including the use of settlement or filtration systems as appropriate.

Concrete works shall be undertaken in a manner that prevents the release of uncured concrete or alkaline runoff to watercourses. Formwork shall be designed to prevent leakage, and appropriate materials shall be used.

Downstream protective measures shall be installed where required to intercept sediment during works.

Any temporary works associated with flow diversion or channel modification shall be removed following completion of works, and the channel and banks reinstated to pre-construction condition, as far as practicable.

Where riparian vegetation is disturbed, appropriate reinstatement and stabilisation measures shall be implemented to restore channel margins.

M4.1 – Site-Specific Measures at Bridge S04 (Eske Viaduct)

- In addition to the general mitigation measures outlined in Sections M3 and M4, the following controls shall be implemented at the Bridge S04 construction site due to the requirement for bored pile foundations in proximity to a waterbody.
- A site-specific risk assessment shall be undertaken prior to the commencement of piling works, in consultation with the National Parks and Wildlife Service and Inland Fisheries Ireland, to identify and manage potential risks to water quality and hydromorphology.
- Drilling and piling activities shall be undertaken from suitably designed and stable working platforms to prevent disturbance of underlying soils and minimise the mobilisation of sediment.
- Drilling fluids shall be selected, used and managed in a manner that minimises potential environmental impacts.
- All drilling, pumping and slurry management operations shall be confined to controlled working areas, with appropriate containment measures implemented to prevent the release of material to surrounding soils or watercourses.
- Pumps, hoses and associated equipment shall be regularly inspected and maintained to prevent leaks and spillages.
- Boreholes shall be appropriately cased and sealed to prevent interaction between groundwater and surface water and to maintain the integrity of the surrounding environment.
- Any arisings from drilling and piling operations shall be contained, handled and disposed of in accordance with relevant environmental requirements.

The potential impacts summarised in Table 9-8 have been assessed with the implementation of the mitigation measures outlined in Section 9.5.4. These measures comprise standard construction management practices (M1), erosion and sediment control measures (M2), construction site and runoff management controls (M3), and specific measures for works adjacent to watercourses and hydraulic structures (M4), including site-specific measures at Bridge S04 (M4.4.1).

The indirect effects on Lough Eske (Impact ID 17) and Lowerymore_030 (Impact ID 19), arising from works at upstream locations, will be mitigated at source through the implementation of mitigation measures M2, M3 and M4.

The identified effect on Lough Mourne (Impact ID 27), arising from works at Bridge S12 on the Mourne Beg_010, is of negligible magnitude, and therefore no additional mitigation measures are required.

9.5.5 Construction Phase Residual Impact

The mitigation measures described above form part of the proposed development and have been incorporated into the construction methodology. The application of these measures reduces the magnitude of all identified effects to negligible. The resulting residual effects are therefore not significant. A summary of the residual impact assessment is provided in Table 9-9. Standard mitigation measures (M1) apply to all construction works and are therefore not included in Table 9-9.

Table 9-9 - Residual effect significance assessment

Impact ID	Receptor	Attribute	Mitigation Codes	Residual Magnitude	Residual Significance
1	Eske_020	Water Quality	M4	Negligible	Not Significant
1	Eske_020	Hydromorphology	M4	Negligible	Not Significant
2	Eske_020	Water Quality	M2, M3	Negligible	Not Significant
2	Eske_020	Hydromorphology	M2, M3	Negligible	Not Significant

Impact ID	Receptor	Attribute	Mitigation Codes	Residual Magnitude	Residual Significance
3	Eske_020	Water Quality	M2, M3	Negligible	Not Significant
3	Eske_020	Hydromorphology	M4	Negligible	Not Significant
4	Drumroosk_East	Water Quality	M2, M3	Negligible	Not Significant
4	Drumroosk_East	Hydromorphology	M2, M3	Negligible	Not Significant
5	Drumroosk_East	Water Quality	M2, M3	Negligible	Not Significant
5	Drumroosk_East	Hydromorphology	M4	Negligible	Not Significant
6	Drumroosk_East	Water Quality	M2, M3	Negligible	Not Significant
6	Drumroosk_East	Hydromorphology	M4	Negligible	Not Significant
7	Eske_020	Water Quality	M3	Negligible	Not Significant
7	Eske_020	Hydromorphology	M2	Negligible	Not Significant
8	Eske_010	Water Quality	M2, M3, M4, M4.1	Negligible	Not Significant
8	Eske_010	Hydromorphology	M4, M4.1	Negligible	Not Significant
9	Tributary to Eske_010	Water Quality	M4	Negligible	Not Significant
9	Tributary to Eske_010	Hydromorphology	M4	Negligible	Not Significant
10	Carbbeagh	Water Quality	M4	Negligible	Not Significant
10	Carbbeagh	Hydromorphology	M4	Negligible	Not Significant
11	Eske_010	Water Quality	M3	Negligible	Not Significant
11	Eske_010	Hydromorphology	M2	Negligible	Not Significant
12	Milltown 37	Water Quality	M4	Negligible	Not Significant
12	Milltown 37	Hydromorphology	M4	Negligible	Not Significant
13	Eske_010	Water Quality	M4	Negligible	Not Significant
13	Eske_010	Hydromorphology	M4	Negligible	Not Significant
14	Lowerymore_030	Water Quality	M4	Negligible	Not Significant
14	Lowerymore_030	Hydromorphology	M4	Negligible	Not Significant
15	Lough Eske	Water Quality	M2, M3	Negligible	Not Significant
15	Lough Eske	Hydromorphology	M2, M4	Negligible	Not Significant
16	Mulanamphry	Water Quality	M4	Negligible	Not Significant
16	Mulanamphry	Hydromorphology	M4	Negligible	Not Significant
17	Lowerymore_030	Water Quality	M3	Negligible	Not Significant
17	Lowerymore_030	Hydromorphology	M2	Negligible	Not Significant
18	Minor channel	Water Quality	M4	Negligible	Not Significant
18	Minor channel	Hydromorphology	M4	Negligible	Not Significant
19	Minor channel	Water Quality	M4	Negligible	Not Significant
19	Minor channel	Hydromorphology	M4	Negligible	Not Significant
20	Sessiagh 01	Water Quality	M4	Negligible	Not Significant
20	Sessiagh 01	Hydromorphology	M4	Negligible	Not Significant
21	Burn Daurnett	Water Quality	M4	Negligible	Not Significant
21	Burn Daurnett	Hydromorphology	M4	Negligible	Not Significant
22	Lowerymore_020	Water Quality	M2, M3, M4	Negligible	Not Significant
22	Lowerymore_020	Hydromorphology	M2, M4	Negligible	Not Significant

Impact ID	Receptor	Attribute	Mitigation Codes	Residual Magnitude	Residual Significance
23	Lowerymore_020	Water Quality	M2, M3	Negligible	Not Significant
23	Lowerymore_020	Hydromorphology	M4	Negligible	Not Significant
24	Finn_060	Water Quality	M4	Negligible	Not Significant
24	Finn_060	Hydromorphology	M4	Negligible	Not Significant
25	Mourne Beg_010	Water Quality	M4	Negligible	Not Significant
25	Mourne Beg_010	Hydromorphology	M4	Negligible	Not Significant
26	Lough Mourne	Water Quality	Mitigation not required	Negligible	Not significant
26	Lough Mourne	Hydromorphology	Mitigation not required	Negligible	Not significant
26	Croaghonagh Bog SAC	Water Quality	Mitigation not required	Negligible	Not significant
26	Croaghonagh Bog SAC	Hydromorphology	Mitigation not required	Negligible	Not significant

The significance of residual effects on surface water quality and hydromorphological attributes is assessed as not significant in all cases.

9.5.6 Description of Potential Operational Phase Impacts.

This section outlines the potential impacts of construction activities on water quality and hydromorphology, describing the key sources and pathways through which effects on the surface water environment may arise. The proposed development could give rise to impacts on the surface water environment during construction, including changes to water quality and flows. The following potential impacts are considered as part of this assessment:

- Effects on water quality and hydromorphology due to run off from greenway surface
- Effects on water quality and hydromorphology due to runoff from trail head carparks
- Effects on water quality due to greenway drainage.
- Effects of greenway construction on RBZ functions
- Effects of hydraulic structures on hydromorphology.
- Effects on flood risk.

9.5.6.1 Effects due to runoff from greenway surface.

Water quality

As the Greenway will be used primarily for recreational purposes, the only notable sources of hydrocarbons during the operational phase are expected to be limited to bicycles and low-intensity vehicular traffic associated with maintenance activities. Surface wear rates are anticipated to be low, and the proposed development is not expected to represent a notable source of chemical pollutants to the water environment during operation.

The greenway surface may accumulate solid matter including dust, soils and organic matter: leaf litter, bird droppings, and dog faeces. These solids can be mobilised in runoff during rainfall events.

If transported to receiving watercourses, this material may contribute nutrients and organic matter, which can increase biological activity and impose an oxygen demand within the receiving water, with potential to influence ecological functioning.

Bird and dog faeces may also act as vectors for bacterial, helminth, and protozoan pathogens, which may be transported to receiving waters via surface runoff. Similar pathogens may also arise from agricultural sources, including farmyards and livestock, and are therefore

widespread in the environment. Protozoan pathogens such as Cryptosporidium and Giardia may pose risks to human health where they enter drinking water supplies.

Hydromorphology

The Greenway will introduce areas of hardstanding, which may reduce infiltration and alter local runoff pathways. This may influence the volume and timing of surface water runoff reaching receiving watercourses, with the potential to affect erosion processes and local flow behaviour. The magnitude of any such local effects is a function of the proportional increase in impermeable area relative to the capacity of the receiving drainage network and proximity to the receiving channel.

9.5.6.2 Effects on Water Quality Due to Greenway Drainage

Greenway drainage may influence water quality through the mobilisation and conveyance of surface runoff during rainfall events. Runoff from the Greenway surface can entrain fine sediments, organic matter, and other accumulated materials, which may be transported to receiving watercourses via drainage pathways. If discharged to surface waters, these materials may increase turbidity and associated sediment loads and may carry nutrients and contaminants that could affect water quality locally. The extent of any such effects is dependent on the volume of runoff generated, the connectivity of drainage pathways, and the degree of attenuation and dispersion prior to discharge.

9.5.6.3 Effects on Water Quality and Hydromorphology Due to Runoff from Trailheads

Water Quality

Chemical pollutants, including hydrocarbons and heavy metals, may accumulate on trailhead surfaces as a result of vehicular use and general site activity. During rainfall events, these pollutants may be mobilised in surface runoff and transported to receiving watercourses, providing a potential pathway for contamination.

Chemical pollutants such as hydrocarbons and heavy metals may accumulate on the Trailhead surface and be transported to receiving water courses in runoff following rainfall events causing water pollution.

Hydromorphology

Trailhead areas may also accumulate solids such as dust, soils, and rubber particles, which may be mobilised and transported to receiving watercourses as suspended sediments in runoff during rainfall events. Upon entering a watercourse, these materials may settle and contribute to localised changes in bed substrate composition.

Trailheads have the potential to introduce areas of hardstanding, which may reduce infiltration and alter local runoff pathways. This may influence the volume and timing of surface water runoff reaching receiving watercourses, with the potential to affect erosion processes and local flow behaviour.

9.5.6.4 Effects of Greenway Construction on RBZ Functions

Construction activities within or adjacent to RBZs may result in the localised disturbance or removal of vegetation and soils. This can reduce the effectiveness of RBZs in intercepting surface runoff and filtering sediments and nutrients prior to entry into receiving watercourses. Disturbance of soils within RBZs may also increase the potential for sediment mobilisation during rainfall events, providing a pathway for suspended solids to enter the water environment.

9.5.6.5 Effects of Hydraulic Structures on Hydromorphology

Hydraulic structures, including culverts and bridge openings, can alter natural flow characteristics by constricting the channel and modifying flow velocities. Increased velocities through structures may give rise to localised erosion (scour) downstream, while reduced velocities upstream may result in sediment deposition and backwater effects.

The introduction of hard structures modifies natural channel form by altering bed and bank composition and interrupting natural geomorphological processes. Over time, this can reduce the capacity of the channel to adjust naturally to changes in flow and sediment supply.

Hydraulic structures may also disrupt sediment continuity by trapping sediment upstream and reducing sediment transport to downstream reaches.

9.5.6.6 Effects on Flood Risk

The operational phase of the proposed development has the potential to influence local runoff characteristics and flow pathways. The introduction of hardstanding surfaces associated with the Greenway and ancillary infrastructure (e.g. trailhead car parks) may reduce infiltration and increase the proportion of rainfall that becomes surface runoff. This may result in increases in runoff rates and volumes during rainfall events.

9.5.7 Operational Phase Impact Assessment

This section presents an assessment of the potential operational phase impacts of the proposed development on the surface water environment. The assessment considers the sensitivity of identified receptors and evaluates the magnitude of potential impacts arising from identified pathways, including runoff, changes to hydromorphology, and alterations to surface water flow. The significance of effects is determined based on the scale and nature of the development and the characteristics of the receiving environment.

The proposed development does not represent a significant source of chemical pollutants, including hydrocarbons or heavy metals, during operation. On this basis, potential effects on water quality arising from chemical contaminants are screened out at source from further assessment.

Trailhead areas are designed using permeable, flood resilient materials such as Grasscrete or similar porous paving, which provides infiltration and treatment of surface runoff in accordance with SuDS principles. This form of drainage is effective in retaining and breaking down hydrocarbons and associated pollutants. The adoption of porous paving in the design will prevent the Trailheads from impacting the timing and volume of runoff. Accordingly, the Trailheads do not represent a meaningful source of hydrocarbon contamination or modified runoff response, and potential effects on water quality and hydromorphology are screened out at source from further assessment.

Greenway drainage will be managed through an integrated SuDS-based design, incorporating measures such as over-edge drainage, infiltration, and attenuation. These features are effective in controlling runoff pathways and facilitating the retention and biological treatment of sediments and associated organic matter prior to discharge. As the Greenway does not represent a source of chemical pollutants, it does not constitute a meaningful source of contaminants via its drainage system. Accordingly, operational impacts on water quality associated with Greenway drainage are screened out from further assessment.

The distance between the mainline and offline Greenway generally exceeds 30m, and the Greenway does not represent a source of effects on the RBZ at sections where this distance is maintained. Accordingly, Greenway sections beyond 30m are screened out at source from further assessment.

9.5.7.1 Effect of on Water Quality and Hydromorphology Due to Run Off from Greenway Surface

The width of the RBZ between the mainline and sensitive surface water receptors is predominantly greater than 30m. The route selection for the offline sections has sought to minimise interaction with sensitive surface waters where feasible.

A 30 m wide buffer has been shown to reduce sediment and nutrient concentrations in surface runoff by up to 85% and 95%, respectively (Ó hUallacháin et al., 2025). For receptors lying outside of the 30 m buffer zone no effective pathway is considered to exist except at crossings.

Concentrations of nutrients and sediments in runoff at crossing points are expected to be negligible relative to existing baseline conditions, given the predominantly rural nature of the

catchments and the presence of diffuse pressures such as agriculture, forestry, and peat extraction.

On this basis receptors lying beyond a 30m buffer zone are screened out from further assessment related to water quality and hydromorphology effects due to run off from the greenway surface.

Eske_020 and Drumroosk _East

The Eske_020 and the Drumroosk_East and Lough Mourne Drinking Water Protected Areas are identified as receptors potentially sensitive to pathogen exposure. No specific abstractions have been identified on other surface waters in the zone of influence, and these are therefore screened out from further consideration of pathogen-related effects. A 400m section of the mainline lies within the 30m buffer zone along the Drumroosk_East waterbody upstream of the Donegal (River Eske) Water Treatment Plant. The sections lying within the RBZ represent a small area. Greenway construction will be undertaken on and adjacent to the mainline. The effect on the RBZ is limited, as it essentially represents the substitution of anthropogenically modified surfaces. The resulting change to baseline conditions is minimal. Accordingly, operational phase impacts due to alteration of the RBZ are screened out from further assessment.

The minimum buffer distance along the section between the greenway edge and the river edge is 5m. The greenway design incorporates a 1m side grassed verge which will limit mobilisation of bulk solids from the greenway surface. A buffer of 5m in width has been shown to effectively remove between 50-60% of suspended sediments and between 30-40% of nutrients from runoff.

The surface area of the Greenway is small relative to the size of the watercourse, and the length of Greenway sections within 5m of the river is limited. Over the length of the route, the distance between the Greenway surface and the river is predominantly greater than 5m. Concentrations of nutrients and sediments in runoff from the greenway surface are expected to be negligible relative to existing baseline conditions. Operational effects on the water quality and hydromorphology of the Drumroosk_East are screened out from further assessment

The Greenway section is located upstream of the confluence of the Drumroosk_East and the Eske_020. Given the low magnitude of the source, attenuation within the hydrological pathway, and dilution at the confluence, no effects on the hydromorphology or water quality of the Eske_020 are anticipated. Accordingly, operational phase effects due to runoff from the Greenway surface are screened out from further assessment.

The potential contribution of microbial contaminants from Greenway surface runoff represents a negligible source relative to existing baseline conditions. The Donegal (River Eske) water supply is a treated surface water supply operated by Uisce Éireann and is therefore subject to national design and operational standards for protozoan risk management, including those set out in the EPA Water Treatment Manual: Filtration (Environmental Protection Agency, 2020). As microbiological risks are managed through treatment performance within the drinking water supply system, operational phase impacts due to microbial contamination from surface runoff from the Greenway are screened out for further assessment.

Lough Eske

Sections of the offline greenway encroach within 30m of Lough Eske. As established in the baseline, the hydrochemistry of the lake is determined by influent rivers. Intermittent runoff from the greenway represents a negligible input of nutrients and sediments to the lake. Where sections are within 30m, the remaining buffer is assessed as being sufficient to reduce sediment and nutrient concentrations in runoff to negligible levels. Operational phase impacts on water quality and hydromorphology in Lough Eske are screened out from further assessment.

The sections lying within the RBZ represent a very small extent relative to the shoreline length, and the increase in impermeable area relative to the lake is negligible. Greenway construction will be undertaken adjacent to an existing road and will not significantly alter the RBZ characteristics. The effect on the RBZ is limited, as it essentially represents the substitution of anthropogenically modified surfaces. The resulting change to baseline conditions is

minimal. Accordingly, operational phase impacts due to alteration of the RBZ are screened out at source from further assessment.

Lowerymore_020

A 130m section of the offline Greenway lies within the 30m buffer zone of the Lowerymore_020 river waterbody, adjacent to Biddy's O'Barnes; however, a minimum buffer distance of 20m is maintained. Hydromorphology at this reach is controlled by natural geomorphological processes, and any effects associated with the Greenway are insignificant relative to these baseline conditions. Concentrations of nutrients and sediments in runoff from the Greenway surface are expected to be negligible relative to existing baseline conditions, and the remaining buffer is sufficient to reduce pollutant concentrations prior to discharge. Operational effects on the water quality and hydromorphology of the Lowerymore_020 are screened out from further assessment. The Greenway will locally alter RBZ characteristics along this section through the introduction of a man-made surface. However, the surface area of the Greenway is small relative to that of the remaining intact RBZ, and given its separation from the watercourse, the Greenway surface will not significantly affect RBZ functions. Accordingly, operational phase effects on the Lowerymore_020 are screened out at source from further assessment.

9.5.7.2 Effects of Hydraulic Structures on Hydromorphology

Culverts

Culverts are proposed on small, first-order streams. The geomorphological context indicates that these streams are likely to play a limited role in sediment transport within the wider system, with transport capacity generally confined to storm events. All proposed culverts have been designed to convey the 1% AEP discharge, including a 20% allowance for climate change; therefore, a significant alteration of the baseline sediment transport regime is not anticipated. The role of these watercourses in relation to habitat connectivity has been assessed as insignificant in Chapter 07: Biodiversity. Accordingly, operational effects on hydromorphology due to culverts are screened out from further assessment.

Bridges

All proposed bridges are clear-span structures and will not modify channel geometry or flow characteristics under normal flow conditions. Consequently, no impacts on existing sediment transport regimes are anticipated. All proposed bridges have been designed to convey the 1% AEP discharge, including a 20% allowance for climate change; therefore, no impacts on water levels during peak flow events are anticipated. Accordingly, operational phase impacts on hydromorphology due to bridge structures are screened out from further assessment.

Lough Mourne DWPA

The mainline Greenway is carried across a tributary of the MourneBeg_010 at Bridge S12. The watercourse discharges to the Lough Mourne DWPA approximately 680m downstream of the bridge, establishing a hydrological pathway for potential effects on water quality in the lake. As the potential contribution of microbial, nutrient and chemical contaminants from Greenway surface runoff represents a negligible source relative to existing baseline conditions, no impacts on baseline water quality conditions are anticipated.

As microbiological risks are managed through treatment performance in accordance with national design and operational standards for protozoan risk management, including those set out in the EPA Water Treatment Manual: Filtration (Environmental Protection Agency, 2020), operational phase impacts due to microbial contamination from surface runoff from the Greenway are screened out from further assessment.

Croaghonagh Bog SAC

The river flows along the margins of the Croaghoanagh Bog. As the potential contribution of microbial, nutrient and chemical contaminants from Greenway surface runoff represents a negligible source relative to existing baseline conditions, no impacts on baseline water quality conditions are anticipated. The greenway construction will not result in a change in the hydrology of regime of the bog, operational phase impacts due to contamination from surface runoff from the Greenway are screened out from further assessment.

9.5.7.3 Effects on Flood Risk

The greenway represents a modest increase in impermeable area relative to the receiving catchments. The greenway pavement is designed with over-edge drainage, discharging to existing drainage networks. Attenuation swales are incorporated into the drainage design to attenuate and control runoff rates prior to discharge to the receiving network. These measures are sufficient to ensure that the greenway does not increase local pluvial flood risk along its route, and operational phase impacts are screened out from further assessment.

The primary source of flood risk to the proposed greenway is fluvial flooding from adjacent rivers. The greenway route has been selected to avoid as far as possible areas of fluvial flood risk, based on flood risk mapping published by the Office of Public Works, supplemented by finer resolution mapping from the Ballybofey/Stranorlar Flood Relief Scheme. The mainline section of the greenway generally follows the topographic contours of the valley and will largely retain existing structures. Accordingly, the development will not result in a material alteration of existing flood regimes at the catchment scale, and operational phase impacts are screened out from further assessment.

The offline sections are in rural, sparsely populated areas. At locations where these sections intersect significant overland flow paths, culverts designed to convey the 1% AEP flood event with a 20% allowance for climate change are incorporated into the design, and the greenway will be constructed largely at grade. These measures are sufficient to prevent any measurable increase in flood risk, and operational phase impacts are screened out from further assessment.

9.5.8 Operational Phase Mitigation

The assessment of the operational phase has identified no impacts on surface water quality, hydromorphological conditions, or hydrological regimes arising from the proposed development. As such, no specific mitigation measures are required during operation.

The design of the proposed development incorporates appropriate surface water management measures, including permeable surfaces, vegetated filter strips, and drainage controls. These embedded design features ensure that surface water runoff is effectively managed and does not adversely affect receiving watercourses or downstream receptors.

9.5.9 Operational Phase Residual Impacts

The assessment of the operational phase has identified no impacts on surface water quality, hydromorphological conditions, or hydrological regimes arising from the proposed development. As such, no specific mitigation measures are required during operation.

The design of the proposed development incorporates appropriate surface water management measures, including permeable surfaces, vegetated filter strips, and drainage controls, which ensure that runoff is effectively managed and does not adversely affect receiving watercourses or downstream receptors.

Accordingly, no residual impacts on surface water receptors are predicted during the operational phase. There will be no changes to water quality, flow characteristics, or river morphology, and no impacts on sensitive receptors, including designated water bodies, drinking water sources or downstream environments.

The significance of residual effects during the operational phase is therefore assessed as not significant.

Potential cumulative effects have been assessed in the context of existing pressures on the surface water environment within the study area, including wastewater discharges, agricultural activities, forestry operations and existing land use. These pressures contribute to the current baseline condition of water quality and hydrological regimes within the receiving catchments.

Key existing pressures include discharges from wastewater treatment plants, including those at Donegal Town, Ballybofey–Stranorlar and Killygordon, as well as diffuse inputs from agriculture and other land use activities. These pressures have been considered in defining

the baseline condition of surface water bodies and are reflected in current Water Framework Directive (WFD) status classifications.

The residual effects of the proposed development on surface water quality and hydromorphological conditions have been assessed as negligible following the implementation of mitigation measures. As such, there is no potential for the proposed development to contribute to cumulative impacts when considered in combination with existing pressures or other developments within the catchment.

No significant in-combination effects are predicted on surface water receptors, including designated European sites such as the River Finn SAC, Croaghonagh Bog SAC, and Lough Eske and Ardnamona Wood SAC. The proposed development will not give rise to any measurable deterioration in water quality, hydrological regime, or morphological condition when considered cumulatively.

Accordingly, the significance of cumulative effects on the surface water environment is assessed as **not significant**.

9.6 Monitoring

Given the scale and nature of the proposed development, impacts on water quality and hydromorphology are expected to be localised and primarily associated with the implementation and performance of mitigation measures. The selected monitoring parameters—electrical conductivity (µS/cm), pH, temperature (°C) and dissolved oxygen (mg/l)—are measurable using reliable, low-cost field instrumentation and are directly relevant indicators of the effectiveness of the prescribed mitigation measures. To monitor these potential effects, a programme of field measurements and will be undertaken at points where M3 and M4 mitigation measures are proposed. Selection of the monitoring methodology and the sampling points shall be determined by the Ecological Clerk of Works (ECoW) in consultation with Inland Fisheries Ireland (IFI) and the National Parks and Wildlife Service (NPWS) in advance of construction.

9.7 References

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