

# BALLINA FLOOD RELIEF SCHEME

## Volume A - Non-Technical Summary

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Volume A Non-Technical  
Summary

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## Volume A – Non-Technical Summary

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#### Prepared by:

**RPS**

#### Prepared for:

**Mayo County Council**

Dublin | Cork | Galway | Sligo | Kilkenny  
rpsgroup.com

RPS Group Limited, registered in Ireland No. 91911  
RPS Consulting Engineers Limited, registered in Ireland No. 161581  
RPS Engineering Services Limited, registered in Ireland No. 99795  
The Registered office of each of the above companies is West Pier  
Business Campus, Dun Laoghaire, Co. Dublin, A96 N6T7



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## GLOSSARY

Term	Meaning
Catchment Flood Risk Assessment Management Study (CFRAMS)	The CFRAM Programme was developed to meet the requirements of the EU Floods Directive and national flood policy and aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity.
'Do-Nothing Effects'	The environment as it would be in the future should the subject project not be carried out.
EIA Directive	An official order requiring major building or development projects in the EU to be assessed for their impact on the environment. This is done before the project can start.
Material Assets	According to the EPA, Material assets is taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes transport infrastructure.
Noise Sensitive Location (NSL)	NSL refers to noise and vibration sensitive receptors. NSLs are typically residential premises but can also include schools, places of worship and other noise sensitive locations.
Water Framework Directive (WFD)	The EU Water Framework Directive (2000/60/EC) requires all Member States to protect and improve water quality in all waters so that we achieve good ecological status by 2015 or, at the latest, by 2027.
Zone of Influence	The ZoI (or "spatial extent of the impact" as described in Annex III (3) of the EIA Directive) is the area over which ecological features may be subject to significant impacts as a result of the Proposed Development and associated activities.

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**ACRONYMS**

<b>Term</b>	<b>Meaning</b>
AADT	Annual Average Daily Traffic
AEP	Annual Exceedance Probability
AFA	Area for Further Assessment
BPM	Best Practice Mitigation
CBA	Cost-Benefit Analysis
CCRA	Climate Change Risk Assessment
CEMP	Construction Environmental Management Plan
CFRAM	Catchment Flood Risk Assessment and Management
CIA	Cumulative Impact Assessment
CL	Conservation Limit
CSO	Central Statistics Office
CTMP	Construction Traffic Management Plan
DHPLG	Department of Housing, Planning and Local Government
ED	Electoral Divisions
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EU	European Union
FRS	Flood Relief Scheme
GHA	Geological Heritage Area
GI	Ground Investigation
GHG	Greenhouse Gas
GHGA	Greenhouse Gas Assessment
GWB	Groundwater Bodies
GWDTE	Groundwater Dependent Terrestrial Ecosystem
HV	High Voltage
IAA	Irish Architectural Archive
IAPS	Invasive Alien Plant Species
IAQM	Institute of Air Quality Management
IEFS	Important Ecological Features
IEMA	Institute of Environmental Management and Assessment
IFI	Inland Fisheries Ireland
IGH	Irish Geological Heritage
LED	Light Emitting Diode
LV	Low Voltage
MCA	Multi-Criteria Analysis
MCC	Mayo County Council
MV	Medium Voltage
NbCM	Nature-based Catchment Management
NBS	Nature-Based Solutions
NPWS	National Parks and Wildlife Services
NSL	Noise Sensitive Location
NIS	Natura Impact Statement
NTS	Non-Technical Summary



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<b>Term</b>	<b>Meaning</b>
OPW	Office of Public Works
QI	Qualifying Interest
SAC	Special Area of Conservation
SAP	Small Area Population
SoP	Standard of Protection
TII	Transport Infrastructure Ireland
TTA	Traffic and Transport Assessment
WFD	Water Framework Directive
WMP	Waste Management Plan
ZOI	Zone of Influence

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# 1 INTRODUCTION

This document is Non-Technical Summary (NTS) of the Environmental Impact Assessment Report (EIAR) and its purpose is to describe the proposed Ballina Flood Relief Scheme (FRS) and provide a summary in non-technical language of the likely significant effects identified, the mitigation and monitoring measures proposed, as well as any residual effects arising from the proposed Scheme that have been identified during the construction and operational phases to inform the planning consent process.

RPS has been appointed by Mayo County Council (MCC), in partnership with the Office of Public Works (OPW), to identify, design and submit (for planning consent) an FRS that is technically, socially, environmentally, and economically acceptable and to procure, manage and oversee the construction of the Proposed Scheme, should planning consent be granted.

## 1.1 Background and Need for the Proposed Development

The OPW, working in partnership with MCC and other local authorities completed the Western Catchment Flood Risk Assessment and Management (CFRAM) Study. The study included Ballina as an Area for Further Assessment (AFA) and concluded that an FRS would be viable and effective for the community.

As per OPW targets, the Standard of Protection (SoP) for areas at risk of flooding within the community is 1% of the Annual Exceedance Probability (AEP) for fluvial areas and 0.5% AEP for coastal flood events.

Based on Ballina's current susceptibility to flooding in conjunction with the expected increase in future flooding, there is a strong need to develop an FRS to protect Ballina residents from serious flooding events and to preserve Ballina as an attractive town for development. Ballina has a long history associated with flooding because of the River Moy's high-water level, in conjunction with inadequate conveyance capacities of the smaller stream/channels and associated culverts. The highest observed water level recorded a height of 3.21 metres above Ordnance Datum (mOD)-Malin in 2014. Within this flood plain, a high number of receptors are currently at risk of damage. Approximately 228 residential and 69 commercial receptors are potentially affected by flooding within the River Moy catchment. Refer to **Figure 1-1** for the location of the Proposed Scheme.

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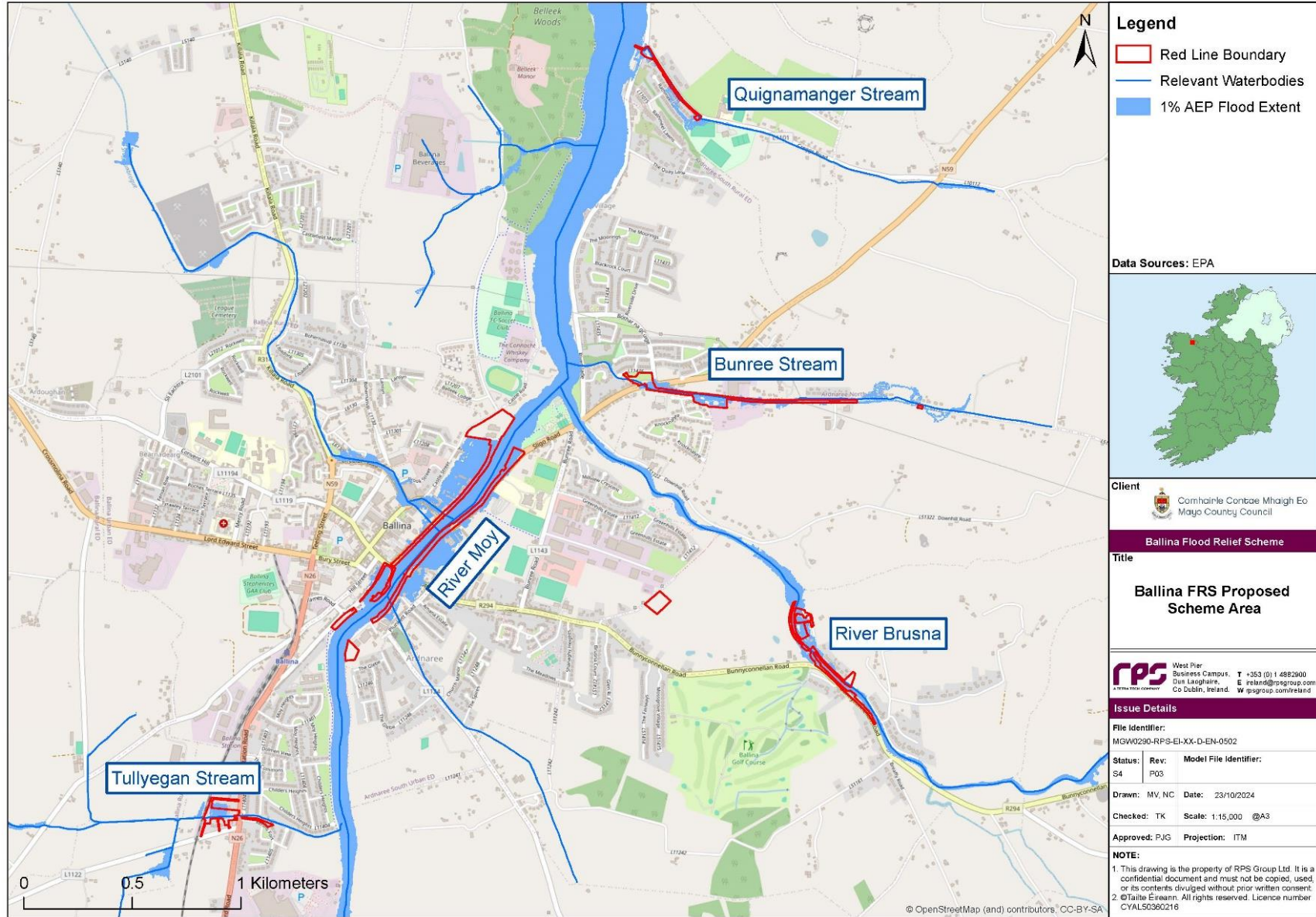


Figure 1-1: Location of the Proposed Scheme

## 1.2 Purpose of the Environmental Impact Assessment

The requirement for an Environmental Impact Assessment (EIA) for a project was initially set out in European Union (EU) Directive (85/337/EEC) as amended by Directive 97/11/EC, 2003/35/EC and 2009/31/EC on the assessment of the effects of certain public and private projects on the environment. The amendments were codified by Directive 2011/92/EU of the European Parliament and the Council on the assessment of the effects of certain public and private projects on the environment (and as amended in turn by Directive 2014/52/EU). The Directives as amended being herein referred to as the ‘EIA Directive’.

The EIA Directive requires that certain developments be assessed for likely significant effects before planning permission can be granted. An EIAR is required to be produced by the developer of a project under Articles 5(1) and 5(2), and with reference to Annex 1 and 2, of the EIA Directive and must contain the information specified in Annex IV. The EIAR requirements of the EIA Directive are transposed into Irish Law in the Planning and Development Regulations 2001 (as amended and substituted).

## 1.3 EIA Guidance

The EIAR has been informed by the following relevant European and national EIA guidelines:

- Advice Note seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects, published by the Planning Inspectorate, an executive agency of the Ministry of Housing, Communities and Local Government of the United Kingdom (2019).
- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (EC, 2017b).
- Guidelines for Planning Authorities and An Bord Pleanála; on carrying out Environmental Impact Assessment, (DHPLG, 2018)
- Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (EC, 1999).
- Guidelines on information to be contained in the Environmental Impact Assessment Report (EPA, 2022).

Other relevant legislation and guidance has also been applied and is detailed in the relevant technical assessment chapters of this EIAR. Potential effects from the Proposed Scheme are described in the EIAR using *Guidelines on information to be contained in the Environmental Impact Assessment Report* (EPA, 2022). Effects can result from direct, indirect, secondary, and cumulative effects on environmental conditions. Effects can be positive, neutral or negative. The significance of an effect is based on objective evidence and subjective concerns and may be described as imperceptible, slight, moderate, significant, very significant or profound impact. Significance depends on, among other considerations, the nature of the environmental effect, the timing and duration of an effect and the probability of the occurrence of an effect. The effects may be short-term, medium-term or long-term.

## 1.4 EIA Structure

The EIAR is divided into four volumes as follows:

- **Volume A:** NTS
- **Volume B:** Main EIA Body
- **Volume C:** EIAR Technical Appendices
- **Volume D:** Natura Impact Statement (NIS)

**Table 1-1** details the chapters included within the EIAR and associated competent experts for each discipline.

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**Table 1-1: Volume B EIAR Structure and Competent Expert**

Chapter Number	Chapter	Competent Expert
1	Introduction	PJ Griffin
2	Planning & Policy	Michael Higgins
3	Consultation	PJ Griffin
4	Assessment of Alternatives	PJ Griffin
5	Project Description	PJ Griffin
6	Traffic and Transportation	Padraic Culkin
7	Population	Michael Higgins
8	Human Health	Ryngan Pyper
9	Aquatic Biodiversity	Lauren Williams
10	Terrestrial Biodiversity	Robert Rowlands
11	Land, Soil, Geology and Hydrogeology	Noreta Daly
12	Water Water Framework Directive (WFD)	Uzzal Mandal Lauren Williams
13	Air Quality	Ciara Nolan
14	Climate	Ciara Nolan
15	Noise & Vibration	John Mahon
16	Material Assets: Waste and Utilities	PJ Griffin
17	Material Assets: Land and Properties	Michael Higgins
18	Cultural Heritage	Kate Robb (Terrestrial) Juliana O'Donoghue (Aquatic)
19	Landscape and Visual	Joanna Mole
20	Interactions & Cumulative Effects	PJ Griffin
21	Risks of Major Accidents or Disasters	PJ Griffin
22	Schedule of Environmental Commitments	PJ Griffin

## 2 PLANNING AND POLICY

### 2.1 European Policy Context

The principal European policies that underpin the implementation of the Ballina FRS are contained within the following plans and programmes:

- EU Directive on the Assessment and Management of Flood Risks (2007/60/EC)
- EU Strategy on Adaptation to Climate Change, 2021
- EU Floods Directive (2007/60/EC)

### 2.2 National Policy Context

The principal national policies that underpin the implementation of the Ballina FRS are contained within the following plans and programmes:

- National Planning Framework 2040
- National Development Plan 2021 -2030
- National Marine Planning Framework, 2021
- Climate Action Plan 2024
- Ireland’s 4th National Biodiversity Action Plan 2023–2030
- Biodiversity Action Strategy 2022-2026
- Climate Change Sectoral Adaptation Plan for Flood Risk Management, 2019-2024
- National Flood Policy, 2004
- The Planning System and Flood Risk Management 2009
- National CFRAM Programme
- River Basin Management Plan for Ireland 2018 – 2021
- Water Action Plan 2024: A River Basin Management Plan for Ireland
- National Adaptation Framework 2024

### 2.3 Regional Policy Context

The principal regional policy that underpins the implementation of the Ballina FRS is contained within the following strategy:

- Regional Spatial and Economic Strategy 2020-2032- Northern and Western Regional Assembly

### 2.4 Local Policy Context

The principal local policies that underpin the implementation of the Ballina FRS are contained within the following plans and programmes:

- Mayo County Development Plan 2022 – 2028
- Strategic Flood Risk Assessment to the Mayo County Development Plan
- County Mayo Biodiversity Action Plan 2010 - 2015
- Draft Mayo Heritage and Biodiversity Strategy 2023-2030
- County Mayo Biodiversity Action Plan 2010-2015
- MCC Climate Adaptation Strategy 2024-2029

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- Ballina Local Area Plan 2024 – 2029
- Draft Ballina Local Transport Plan 2023
- Ballina Draft Public Realm Strategy
- Flood Risk Management Plan Moy and Killala Bay

European, national, regional and local planning policies identify the increased flood risk arising in part from climate change. There is support at all levels for the appropriate provision of flood relief measures to address flooding risk.

## 3 CONSULTATION

Consultation is an essential part of the EIA process. This includes not only the statutory consultation associated with the application but public engagement. At pre-planning stage, the early involvement of the public and other stakeholders ensure that these views are taken into consideration throughout the evolution of the design and preparation of the EIAR.

The main consultations carried out over the course of the project were undertaken at key stages in the design process:

- Consultation on the Study Area, constraints and preferred options.
  - **Public Consultation:** 23<sup>rd</sup> September 2020.
  - **Stakeholder Consultation:** 08<sup>th</sup> July 2020.
- Consultation requesting feedback on existing environmental constraints.
  - **Stakeholder Consultation:** 18<sup>th</sup> September-2020
- Provide scoping report for review
  - **Stakeholder Consultation:** 28<sup>th</sup> February 2023
- Consultation on introducing the emerging preferred option.
  - **Stakeholder Consultation:** 21<sup>st</sup> December-2022
  - **Public Consultation:** 30<sup>th</sup> March 2023.

### 3.1 Project Website

Access to up-to-date, accurate and reliable information about the Proposed Scheme is considered essential to ensuring good consultation can occur. To aid the consultation process a stand-alone website was set up at <https://www.floodinfo.ie/frs/en/ballina/home/>. This website has allowed the public to access up-to-date information on the consultation process, the Proposed Scheme design and the overall project programme. It has maintained a resource allowing submissions to be made online as well as providing a postal address for anybody who wishes to submit a hard copy at any time.

### 3.2 Project Newsletter

Project newsletters providing updates on the progress of the Proposed Scheme are provided on the website on a quarterly basis.



## 4 ASSESSMENT OF ALTERNATIVES

From project inception, all reasonable alternatives were considered. Non-viable alternatives were rejected at an early phase. The Proposed Scheme is a culmination of an iterative design process that emphasised constraints and consultation at pivotal points of the process.

### 4.1 Do-Nothing Scenario

The 'Do Nothing' scenario is defined as the option involving no future expenditure on water management infrastructure, flood defences and differs from the 'Do Minimum' alternative in that it also assumes no future maintenance of such infrastructure. This involves maintaining the status quo without taking any proactive steps to address the existing and future flood risks associated with the River Moy and its tributaries. This includes a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the Proposed Scheme as far as natural changes from the baseline scenario can be assessed with reasonable effort based on the availability of environmental information and scientific knowledge.

Hydraulic modelling has clearly demonstrated that the current infrastructure does not meet the required Target SoP of 1% of the AEP for fluvial areas and 0.5% of the AEP for coastal areas, also referred to the 1 in 100 year and 1 in 200-year flood events, respectively. There is an unacceptable risk of flooding and damage to property and infrastructure. In addition, the current flood defences need repair and if not addressed may fail in the future, increasing the flood risk and associated damage to property and infrastructure.

The 'Do Nothing' scenario could mean the failure of the existing levels of protection and thus does not meet current or future acceptable levels of flood protection and is thus not a sustainable alternative. This alternative has not been considered further.

### 4.2 Do Minimum

The 'Do Minimum' measure consists predominantly of repair and ongoing maintenance works to maintain the existing water management infrastructure. Although the current level of protection would be maintained in this scenario, the current infrastructure does not meet the required Target SoP, and the risk of flooding is considered unacceptable.

Although doing the minimum will not result in any impacts related to the construction and development of the Proposed Scheme, it is not a sustainable alternative, so it was not considered further.

### 4.3 Alternative Design

An Option Development Process (RPS, 2024) was undertaken to identify engineering options for the Ballina FRS that meet the required SoP. The process undertaken aimed at identifying options that are economically viable and environmentally acceptable while also being satisfactory to the community and other stakeholders.

Various structural measures were considered as FRS options:

- Relocate and Reconstruct Properties
- Divert River and Flood Bypass Channel
- Upstream Storage
- Wall and Embankments
- Increased Conveyance

A Multi-Criteria Analysis (MCA) and Cost-Benefit Analysis (CBA), which considers technical, social, economic and environmental criteria was used to compare the options. From these analyses, the options were identified.

The adaptability of the Proposed Scheme to address climate change scenarios was assessed. It was identified that additional works would be required in year one of the construction phase. The preferred options for each section of the scheme were adapted to meet these requirements.

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RPS also completed a Nature-based Catchment Management (NbCM) assessment for the Ballina catchment to better understand what nature-based solutions (NBS) could be considered within the Proposed Scheme catchment area. The assessment concluded that there were no NBS solutions that would entirely address the SoP required for the Proposed Scheme due to the predominately tidal nature of flooding along the River Moy. Fluvial flooding risk could be reduced with the implementation of NBS within the wider catchment; however, current legislation and an onus to prove 1 in a 100-year flood resilience would make these options unsuited to meet the project requirements.

### 4.4 Alternative Locations

#### 4.4.1 Construction Compound Locations

Construction compound locations were strategically identified across the Proposed Scheme based on proximity to the proposed works. Priority was given to disturbed areas owned by MCC. Private lands on which access is likely to be granted were also considered. The locations are as follows:

- Ballina Dairies site and adjacent boat club site.
- MCC lands on Barrett Street.
- Sites owned by Bourke Builders located on:
  - Ridgepool Road.
  - Behy Road.
  - Bonniconlon Road.

Baseline ecological surveys did not identify any sensitivities at the proposed sites. Furthermore, consultation with landowners has indicated that the sites would be made available for use as construction compounds. For this reason, no further alternatives were considered.

### 4.5 Alternative Layouts

Following selection of the preferred option many localised alternatives were assessed during the design stage. This assessment process included surveys, site investigations and walkovers, inputs from environmental experts, stakeholder feedback and the various public consultation feedback (**Chapter 3: Consultation**). Examples of changes made to the original design to accommodate environmental objectives are outlined below.

#### 4.5.1 Public Open Space - River Moy

Opportunities for the Proposed Scheme to be incorporated in the future Ballina Town Public Realm were considered. This culminated in the improvement of the plaza opposite St. Muredach's Cathedral along Cathedral Road into a Public Open Space area that can be incorporated into the future public realm (see **Chapter 5: Project Description**). The planned open space will consist of a raised platform which will serve the necessary flood protection. Access to the River Moy will be maintained and accessible access will be facilitated. The landscape design has included architectural input from MCC as well as a specialist Conservation Architect (See **Chapter 19: Landscape and Visual**) to ensure that it is in keeping with the build heritage of Ballina.

#### 4.5.2 Protection of Tufa Habitat – Quignamanger Stream

The majority of flood defence works on the Quignamanger consist of the replacement of the existing diversion culvert. The original preferred option included the extension of this culvert to replace the current open section of the river, including the upgrade of the section under Quay Road and extending into the River Moy. However, based on the identification of Tufa habitat (habitat that forms where calcareous waters deposit tufa (a porous rock made of calcium carbonate), in this area as part of the ecological baseline studies, the option of flood walls within this area was selected as the preferred option. In addition, to facilitate the movement of fish into the river, the culvert underneath Quay road will be replaced with a box culvert, and the existing culvert on the River Moy side of the Quay Road will be removed. The alternative layout includes

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the set back of the southern flood wall to protect existing habitat on the bank of the open channel and allows for a small area of natural floodplain. The biodiversity potential of this area is further detailed in **Chapter 9: Aquatic Biodiversity**.

### 4.5.3 Access to Shanaghy & Rathkip - Brusna (Glenree) River

It was originally proposed to raise the road to the river bridge that leads to Shanaghy & Rathkip. The alternative of providing a flood embankment on the river side of the road was considered. The option is preferred as it will negate the need for a road diversion during construction thus lowering the ecological impact footprint in a sensitive habitat (part of the River Moy Special Area of Conservation (SAC)). It is expected to be a lower impact solution while still achieving the flood management objectives.

### 4.5.4 Protection of Trees and Otter Habitat – Tullyegan Stream

Based on the tree survey undertaken for the EIAR, it was apparent that many mature trees would need to be removed to accommodate the proposed flood walls along the Tullyegan Stream. The layout of the flood walls has thus been reconfigured and moved inland from the riparian zone to allow for the protection of these trees and negate their removal.

In addition, terrestrial ecological surveys revealed that the wooded section on the northern side of the river, adjacent to the railway embankment acts as a passage for otters (a species protected under the Habitats Directive). The scheme layout was changed in this section to substitute the proposed flood walls with embankments in this section to facilitate passage of otters in this area.

### 4.5.5 Ridgpool – Protection of Habitat

Given the sensitivities of the River Moy, instream works have been avoided where possible so as to minimise potential impacts on salmon and lamprey which are qualifying interests (QI) of the SAC. However, given the limited available space on the left bank of the River Moy in the section from the Salmon Weir to the Upper Bridge (Ridgpool), it will not be possible to avoid instream works in that area. This is further complicated by the need to restrict the construction works to times that will minimise the impacts on salmon angling season (April-September), a key activity within Ballina as well as, spawning season for lamprey (April-June).

Options were considered for the undertaking of the works on both sides of the river including the use of cofferdams (sheet piling, sandbags) as well as the installation of causeways or ramp to allow access to the construction areas. Based on initial noise and vibration assessments undertaken as part of the EIAR, it was concluded that sheet piling would result in unacceptable noise and vibration impacts on residents. Piling was also rejected due to the likely presence of shallow bedrock.

To avoid impacts to the SAC most of the construction works on the quay wall adjacent to Ridgpool Road will be undertaken from the roadside and works on the instream side will be limited to that which is deemed necessary. This work will be undertaken using cofferdams constructed using 1-tonne sandbags, as necessary and be completed in short sections of no more than 50 m along the quay wall. On the northern bank access to the river is restricted and thus a causeway will be needed to facilitate works.

A ramp is to be constructed along the banks of the river from the Inland Fisheries Ireland (IFI) offices in order to gain access to the area in front of the warehouse and apartments located immediately upstream of the IFI offices. This will allow for flood walls to be constructed in this area and connect to the existing defences at the Ballina Arts Centre.

The ramp layout has been planned in consultation with IFI and the National Parks and Wildlife Services (NPWS) together with the aquatic specialist's input to minimise any impact on lamprey spawning habitat. The necessary machinery and materials will be craned over the Upper Bridge and will be limited to the smallest needed to complete the works. In addition, the IFI agreed to restrict the angling season to June and July during the two years that construction will be taking place to facilitate the works to be undertaken during periods of low water.

## 5 PROJECT DESCRIPTION

### 5.1 Description of Proposed Scheme

The River Moy flows through Ballina and is the main source of flooding in the town. The current Proposed Scheme includes flood relief measures in Ballina for the River Moy and the following tributaries: Quignamanger Stream, Bunree Stream, Brusna River and the Tullyegan Stream. See **Figure 1-1**. A summary of the Proposed Scheme is provided in **Table 5-1 below** with a description of each element found in **Section 5.2**.

**Table 5-1 Summary of Proposed Scheme**

Watercourse	Location	Description of Works
River Moy	Pedestrian Bridge to Salmon Weir	New flood walls
	Barretts Street	Proposed storm water pumping station
	Ridgepool	<ul style="list-style-type: none"> <li>New flood walls</li> <li>Tanking of the Weir Building</li> <li>Additional access to the river</li> <li>Repairs to quay wall as necessary</li> <li>Proposed storm water pumping station.</li> </ul>
	Cathedral Road	Raised plaza to act as flood defence incorporating public realm elements.
	Emmet Street	<ul style="list-style-type: none"> <li>Removal and reconstruction of existing wall using original stone.</li> <li>Replace existing railings with combination of new flood wall and glass wall</li> </ul>
	Clare Street/Howley Terrace	<ul style="list-style-type: none"> <li>New flood walls</li> <li>Accessible access at existing angling area</li> <li>Proposed storm water pumping station</li> </ul>
	Bachelors Walk	<ul style="list-style-type: none"> <li>New flood walls</li> <li>Proposed storm water pumping station</li> </ul>
	General	Tree removal, cutting, pruning and bankside maintenance
Quignamanger Stream	Existing diversion culvert	New culvert
	Existing open reach	New flood walls Lowering of existing LBW Baffle/ stepped pool at D/S reach of drainage channel
	Outfall to River Moy	New culvert crossing of Quay Road and replacement of downstream culvert with open channel.
	General	Tree removal, cutting, pruning and bankside maintenance
Bunree Stream	Existing culverts and open reaches along Behy Road from Behy Business Park to N59	New culvert
	Existing culvert downstream of N59   public open space	<ul style="list-style-type: none"> <li>Replace existing culvert with open channel</li> <li>Regrade channel bank where possible to achieve a stepped/gentler slope</li> </ul>
	Field bridge	New culvert
	General	Tree removal, cutting, pruning and bankside maintenance
Brusna River	Rathkip/ Shanaghy Area	Flood walls and embankments
	Bridge Crossing	Beam to act as flood defence

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Watercourse	Location	Description of Works
		Replacement of scour protection including bank retaining walls as required
	General	Tree removal, cutting, pruning and bankside maintenance
Tullyegan Stream	Between N26 and railway crossing	Flood walls and embankment
	General	Tree removal, cutting, pruning and bankside maintenance

## 5.2 Proposed Scheme Elements

### 5.2.1 Flood Walls

A standard flood wall detail to be used on the River Moy and other areas across the Proposed Scheme. The majority of flood walls will consist of reinforced concrete with a suitable foundation, stone cladding along the face and of varying height.

The existing flood walls located along the River Moy will be removed and disposed offsite. Suitable demolished flood wall material will be reused for the likes of stone cladding of the new flood wall. The walls will be constructed from cast in-situ reinforced concrete.

### 5.2.2 Embankments

Embankments are proposed on the River Brusna and on the Tullyegan Stream. Embankments will be constructed of impermeable clay with a capping of topsoil of approximately 150 mm depth to allow for landscaping.

### 5.2.3 Public Open Space

The plaza opposite Muredach's Cathedral along Cathedral Road will be modified for incorporation into the future planned Ballina Public Realm. This will involve the development of a raised platform to a height of approximately 0.8 m. Existing pedestrian access to the river will be maintained, including provision for accessible access and access for boats.

### 5.2.4 Surface Water Drainage

New surface water sewers will be installed along all road sections adjacent to new flood walls on the River Moy. This includes Ridgepool Road, Barrett Street, Cathedral Road, Emmet Street, Bachelors Walk and Clare Street. New outfalls to the River Moy will be installed with petrol interceptors. Flap valves will be required on all discharge points into the rivers.

Surface water pumping stations will be installed at strategic points to manage excess water during flood events. The pumping stations will be submersible in nature with a valve chamber and kiosk. Surface water flows from the pumping station will be pumped directly to the river. Hydrocarbon interceptors will be installed upstream of the pumping stations.

Pumping stations will be installed at the following locations:

- Bachelors Walk
- Clare Street
- Ridgepool Road
- Barrett Street

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### 5.2.5 Bridge Works

Along the River Moy, new flood walls will tie into the existing bridges. The Proposed Scheme will not result in any alterations to the Upper, Lower and Pedestrian bridges or the Salmon Weir. The access bridge to Rathkip/Shanaghy area on the Brusna River will be reinforced to protect the bridge during flood events.

### 5.2.6 Diversion of Utilities

The utility providers identified within, or adjacent to, the footprint of the Proposed Scheme include:

- **Electricity Supply:** ESB Networks
- **Water Mains and Foul Sewers:** Irish Water
- **Telecommunications:** Eir, Virgin Media, E-Net
- **Gas Networks:** Gas Networks Ireland

The interactions of the Proposed Scheme with utilities and measures to minimise disruptions are provided in **Chapter 16: Material Assets Utilities and Waste**. Interactions will be considered on an individual basis, and each conflict location will be discussed with the relevant utility provider. Interactions will be considered on an individual basis, and each conflict location will be discussed with the relevant utility provider.

### 5.2.7 Amenity Access to the River Moy

Access to the River Moy for recreational activities and anglers along the Proposed Scheme is required. Existing access types include vehicular, pedestrian and accessible entry. Such access points to the River Moy will be maintained through ramps, stiles or flood gates. It is intended to retain all existing access points with access to be improved where practical. Public access to the religious grotto on Clare Street will also be maintained by placing the wall behind the structure.

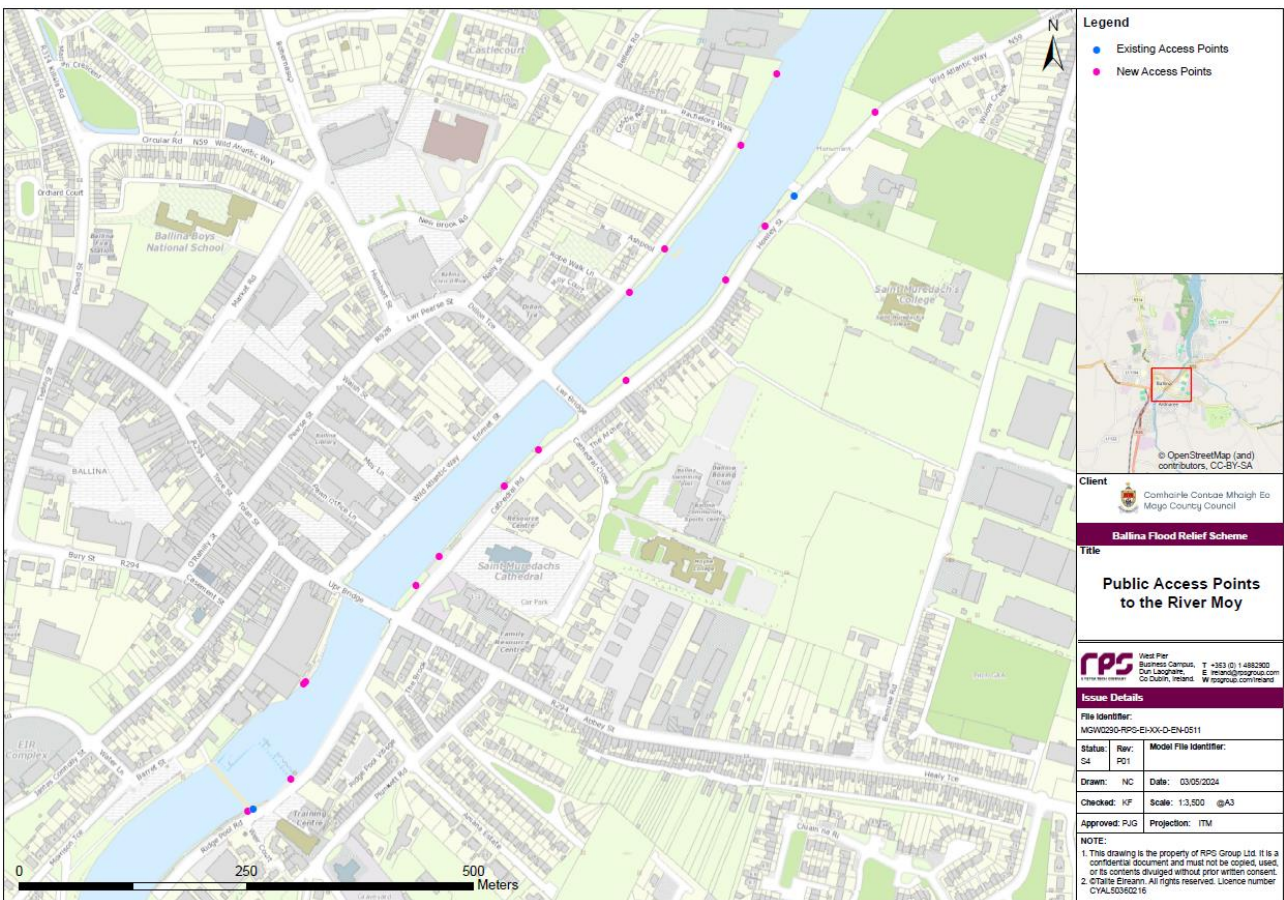


Figure 5-1: Public Access Points to the River Moy

## 5.2.8 Lighting Design

Existing lighting will be replaced where disturbed along the River Moy and all other areas of work. There are currently no proposals to change the nature of the lighting except for making a change to Light Emitting Diode (LED) lighting where lights have not already been upgraded.

The exception to this would be the proposed public realm areas where further lighting may be added as part of detailed design. Further lighting will require input from a qualified ecologist to ensure there is no further impact to the surrounding habitat.

## 5.2.9 Construction Compounds

The appointed contractor will set up the temporary construction compounds. Compounds will include site offices, welfare facilities, bunded fuel storage areas, designated storage area and construction parking. Wastewater will connect to foul sewer networks where available. Where not available, the contractor will have to provide welfare facilities in accordance with best practice.

The locations of potential temporary compounds are listed below:

- Ballina Dairies site and adjacent boat club site.
- MCC lands on Barrett Street.
- Sites located on private lands:
  - Ridgepool Road.
  - Behy Road.
  - Bonniconlon Road

The majority of material will be imported and stockpiled in the compound locations.

## 5.2.10 Instream Works

Instream works will be required to facilitate construction activities in certain parts of the Proposed Scheme. Works will be undertaken during low level conditions as far as practicable and within the seasonal restrictions placed on the programme. Works on the River Moy and Brusna Stream are within the boundary of the River Moy SAC and Killala Bay/Moy Estuary SAC. Historical fishing access to the river will be maintained where possible.

## 5.3 Construction Management

The EIAR is supported by the development of a Construction Environment Management Plan (CEMP). The CEMP provides detail on the mitigation and monitoring measures as identified in the EIAR that will be implemented during the construction phase for the protection of the environment and human health. The CEMP will be implemented by the appointed contractor.

The CEMP will be updated to address the requirements of any relevant planning conditions, including any additional mitigation measures.

### 5.3.1 Construction Hours

It is proposed that standard construction working hours will apply as follows: Monday to Friday: 08:00 to 19:00; Saturdays: 08:00 to 14:00; and no work on Sundays and Bank Holidays. Deviation from these times will only be allowed where prior written approval has been received from the local authority.

### 5.3.2 Traffic Management

Detailed information on anticipated traffic movements is not available. Indicative daily movements for one construction team operating on site are provided below:

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- Six vehicles (cars/vans) will arrive on site in the morning (07:00 – 08:00) and depart in the evening (18:00 – 19:00)
- Up to two Heavy Goods Vehicle (HGV) will arrive and depart the site per hour throughout the typical working day (07:00 – 19:00)

A total of 3-4 crews operating at all times has been assumed. Total traffic movements will depend on construction methodology and actual number of crews during construction stage.

### 5.3.2.1 Haul/Access Routes

Haul routes have been identified for the 5 no. number construction compounds. Delivery of materials and other infrastructure associated with the Proposed Scheme will be carried out using High Voltage (HV). Deliveries to the site will adhere to the hierarchy of roads where possible utilising the National Primary and Secondary Roads, Regional Roads then Local Roads.

Access routes for implementing the construction works associated with the River Moy in Ballina have been identified. Construction traffic will access the temporary construction compound via the N59 National Road. Additionally, construction traffic will be prohibited from travelling on Castle Road or L-1120 Belleek Road.

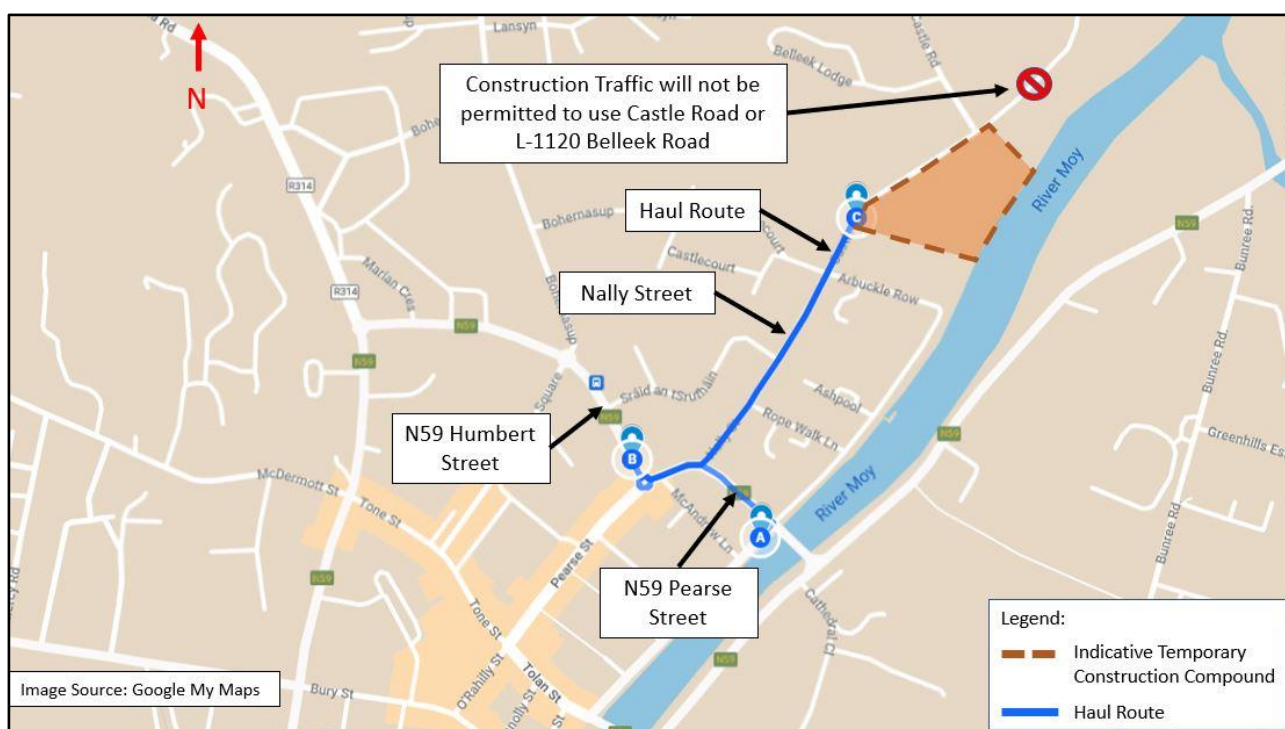


Figure 5-2: Construction Traffic Haul Route (River Moy Works) – (1 of 3)

Construction traffic will access the Barrett Street temporary construction compound either via the N26 National Road (James Road and Water Lane) or the N59 National Road (Tolan Street and Barrett Street).



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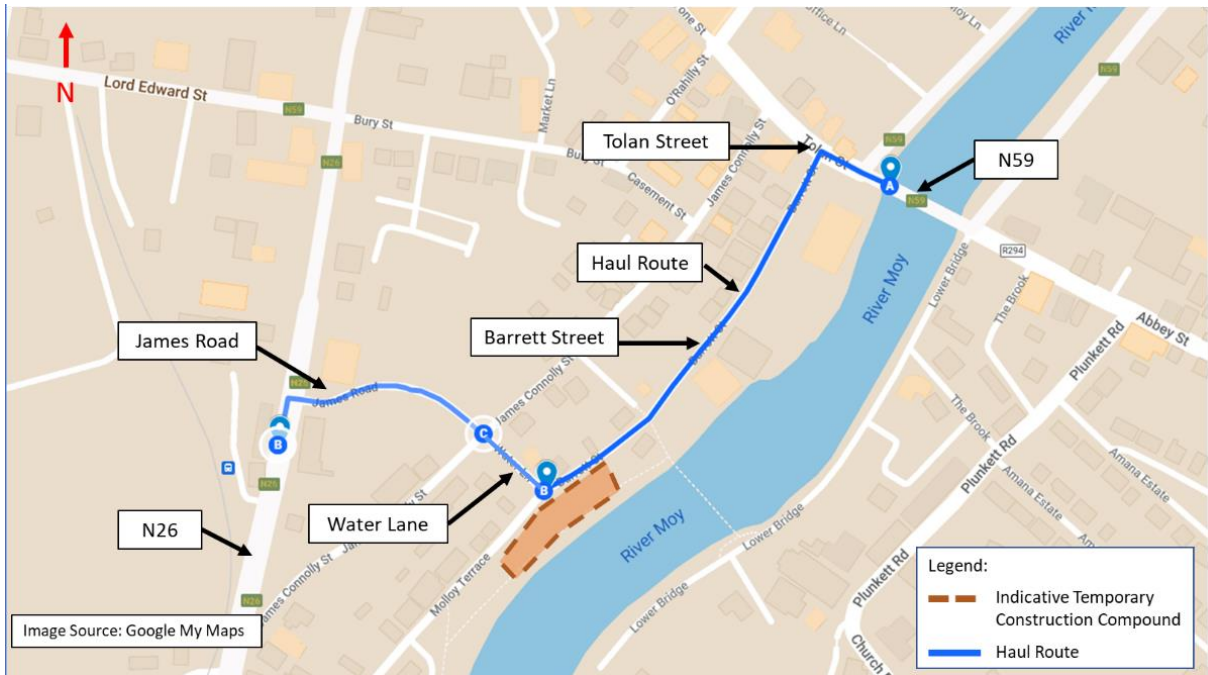


Figure 5-3 Construction traffic haul route (River Moy works) – (2 of 3)

Construction traffic will access the temporary construction compound on Ridgpool Road via the R294 Regional Road and Plunkett Road.

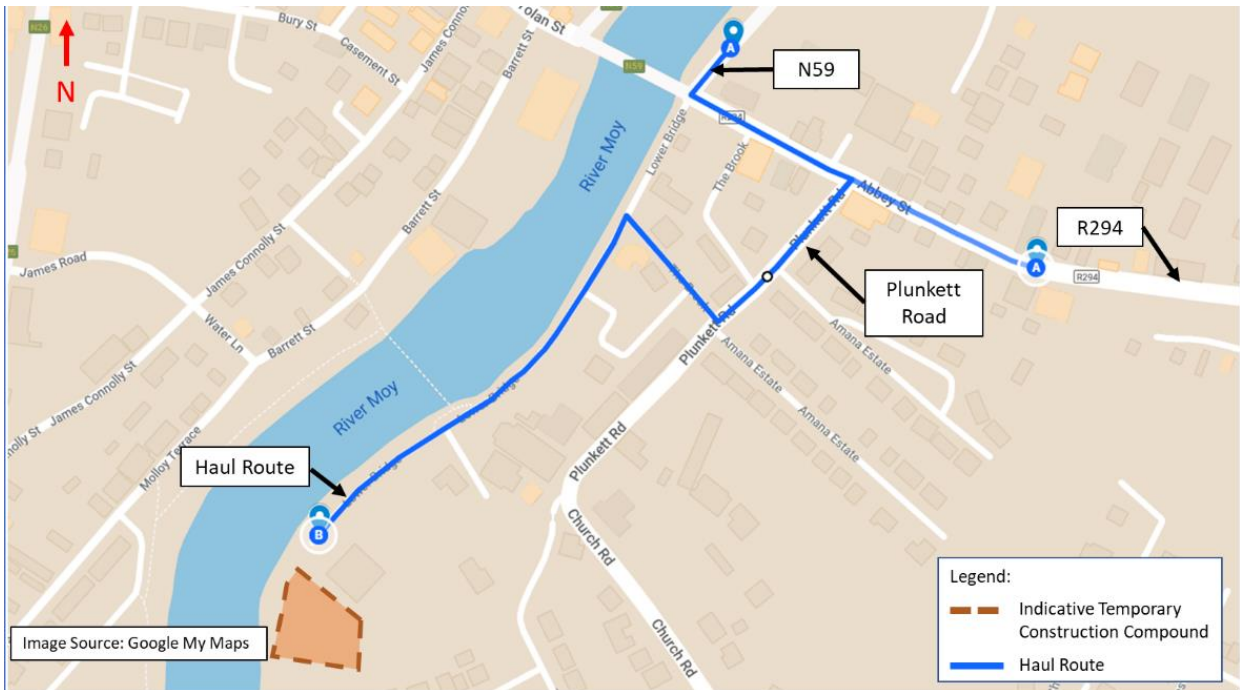


Figure 5-4 Construction traffic haul route (River Moy works) – (3 of 3)

Construction traffic will access the temporary construction compound on Behy Road via the N59 National Road as per **Figure 5-5**. Additionally, construction traffic will be prohibited from travelling east of the temporary construction compound on Behy Road.

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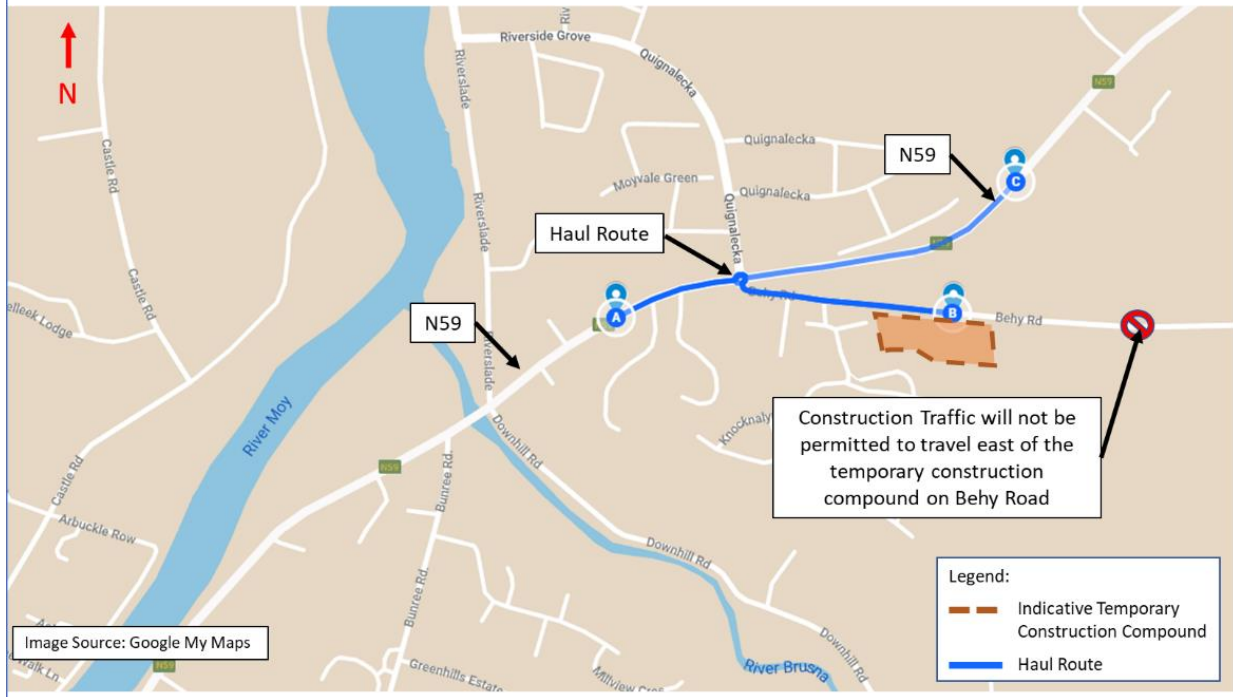


Figure 5-5: Construction traffic haul route (Bunree Stream Works Area)

Construction traffic will access temporary construction compound on Bonniconlon Road for works on the River Brusna via the R294 Regional Road as shown in Figure 5-6.

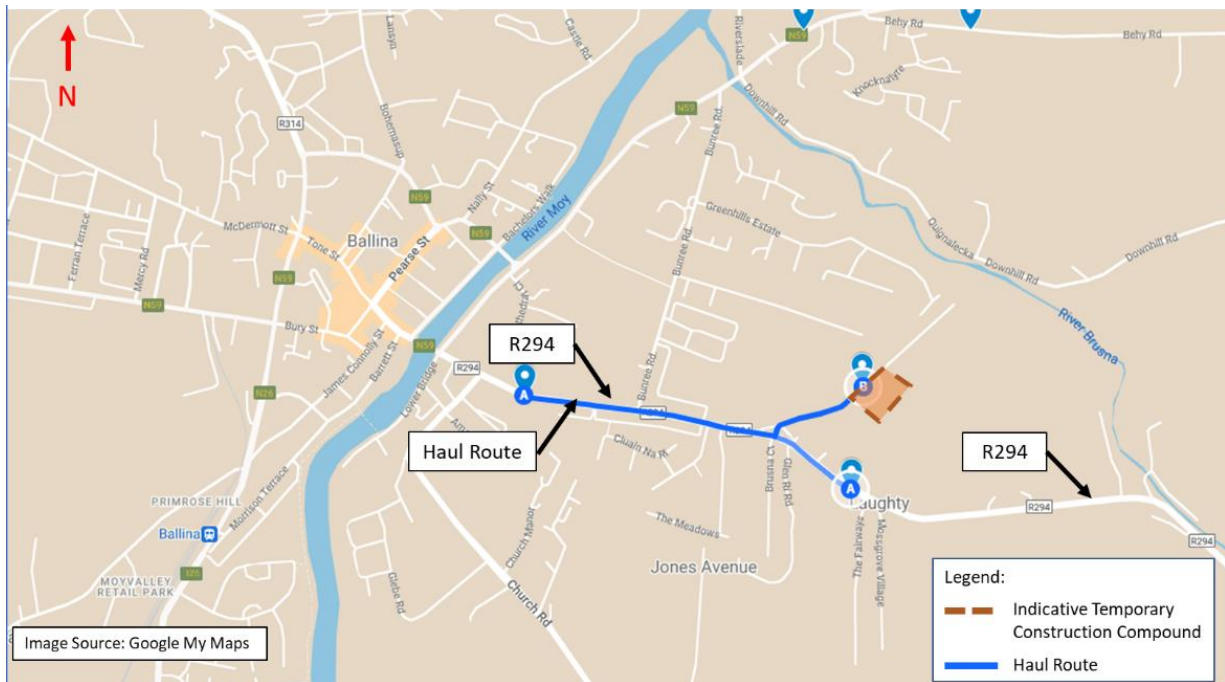


Figure 5-6: Construction traffic haul route (River Brusna Works Area)

Haul routes to the construction site at Tullyegan will be via the N26 and L1122 Commons roads.

### 5.3.3 Construction Waste Management

During the construction phase, emissions and residues will arise from the following and are assessed in the relevant chapters of this EIAR:

- Construction dust
- Exhaust emissions from construction traffic and machinery
- Construction noise and vibration
- Security lighting
- Treated surface water drainage discharge
- Residue, emissions, and waste from any construction stage pumping
- Material wastes

### 5.3.4 Commitments Register

A register of the environmental commitments (i.e. the mitigation measures and monitoring to be undertaken during the construction phase, operational and maintenance phase of the Proposed Scheme) is provided in **Chapter 22: Schedule of Environmental Commitments**.

This summary will be used to inform the commitments register in the CEMP, which will be developed by the appointed contractor. Any conditions of planning (should consent be granted) and any commitments made during the consent application process will also be added to the commitments register. The contractor will be required to implement the schedule of commitments during the construction phase under supervision from MCC and an Environmental Monitoring Group will be set up to ensure adequate implementation of the Schedule of Environmental Commitments which will include representatives from MCC and OPW.

## 5.4 Construction Programme and Phasing

Construction activities are envisaged to take place during a single construction campaign lasting 36 months but could extend beyond this should unforeseen circumstances arise. All applicable constraints and mitigations will apply to any extended programme. This will be followed by a 15-month handover period. The activities planned for each of the areas within the Proposed Scheme are yet to be scheduled, but it is assumed that activities will run simultaneously within 3 to 4 different areas of the Proposed Scheme.

There will be restrictions on the construction programme to accommodate angling activities and fishing rights on the River Moy with construction activities to take place outside of angling season in some areas. There are also restrictions as a result of fish spawning season.

The following restrictions are to be in place to accommodate fish breeding, angling and spawning seasons:

- Freshwater River Moy (Ridgepool and Salmon Weir):
  - **Year 1 (Y1)** – No instream works from January until the IFI peak angling season finishes at the end of July of Y1.
  - Instream works cannot occur until the end of Week 2 of August of Y1 in relation to sea lamprey habitat protection at specific points within the Ridgepool (Sites RP2A, RP8-RP8A, see **Appendix 9.6 of this EIAR** for locations).
  - **Year 2 (Y2)** – The access ramp / cofferdam work areas on the LHS in front of Ballina Manor Hotel / IFI Building will remain in place for the remainder of Y1 and through Y2 until those works are completed. IFI have agreed that the works can continue through the angling season of Y2 so that the instream low flow period can be utilised to expedite the work schedule.
  - Instream works may continue on the Ridgepool Roadside (RHS) of Ridgepool through Y2 subject to the restrictions set out in **Section 9.5.1.3 of Chapter 9 Aquatic Biodiversity** relating to sea lamprey habitat protection regarding the timing of placement of cofferdams that cover the reach that includes Sites RP8 to RP8A (see **Appendix 9.6 of this EIAR** for locations).
- Estuarine River Moy (main channel downstream of Upper Bridge, including Cathedral pool):

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- **Year 1 (Y1)** – No near-bankside works that could disturb the fishing amenity of Cathedral pool until at earliest **August 1<sup>st</sup> of Y1** of the work programme, i.e., no scaffolding or flood wall works along Emmet Street. This is to allow for the peak angling season to be undisturbed until the end of July.
- **Year 2 (Y2) – No timing restrictions** for works in the estuarine River Moy (Cathedral Pool and downstream of Lower Bridge) as it is a transitional water and is not subject to timing restrictions for fish spawning waters.
- Quignamanger
  - No restrictions for the diversion culvert and flood walls along existing open section.
  - Instream works restricted to **May to September inclusive**.
- Bunree Stream
  - Instream works restricted to **May to September inclusive**.
- Brusna River –
  - Instream works (Bridge Upgrade) restricted to **July to September inclusive**.
  - Instream works (All works over or near water set back floodwall and embankment) restricted to **May to September inclusive**
- Tullyegan Stream
  - Instream works (floodwalls) restricted to **May to September inclusive**.

## 5.5 Operation and Maintenance Phase

The operational and maintenance phase of the Proposed Scheme will not require any additional dedicated employees. It is expected that the operation and maintenance activities required will be undertaken by existing MCC maintenance personnel. **Table 5-2** provides a description of the expected maintenance activities required for the Proposed Scheme.

**Table 5-2: Operational and Maintenance Activities**

Element	Activity	Frequency
Flood walls (including glass)	Inspections	Annually
	Window cleaning	Annually
	Repairs	As req
	Vegetation control	Annually
Pumping stations	Inspections	Bi-annually
	Repairs	As req
Open space	Inspections	Monthly
	Repairs	As req
	Replanting and landscaping	As req
Stormwater drains	Inspections	Bi-annually
	Repairs	As Req
	Petrol interceptor emptying and cleaning	Quarterly
Open Channel <sup>1</sup>	Channel maintenance	Annually

<sup>1</sup> There is no proposed channel maintenance and vegetation control within SAC channels. The River Moy and Brusna/Glenree are self-maintaining owing to channel morphology (swift flows / depth) that do not facilitate algal growth and sediment deposition) and will not require channel maintenance. In the unlikely event that instream channel maintenance on SAC channels is required, this would be subject to a site-specific Appropriate Assessment, as per OPW protocols.

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Element	Activity	Frequency
	Vegetation control	Annually
	Removal of trash	As req
Culverts	Inspections	Annually
	Repairs	As required
	Removal of trash and vegetation	Quarterly
Embankments	Inspections and maintenance	Annually
	Vegetation control	Annually
	Vermin control	Bi-annually
	Back drainage improvements	Bi-annually
Flood Gates	Inspections	Bi-annually
	Repairs	As required
Sour Protection (River Brusna)	Inspections	Annually
	Repairs	As required

## 6 TRAFFIC & TRANSPORTATION

The Traffic and Transport Assessment (TTA) conveys the likely significant effects that the Proposed Scheme will have on the traffic and transport environment of Ballina and surrounding areas. The assessment has focused on the likely significant effects of the Proposed Scheme during construction, as there will be imperceptible changes to the traffic and transport environment at post scheme implementation.

The key components of the assessment include the traffic generated by the staff and plant machinery associated with construction and the temporary diversions and traffic management in place during the works.

The proposed TTA study area includes Ballina Town and the roads impacted by the Proposed scheme such as Clare Street, Bunree Road, Abbey Street, Cathedral Road, Emmet Street etc. The TTA study area was developed by identifying the routes that would be used by construction vehicles and employees and considering where the highest percentage of potential impact would be on background traffic flows and the routes within Ballina Town. A 5% impact threshold was used when developing the TTA study area, based on Transport Infrastructure Ireland (TII) TTA Guidelines.

### 6.1 Baseline Environment

The baseline road network is shown in **Figure 6-1**.



**Figure 6-1: Baseline Road Network Overview**

Traffic volumes are described in terms of Annual Average Daily Traffic (AADT), which is the traffic volume in both directions on a section of road, averaged over a year (total annual flow divided by 365). The AADT values for the area are shown in **Table 6-1**.

**Table 6-1: AADT Volumes**

Road Section	Two-Way Traffic		
	WADT	Monthly Index Factor (from TII PAG Unit 16.1 Annex C) – West	AADT
Quay Road	2,491	1.06	2,640
Nally Street	2,059	1.06	2,183
Tolan Street	8,135	1.06	8,623
Emmet St	12,808	1.06	13,576
Cathedral Rd	11,637	1.06	12,335
Clare St	13,045	1.06	13,828
Abbey St	9,054	1.06	9,597
Bunree Rd	5,216	1.06	5,529

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Road Section	Two-Way Traffic		
Behy Rd	1,369	1.06	1,451
R294 (Brusna)	3,400	1.06	3,604

## 6.2 Significant Effects

The temporary impact of additional vehicles on existing traffic volumes which includes excavation and demolition, importing materials, staff commuting, and associated traffic will only produce **imperceptible** or **slight** effects on the traffic and transport environment as it is projected that a maximum of only 60 additional vehicles will be present per day on each road assessed.

Junction assessments were carried out at key junctions that would be affected during the construction stage. Two main diversions (Clare Street Road closure, Barrett Street road closure) and a temporary lane closure (Emmett Street lane closure) were identified to have the most potential impact on junction capacity during works.

The effect from the closure of Clare Street and diversion through Bunree Road will be **not significant**. There will be a **slight** impact on the junction of Tone/Tolan/O' Rahilly/Pearse Streets. There will be a **significant** effect on the performance of the junction of Bury/Kevin Barry/Teeling/Lord Edward Streets due to the extra flows entering the junction whereas usually they would bypass the junction and use Barrett Street. There will be a **moderate** effect on the junction of Tolan Street, Emmett Street and Ham Bridge due to the lane closure on Emmett Street.

The impact of diversions and closures was also assessed in terms of impact on Road capacity. **Significant** capacity effects are projected on Abbey Street due to the closure of Clare Street.

As the construction phase has a fixed duration, any effects will be temporary and the effects with a significance level of slight or less have been concluded to be **not significant** in EIA terms.

## 6.3 Mitigation measures

There are seven proposed diversion routes to ensure the flow of traffic is maintained in Ballina during the works. These diversions will occur on and near Bachelor's Walk, Barrett Street, Ridgepool road, Clare Street/Howley Street, Quignamanger/Greggs Road, near Bunree/Behy Road, and near Brusna (Glenree) River.

For Barrett Street works it is proposed that local vehicular traffic will be permitted to access the alternative temporary parking and the Ballina Manor Hotel resident carpark. Advance warning signage will be provided at Abbey Street (R294) and Cathedral Road, advising all HVs to route via Emmet Street to avoid an excess of traffic using Tolan Street and subsequently Bury Street. With regard to the Clare Street works, it is proposed that lane closures on Clare Street and Cathedral Road occur simultaneously, where possible. These diversions and all other diversions are explained in full in the Construction Traffic Management Plan (CTMP).

Temporary traffic management measures are proposed on Cathedral Road with the removal of on-street parking to accommodate the works. Similar measures will happen on Emmett Street. It is proposed that works on Emmett Street do not occur at the same time as those on Barrett Street.

## 6.4 Residual Effects

Overall, it is concluded that there will be significant effects arising from the Proposed Scheme during the construction phases, but these issues can be mitigated for through planning of construction periods, signage, diversion routes, and signalization as described below and in the CTMP. With the implementation of the mitigation measures, there will be no significant construction phase and operational and maintenance phase impacts associated with the Proposed Scheme. It is anticipated that the Proposed Scheme will in a positive residual effect on traffic and transport during the operational stage as the flood defences will prevent the flooding of roads including Emmett Street, Cathedral Road, Clare Street, Bachelors Walk, Barrett Street, Lower bridge, Downhill Road, Creggs Road and Quay Road.

## 7 POPULATION

This chapter identifies, describes and presents an assessment of the likely significant effects of the Proposed Scheme on the population during the construction and operational phases. The Population study area was created based on the Small Area Population (SAPs) data published following the Central Statistics Office (CSO) 2016 and 2022 Census. This Population study area includes all SAPs within 5 kilometres of the proposed works.

The following aspects were considered in the assessment of the potential effects of the Proposed Scheme on Population: Population Level, Economic Effects, Residential Amenity, Community Facilities, Recreational and Tourism Facilities, and Transport, Connectivity and Accessibility.

### 7.1 Baseline Environment

The Population study area had a population in 2022 of 12,823 persons and covers a land area of 58.45 km<sup>2</sup> in size. The population of the study area has increased by 0.4%, from 12,492 to 12,823, between 2016 and 2022. During this time period, population density increased by 3 people per km<sup>2</sup> from 213 to 216.

There are 6,865 properties within the study area with 5,787 no. residential, 516 no. commercial, 373 no. properties listed as both commercial and residential, and 189 no. property uses as unknown. There are 228 no. residential buildings and 69 no. commercial properties at risk of flooding during a design flood event (1% Fluvial and 0.5% Tidal).

The total number of households between 2016 to 2022 increased from 4,664 to 4,708.

Businesses, located within the study area with a significant number of employees include; Coca-Cola Ballina Beverages, Hollister ULC, Heyco Werk Ireland Limited, Charles River Laboratories, and Telus International. There are a number of Larger Retail Employers including Aldi, Dunnes Stores, Homeland, Lidl, Penneys, SuperValu, and Tesco.

There are a number of community facilities identified within the study area including 10 no. primary schools, 3 no. secondary schools, and 13 no. childcare facilities. In addition, there are 14 no. Healthcare Services. There are a large number of recreational facilities including, GAA, rugby and soccer clubs, Ballina Golf Club, Moy Boat Club, and Ballina Swimming Pool. There are 6 no. train services daily running between Ballina and Dublin and serving several other population centres including Roscommon, Athlone and Kildare. In addition, there are four Local bus links serving Ballina.

### 7.2 Significant Effects and Mitigation Measures

#### 7.2.1 Construction Phase

The effects on Population are projected to be **short-term, slight positive** impact. Construction workers within the area may enjoy an increase in available job opportunities and construction materials may also be sourced locally for the Proposed Scheme.

The effects of the Proposed Scheme will overall have a **short-term, imperceptible** impact on Economic Activity. The construction phase of this project will increase economic activity in the area primarily as a result of the presence of construction workers in the area. In addition, it is considered that the construction phase will bring indirect employment to the local services within Ballina. The construction works would involve temporary restrictions on traffic movements and temporary road closures may impact businesses due to the loss of parking and disruptions to the regular flow of traffic.

The Proposed Scheme will have a **short-term, slight, negative** impact on Residential Amenities. The Proposed Scheme will have a **short-term, slight, negative** impact on Community Facilities. Community facilities are expected to operate normally during the construction phase. There may be some effects on accessing community facilities during the construction phase of this project due to the presence of machinery and plant, and there may also be some disturbance as a result of noise and dust.

The Proposed Scheme will have a **short-term slight negative** impact on Recreational and Tourism Facilities. Recreational and tourism facilities are expected to operate normally during the construction phase. The Proposed Scheme will have a **short-term negative moderate** impact on Transport, Connectivity, and Accessibility. During the construction phase of the Proposed Scheme, several roads within the town will be



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temporarily impacted. There will be increased traffic on the local road network and temporary localised traffic management measures in place such as a stop and go system in many of these temporary one-way streets.

### 7.2.2 Operational Phase

The Proposed Scheme will provide flood protection to 54 no. commercial and business premises, 187 no. existing residential units and a number of community, recreation and tourism facilities within Ballina and the surrounding areas.

The Proposed Scheme will have a **moderate, long term, positive** impact on Population level, Economic Activity, Residential Amenities, Community Facilities, Recreational and Tourism Facilities, and Transport, Connectivity and Accessibility.

### 7.3 Residual Effects

During the Construction Phase, there will be an increase in construction works in Ballina, which can have a positive effect on the local businesses and the local population.

This Proposed Scheme will protect homes and businesses in Ballina from flooding events. As a result of the Proposed Scheme, the Ballina area may become more attractive for residential and business purposes. The Proposed Scheme will also protect existing amenities, recreation facilities and tourism destinations within Ballina, promoting economic activity and economic growth in the town.

## 8 HUMAN HEALTH

This chapter provides reasoned conclusions for the identification and assessment of any likely significant effects of the Ballina FRS on population health. Physical health, mental health and health inequalities are considered across a broad range of determinants of health. Population health refers to the health outcomes of a group of individuals, including the distribution of such outcomes within the group. Population health varies, given factors such as personal choice, location, morbidity and exposure. These factors that influence health are called determinants of health and span environmental, social, behavioural, economic and institutional aspects.

The chapter follows best practice regarding health in EIA guidance set out by the Institute of Environmental Management and Assessment (IEMA) and the Institute of Public Health.

The health assessment looks at the potential effects for both the general population and for vulnerable groups. Vulnerability relates to experiencing effects differently due to age, income level, health status, degree of social disadvantage or the ability to access services or resources. The health assessment considers localised population effects and also considers wider population effects at the regional and national levels.

The health assessment is informed by the findings of other EIAR chapters including; Traffic & Transport, Population, Climate, Noise & Vibration and Risk of Major Accidents or Disasters. The health assessment has also been informed by a review of relevant public health evidence sources, including scientific literature, baseline data, health policy, local health priorities and health protection standards.

### 8.1 Baseline Environment

An overall baseline health profile was gathered for relevant electoral divisions (EDs) in Ballina, using Mayo County and the Republic of Ireland as comparators. Data was gathered from publicly available public health evidence sources. This data shows that overall, the general health of the five EDs that make up the study area is very good, which is consistent with the county and national averages. The majority of the population in Mayo County reported very good and good health. However, all-age all-cause mortality in Mayo County is higher than the national average, and cancer mortality in the county is slightly rising. Whilst death from mental and behavioural disorders is lower in Mayo County compared to Ireland, the suicide rate in the county is slightly higher than the national average. These indicators do not suggest increased sensitivity to change in the area as a whole, however this does not exclude vulnerable groups.

### 8.2 Significant Effects and Mitigation Measures

A number of potential impacts on human health associated with the construction, operational / maintenance of the Proposed Scheme, were identified. These included access to open space, leisure and play, transport modes, access and connections, employment and income, noise and vibration, and housing.

#### 8.2.1 Construction Phase

Construction Phase of the Proposed Scheme has the potential to result in temporary and short-term disruption of public open spaces, affecting recreational activities for local people. This effect is assessed as being of **minor adverse** significance (not significant). During construction, the Proposed Scheme has the potential to result in small and medium-term disruptions in relation to health-related travel times and accessibility, active travel and road safety. The effect is assessed as being of **minor adverse** significance (not significant). The construction of the Proposed Scheme is likely to have **minor beneficial** effect (not significant) on economic activity as a result of the presence of construction workers in the area. Construction noise impacts of the Proposed Scheme are considered to result in a **minor adverse** (not significant) effect on population health.

#### 8.2.2 Operational Phase

During the operational and maintenance phase, the Proposed Scheme will deliver protection against the 1% AEP (1% chance of occurring in any single year) river flood events and the 0.5% AEP (0.5% chance of occurring in any single year) coastal flood events. Providing flood protection local residents and commercial

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property owners can reducing stress, anxiety and post-traumatic stress disorder for residents during flood events, knowing that their properties are protected. Furthermore, the provision of flood relief measures can minimise the potential for contamination and spread of pathogens from sewage or hydrocarbons which can occur in flood events.

During the operational and maintenance phase, the Proposed Scheme is expected to have a **moderate beneficial** (significant) effect on housing, as the flood protection provided to residential amenities will be long-lasting and will affect all residents in the area. Operational impacts on open space, leisure and play and transport modes, access and connections, are considered to result in a **minor beneficial** (not significant) effect on population health. This is due to improved flood relief measures making travels routes and recreational use of public open spaces safer and more accessible, as well as improving emergency health response times. During operation, employment and income health effects are assessed to be **moderate beneficial** (significant). The Proposed Scheme is anticipated to have a protective impact on local jobs and economic activity. The flood relief safety and protection provided by the Proposed Scheme would enable many aspects of everyday life that either protect or promote good health, as well as mitigate against the increasing frequency and severity of floods due to climate change.

### 8.3 Residual Effects

The residual effects of the Proposed Scheme during construction and operation remain the same as those presented in **Section 8.2**.

## 9 AQUATIC BIODIVERSITY

### 9.1 Introduction

The Aquatic Biodiversity chapter assesses the effects that the Proposed Scheme may have on aquatic ecological receptors and sets out the mitigation measures proposed to avoid or reduce any potential likely significant effects that were identified.

### 9.2 Baseline Environment

The Proposed Scheme spans the Ballina section of the River Moy and upper River Moy Estuary, plus four separate tributaries of the River Moy in the vicinity of Ballina: Tullyegan Stream, Quignamanger Stream, Bunree Stream and the Brusna / Glenree River.

The River Moy and its major tributaries upstream of Ballina comprise a catchment area of approximately 2,045 km<sup>2</sup>. It is one of the most important salmon catchments in Ireland, famous for the Ridgepool and Cathedral Beat within Ballina. Unlike many large rivers in Ireland, the Moy consistently exceeds its Conservation Limit (CL) for salmon, with return surpluses of over 12,000 fish annually, equating to 173% of CL. This allows for a managed recreational salmon fishery with direct harvest of salmon on an annual basis.

The River Moy and Brusna / Glenree River are covered by the River Moy SAC. The riverine reach of the Moy Estuary is part of the Killala Bay/Moy Estuary SAC and Killala Bay/Moy Estuary SPA. In addition, the main channel of the Moy is a designated Salmonid Water under the salmonid regulations. Of relevance to the Aquatic Biodiversity chapter are the QI Annex II species salmon, sea lamprey and brook lamprey. The QI species white-clawed crayfish was not present in the study area but was included in the assessment as a precaution. Marine QI habitats Estuaries [Habitat 1130] and Mudflats and sandflats not covered by seawater at low tide [Habitat 1140] occur in the downstream zone of influence (Zol).

The reach of the River Moy and Moy Estuary within the Proposed Scheme study area is primarily a migration route for salmonids (salmon, sea trout) and migratory lampreys (sea and river lamprey). There is no significant salmonid spawning or nursery water on the River Moy within Ballina because of its tidal nature. Sea lampreys, however, are reported to undergo nest building activity (and presumably spawning) in the Ridgepool on occasion. There are also good patches of lamprey nursery habitat at the river margins downstream of the Lower Bridge, and two discrete patches of lamprey nursery habitat present in the Ridgepool. Juvenile sea lamprey (ammocoetes) have been recorded in these locations.

The Brusna/Glenree is a significant salmonid spawning and nursery tributary of the Moy Estuary, confluencing downstream of Ballina. A series of natural rock falls and historical modifications near the Moy confluence apparently preclude migratory lampreys from the Brusna / Glenree catchment. The river within the study reach is fast flowing and while it is good for salmonids, brook lampreys were not present. Catchment wide electrofishing has shown that despite good potential spawning and nursery habitat in the lower reaches, the Brusna/Glenree system is below expected carrying capacity for salmon, with lower than optimal densities of juvenile fish.

The remaining three streams are of much lower quality, being highly modified by existing urbanisation, extensive culverting and drainage. The Tullyegan is a small trout (and potential brook lamprey) stream that has been subjected to arterial drainage, with deepening and straightening through the relevant lower urban reach. The Quignamanger and Bunree are both extensively culverted through the Ballina urban area as far as the Moy main channel. These latter two streams have low fisheries significance, although the Quignamanger was observed to be visited on occasion by a few juvenile salmonids in the lower reaches, likely to be smolts foraging up from the main channel since the stream itself has no salmonid spawning or nursery habitat. The Quignamanger is of interest in that it is fed by highly calcareous spring waters originating upstream of the existing culverts (and upstream of the Proposed Scheme). In areas where there is turbulence, small patches of calcareous deposit have formed which pertain to Annex I Priority Habitat 7220 (hereafter \*7220): Petrifying springs with tufa formation (Cratoneurion). One such area is present just upstream of proposed culvert works near the Moy confluence.

The lower freshwater reach of the Moy\_120 (river waterbody) and the upper (freshwater dominated) reaches of Moy Estuary (transitional waterbody) within Ballina town are currently classified as 'Moderate' status under the WFD (based on EPA data 2016-2021). The Quignamanger, Bunree and Brusna / Glenree are classified as 'Good' status, while the Tullyegan is 'Moderate' status.

## 9.3 Significant Effects and Mitigation Measures

### 9.3.1 Construction Phase

In the absence of mitigation measures, the Proposed Scheme would be expected to elicit significant, temporary to short-term effects onto aspects of aquatic biodiversity. These effects include:

- **River Moy** - Disturbance to sea lamprey and their habitats (indirect disturbance to adult sea lamprey, direct disturbance to larval lamprey) because of temporary instream access route, cofferdam installation and flood wall construction works.
- **River Moy** - Degradation of water quality and aquatic habitats arising from pollutant wash-out from temporary works areas, pump out of ingress water from cofferdams and from out-of-channel flood wall repairs and construction.
- **River Moy** - Indirect degradation of water quality effects may arise from instream works on tributary culverts along the River Moy.
- **Quignamanger**- Potential temporary-to-short term reversible effects on Annex I priority habitat \*7220 tufa deposits, arising from culvert removals / installations leading to physical impact and potential pollutant wash-out.
- **Brusna / Glenree** - Potential for direct mortality of salmon and trout, negative effects on salmonid migration, short term loss of localised salmonid habitat due to replacement of instream bed and bank protection at Rathkip/Shanaghy Bridge.
- **Brusna / Glenree** - Removal of existing bed and bank protection will generate concrete spoil, fines and dust which can taint fish and smother habitats locally.
- **Brusna / Glenree** - Degradation of localized downstream habitats due to wash-out of pollutants from bank-side construction areas.

A detailed suite of site-specific mitigation measures and monitoring have been included in the EIAR to avoid, prevent and reduce the identified likely significant effects. This includes the use of 'dry' working areas for instream works and specific measures relating to timing of construction works, particularly in the Ridgepool in relation to potential sea lamprey habitats. This will reduce the level of construction phase effects on aquatic ecological receptors to temporary to short-term, slight, reversible negative (at worst) in relation to disturbances that are associated with civil construction works.

### 9.3.2 Operational Phase

Following short-term disturbance during the construction phase, the operational phase effects in terms of hydraulic changes were assessed to be non-significant with respect to habitats that support aquatic biota. A thorough examination was made using baseline and post-scheme modelled hydraulic cross section data, which showed no significant effects on hydraulic or hydromorphological conditions (in-channel velocity, froude number). No significant changes to the existing patterns of erosion, deposition or sediment transfer are associated with the proposed works. The proposed scheme therefore does not result in hydromorphological effects that could cause deterioration in WFD river or transitional water body status of the River Moy, Moy Estuary or the Brusna / Glenree, which are the SAC channels and of importance to QI species.

Significant effects may potentially arise along the Quignamanger if the reinstated stream bed (following regrading) was overly uniform, which could result in loss of tufa deposits along 5-7 m of regraded channel (these are in conjunction with Priority \*7220 habitat slightly further upstream). Moreover, if the new Quay Road culvert is not correctly designed and installed, it has the potential to introduce a fish passage barrier, preventing eel and salmonids entering the lower reaches of the Quignamanger and resulting in long term habitat fragmentation. Specific mitigation has been prescribed to prevent these negative effects.

Replacement of bed and bank protection at Rathkip/Shanaghy Bridge (Brusna / Glenree) has potential to cause severance of fish passage if not designed and installed to ensure a low flow channel and turbulence that provides cover to migrating fish. A small number of trees will be removed on the LHS bank, plus some riparian tree removal upstream of Rathkip/Shanaghy Bridge. Whilst there will still be some cover from both LHS and RHS banks, the loss of function provided by the existing tree cover may degrade fish habitats

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through loss of cover and thermoregulation effects. Specific mitigation has been prescribed to avoid, prevent and reduce these negative effects and to provide for replanting of suitable riparian tree cover post-works.

A wide range of mitigation measures have been included as part of the scheme to prevent contamination of surface waters and protection of critical life-cycle periods for fish species during the construction phase as these are primary source of potentially significant effects. Operational phase mitigations are primarily in relation to ensuring fish passage and preserving fish holding habitat at Rathkip/Shanaghy Bridge, plus careful regrading and installation of a baffled channel in the approach to the new Quay Road culvert on the Quignamanger.

Mitigation measures for the protection of important ecological features (IEF) also include measures such as the following:

- Overarching measures relating to adherence to water quality protection measures.
- Adherence to prescribed timing restrictions for works at the various channels to avoid and prevent damage during critical spawning and early nursery periods for salmonids and lampreys, plus to accommodate angling restrictions (Ridgepool and Cathedral Beat).
- Close consultation with IFI in the pre-commencement phase with regard to finalised construction works programming and finalised instream works Construction Method Statements in order to ensure that angling restrictions and fisheries protection timing restrictions are adhered to.
- Implementation of the IFI prescribed fisheries enhancement measure in the Ridgepool.
- Preconstruction bathymetric survey at Rathkip/Shanaghy Bridge to ensure bed levels remain like for like and ensure the bed protection is set at the correct invert level such that it is drowned out under all (including lowest) flow levels, plus reinstatement of the holding pool downstream of the structure following construction.
- Bed scour protection at Rathkip/Shanaghy Bridge will be designed with a low flow channel or mid-channel depression so that water depth will always be sufficient for fish passage.
- Rathkip/Shanaghy Bridge bed scour protection will include ‘roughness’ elements (mortared riprap, embedded stones, blocks) to break up laminar flow and create turbulence.
- Minimisation of tree loss along the Brusna (Glenree) works reach and replacement planting where tree loss is unavoidable.
- Specific measures relating to sea lamprey at the Ridgepool, which includes instream works timing restrictions with regard to discrete areas of potential spawning habitat, plus exclusion zones around lamprey nursery habitats in the Ridgepool.
- Larval lamprey removal and release, if and where cofferdams are required (Ridgepool, downstream Lower Bridge).
- Inclusion of baffles or low step-pool type cascades down into new box culvert to ensure fish passage on the Quignamanger, encourage tufa deposition.

## 9.4 Residual Effects

It is envisaged that with the implementation of prescribed mitigation measures the effects on aquatic biodiversity will be **temporary-to-short term, slight, negative, reversible** effects locally related to discrete areas of instream disturbance in the construction phase, with the operational effects being **neutral to not significant**.

## 10 TERRESTRIAL BIODIVERSITY

### 10.1 Introduction

An assessment of the potential for likely significant impacts of the Proposed Scheme on Terrestrial Biodiversity during both the construction and operational phases was carried out. This includes impacts on habitats, protected species and designated sites.

### 10.2 Baseline Environment

The Proposed Scheme spans the River Moy and upper River Moy Estuary within Ballina town and environs and also four separate tributaries of the River Moy: Tullyegan Stream, Quignamanger Stream, Bunree Stream and the Brusna/Glenree River.

The River Moy SAC (Site Code: 002298), Killala Bay/Moy Estuary SAC (Site Code: 000458), Killala Bay/Moy Estuary SPA (Site Code: 004036), Killala Bay/Moy Estuary Ramsar site (Site Ref. 843) and Killala Bay/Moy Estuary pNHA (Site Code: 000458) intersect the Proposed Scheme.

There is also connectivity between the Proposed Scheme and Lough Conn and Lough Cullin SPA (Site Code: 004228), Moy Valley pNHA (Site Code: 002078), Lough Conn and Lough Cullin pNHA (Site Code: 000519), Cloonagh Lough (Mayo) pNHA (Site Code: 001485) and Lough Alick pNHA (Site Code: 001527).

Desktop studies indicated the presence of invasive alien plant species (IAPS) which are included under the Third Schedule of the Birds and Natural Habitats Regulations 2011, as amended. The field surveys also identified the presence of IAPS. Habitats identified were largely of Local Importance with respect to ecological and nature conservation value with the exception of floating river vegetation and tall herb swamp, both associated with the River Moy corridor and a section of wet grassland that was observed adjacent to the Bunree/Behy Road proposed works area. Each of these three habitats (i.e. floating river vegetation, tall herb swamp and wet grassland) corresponded to EU Annex I habitats. No protected flora species listed on the Flora (Protection) Order 2022 were noted during field surveys.

Bat activity and emergence/re-entry surveys were carried out to determine the species present along the Proposed Scheme. Data from the bat activity transects indicate that the Proposed Scheme along the River Moy offers a foraging and commuting source for soprano pipistrelle, common pipistrelle, Leisler's and Daubenton's bat. A single bat (soprano pipistrelle) was observed roosting across the Proposed Scheme.

Protected mammals are likely to occur throughout the Zol of the Proposed Scheme such as otter, badger, fox, Irish stoat, pygmy shrew and hedgehog. Surveys to confirm the presence of otter along the watercourses within the Proposed Scheme found evidence of otter along the River Moy, River Brusna and River Tullyegan. Surveys to confirm the presence of badger within 150 m of the Proposed Scheme identified badger trails and scat adjacent to the Brusna proposed works area. Although there was no direct evidence recorded of other mammals, with the exception of foxes, their presence cannot be ruled out.

Breeding bird surveys confirmed that the habitats within and adjacent to the Proposed Scheme supported regular occurrences of resident breeding passerine species. Migratory passerine species were also observed during breeding bird surveys. Wintering bird surveys indicated that numerous overwintering bird species utilise the river Moy and Moy estuary for foraging and roosting.

Characterisation of the receiving environment identified a number of IEF for further assessment. These include designated sites (European and National), habitats (i.e. floating river vegetation, tall herb swamp, wet grassland, riparian woodland, mixed broadleaved woodland and hedgerow/treelines), badger, otter, harbour seal, bats – commuting and foraging, breeding birds and over-wintering birds.

### 10.3 Significant Effects

The key parameters examined as those having the potential to result in the greatest impact on the receiving terrestrial biodiversity environment were water pollution, air pollution, habitat loss/degradation and fragmentation, habitat severance/barrier effect, disturbance/displacement, accidental killing/injury and the spread of IAPS.

Instream and bankside construction has the greatest potential to adversely affect water quality of the River Moy and its tributaries, both locally and downstream. This is primarily linked to construction activities that can

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cause contamination of nearby surface waters with consequent effects on terrestrial ecological receptors that use the aquatic environment. This can be due to the release of silt, clay and cement particles in run-off or due to accidental spillages of pollutants.

Habitat loss is expected within the construction footprint of the Proposed Scheme, including the loss of floating river vegetation to facilitate instream works within the River Moy and the loss of tall herb swamp to facilitate flood wall demolition and construction along Clare Street and Bachelors Walk. Vegetation removal and earthworks during site clearance will result in the loss of habitat and its supporting function for a number of species. This activity will also result in potential for habitat degradation due to impacts and effects such as polluted run-off, disturbance from construction and the spread of IAPS. Such degradation could also result in effects on species dependent on this habitat. The extent of habitat loss to enable the Proposed Scheme will have a significant impact on the available habitat for local species such as bat and otter.

Construction along the River Brusna, River Moy and River Tullyegan have the greatest potential to adversely affect otter habitats. This is primarily linked to construction vehicles, machinery, excavations and materials involved in the demolition of old flood defences and construction of new flood defences. Two otter couches will be removed along the River Moy to facilitate the proposed works while the use of a natal holt along the River Brusna by otter will also be affected. A derogation application to the NPWS pertaining to these holts was received from the NPWS in April 2025 (DER-Otter-2025-09). As this licence is valid for the calendar year 2025, a second licence will be applied for, if required, following the results of the pre-construction surveys.

During construction, noise and vibration due to excavations, earthworks and movement of construction vehicles could displace foraging or commuting birds and SCI bird species. Disturbance from construction activities (i.e. noise, vibration, human presence, artificial lighting, occasional night time working) may also result in the partial loss of foraging and commuting habitat and displacement of otter. Additionally, there is the potential for direct mortality of fauna during construction activities e.g. badger or otter falling into open excavations, vegetation removal resulting in the killing and/or injury of nesting birds and their young.

During construction activity, there is potential to cause the spread of invasive species due to the movement of construction personnel, transport vehicles and excavated spoil. IAPS are easily spread and their proximity to the Proposed Scheme may change over time.

### 10.4 Mitigation Measures

Mitigation measures for the protection of IEFs include measures such as the following:

- Pre-construction surveys.
- Timing of works to avoid breeding and migratory seasons.
- Watching brief during site clearance.
- IAPS management.
- Specific measures surrounding bats, breeding birds, habitats including floating river vegetation, wet grassland and tall herb swamp, badger and otter which may also include a derogation licence and landscape planting. A derogation application to the NPWS pertaining to these holts was received from the NPWS in April 2025 (DER-Otter-2025-09). As this licence is valid for the calendar year 2025, a second licence will be applied for, if required, following the results of the pre-construction surveys.
- Enhancement measures for breeding birds and roosting bats will involve erecting bird and bat boxes.

The implementation and efficacy of all mitigation measures will be overseen and monitored by a dedicated ECoW during both the construction and operational phases.

A wide range of mitigation measures have also been included within other chapters (**Chapter 9: Aquatic Biodiversity**, **Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**) as part of the Proposed Scheme to prevent contamination of surface waters during the construction phase. Additionally, noise and vibration measures have been provided in **Chapter 15: Noise and Vibration**.

### 10.5 Residual Effects

Mitigation measures will prevent any long-term significant impacts on the species and habitats of conservation interest present within the Zol of the Proposed Scheme, while the implementation of landscape



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planting will minimise any effects of loss of semi-natural habitats, over the medium to long term, as these landscaping features continue to establish and mature. The residual effects are not anticipated to be significant for species or habitats of conservation interest for the construction or operational phases.

## 11 LAND, SOIL, GEOLOGY & HYDROGEOLOGY

This chapter of the EIAR considers and assesses the likely significant effects on land, soil, geology and hydrogeology associated with both the construction phase and the operational phase of the Proposed Scheme.

### 11.1 Baseline Environment

The existing environment of the Proposed Scheme was analysed using data collected from a desk study, site walkover and a preliminary ground investigation (GI) programme. This study was used to inform the development of a conceptual site model to develop an understanding of the geological and hydrogeological environment of the Proposed Scheme. Although the wider geomorphology and topography of the works areas was considered, the primary study area comprised of a 1 km buffer zone either side of the Proposed Scheme.

The study area is underlain by dark grey calcareous limestones and shales of the Ballina Limestone Formation. The vast majority of the bedrock geology in the study area is classified by the Geological Service Ireland (GSI) as a Regionally Important Karstic Aquifer represented by the Pure Bedded Limestone of the Upper Ballina Limestone Formation. Subsoils with 'High' groundwater vulnerability underlie a high proportion of the Proposed Scheme. Under the WFD, the Groundwater Bodies (GWBs) that need to be protected are Ballina GWB, Foxford GWB and Ballina Gravels Group 1.

There is one geological heritage area (GHA) identified within the study area: The River Moy is a designated County Geological Site under the Irish Geological Heritage (IGH) Programme.

Features of high geological/hydrogeological importance identified include Tufa cascades, commensurate with the priority Annex I habitat Petrifying Springs [7220] located along the lower reaches of the Quignamanger Stream where it approaches its confluence with the River Moy.

There is no evidence of contaminated land along the Proposed Scheme and the potential to encounter contaminated land is low to minimal.

### 11.2 Significant Effects and Mitigation Measures

Predicted impacts during the construction phase were identified as soil erosion and compaction, soil pollution (via spillage of construction materials, dewatering, infiltration of surface water runoff), embankment settlement, loss of bedrock and soil reserves, increase of aquifer vulnerability, groundwater contamination and impacts to riverbed geomorphology and Groundwater Dependent Terrestrial Ecosystems (GWDTE) (tufa formation). These impacts were assessed by taking into account the methods, extent, and volume of earthworks proposed, excavations of soft soil and rock and material extraction.

No potential impacts were identified during the operation phase. Maintenance activities during the operational stage will involve periodic inspection of flood walls, monitoring of the newly constructed embankments to check for signs of instability or soil slippage and inspection of culverts.

A series of measures have been proposed to mitigate the potential impacts associated with the construction phase. These measures include the minimising of excavations, reuse of excavated material (soil and stone), erosion and sediment control techniques, compliance with measures set out in CIRIA's Control of water pollution from construction sites, use of geotextiles for construction of embankments, instream works to be undertaken in the dry or in low flow conditions, exclusion zone around tufa formations (open channel design).

### 11.3 Residual Effects

Residual impacts associated with the Proposed Scheme are predicted to be reduced to **Imperceptible** with the implementation of the mitigation measures.

## 12 WATER

An assessment of the potential for likely significant impacts of the Proposed Scheme on the natural water environment during both the construction and operational phases was carried out. This includes impacts on the quality of surface waters, drainage and flood risk.

### 12.1 Baseline Environment

The Proposed Scheme is located within the lower reaches of the River Moy catchment. The principal watercourses identified in the Zol are the River Moy and its tributaries, the Tullyegan stream, the River Brusna, the Quignamanger stream, and the Bunree stream. These watercourses flow into the Moy Estuary, which flows into the Atlantic Ocean.

The scheme area is subject to fluvial and tidal flooding within the Zol. The predicted flooding within the Zol affects 297 properties in the 100-year fluvial event and 184 properties in the 200-year coastal event, and there are extensive records of historic flooding. The flooding impacts are predicted to worsen with climate change.

The River Moy SAC and Killala Bay/Moy Estuary SAC are within the Zol, both of which are water dependent ecological receptors. The River Moy also represents a highly significant salmonid system and is a designated salmonid water.

The latest WFD status of the waterbodies in the Zol ranges from Moderate to Good. The River Moy and Moy Estuary are classified as *At Risk* of not achieving Good ecological status.

There are no known public or private groundwater abstractions within the study area. Significant Impacts and

### 12.2 Mitigation Measures

Following the Source-Pathway-Receptor approach, the key parameters examined as those having the potential to result in the greatest impact on the receiving Water environment were surface water quality, drinking water resources, flood risk, and hydromorphology. Impacts on the recreational use of water, aquatic ecology, and groundwater were assessed in **Chapters 7: Population, Chapter 9: Aquatic Biodiversity** and **Chapter 11: Land, Soil, Geology & Hydrogeology** respectively.

Construction activity can cause contamination of nearby surface waters. This can be due to entrainment of silt, clay and cement particles in run-off, or due to accidental spillages of pollutants within the works areas.

With the implementation of mitigation measures, the Proposed Scheme will not cause deterioration of good water body status and does not jeopardise attainment of good status in any of the waterbodies in the study area. Extensive hydraulic modelling indicates the Proposed Scheme will result in a **major beneficial** impact on the receiving environment by reducing flooding during the operational phase. It will also reduce the likelihood of pollution events occurring due to flooding of urban areas.

**Negligible** impacts on drinking water resources and hydromorphology are predicted during the construction and operational phases.

A wide range of mitigation measures have been included as part of the scheme to prevent contamination of surface waters during the construction phase.

### 12.3 Residual Impacts

**No significant** residual impacts are anticipated for the construction or operational phases.

## 13 AIR QUALITY

This chapter of the EIAR considers and assesses the likely significant effects on Air Quality associated with the construction phase of the Proposed Scheme.

### 13.1 Baseline Environment

The air quality in the area is generally good, with concentrations of the key pollutants generally well below the relevant limit values. However, the EPA have indicated that road transport emissions are contributing to increased levels of NO<sub>2</sub> with the potential for breaches in the annual NO<sub>2</sub> limit value in future years at locations within urban centres and roadside locations. In addition, burning of solid fuels for home heating is contributing to increased levels of particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>).

In terms of the existing air quality environment, air quality monitoring data available from similar environments indicate that levels of nitrogen dioxide (NO<sub>2</sub>), particulate matter less than 10 microns (PM<sub>10</sub>) and particulate matter less than 2.5 microns (PM<sub>2.5</sub>) are generally well below the National and EU ambient air quality standards.

### 13.2 Significant Effects and Mitigation Measures

Impacts to air quality can occur during both the construction and operational phases of the Proposed Scheme. With regard to the construction stage, the greatest potential for air quality impacts is from fugitive dust emissions impacting nearby sensitive receptors. Due to the nature of the Proposed Scheme, operational phase air quality impacts were scoped out of the assessment as there will be no emissions to atmosphere of significance once the scheme is operational and therefore, no potential for impacts to air quality.

An assessment of the potential dust impacts as a result of the Construction Phase of the Proposed Scheme was carried out based on the UK Institute of Air Quality Management (IAQM) guidance. This established the sensitivity of the area to impacts from construction dust in terms of dust soiling of property, dust-related human health effects and dust-related ecological effects. The Proposed Scheme is divided into a number of subsections to represent the different areas where works are required. The sensitivity of each subsection was assessed and ranged from high to low sensitivity in relation to dust soiling, from medium to low sensitivity in relation to potential dust-related human health effects and was assessed as high sensitivity in relation to potential dust-related ecological effects due to the proximity to a number of designated sites.

The sensitivity of the area was combined with the dust emission magnitude for the site under three distinct categories: demolition, earthworks and track out (movement of vehicles) in order to determine the mitigation measures necessary to avoid significant dust impacts. It was determined that there is at most a medium to low risk of dust related impacts associated with the Proposed Scheme. Any potential dust impacts will be mitigated through the use of best practice and minimisation measures which are outlined in **Chapter 11: Air Quality**. Therefore, dust impacts will be short-term, direct, negative, **imperceptible to slight** and **not significant** to air quality as a result of construction dust emissions.

Due to the nature of the Proposed Scheme, there will be no emissions to atmosphere during the operational phase. Therefore, there is no potential for effects to air quality as a result of the Proposed Scheme. The operational phase is considered neutral in terms of air quality.

### 13.3 Residual Effects

**No significant** impacts to air quality are predicted during the construction or operational phases of the Proposed Scheme.

## 14 CLIMATE

### 14.1 Introduction

This chapter of the EIAR considers and assesses the likely significant effects on Climate associated with both the construction and operational phases of the Proposed Scheme.

### 14.2 Baseline Environment

The existing climate baseline can be determined by reference to data from the EPA on Ireland’s total greenhouse gas (GHG) emissions and compliance with EU’s Effort Sharing Decision “EU 2020 Strategy” (Decision 406/2009/EC). The EPA estimated that Ireland had total GHG emissions of 60.76 Mt CO<sub>2e</sub> in 2022. This is 3.72 Mt CO<sub>2e</sub> higher than Ireland’s annual target for emissions in 2022. EPA projections indicate that assuming full implementation outlined in the Climate Action Plan 2019 and the use of the flexibilities available, Ireland can achieve an emissions reduction of 25% by 2030. The potential impacts on climate have been assessed in two distinct ways – a greenhouse gas assessment (GHGA) and a Climate Change Risk Assessment (CCRA). The GHGA quantifies the GHG emissions from a project over its lifetime and compares these emissions to relevant carbon budgets, targets and policy to contextualise magnitude. The CCRA considers a projects vulnerability to climate change and identifies adaptation measures to increase project resilience if required. Impacts to climate are assessed for the Proposed Scheme as a whole over its lifetime rather than for individual phases of the project.

### 14.3 Significant Effects

#### 14.3.1 Construction Phase

Calculation of the GHG emissions during the construction of the Proposed Scheme was based on the TII online Carbon tool. GHG emissions associated with the Proposed Scheme are predicted to be a small fraction (0.03%) of Ireland’s Industry sector 2030 emissions ceilings of 4 Mt CO<sub>2e</sub>. The Proposed Scheme will incorporate a number of mitigation measures which will aim to reduce climate impacts during construction. **No significant** impacts to climate are predicted during the Construction Phases of the Proposed Scheme.

#### 14.3.2 Operational Phase

As per IEMA guidance, where the fundamental reason for a proposed project is to combat climate change and this beneficial effect drives the project need, then the impact of the project is likely to be significant. While the Proposed Scheme will result in some GHG emissions during construction and minor GHG emissions during operation, these GHG emissions must be considered in the context of the overall Proposed Scheme and the purpose of the Proposed Scheme. The Proposed Scheme will implement a number of Best Practice Mitigation (BPM) measures to reduce GHG emissions which will reduce the impact to climate. GHG emissions during the operational phase due to ongoing maintenance activities were assessed and were found to be a small fraction (0.0001%) of Ireland’s Industry sector 2030 emissions ceilings of 4 Mt CO<sub>2e</sub>. These emissions were considered **not significant**.

A CCRA was conducted to consider the vulnerability of the Proposed Scheme to climate change, as per the TII 2022 PE-ENV-01104 guidance. This involves an analysis of the sensitivity and exposure of the development to future climate hazards which together provide a measure of vulnerability. The hazards assessed included flooding (coastal, pluvial, fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning, hail, landslides and fog. The Proposed Scheme has a low vulnerability to the identified climate hazards and therefore no risk was identified. **No significant** impacts to climate are predicted during the operational phases of the Proposed Scheme.

### 14.4 Residual Effects

Overall, when taking the purpose of the scheme into consideration, along with the predicted GHG emissions, the impact to climate is considered long-term, neutral, minor and **not significant**.

## 15 NOISE & VIBRATION

### 15.1 Introduction

A noise and vibration assessment of construction phase of the Proposed Scheme has been conducted. The Construction Phase of the Proposed Scheme has been assessed in accordance with British Standard BS5228 which provides guidance for the assessment of noise and vibration from construction activities.

The Operational Phase of the Proposed Scheme will be limited to occasional activation of pumps etc., and as such will not result in significant noise emissions. Operational noise emissions were therefore scoped out of the assessment at an early stage and not considered further.

### 15.2 Baseline Environment

A desktop study and baseline noise surveys have been conducted in the vicinity of the five works areas to characterise the existing baseline noise environment. All five locations had relatively low daytime baseline noise levels, ranging from 54 – 57dB L<sub>Aeq</sub>, 30min. Sources of baseline noise included road traffic, flow of water in the rivers, birdsong, local activity and urban hum. Results of the baseline noise surveys have been used to determine the BS5228 noise thresholds (ABC method) for the onset of potential significant effects, with all locations assessed as being in the most sensitive category.

### 15.3 Significant Effects and Mitigation Measures

The project description, information provided by the design team, and BS5228 source noise levels for the various types of construction plant and equipment have been used to predict noise from works at the nearest sensitive receptors. The predicted levels have been assessed against the previously determined noise thresholds and other factors such as duration, frequency and likelihood have been considered in determining the potential for significant effects. A similar method has been used to assess vibration effects.

Predicted noise levels for most phases of construction at the five sites are below the BS5228 thresholds for onset of significant effects. Site preparation (use of chainsaw), foundations, demolition, construction works, excavation and finishes at some of the work's locations are predicted to have noise emissions which may at times exceed the BS5228 thresholds at the nearest NSLs. However, the predicted exceedances are due to a small number of plant items (rock breaker, consaw, chainsaw and hydraulic compactor) which will not be in use for durations (10 or more days or nights in any 15 consecutive days or nights; or a total number of days exceeding 40 in any 6 consecutive months) sufficient for significant effects. Furthermore, a positive attitude to the Proposed Scheme is expected from all nearest NSLs given the obvious benefits conferred by prevention of floods, and therefore a higher tolerance for elevated noise levels is expected (as allowed for in BS5228).

Without noise mitigation measures, the predicted significance of effects due to construction noise at the nearest NSLs range from **slight** to **profound**. Other effects predicted by the assessment are listed below:

- Construction Phase vibration – **not significant**.
- Construction Traffic noise and vibration – **not significant**.
- Construction Compounds noise and vibration – **slight**.
- Operational noise and vibration – **scoped out of the assessment**.

The noisiest plant items expected to be in use are the rock breaker and consaw, and temporary noise barriers completely blocking line of sight to the nearest NSLs will be used where Noise Sensitive Locations (NSLs) are within 25 m of these activities. Engagement and communication with residents regarding noisy works is recommended. Implementation of BPM is required to ensure that construction noise levels are properly controlled.

## 15.4 Residual Effects

Following implementation of BPM and specific mitigation measures, **slight to moderate** residual effects will remain. In summary, following implementation of all recommended mitigation measures there are **no significant** effects predicted due to noise and vibration from the Proposed Scheme

## 16 MATERIAL ASSETS (WASTE & UTILITIES)

### 16.1 Introduction

Impacts to built services and waste management could arise during the construction and operational phases of the Proposed Scheme. The study area for Material Assets (Waste and Utilities) has been defined with reference to the area in which there is potential for direct and indirect impacts on human assets because of the Proposed Scheme.

### 16.2 Baseline Environment

The site crosses connection lines to the gas, electrical and water grids as well as telecommunication and sewerage infrastructure. The identified power infrastructure consists of a mix of overhead lines (OHLs) and underground cables. A number of HV, Medium Voltage (MV) and Low Voltage (LV) overhead lines and cables are noted across the Proposed Scheme area. Underground ESB cables are present in all locations of the Proposed Scheme. Overhead ESB lines are only present in the Bunree and Brusna part of the Proposed Scheme. Low and /or Medium-Pressure Gas networks occur across all sections of the Proposed Scheme.

### 16.3 Significant Effects and Mitigation Measures

Clashes and likely temporary disruptions to the existing utility connections will be likely to accommodate the excavations envisaged. Construction of the Proposed Scheme is likely to have short-term, **slight** or **moderate** effects on utilities without the implementation of mitigation measures during the Construction Phase. **No significant** impacts to utilities are predicted during the operational and maintenance phase of the Proposed Scheme.

Waste will arise from construction activities. Given the scale of the proposed changes to site, moderate levels of waste are expected to be generated during the construction. All waste generated on site will be segregated at source and removed by a licensed waste collector(s) or reused where appropriate. All wastes generated by demolition and excavation that is deemed unsuitable will be immediately removed from site by the service contractor. The significance of effects related to waste resulting from demolition and construction works are **imperceptible** or **slight** for excavation material and building demolition but **imperceptible** for other waste sources i.e. individual waste and vegetation waste. Due to the nature of a FRS, the Operational Phase of the Proposed Scheme will not cause any significant effects to waste.

There are a series of best practice requirements and mitigation measures that must be implemented for the Construction Phase and Operational Phase to minimise the effect on waste facilities and utilities. A Waste Management Plan (WMP) will be developed and implemented by the Contractor.

### 16.4 Residual Effects

Effects on utilities during construction after the introduction of mitigation measures are expected to be short-term in nature and **not significant**. The Proposed Scheme will also protect existing key utilities during operational phase, thus reducing the disruptions to these facilities in the future. The residual effect of the operational phase is predicted to have a **slight** positive, long-term effect.

Following implementation of the mitigation measures, the residual effects of the Proposed Scheme are considered to be adverse but minor and short-term in nature. The waste generated during the Operational Phase of the Proposed Scheme will not be significant as it will mainly be associated with occasional maintenance works. The residual effect on resource and waste management is expected to be **slight**.



## 17 MATERIAL ASSETS: LAND AND PROPERTIES

### 17.1 Introduction

This chapter of the EIAR identifies, describes and presents an assessment of the likely significant effects of the proposed Ballina FRS (hereafter referred to as the 'Proposed Scheme') on the topic of Material Assets: Land & Properties during both the construction and operational phases.

In the 2014 EIA Directive, 'Land' is introduced as a specific factor to be identified, described, and assessed in an EIA. The Department of Housing, Planning and Local Government (DHPLG) *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018)*, outlines that information to be submitted and assessed as part of an EIAR in respect of land should include details of 'land take' and land use requirements of the whole project during the construction and operational phases.

### 17.2 Baseline Environment

The study area for the Proposed Scheme is located within the town where there is a mix of land uses and activities typical of a town of this size including residential, retail, commercial, social, community and recreation. Outside of the urban area agriculture is the predominant land use.

There are approximately 50 no. private landholdings directly affected by the Proposed Scheme. These include residential properties, commercial properties and lands owned by Irish Rail, the ESB, Uisce Éireann, Mayo County Council, the Western Health Board, the Northwestern Regional Fisheries Board. In addition, works will take place within the public domain on the roadbed/ road verge across various landholdings.

### 17.3 Significant Effects and Mitigation Measures

The effects of Proposed Scheme on properties are generally considered and assessed under these main headings:

- Temporary Land take
  - Temporary acquisition of those lands required for construction compounds for the duration of construction only.
  - Temporary working areas along the project scheme where additional space is required for the duration of construction only to facilitate the construction of permanent infrastructure.
- Permanent Land take
  - Permanent acquisition associated with new FRS infrastructure, and which include land take and / or severance which is permanent.
  - Permanent wayleave over the footprint of the new FRS infrastructure to ensure access can be facilitated during operation and maintenance period.
  - Permanent right of way through lands to access permanent wayleaves during operation and maintenance period.
- No Land take.
  - Where works fall within private ownership but are confined to the public road, there is no requirement to acquire the lands. Works are undertaken; in accordance with Section 66(4) of the Local Government Act 2001.

For lands temporarily required for construction, the principal construction impacts will be interruptions to property accesses (for example where a driveway might be resurfaced to align with new road levels) or temporary loss of use of a premises while works are underway.

The temporary land take for the Proposed Scheme consists of the temporary working area of 5.3ha from 20no. landholdings. The Proposed Scheme will involve the permanent acquisition of land of approximately

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0.85ha from 11 no. landholdings and the procurement of permanent wayleaves of approximately 2ha from 37 no. landholdings and rights of way of approximately 0.3ha from six no. landholdings.

The area of land required for the Proposed Scheme does not have a significant effect when considered at a national or regional level. However, from a local or individual perspective, land take can be **significant**. The significance of the impact of each land take has been considered. For the vast majority of properties, the effects of the proposed land take are in the **slight to moderate** range. For 12 no. of properties the effects are **significant to profound** before mitigation.

Mitigation measures vary as required to address each individual land take, but generally include:

- Existing accesses to property, including homes and businesses, will be maintained during construction of the Proposed Scheme; otherwise, reasonable temporary access will be provided.
- Where necessary, suitable boundary fencing will be erected for the duration of the works.
- All lands temporarily acquired, will be re-instated to pre-construction conditions unless otherwise agreed with the landowner.
- Boundary treatment for all lands permanently acquired will be provided to mirror pre-construction conditions unless otherwise agreed with the landowner.

### 17.4 Residual Effects

For three no. of properties the effects are in the range **profound** post mitigation. The impact can only be mitigated through compensation under the statutory CPO process. Arrangements for compensation under the statutory CPO process will run in parallel to the planning application for the Proposed Scheme.

Overall, it is considered that the land take effects of the Proposed Scheme are **imperceptible to not significant**. There are exceptions where eight properties are envisaged to experience **moderate to slight** effects post- mitigation.

## 18 CULTURAL HERITAGE

In broad terms, 'Cultural Heritage' includes the designated and non-designated heritage categories of (i) archaeology (known and unknown), (ii) architectural (built) heritage and (iii) history and folklore.

Desk assessment and data collation have informed baseline studies for the proposed flood relief measures. Field walkover surveys (John Cronin & Associates) and underwater archaeological dive/wade/metal detection surveys of the River Moy and its tributaries (Mizen Archaeology) have been undertaken. All collated datasets have informed the evaluation of the significance of predicted impacts on the recorded and unrecorded Cultural Heritage resource within the study area.

### 18.1 Baseline Environment

#### 18.1.1 River Moy

The River Moy area largely comprises the urban built environs of Ballina town and consequently there is a high volume of recorded architectural heritage receptors (93 No.). Key architectural heritage receptors are Upper and Lower bridge, the Salmon Weir, and the quays along Emmett Street. In addition, there are two key groupings of recorded archaeological monuments in the area: the fourteenth century Augustinian Friary (also a protected structure together with present-day St Muredach's Cathedral) and a former bridge and gatehouse at the location of present-day Lower Bridge. Nine unrecorded cultural heritage features were also identified in this area comprising a stone culvert, a cut stone drain, landing platform, stone access steps (3 No.), a stone pier and a Marian Shrine. It is noted that reference to a massacre of Gallowglasses in 1586 is cited to have occurred at the area of Ardnaree along the west banks of the Moy, and a recent commemoration memorial/art installation is noted that also reflects same.

#### 18.1.2 Quignamanger

There are three recorded archaeological sites located within the area: two enclosures and a 19th century Knox monument on the Belleek Castle estate. The latter is also listed as a recorded architectural receptor while the Creteboom shipwreck is also a protected structure. Two unrecorded receptors have also been identified: Quay View House (levelled) and a townland boundary.

#### 18.1.3 Bunree/Behy Road

There are four recorded archaeological sites located in this area: a prehistoric court tomb, a barrow site, a ringfort and a 13th century castle site in the grounds of the present-day Ballina Manor House. There are two recorded architectural heritage sites: Bunree road bridge and a derelict store/warehouse on the Downhill Road. Two unrecorded stone culverts were identified during field surveys.

#### 18.1.4 Brusna (Glenree)

There are three archaeological receptors recorded in this area: two ringforts and one enclosure, while there are no recorded architectural heritage receptors. A total of nine unrecorded cultural heritage receptors were identified from desk and site-based surveys: two fording points, two weirs, Rathkip Bridge, a former Tuck Mill and a former Flax Mill, a townland boundary and the community amenity area of Rathkip (ringfort replica).

#### 18.1.5 Tullyegan

There are no recorded archaeological sites located in this area. There is one recorded architectural heritage site: a railway bridge at Behybaun townland. Three unrecorded cultural heritage receptors were identified: an engine pumping house, Rahans Bridge and a townland boundary.

## 18.2 Significant Effects

### 18.2.1 Construction Phase

There are no identified significant effects on the Cultural Heritage resource as a result of Construction Phase for the Proposed Scheme.

A number of **moderate** effects at construction stage are noted, primarily for the Moy Area. This includes Bachelors Walk and Clare Street walling, Lower Bridge and Upper Bridge (indirect), the quays along Emmet Street, walling at Ridgepool Rd and the IFI building (forming part of the Salmon Weir designation) as well as four undesignated receptors (commemorative memorial, stone access steps/pier). For the Brusna (Glenree) area a possible weir identified from underwater surveys has a predicted **moderate** effect. The majority of the other works areas retain **minor, no change, negligible** or **slight** effects during the Construction Phase.

Applicable appropriate mitigation measures during the Construction Phase in relation to the identified Cultural Heritage impacts within the study area, largely include preservation by record for direct impacts (written/drawn/photographic/digital/photogrammetry surveys; built heritage surveys to include landscape setting; written/drawn cross-sections of exposed masonry walling, re-use of salvaged stone, submission of digital records to Irish Architectural Archive (IAA) and Ballina Library).

In addition to this it is proposed to carry out licenced archaeological monitoring of all ground reduction/topsoil stripping areas within the design footprint and works areas (including temporary storage/compound areas and in-river works areas), during construction stage. Furthermore, any predicted hydrological changes to water flow, will be routinely monitored to avoid potential scouring impact to Lower Bridge and Upper Bridge.

Any identified built heritage features sited along access routes or immediately adjacent to works areas/along streetscapes shall be protected by temporary hi-visibility fencing measures, where required, to avoid any inadvertent strike damage by vehicular movements.

All mitigation measures are subject to statutory prior agreement by National Monuments Service/National Museum of Ireland. Direct liaison with the local community will also be required to scope the feasibility and/or need for re-siting the Rathkip amenity area (replica ringfort) at an appropriate alternative location.

### 18.2.2 Operational Phase

There are no identified significant effects on the Cultural Heritage resource at Operational Phase for the Proposed Scheme.

Predicted **moderate** effects largely consider direct impact of the new infrastructure on the overall setting and amenity value of a given receptor in terms of loss (including spatial interconnectivity) and visual character in terms of amenity value including any access modification (positive and negative).

Identified negative **moderate** effects during the Operational Phase predominantly refer to the River Moy receptors only: Bachelors Walk, Clare Street and Ridgepool Rd walling and the IFI building (forming part of the Salmon Weir designation) as well as three undesignated receptors (stone access steps/pier).

Identified positive moderate significance of effect during the Operational Phase include receptors: Lower Bridge and Upper Bridge and the quays along Emmet Street.

There are no predicted moderate effects on receptors within the other remaining Scheme Areas.

There are no predicted impacts on the Cultural Heritage resource that will require mitigation as part of any future maintenance regime for the operational phase (vegetation and condition management of the flood walls or embankments, clearance of debris at culvert inlets, checking of structures and any necessary ad hoc repairs).

On-going monitoring of hydrological processes that affect water velocity will be undertaken which will include provision for preventing any (low risk) potential scouring impact to the protected in-river structures of Upper Bridge, Lower Bridge and the Salmon Weir along the River Moy.

### 18.3 Residual Effects

Any identified residual effects relate to the Moy Area of the Proposed Scheme. There is **slight**, negative residual impact noted for the removal of existing flood walls at Bachelors Walk, Clare Street (Howley Street) and Ridgepool Road.

Removal of existing surfaces and walling at the amenity area along Cathedral Road is considered a **slight positive** impact. Furthermore, resulting indirect **slight**, positive impact on the setting of the adjacent Cultural Heritage receptors of the Augustinian Friary and St Muredach's Cathedral is identified (in the context of future Public Realm plans for this location).

Similarly, replacement high quality walling at tie in points with Upper and Lower Bridges as well as the removal of modern railings at the quays along Emmet Street are considered **slight, positive** residual impact on the receptors in and of themselves, as well as indirectly for adjacent receptors (setting) (including the Mary Robinson Centre).

## 19 LANDSCAPE & VISUAL

### 19.1 Introduction

An assessment has been made of the landscape and visual impacts for the Proposed Scheme within the Landscape and Visual Study Area that is made up of five sub study areas centred around the five watercourses that are to receive flood relief measures. These are the River Moy, the Quignamanger Stream, Bunree Stream, Brusna River and Tullyegan Stream.

This assessment methodology has been informed by a range of guidance documents specific to landscape and visual assessment.

The assessment has also been informed by desktop study with particular consideration given to the Mayo County Development Plan 2022-2028 and the Draft Ballina Local Area Plan 2024-2030. Field survey work was also undertaken to inform the baseline and assessment.

### 19.2 Baseline Environment

The local landscape character for the five sub-study areas was identified and characterised. The River Moy flows through the middle of Ballina's urban town centre. The Moy River is a valuable amenity to the town economically, environmentally and as a tourism and community facility. The banks of the River Moy are a strong and distinctive feature of the town and forms a major part of the general character of the place. Furthermore, the river corridor, the '*Moy Quarter*' is recognised as a 'character area' in the Draft Ballina Local Area Plan.

While all slightly differing in their local character, the Quignamanger Stream, the Bunree Stream and Tullyegan Stream are all found on the outskirts of Ballina Town. They are located in primarily or partially suburban residential areas but also include areas such as community facilities and industrial areas. In each of these sub-study areas the watercourses are barely visible and have a very minor part to play in defining the landscape character.

The Brusna River sub-study area is further outside Ballina Town and as such has a more rural and natural landscape character. The Brusna River has an important part in shaping the character of this sub study area, although it is surrounded by ribbon development, the Ballina Golf Course and the R294 Regional Road.

No landscape designations have been identified in either the Mayo County Development Plan or the Draft Ballina Local Area Plan

In terms of visual amenity only the Mayo County Development Plan has designated a scenic route running along the eastern bank of the River Moy.

Ten viewpoints were selected for photomontages and the existing visual amenity and sensitivity of the visual receptors (viewers) was evaluated for each view.

### 19.3 Significant Effects and Mitigation Measures

Assessment of potential landscape and visual impacts are separate but linked processes. An assessment is made of the sensitivity of the baseline landscape and the level of impact resulting from the proposed change to arrive at a significance of effect. Similarly, the sensitivity of the visual receptor is assessed along with the magnitude of visual impact (change to existing view) to arrive at a significance of effect. Visual effects on designated views and viewers at selected viewpoint locations are assessed.

During construction primarily vegetation removal, construction activity and construction site traffic and traffic management will result in adverse impacts and effects on landscape, landscape character and visual amenity, however these will be of short-term duration.

Along the River Moy impacts and effects on landscape and visual amenity during year 1 of operation will be beneficial or neutral as the line of the proposed wall will follow that of the existing walls and the proposed public realm works will have a beneficial landscape and visual impact on the areas surrounding the river.

The changes along the Quignamanger Stream, the Bunree Stream and Tullyegan Stream will be so minor that the landscape and visual effects will be at most **negligible** to **minor**, **not significant** and neutral or beneficial.

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Adjacent to the Brusna River the introduction of this more urban structure of the flood defence wall into this rural landscape will give rise to adverse landscape and visual effects. These effects are seen to be **minor** and **not significant**.

There will be maturing mitigation planting along the alignment will, at year-15 contribute towards increased screening of some of the project components or less attractive areas exposed during required vegetation removal thereby reducing adverse effects compared with year-1 of operation.

### 19.4 Residual Effects

Upon maturing of mitigation planting and having regard for mitigation measures in the design, only landscape and visual receptors at the River Brusna are assessed as experiencing **minor and not significant** adverse effects at year-15.

## 20 INTERACTIONS & CUMULATIVE EFFECTS

The various chapters of the EIA identify the potential significant environmental impacts and residual effects that may occur in terms of Population, Human Health, Biodiversity (Terrestrial and Aquatic), Land, Soils, Geology and Hydrogeology, Air Quality, Climate, Noise and Vibration, Cultural Heritage, Landscape and Visual, Material Assets as a result of the Proposed Scheme as described in **Chapter 5: Project Description**.

Mitigation measures and best practice measures for the Construction and Operational Phases are detailed in the accompanying CEMP. However, for any development with the potential for significant environmental effects there is also the potential for interaction between these potential significant effects. The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them or have a neutral effect. In addition to the assessment of impacts on individual environmental topics, the potential interactions between these factors have also been considered as part of the topic-specific assessments. A matrix is presented in **Chapter 20: Interactions and Cumulative Effects** to identify interactions between the various aspects of the environment already discussed in the EIA. The matrix highlights the occurrence of potential positive or negative impacts during the construction, operational/maintenance phases of the Proposed Scheme. Where any potential interactive impacts have been identified, appropriate mitigation is included in the relevant sections within **Chapters 6–19**.

### 20.1 Summary of Cumulative Effects

Cumulative effects result from the addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects. Additionally cumulative effects can be caused due to incremental changes by other past, present or reasonably foreseeable projects together with the Proposed Scheme.

The ZoI considered for the Cumulative impact assessment (CIA) takes into consideration the previously defined study areas in each of the respective specialist chapters of this EIA (**Chapters 6 – 19**) which is informed by the appropriate guidance documents together with the professional judgement associated with the potential for cumulative environmental effects to occur based on the location, nature, and characteristics of the cumulative effects of projects in conjunction with the Proposed Scheme.

The main aspect of the CIA relates to the assessment of existing and/ or approved projects with the Proposed Scheme. A staged approach was applied in order to undertake the CIA as follows:

- **Stage 1:** The ZoI was defined, and a desk study was undertaken to source publicly-available information on projects within the CIA ZoI using planning databases. Once the long list of projects was collated, a number of assumptions were developed based on RPS guidance and best practice and applied in order to create a short-list of projects (32 no.) which may have the potential to give rise to cumulative effects in conjunction with the Proposed Scheme.
- **Stage 2:** The list of projects was then brought forward to the respective EIA specialist to carry out a screening exercise to identify the potential for cumulative effects between the planning applications and the Proposed Scheme. This screening exercise was carried out in accordance with a set of defined screening criteria (grounds for screening-in or out) in order to identify which projects should be considered in the assessment of cumulative effects.
- **Stage 3:** This stage comprised the detailed assessment which considered the potential cumulative impacts of the projects screened-in during Stage 2 in conjunction with the Proposed Scheme. The CIA for each topic used the same language as that used for the impact assessments as set out in the methodology sections for each topic chapter.

Overall, the assessment did not identify potential for any significant cumulative effects with other projects.



## 21 RISKS OF MAJOR ACCIDENTS AND/OR DISASTERS

### 21.1 Introduction

This section of the EIAR describes the vulnerability of the Proposed Scheme to risks of major accidents and/or disasters or to cause major accidents and/or disasters. Major accidents or disasters are hazards which have the potential to affect the Proposed Scheme and consequently have potential impacts on the environment. These include accidents during Construction and Operation caused by operational failure and/or natural hazards.

The assessment of the risk of major accidents and/or disaster considers all factors defined in the EIA Directive, i.e., population and human health, biodiversity, ornithology, land, soil, water, air quality, climate and material assets, cultural heritage and the landscape. A desk-study was completed to establish the baseline environment for which the proposed risk assessment has been carried out. Local and regional context has been established prior to undertaking the risk assessment to develop an understanding of the vulnerability and resilience of the area to emergency situations.

The Proposed Scheme has been designed and will be constructed in accordance with the best practice measures set out in this EIAR and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the design.

### 21.2 Hazards/Risks and Mitigation

From examining all potential risk events associated with the Proposed Scheme, scenarios that were considered to be of the highest risk in terms of the Proposed Scheme's vulnerability and its potential to cause such an event include but are not limited to events leading to structural collapse / damage to bridges, extreme weather causing damage to vulnerable newly laid bridge, potential for the Proposed Scheme to harm paddle boat users / pleasure boat users and an extreme flooding events if flood defence failure coincided with the Construction Phase. The assessment considered mitigation by design (where appropriate), and it was determined these are sufficient to mitigate the associated risk level(s) to be low.

### 21.3 Residual Effects

The risk of a major accident and/or disaster during the construction of the Proposed Scheme is considered 'low' in accordance with 'A National Risk Assessment for Ireland 2020' (Department of Defence 2021). When the implementation of best practise measures and all proposed mitigation and monitoring measures detailed across the respective chapters is implemented, the residual effect(s) associated with the Construction, and Operational Phase of the Proposed Scheme are low risk.

## 22 SUMMARY OF ENVIRONMENTAL COMMITMENTS

The Schedule of Environmental Commitments presents a summary of the mitigation measures identified as a result of undertaking the environmental impact assessments, as well as the mitigation measures detailed in the NIS which has been carried out to inform the Appropriate Assessment (AA) process.

From the inception of the design and environmental assessment processes of the Proposed Scheme, the design team has strived to avoid, prevent and reduce adverse effects, which are incorporated into the design drawings and specifications for the Proposed Scheme that have been assessed as part of the EIAR and NIS.

Avoidance of impacts is most applicable at the earliest stages of a Proposed Scheme, whereas prevention has taken place during the design and environmental assessment process between the design team and EIA team. Mitigation is a last resort and can include a remedy or offsetting of adverse effects. For example, this can apply when a Proposed Scheme cannot avoid significant effects due to their need to be located within a particular site.

Where significant effects have been identified during the EIA and AA processes, measures will be implemented to mitigate these effects as much as reasonably possible, with any residual effects identified in the relevant chapters of this EIAR. The objective of this chapter is to provide a central location where a summary of measures from the preceding chapters are presented together for both ease of reference and inclusion in the contract documents at a later stage of the Proposed Scheme.

All of the mitigation commitments in EIAR are incorporated in full into the CEMP.