BALLINA FLOOD RELIEF SCHEME

Construction Environmental Management Plan

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CEMP
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1 INTRODUCTION

This document comprises the Construction Environmental Management Plan (CEMP) for the proposed Ballina Flood Relief Scheme (hereafter referred to as the 'Proposed Scheme'). The CEMP outlines the procedures for the delivery of environmental mitigation and monitoring measures and for addressing general day-to-day environmental issues that can arise during the construction phase of the Proposed Scheme, assisting the contractor in preventing, managing and/or minimising potential significant environmental effects during the construction phase.

This CEMP has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) and the Natura Impact Statement ('NIS') which accompany this planning application for the Proposed Scheme.

A site-specific Construction Method Statement (CMS) will be prepared by the Contractor and submitted to Mayo County Council, which will be underpinned by all the measures set out in this CEMP. The CMS will be prepared by the contractor prior to the commencement of any works in order to ensure all works are carried out in a manner designed to avoid and minimise any adverse impacts on the receiving environment. The site-specific CMS will incorporate all elements of the CEMP that accompanies the planning application for the Proposed Scheme.

It should also be noted that the CMS is a live document which will be updated by the appointed Contractor on an as-needed basis throughout the construction of the Proposed Scheme. The appointed Contractor will be responsible for ensuring that all sub-contractors adhere to and implement the procedures and measures included in the CMS.

1.1 Purpose of CEMP

The purpose of the CEMP is to detail appropriate environmental management, mitigation and monitoring measures required for the avoidance, minimisation and control of any potential adverse environmental impacts associated with the construction phase of the Proposed Scheme.

The CEMP will form part of the Works Contract (hereafter, the Contract) to ensure that all mitigation and monitoring measures, which are considered necessary to protect the environment, are implemented. The methods and principles contained herein, as well as within legislative instruments and published guidance documents, will be adhered to by the Contractor.

The Contractor will submit all relevant information as detailed in this document to Mayo County Council for acceptance in accordance with the contract provisions. No construction works will commence prior to the Mayo County Council's acceptance.

1.1.1 Targets and Objectives

The following key targets and objectives will ensure the protection of the environment from all construction-related environmental issues, which can significantly impact the local environment if not reduced. These targets and objectives will ensure that the potential environmental impacts associated with the Proposed Scheme are managed in an environmentally friendly way, and that the construction activities comply with environmental regulations, local authority guidelines and conditions that may be attached to a planning approval.

- Adopt a sustainable approach to construction and, ensure sustainable sources for materials supply where possible.
- Keeping all watercourses free from obstruction where possible, and debris.
- Avoidance of any pollution incident or near miss as a result of working within and/ or close to existing watercourses and having emergency measures in place.
- Correct fuel storage and refuelling procedures to be followed; Air and noise pollution prevention to be implemented.
- Construction methods and designs will be altered where it is found there is an adverse effect on the environment.
- Good waste management and house-keeping to be implemented.
- Monitoring of the works and any adverse effects that it may have on the environment; and,

- Provide adequate environmental training and awareness for all project personnel.

The key construction site objectives are as follows:

- Keep impact of construction to a minimum on the local environment, watercourses, wildlife and heritage.
- Comply with all relevant water quality legislation and the Habitats Directive.
- Ensure construction works and activities are completed in accordance with mitigation and best practice approach presented in the Environmental Impact Assessment Report (EIAR), Natura Impact Statement (NIS) and associated planning documentation.
- Ensure construction works and activities are completed in accordance with any planning conditions for the Proposed Scheme.
- Ensure construction works and activities have minimal impact/disturbance to local landowners and the local community.
- Ensure construction works and activities have minimal impact on the natural environment.

1.2 Contractor's Environmental Policy Statement

Once appointed, the Contractor shall append their Environmental Policy Statement to this section.

2 ROLES AND RESPONSIBILITIES

This section sets out the roles and responsibilities of the principal parties involved in the construction of the Proposed Scheme. The roles and responsibilities outlined below are indicative, and these will be updated upon appointment of the Contractor. The Contractor will allocate responsibility for compliance with the terms of the CEMP during the construction phase of the Proposed Scheme.

2.1 The Contractor

The Contractor is responsible for all activities necessary to complete the works in accordance with the Scope/Requirements stated or implied within the Contract, unless explicitly stated as being the responsibility of the Employer or others. This includes construction, testing and all associated management and supervision. It also includes implementation of mitigation measures and monitoring required. The Contractor shall resource, plan, progress and deliver the project in such a manner that all management systems are fully transparent and auditable. The Contractor's management systems shall be inspected by the Local Authority as appropriate throughout the Contract. The Contractor shall be assigned the following responsibilities as a contractual requirement. It should be noted that this is an indicative list and does not limit the requirements of the Contract:

- Monitoring and Mitigation
- Inspections
- Reporting and Documentation
- Auditing
- Communication and Training.

2.2 Environmental Manager

The Contractor shall appoint Environmental Manager who shall have overall responsibility for the organisation and execution of all related environmental activities as appropriate, in accordance with regulatory and project environmental requirements. The duties and responsibilities of the environmental manager shall include:

- Ensure that all works are completed safely and with minimal environmental risk
- Approve and implement the CEMP and supporting environmental documentation and ensure that all environmental standards are achieved during the construction phase of the project
- Take advice from the Environmental Clerk of Works (EnvCoW) and Ecological Clerks of Works (ECoW) on legislation, codes of practice, guidance notes and good environmental working practice relevant to their work.
- Ensure compliance through audits and management site visits
- Ensure timely notification of environmental incidents
- Ensure that all construction activities are planned and performed such that minimal risk to the environment is introduced.

2.3 Environmental Clerk of Works

The Contractor shall appoint an Environmental Clerk of Works (EnvCoW) for the duration for the construction phase to ensure that the mitigation measures outlined in this CEMP (including any updates to this document following consent) and any associated method statements, are implemented in full. The EnvCoW will have the responsibility of being fully aware of all mitigation measures (outlined in Section 10), as well as being aware of the reasons for the implementation of all mitigation measures.

The EnvCoW will:

- Have a suitable environmental qualification - degree in environmental / ecological sciences.
- Have demonstrable experience (minimum of 5 years) in overseeing construction projects; and

- Be a full member of a relevant environmental institute, such as the Chartered Institute of Ecology and Environmental Management (CIEEM), the Institute of Environmental Management, or equivalent.

The EnvCoW will be delegated sufficient powers under the construction contract so that they will be able to instruct the Contractor to stop works and to direct the carrying out of emergency mitigation/clean-up operations. The EnvCoW along with the ECoW will also be responsible for consultation with environmental stakeholders including the National Parks and Wildlife Services (NPWS) and Inland Fisheries Ireland (IFI), as required.

The EnvCoW will be responsible for carrying out regular environmental auditing and monitoring to ensure of water, air and noise quality, to ensure works remain in compliance with the CEMP and agreed method statements as required for the protection of the environment. The EnvCoW is to be notified of any environmental incident and is to sign-off on any mitigation and remediation measures proposed. The EnvCoW will be responsible for preparing and producing compliance reports which will be sent to the Client and Contractor.

An appointed Health and Safety officer will take responsibility for declaring the site safe after an occurrence of an environmental incident.

2.4 Ecological Clerk of Works

The Developer shall appoint a suitably experienced and competent Ecological Clerk of Works (ECoW) before the commencement of works. The ECoW will supervise all pre-construction ecological surveying, implementation and overseeing of ecological mitigation measures, including aquatic ecological mitigation measures, and ensuring that activities on site are conducted in accordance with the planning permission as they pertain to ecological matters and specifically any works that could impact protected habitats, species and aquatic ecology.

The ECoW will be the liaison for the purposes of consulting with environmental bodies including Inland Fisheries Ireland and the NPWS. In advance of works commencing on site, all personnel will receive on-site induction by the ECoW and Contractor relating to the ecological constraints and mitigation measures associated with the site. It will be the responsibility of the Contractor to ensure that any new personnel who are employed during the construction work also receive the on-site induction.

The ECoW will be required to be fully appraised of all the pollution control and biosecurity mitigation measures outlined in the EIAR and the reasons why they are applied. The ECoW shall be in attendance for all site clearance, excavations, including topsoil stripping and earthworks activities, foundations and flood wall construction works, embankment creation, construction of culverts.

The ECoW will be responsible for:

- Prior to the commencement of construction works, the scope, programme and phasing of update habitat and species surveys will be defined by the ECoW in consultation with the Client and Main Contractor. Given the duration of the construction works, the update habitat and species surveys will need to be appropriately phased mindful of the planned work and seasonal constraints. These surveys will be completed prior to any site preparation works at any one site.
- A derogation licencing is required for otter and an application for such a licence is currently underway. That being said, the need for derogation licencing for any particular phase of works will need to be informed by the findings of the updated pre-construction surveys. The level of surveying will need to be sufficient to inform any derogation licensing which may be required. The need for derogation licensing will be determined by the ECoW prior to any works commencing, including site preparation works. The need for derogation licences will be kept under review by the ECoW as the works progress based on the findings of the update surveys completed.
- The ECoW will oversee the implementation of the eradication of invasive alien species, however, the “sign off” of the works required to remove/eradicate invasive alien species will be completed by a specialist contractor specialising in such eradication.
- The CEMP will be developed further in consultation with the Contractor. It will be the role of the ECoW to ensure that all the relevant ecological mitigation measures set out below and within the NIS are incorporated into the CEMP and implemented thereafter. The ECoW will review and input to the final construction phase CEMP in respect of ecological matters.

- The ECoW is responsible for the supervision and monitoring of all licensed activities to ensure implementation of biodiversity management requirements is achieved. The ECoW shall not delegate duties to other staff. The only exception is for unforeseen absence and annual leave cover, in which case the Site Manager shall appoint a suitably qualified back-up ECoW to temporarily fulfil the role. Training for each member of staff on their specific area of responsibility to implement environmental controls shall be carried out before the commencement of that operation. A record of all training carried out shall be maintained in the CEMP.
- Any vegetation within the Proposed Scheme boundary which is capable of being retained during the construction works will be fenced-off with suitable protective fencing and location to be specified by the ECoW. The fencing will form a clear barrier between retained habitats within and adjacent to the Proposed Scheme boundary which includes European Sites. This includes the retention of trees, hedgerow, woodland, grassland, aquatic features etc. The same measures as stipulated below with respect to avoiding unintended incursion will also be applied to these areas.
- To avoid unintended incursion by personnel, equipment and materials, the construction site boundary will be fenced off and site access/egress points constructed. Only site access/egress points will be used by personnel and equipment. Signage will be placed at intervals along the fencing stating, "*no access or storage of materials beyond this point*" (or similar). The signage to face inwards into the construction site. As part of the on-site ECoW induction for construction personnel, it will be stated that there will be no access for personnel or equipment and no storage of construction materials beyond the fenced construction boundary.
- The ECoW will review the fencing plan prior to its installation. They will also undertake a site walkover of all areas where fencing is to be erected to ensure that no pathways of connectivity for commuting foraging QI species (e.g. otter) will be disconnected by the fencing. Where necessary, fencing will include mammal passes or other necessary features to allow for commuting/foraging QI species.

The ECoW will be responsible for regular inspection and monitoring through all phases of construction/operation and provide ecological advice as required.

- The proposed construction works and associated *insitu* control measures, will be supervised full-time by the ECoW.
- Toolbox talks on the CEMP will be presented by the ECoW to all site staff immediately before works commence. The subject shall be the measures that have been put in place to protect the environment and the procedures, monitoring, and recording that is to be undertaken in accordance with the Construction Methodology, environmental commitments, and the CEMP. Site personnel will also be made aware of the ecological sensitivity of the site and its surrounds.
- The ECoW will report any instances of failure of mitigations, spillage, non-conformances, maintenance and repair by way of specific Incident Reporting sheets that include how the issue was remedied.
- The ECoW will attend all relevant stakeholder meetings throughout the construction (IFI, NPWS etc.).
- Carry out ecological monitoring and survey work as may be required by the planning authority.

2.5 Contracting Archaeologist

A suitably qualified archaeologist will be appointed to oversee the construction phase of the Proposed Scheme. The Contracting Archaeologist responsible for archaeological monitoring of the site during the construction phase. This will include monitoring of site investigations and excavation works as well as the monitoring and metal detection of spoil during construction. If new archaeological material is detected during the pre-construction re-inspection, testing or monitoring, the project archaeologist will be responsible for ensuring they are preserved by record (archaeologically excavated) and therefore permanently removed with a full record made. All monitoring will be carried out under licence by the National Monuments Service, Department of Housing, Local Government and Heritage.

- Licenced archaeological monitoring of all ground reduction/topsoil stripping areas within the design footprint and works areas (including compensatory woodland planting areas, temporary storage/compound areas and in-river works areas), during construction stage.

- 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.
- Any commemorative wall-mounted plaques or free-standing artwork installed by the local community (along Ridgepool Road) will require careful removal, temporary storage, and reinstatement post-works, in consultation with relevant local community groups.

2.6 Other Roles

The Contractor shall be responsible for engaging suitably qualified and experienced professionals to fulfil the environmental obligations of the CEMP, if and where required. Roles that may be required are:

- Specialist underwater archaeologist
- Noise and Vibration Specialist
- Arboriculture Specialist
- Road Surveyor
- Ornithologist.

3 GENERAL PROJECT DETAILS

3.1 Location of the Proposed Scheme

The Proposed Scheme is located in Ballina town, upstream of the Moy Estuary in, Co. Mayo. The River Moy flows through Ballina and is the main source of flooding in the town. The reach of the Moy downstream of the Salmon Weir in Ballina town, is tidally influenced.

There are several tributaries of the River Moy flowing within the town including the Quignamanger Stream, Bunree Stream (known locally as the Behy Road Stream), Brusna River, Tullyegan Stream and Knockanelo Stream. The Proposed Scheme will be constructed along several sections of the River Moy and associated tributaries (See **Figure 3-1**). This figure also includes the pre development 1% AEP (Annual Exceedance Probability) flood extents, illustrated in blue.

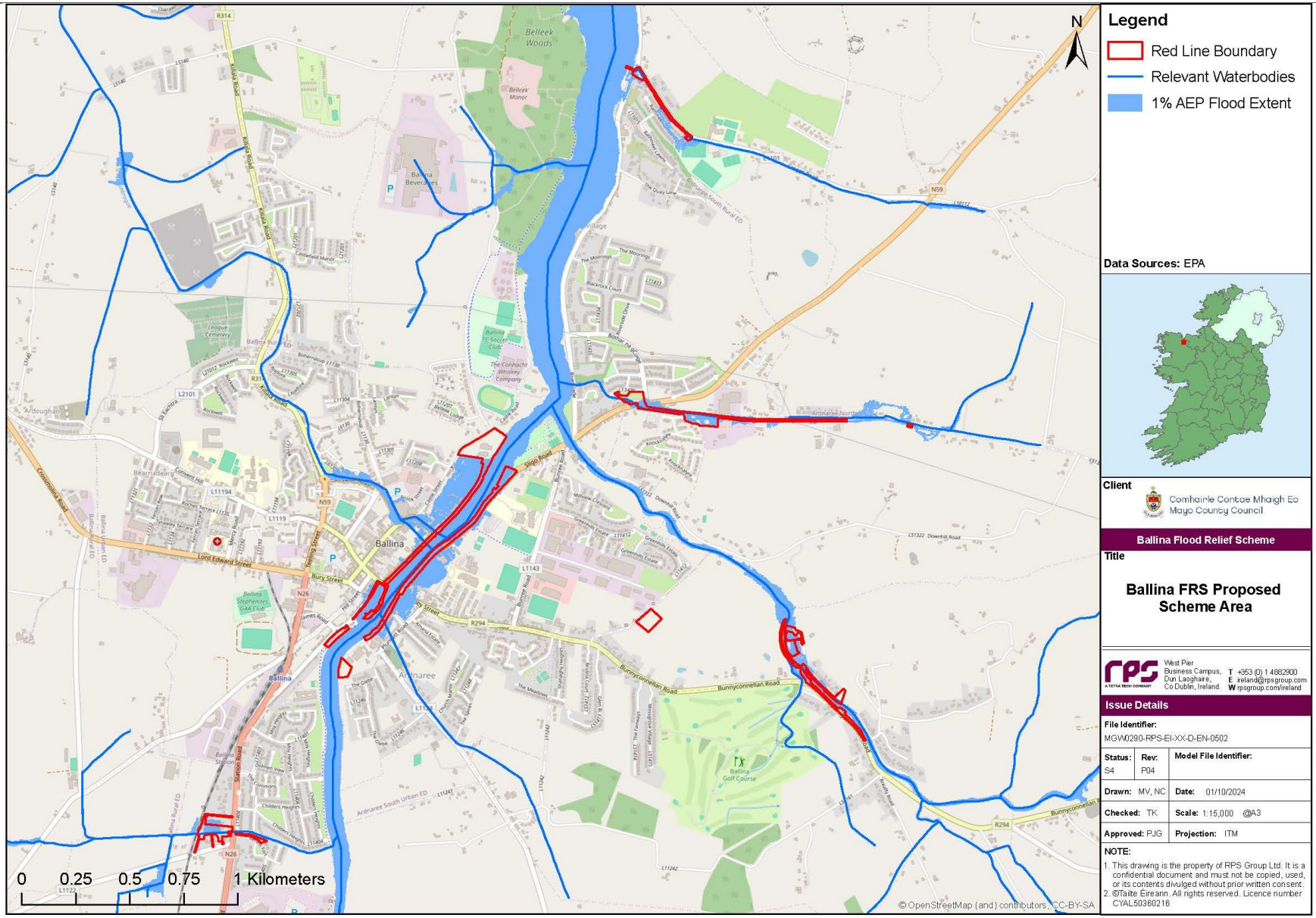

Figure 3-1: Location of the Proposed Scheme

3.2 Overview of Scheme Design

Figure 3-2 below includes the areas where physical works will be undertaken as part of the construction phase of the Proposed Scheme. **Table 3-1** below provides an overview of the works to be carried out on the River Moy and the tributaries.

Banks are referred to in terms of Left-Hand Side (LHS) or Right-Hand Side (RHS), which are the true left and true right banks facing downstream.

Table 3-1: Summary of Proposed Scheme

Watercourse	Location	Description of Works
River Moy	Pedestrian Bridge to Salmon Weir	New flood walls
	Barrett Street	Proposed storm water pumping station
	Ridgepool	New flood walls Tanking of the Weir Building Additional access to the river Repairs to quay wall as necessary Proposed storm water pumping station.
	Cathedral Road	Raised plaza to act as flood defence incorporating public realm elements.
	Emmet Street	Rebuild exiting wall Replace existing railings with combination of new flood wall and glass wall
	Clare Street/Howley Terrace	New flood walls Accessible access at existing angling area Proposed storm water pumping station
	Bachelors Walk	New flood walls Proposed storm water pumping station
	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 I public open space	Replace existing culvert with open channel
		Regrade channel bank where possible to achieve a stepped/gentler slope
	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
		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

Watercourse	Location	Description of Works
	General	Tree removal, cutting, pruning and bankside maintenance

3.2.1 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 be required to provide welfare facilities in accordance with best practice.

The locations of potential temporary compounds are shown in **Figure 3-2**, and listed below:

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

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

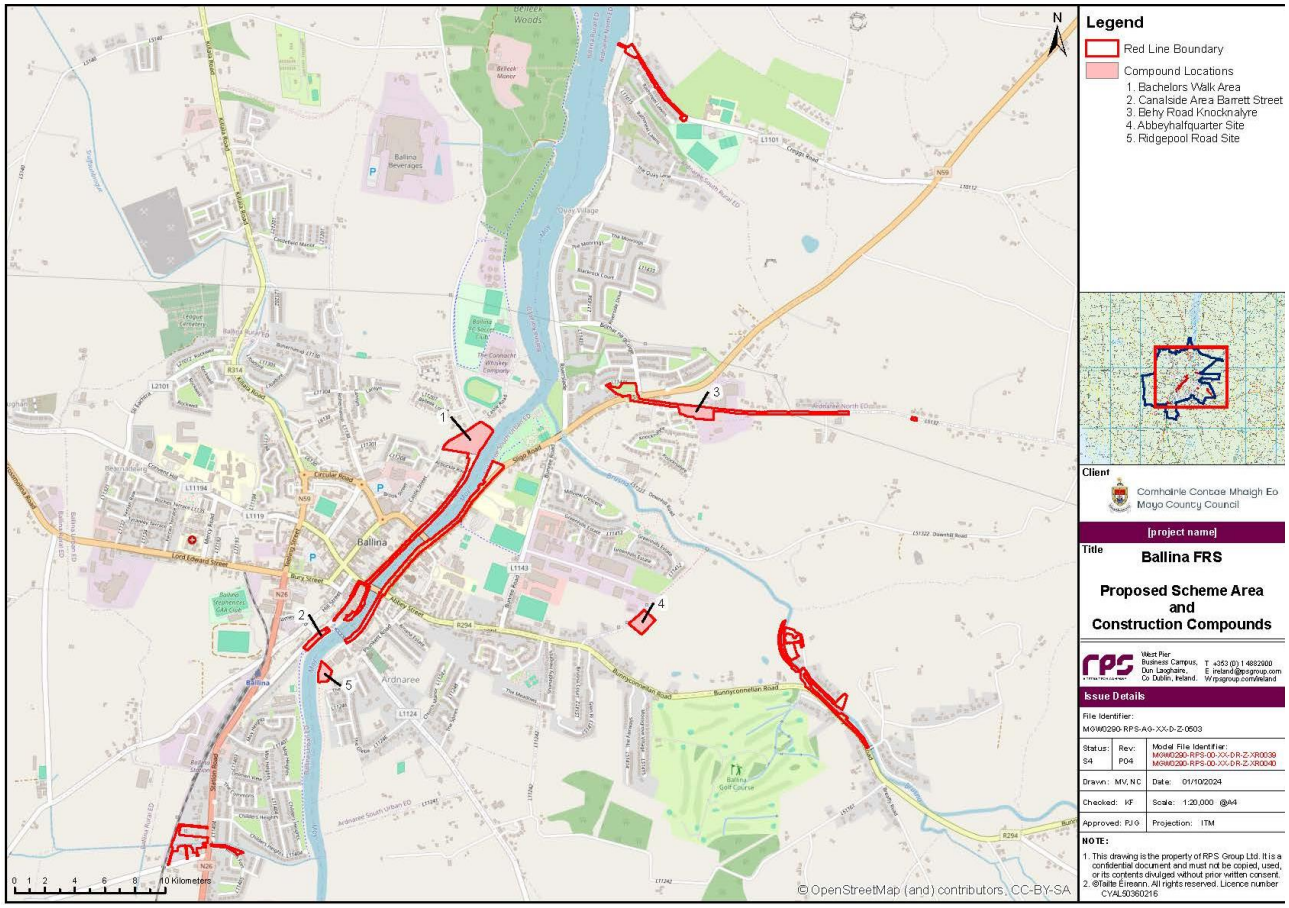

Figure 3-2 Location of Proposed Works and Construction Compounds

3.3 Proposed Construction Activities

3.3.1 Construction Sequence and Programme

Construction activities are planned to take place during a single construction campaign lasting up to 36 months. 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 Road side (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):
  - **Year 1 (Y1)** – No near-bankside works that could disturb the fishing amenity of Cathedral pool until at earliest **August 1st 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.
  - Once the above restriction is adhered to, near-bankside works (Cathedral pool), and instream works (downstream of Lower Bridge) may then continue in the estuarine River Moy (Bachelors Walk, Emmet Street and Clare Street) through the remainder of Y1.
  - **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 (any year):
  - No restrictions for the diversion culvert and flood walls along existing open section.
  - Instream works restricted to **May to September inclusive**. No instream works are allowed during fish breeding season – October to April inclusive.
- Bunree Stream (any year):
  - Instream works restricted to **May to September inclusive**. No instream works are allowed during fish breeding season – October to April inclusive.
- Brusna River (any year):
  - Instream works (Bridge Upgrade) restricted to **July to September inclusive**. No instream works during fish breeding season – October to June inclusive.
  - Instream works (All works over or near water set back floodwall and embankment) restricted to **May to September inclusive**

- Tullyegan Stream (any year):
  - Instream works (floodwalls) restricted to **May to September inclusive**. No instream works are allowed during fish breeding season – October to April inclusive.

3.3.2 Proposed 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.

4 TRAFFIC MANAGEMENT

From a traffic and transport perspective, the key components of the Proposed Scheme are:

- The traffic generated by the staff and plant machinery associated with the construction works.
- The temporary diversions in place during construction works.

4.1 Construction Phase Traffic

Construction traffic will include Heavy Vehicles (HV) and construction staff cars / vans (Light Vehicles (LV)). Construction traffic will travel on roads that are located adjacent to residential and retail development, and which also serve pedestrian movement. The scale of trips generated during the construction phase over a 36-month programme has been estimated to ensure that the receiving environment has ample capacity to cater for the HV trips and construction staff trips, and to ensure there are no safety risks to road and footpath users.

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

- 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)

Total traffic movements will depend on construction methodology and actual number of crews during construction stage.

4.1.1 Haul Routes

Potential 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 Heavy Vehicles (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.

The final selected haul routes for the Proposed Scheme will vary depending on the Contractor's specific procedures and programme. All routes are subject to the agreement of MCC and TII where appropriate and alternative routes may be considered.

4.1.2 Temporary Traffic Diversions

A total of seven works areas have temporary traffic diversion routes (proposed and optional) in addition to overall TTM are required for the Proposed Scheme.

These proposals, and the routes identified, were determined though consultation with MCC. The Contractor shall be required to further examine and develop these initial proposals prior to the commencement of construction on site. The Contractor will work closely with MCC to agree, coordinate and schedule the work and plan all TTM measures for the Proposed Scheme. Please see **Appendix 6-2** of this EIAR for details

4.2 Construction Traffic Management Plan (CTMP)

A Construction Traffic Management Plan (CTMP) has been prepared for the Proposed Scheme. See **Appendix 6-2** of this EIAR for details. The CTMP considers the potential impacts of construction related traffic generated as part of the Proposed Scheme and sets out the measures considered necessary to ensure that such traffic will be managed and monitored safely and efficiently throughout the construction phase.

It will be the responsibility of the appointed Contractor to further update this CTMP prior to the commencement of the construction phase. The Contractor will be required to agree the contents of the

CTMP with both Mayo County Council (MCC) and An Garda Síochána before the commencement of works on site. The Contractor will fully implement and maintain the CTMP throughout the construction phase.

The objectives of the CTMP are to:

- Outline minimum traffic management measures to be implemented for the works.
- Demonstrate to the Contractor and suppliers the need to adhere to the relevant guidance documentation for such works.
- Provide the basis for the preparation of a final CTMP by the appointed Contractor to carry out the works.

If approval is granted for the Proposed Scheme, the CTMP will address the requirements of any relevant conditions, including any additional mitigation measures which are conditioned. The Contractor will be responsible for ensuring the traffic related construction activities are undertaken accordance with the CTMP. All site personnel will be responsible for following good practice and will be encouraged to provide feedback and suggestions for improvements. Site personnel will also be required to comply with the requirements of the Proposed Scheme's CTMP.

To reduce impacts on local communities and residents adjacent to the Proposed Scheme, the Contractor will be required to:

- Liaise with both Mayo County Council (MCC) to co-ordinate access and egress to the site.
- Schedule deliveries to and from the construction compounds such that traffic volumes on the surrounding road network are kept to a minimum.
- Develop a construction phase programme for the duration of the works.
- Incorporate any specific construction moratoria (for example, certain busy periods) as indicated by MCC into the construction programme.
- Interact with members of the local community to ensure that deliveries will not conflict with sensitive events such as funerals.
- Abide by restrictions associated with the angling season.
- The Contractor will undertake consultation with MCC during the planning of all Temporary Traffic Management (TTM) measures for the Proposed Scheme.
- The Contractor will provide advanced warning signs in accordance with Chapter 8 of the Department of Transport's Traffic Signs Manual (TSM) and its accompanying Design and Operation Guidance documents. The Contractor will also further develop this CTMP and issue it to MCC for agreement prior to the commencement of works on site. This CTMP will be developed by a qualified TTM designer in accordance with Chapter 8 of the TSM.
- The Contractor will provide, erect, and maintain dedicated signage along all public roads affected by the works to ensure the smooth and safe control of traffic entering and exiting the works area and diversion routes. All temporary traffic signs will conform to TSM Chapter 8. All signs will be reflectorised and adequately illuminated by night in a manner approved by the Employer and the Contractor will keep these signs clean and legible at all times.
- No parking, unloading or blockages will occur on the access route adjacent to construction compounds. Such vehicles will be immediately requested to move to avoid impeding traffic flow.

5 LANDOWNER LIAISON

Minimising impact to the land and disruption landowners is a key focus when the construction phase commences. This will be achieved as follows:

- **Landowner Engagement:** Prior to works commencing each landowner will be met by a member of the project team to inform them of the expected start date on their properties, duration of works and to agree on specific issues of access, day to day use etc. pertaining to the Proposed Scheme. Liaison with landowners will be on-going during the works and construction crews will work with landowners to address any issues arising.
- **Adherence to the Construction Methodology:** The construction methodology sets out how structures and work areas will be accessed, the means by which works will be undertaken and reinstatement of land on completion of the works.
- **Landowner Negotiation:** Any issues arising on the part of landowners in respect to the works will be referred to the Mayo County Council for further engagement.

6 TRAINING AND AWARENESS

6.1 Site Induction

The Contractor will ensure that all employees, sub-contractors, suppliers, and other visitors to the site are made aware of the environmental management measures in the CEMP, as applicable. Accordingly, environmental specific induction training will be prepared and presented to all categories of personnel working and visiting the site. As a minimum, the following information will be provided to all inductees:

- Environmental sensitivities related to the site.
- Identification of specific environmental risks associated with the work to be undertaken onsite by the inductee.
- Environmental Incident and Emergency Response Plan.
- Contact details for the EnvCoW and ECoW.

The Contractor will provide an Environmental Risk Map illustrating environmentally sensitive areas, heritage constraints and potential sources of pollution (e.g., refuelling areas, location of spill kits, fuel tanks etc.). The Environmental Risk Map will be used during the induction and prominently displayed in the compound areas. In consultation with the EnvCoW and ECoW, the Contractor will update the map as required. Any update will trigger a toolbox talk to clearly communicate the change and offer opportunity for any necessary clarifications.

6.2 Risk Assessment and Method Statements

The Contractor will undertake risk assessments and method statements for all works and tasks prior to works being undertaken. Such assessments are to consider and address all the environmental aspects of the planned works and will include proposed mitigation measures. These are to be approved by the EnvCoW and ECoW prior to the commencement of works.

6.3 Training and Toolbox Talks

The Contractor will provide, as a minimum, the following environmental training to competent staff/sub-contractors as applicable to their work:

- Training on the use of spill kits (on ground and in surface waters), to be provided on a regular basis (to account for staff/sub-contractor changes, etc); and
- Training on silt mitigation, e.g., installation of silt fencing, etc., silt mitigation measures to relevant construction / site staff.

Toolbox talks will be used to provide on-going reinforcement and awareness training. Toolbox talks will also be used to address any other environmental issues which arise onsite, such as unforeseen risks, repeated observation of bad practices, perceived lack of awareness, pollution event, etc.

Other toolbox talk topics will include but are not necessarily limited to the following:

- Material handling, including excavation, segregation, storage, and reuse/disposal of excavated materials.
- Waste management, including waste storage, waste segregation and littering.
- Control of fuel and refuelling, and fuel handling procedures.
- Surface water runoff, drainage control and silt mitigation.
- Ecologically and archaeologically sensitive areas.

The Contractor will maintain records of all toolbox talks and training and make these records available if requested.

6.4 Notice Boards/Labelling and Signage

The Contractor will provide and maintain project environmental notice board(s) which will be positioned at strategic positions to enhance ongoing environmental awareness. As a minimum, this is to include one notice board at the site compounds. The environmental notice boards are maintained by the Contractor and will be reviewed, and updated as required, to address pertinent environmental topics. As a minimum, the notice boards will contain:

- A description of the key environmental risks and intended risk mitigation measures,
- Environmental Risk Map illustrating the location of the key risks and required exclusion zones / buffer zones and location of emergency response equipment, and
- Key contact numbers and responsible personnel identified within the Environmental Incident and Emergency Response Plan (see **Section 8**).

Environmental labelling and signage will be used onsite to inform project personnel of key environmental requirements or restrictions, including information to assist good environmental practice across the site.

7 HEALTH AND SAFETY

Construction of the Proposed Scheme will require the establishment of construction works areas, temporary construction compounds and travel, usage and temporary closure of sections of the local public road network. Construction sites and the machinery used on them pose a potential health and safety hazard to construction workers if site rules are not properly implemented. The Proposed Scheme will be constructed in accordance with all relevant Health and Safety Legislation, including:

- Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005, S.I. No. 328/2005);
- Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2016 (S.I. No. 36 of 2016);
- Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021 (S.I. No. 528/2021).
- The Safety, Health and Welfare at Work (Diving) Regulations 2018
- All other appropriate legislation in force at the time of their deployment
- All applicable Code of Practices to the works
- A Health and Safety Plan covering all aspects of the construction process will address the Health and Safety requirements in detail. This will be prepared on a preliminary basis at the procurement stage and developed further at construction stage. The Contractor will be responsible for the implementation of procedures outlined in the Safety and Health Plan.

Prior to and during construction, hazards will be identified, and risks assessed as discussed above in Section 6. Where elimination of the risk is not feasible, appropriate mitigation and/or control measures will be established. The Contractor will be required under the construction contract and current health and safety legislation to provide for all hazards and risks associated with the construction phase of the Proposed Scheme. An appointed Health and Safety officer will take responsibility for declaring the site safe after an occurrence of an environmental incident.

Safepass registration cards are required for all construction, delivery and security staff. Construction operatives will hold a valid Construction Skills Certificate Scheme card where required.

Fencing and appropriate signage will be established to restrict public access into construction works areas and compounds.

All staff will be made aware of and adhere to the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021'. This will encompass the use of all necessary Personal Protective Equipment and adherence to the Site Health and Safety Plan.

Due to the scale and nature of the Proposed Scheme, a Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS) are required to be appointed in accordance with the provisions of the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013'. The PSDP appointed for the construction Phase shall be required to perform his/her duties as prescribed in the Safety, Health and Welfare at Work (Construction) Regulations. These duties include (but are not limited to):

- Identify hazards arising from the design or from the technical, organisational, planning or time related aspects of the Proposed Scheme;
- Where possible, eliminate the hazards or reduce the risks;
- Communicate necessary control measures, design assumptions or remaining risks to the PSCS so they can be dealt with in the Safety and Health Plan;
- Ensure that the work of designers is coordinated to ensure safety;
- Organise co-operation between designers;
- Prepare a written Safety and Health Plan;
- Prepare a safety file for the completed structure and give it to the client; and
- Notify the Authority and the client of non-compliance with any written directions issued.

- The PSCS appointed for the construction stage shall be required to perform his/her duties as prescribed in the Safety, Health and Welfare at Work (Construction) Regulations. These duties include (but are not limited to):
- Development of the Safety and Health Plan for the construction stage with updating where required as work progresses;
- Compile and develop safety file information.
- Reporting of accidents / incidents;
- Weekly Site meeting with PSCS;
- Coordinate arrangements for checking the implementation of safe working procedures. Ensure that the following are being carried out:
- Induction of all Site staff including any new staff enlisted for the project from time to time;
- Toolbox talks as necessary;
- Maintenance of a file which lists personnel on Site, their name, nationality, current Safe Pass number, current Construction Skills Certification Scheme (CSCS) card (where relevant) and induction date;
- Report on Site activities to include but not limited to information on accidents and incidents, disciplinary action taken and PPE compliance;
- Monitor the compliance of contractors and others and take corrective action where necessary; and

  Notify the Authority and the client of non-compliance with any written directions issued.

8 ENVIRONMENTAL INCIDENT AND EMERGENCY RESPONSE

An Environmental Incident and Response Plan will be established by the Contractor to deal with environmental incidents or accidents. The plan will contain details of emergency scenarios and relevant procedures and actions that will apply. The Contractor will communicate the plan as part of the site induction to all staff and visitors.

8.1 Incident and Emergency Response Plan

The Incident and Emergency Response Plan will consider the impacts of pollution/spill incidents during construction and will note the actions to be taken in the event of a pollution incident, including the following:

- Containment measures
- Emergency discharge routes
- List of appropriate equipment and clean-up materials
- Maintenance schedule for equipment
- Details of trained staff, location, and provision for 24-hour cover;
- Details of staff responsibilities;
- Internal notification procedures;
- Notification procedures to inform the relevant environmental protection authority;
- Audit and review schedule;
- Telephone numbers of statutory water undertakers and local water company; and
- List of specialist pollution clean-up companies and their telephone numbers.

In the event of spillage of any polluting substance and/or pollution of a watercourse, the relevant local authority, Inland Fisheries Ireland, and the NPWS are to be notified by the Contractor. A specialised Emergency Contractor is to be appointed prior to construction, with contact detail provided in the Environmental Incident and Emergency Response Plan.

The Contractor will ensure that the Environmental Incident and Emergency Response Plan contains contact details of relevant staff / external authorities such as:

- Environmental Protection Agency and EPA 24-hour emergency incident line (1890 33 55 99);
- Specialist clean-up contractor;
- Emergency Services;
- Inland Fisheries Ireland;
- Local Authority Environmental Officers;
- An Garda Síochána; and
- National Parks and Wildlife Services.

8.2 Emergency Access

The Contractor will be required to maintain access routes for the emergency services in all work areas for the duration of the construction phase and to identify the emergency site access points to each work area.

These will be developed in consultation with the emergency services and documented by the Contractor in the updated CEMP prior to construction commencing, as well as being identified in the updated Environmental Incident and Emergency Response Plan.

8.3 Extreme Weather Events and Flood Risk

The Contractor will consider the impacts of extreme weather events, flood risk and related conditions during construction. The Contractor will be required to use the short to medium range weather forecasting service from Met Éireann, or other approved meteorological data and weather forecast provider, to inform short to medium term scheduling of the works, environmental controls, and mitigation measures.

The updated CEMP will include appropriate contingency measures to manage extreme weather events (red weather warnings from Met Éireann), including the suspension of work, where required. The measures will include training of personnel and prevention and monitoring arrangements for weather events. Where relevant risks have been identified, the detailed construction method statements will consider extreme weather events.

8.4 Incident Investigation and Reporting

The Contractor will include an Incident and Investigation Procedures in the updated CEMP. As a minimum the procedure will provide for:

- Description of the magnitude of the incident;
- Documentation of immediate actions taken;
- Identification of the cause;
- Further actions, if required; and
- Recommendations to changes to work methods/procedures required to prevent repeats.

9 CORRESPONDENCE AND GENERAL COMMUNICATION

The Contractor will provide a complete record of all relevant communication and reports associated with aspects of environmental management related to the Proposed Scheme. The following records will be maintained:

- Minutes and attendance records of project progress/planning meetings clearing indicating environmental management as an agenda item.
- Records of environmental induction and training.
- Environmental Inspection Records and Audit Reports.
- Licences and Consents - copies of all permissions, consents, licenses, and permits, including related correspondence.
- Incident Investigation Reports.
- Waste Manifest Documents and Safe Disposal Records.
- General Correspondence - all other relevant internal and external communication records relating to environmental management issues and implementation of the CEMP.

9.1 Construction Phase Communication Plan

Communications with residential receptors and commercial businesses will be maintained during the construction phase. Notification of road closures and any potential for temporary noisy generating construction works will be made in the form of letter drops in advance of the works.

Additionally, information regarding construction phasing, the opening and decommissioning of construction sites and the construction programme and progress will be made available on the local authority website which will be updated regularly. Contact details will also be made available on the local authority website which the public can avail of to raise queries or make comments.

10 ENVIRONMENTAL MITIGATION

10.1 Good Housekeeping and Site Maintenance

Table 10-1: Good Housekeeping and Site Maintenance during the Construction Stage

Location / Receptor	Description of Mitigation
All Locations	• General maintenance of working areas and cleanliness of welfare facilities and storage areas; • Provision of site layout map showing key areas such as first aid posts, spill kits, material and waste storage and welfare facilities. • Maintaining all plant, material and equipment required to complete the construction work in good order, clean, and tidy. • Keeping construction compounds, access routes and designated parking areas free and clear of excess dirt, rubbish piles, scrap wood, etc. and maintaining dust suppression always. • Provision of signs giving details of site management contact numbers, including out of hours, and public information at the boundaries of the working areas. • Provision of adequate welfare facilities for site personnel. • Installation of appropriate security, lighting (ensuring the avoidance of light spill), fencing, and hoarding at each working area. • Provision of appropriate waste management receptors (including provision for waste separation) at each working area and regular collections to be arranged. • Prevention of infestation from pests or vermin including arrangements for regular disposal of food and material attractive to pests. If infestation occurs the Contractor will take appropriate action to eliminate and prevent further occurrence. • Prohibition of open fires always. • Use of less intrusive noise alarms, which meet the safety requirements, such as broadband reversing warnings, or proximity sensors to reduce the requirement for traditional reversing alarms. • Maintenance of public rights of way, diversions and entry/exit areas around working areas for pedestrians and cyclists where practicable and to achieve inclusive access. • All loading and unloading of vehicles will take place off the public network wherever this is practicable.

10.2 Traffic & Transportation Mitigation

10.2.1 Construction Phase

10.2.1.1 Traffic Management

A Construction Traffic Management Plan (CTMP) has been prepared and outlines measures in detail to be implemented by the appointed contractor during the construction phase in order to reduce impacts on local communities and residents adjacent to the Proposed Scheme and wider road network. The information in the below sections provides a summary of the mitigation measures stated in the CTMP.

Table 10-2: Traffic and Transport Mitigation Measures for the Construction Stage

Location / Receptor	Description of Mitigation
Traffic Diversions	
Bachelors Walk works	• Lane closure along the River Moy for the duration of the works. Bachelors Walk will temporarily be a one-way street with a temporary traffic diversion via Nally Street and Arbuckle Row.
Barrett Street works	• Barrett Street will be closed temporarily to facilitate the works with a temporary traffic diversion via Tolan Street, O 'Rahilly Street and Bury Street (four weeks). On street parking along Barrett Street will be temporarily removed to facilitate the works

Location / Receptor	Description of Mitigation
	• An alternative temporary parking area will be provided for the duration of the works as street parking will be removed for the duration of the works. • The road closure will commence at the junction of Tolan Street and Barrett Street and ends at the junction of Water Lane and Barrett Street. Local vehicular traffic will be permitted to access the alternative temporary parking and the Ballina Manor Hotel resident carpark. • Warning signage will be provided at Abbey Street (R294) and Cathedral Road, advising all Heavy Vehicles (HVs) to route via Emmet Street to avoid an excess of extra traffic using Tolan Street and subsequently Bury Street. • This is important as when the junction of Pearse Street/Tolan Street/O'Rahilly Street/ Tone Street and the junction of Bury Street/Teeling Street/Lord Edward Street/Kevin Barry Street receive the extra traffic that would usually use Barrett Street, the junction runs over capacity in peak hours which will lead to delays and congestion.
Ridgepool Road works	• The proposed temporary traffic management to facilitate works at Ridgepool Road will be a road closure of the one-way section of the road with a temporary traffic diversion via Wests Road, Plunkett Road and the R294 Regional Road. • The two-way section of Ridgepool Road will have a lane closure along the River Moy with stop/go or temporary traffic signals for the duration of the works. • Parking will be removed from along the riverside to accommodate the works.
Clare Street / Howley Terrace (N59 Sligo Road), Bunree Road and R294	• Lane closure along the River Moy for the duration of the works. • Clare Street / Howley Terrace will temporarily be a one-way street northbound with a temporary traffic diversion for southbound traffic via Bunree Road and R294 Regional Road. • Junction priority at the intersection of Bunree road and R294 to be changed or controlled via Stop / go, traffic signals or vehicle controller as determined by the contractors TTM designer. • To alleviate capacity issues, the lane closures on Cathedral Road and Clare Street should occur simultaneously, where possible.
Quignamanger Stream works (Creggs Road between Quay Road and Rathmeel Lawns)	• For the section of Creggs Road between Quay Road and Rathmeel Lawns, a section of Creggs Road will be closed with a temporary traffic diversion via Quay Road, Riverslade, Quignalecka, N59 National Road and Creggs Road. • For the section of Creggs Road between Rathmeel Lawns and the Culvert Inlet, a section of Creggs Road will be closed with a temporary traffic diversion via Quay Road, Riverslade, Quignalecka, N59 National Road and Creggs Road. • Access to local properties is to be maintained along Creggs Road.
Bunree/Behy Road Stream	• The proposed temporary traffic management to facilitate works at Behy Road comprise a lane closure along a section of Behy Road with stop / go or temporary traffic signal operation for the duration of the works. • An advisory traffic diversion for through traffic will be northbound via L-10112 Local Road and Creggs Cross and southbound via L-51322 Local Road. • Access to local properties is to be maintained along Behy Road.
Brusna (Glenree) River works	• The proposed temporary traffic management to facilitate works along Brusna (Glenree) River will be in two distinct sections. • For the section of the Proposed Scheme along Brusna River at Shanaghy/Rathkip, the narrow access road will be closed for the duration of the works with a temporary access road / haul route required to maintain access to the local properties. • For the section of the Proposed Scheme along the R294 Regional Road a lane closure along the Brusna River with stop/go or temporary traffic signals will be in place for the duration of the works. • A potential traffic diversion for through traffic will be at Bonniconlon, northbound traffic via the L6612 Local Road and R297 Regional Road and southbound via The L1125 Local Road and N26 National Road.
Temporary Traffic Management Measures	
Cathedral Road	• Lane closure along the Moy River for the duration of these works on Clare Street. • Parking will be removed from along the riverside to accommodate these works.
Emmett Street	• Lane closure along the River Moy for the duration of the works. • Parking will be removed from along the riverside to accommodate the works. • Works on Emmett Street should not occur at the same time as of those on Barrett Street.

10.3 Population and Human Health Mitigation

10.3.1 Construction Phase

Table 10-3: Population and Human Health Mitigation Measures for the Construction Stage

Location / Receptor	Description of Mitigation
All Locations	• Potential health and safety risks associated with traffic, noise and vibrations, air quality, etc. will be minimised through the implementation by the construction workers of a site-specific CEMP which will be prepared by the contractor prior to construction. This will include provisions for managing access around construction sites, maintenance of residential amenities, working hours, noise and dust limits, etc., and aims to reduce effects on residents in the area. • A CTMP was prepared and details how construction traffic will be managed during the duration of the construction phase of this specific Proposed Scheme. The CTMP states that Noise and Vibration from the construction traffic will not result in a nuisance to the area surrounding the permitted site, however, the Contractor will closely monitor and implement appropriate mitigation measures should these be required during construction.

10.4 Aquatic Biodiversity Mitigation

10.4.1 Construction Phase

Table 10-4 Instream Timing Restrictions

Watercourse	Watercourse Reach and Type of Works	Timing restriction (Work Allowed)
Freshwater River Moy	Instream works (Ridgepool and Salmon Weir)	**Angling restriction**: No instream works allowed in Ridgepool before August 1st in Year 1, but as agreed with IFI, Ridgepool instream works can continue through Year 2 (subject to sea lamprey spawning habitat protection timing restrictions set out in table 10-7). **Sea lamprey spawning habitat protection restriction**: see details of bespoke timing restrictions set out in Row 3 of Table 10-6 regarding instream works in the vicinity of Ridgepool Points RP2A and RP8 to RP8A (see Appendix 9.6 for locations).
Freshwater River Moy	Bankside works (no instream intrusion)	No timing restriction
Estuarine River Moy	Instream works downstream of N59 Lower Bridge, both banks.	No timing restriction: work occurs in Transitional Water and does not affect spawning / nursery waters
Estuarine River Moy	Works over or near water (not encroaching instream) adjacent to Cathedral Pool and downstream of N59 Lower Bridge	No timing restriction
Quignamanger	All instream works (culvert replacements).	May 1st to September 30th
Quignamanger	All works over or near water (flood wall construction along existing open section)	No timing restriction for works above water.
Bunree	All instream works for culvert replacement and installation	May 1st to September 30th

Watercourse	Watercourse Reach and Type of Works	Timing restriction (Work Allowed)
Brusna (Glenree)	All instream works (Rathkip/Shanaghy Bridge upgrade)	July 1st to September 30th
Brusna (Glenree)	Works over or near water (set back flood wall and embankment construction)	May 1st to September 30th
Tullyegan	All instream works (flood wall construction)	May 1st to September 30th

Table 10-5: Aquatic Biodiversity Mitigation Measures for the Construction Stage

Potentially Significant Impact Category Identified	Description of Mitigation
Invasive Species	• Personnel working instream will be aware of potential for presence of aquatic invasive species (including but not restricted to zebra mussel, crayfish plague) and strict biosecurity measures applied to any equipment used in the water. • Check/Clean/Dry policy shall be applied. All equipment used for instream works shall be checked before leaving site and any plant or animal material/debris removed. Equipment shall then be cleaned. • Biosecurity facilities shall be installed on-site prior to site works commencing within the site compound. Any personal protective equipment (PPE) machinery and equipment used during instream works for the construction shall be washed down and disinfected in this facility. It shall include facilities for wheel brushing, brushing down of vehicles, cleaning of footwear and other equipment prior to arrival on site and on leaving site. It shall also include an area where bushing can be directed into a dedicated and contained area. Washdown water shall not be allowed to enter surface water bodies. Vehicles leaving the site shall be inspected for any plant/animal material and cleaned down in the biosecurity containment area following the biosecurity procedures within the guidance documents below. Water shall not be abstracted from the River Moy for cleaning. A sign-off sheet shall be maintained by the Contractor to confirm cleaning. • The disinfection protocol is set out in IFI Biosecurity Protocol for Field Survey Work (Caffrey, 2010)
River Moy (Ridgepool)	
1. Timing Restrictions	• **Angling restriction:** No instream works allowed in Ridgepool before August 1st in Year 1, but as agreed with IFI, Ridgepool instream works can continue through Year 2 (subject to sea lamprey spawning habitat protection timing restrictions set out in this table). • **Sea lamprey spawning habitat protection restriction:** see details of bespoke timing restrictions set out in **Row 3** of this table regarding instream works in the vicinity of Ridgepool Points RP2A and RP8 to RP8A (see **Appendix 9.6** for locations).
2. Access ramp construction LHS in front of IFI Building	• The entire temporary access ramp must be comprised of materials that do not cause a constant leaching of suspended solids to the River Moy arising from scour and sediment wash-out owing to variable and at times elevated and swift, erosive flows. To achieve this the base of the access ramp will be constructed using a product such as Ridgeway (Kyowa) Rockbags: Rockbags in Europe and UK - Rockbags or a similar product (e.g., rock filled reno-mattresses) which delivers the same function and effectiveness. Rockbags are a type of flexible rock gabion that can be placed on top of each other to form a base, which could then have a surface of, for example, temporary steel access ramps placed atop to form the access ramp, precluding any requirement for hardcore material with fines that would otherwise be subject to sediment wash-out. Because the access ramp needs to be in place for 20-22months, a robust, non-erodible solution such as this is required as the construction is within the SAC and adjacent to an iconic angling pool.

Potentially Significant Impact Category Identified	Description of Mitigation
	• Use of rockbags (or product of similar function and effectiveness in terms of being non-erodible) will also protect the composition of underlying benthic substrates, such that when the access ramp is removed the overlying bags can be lifted, leaving substates largely unaltered in terms of sediment size class to recolonise with algae and aquatic mosses similar to baseline conditions.
3. Potential sea lamprey spawning habitat protection at Sites RP2A and RP8-RP8A (see Appendix 9.6)	• Although there are no potential lamprey spawning habitats directly affected by the temporary works areas in the Ridgepool (see **Appendix 9.6**: Ridgepool Instream Survey), on a precautionary basis there are two discrete areas (Sites RP2A and RP8-RP8A, see locations in Appendix 9.6) in proximity to the outer margins of the proposed temporary instream works areas on both banks that are subject to precautionary restrictions / mitigations set out here. This is because sea lampreys are mobile and opportunistic and will construct redds in suitable substrates, subject to the actual low flow wetted channel characteristics during spawning season of any year. • It is crucial to take advantage of low flows in the Ridgepool during the construction programme to carry out instream works for wall repairs on the RHS (Ridgepool Road) quay walls which are badly eroded and collapsing at the base. Doing these works during low flows will greatly decrease the risk of pollutant washout from works areas and avoid delays to the overall work programme. • **In Year 1 (Y1):** cofferdams will not be placed between points RP8 and RP8A (RHS) and the access ramp will not be laid adjacent to point RP2A (LHS) before end of Week 2 of August Y1 – this only applies to these specific reaches as an extreme precaution to allow for any late spawned sea lamprey eggs to hatch. Other instream works downstream of these points can commence in Ridgepool on August 1st in Y1. • **In Year 2 (Y2):** The access ramp (LHS) remains in-situ through Y2 with no additional lateral incursion into the Ridgepool. Works will continue on the LHS using the access ramp and the cofferdam containment area. On Ridgepool Road (RHS), instream works downstream of Point RP8A can continue or commence at any time in Y2. However, as a precaution, if works were not completed between RP8 and RP8A between mid-August of Year 1 and the 1st of May in Year 2, then there are two options for placement of cofferdams along the reach that covers RP8 and RP8A on Ridgepool Road (RHS): • **OPTION A (RHS, Y2):** Cofferdams that include the reach RP8 to RP8A must be placed during mid-April, as this is before water temperature reaches 15oC in the Ridgepool and no sea lamprey spawning will have been initiated (see Appendix 9.6). Water temperature must be taken by the ECoW to ensure it is below 15^{o}C. Once the cofferdam id laid in April, any lamprey that then select to nest adjacent to the cofferdam will do so in May / June /July once temperatures reach 15^{o}C, and they will not be subject to direct disturbance during spawning. Prior to removal of cofferdams – if this occurs before mid-August - a qualified, experienced aquatic ecologist or fisheries scientist will be employed to SCUBA or snorkel survey the outer edge of the 5m temporary works cofferdam footprint. This will occur during mid-to-high tide when snorkelling over the area is possible because depth will be more suitable without undue disturbance to any lamprey that are present. If there are no redds or lamprey nest building activity observed by the surveyor, then the temporary cofferdam can be removed immediately and without delay. If there is lamprey nesting building activity or redds observed then cofferdam removal along the reach will be delayed until the end of Week 2 of August Y2, to avoid disturbing nests prior to egg hatching and larval emergence. • **OPTION B (RHS, Y2):** If cofferdams cannot be placed in April of Y2, then there can be no laying of cofferdams later than the last week of April (subject to water temperature being below 15oC) unless a qualified, experienced aquatic ecologist or fisheries scientist is employed to SCUBA or snorkel survey the outer edge of the 5m temporary works footprint in the days before proposed cofferdam placement, i.e., in May June or July. Instream survey will occur during mid-to-high tide when snorkelling over the area is possible because depth will be suitable without undue disturbance to any lamprey that do happen to be present. If sea lamprey nest building / spawning activity is recorded on the outer edge of the proposed 5m temporary work area, then the cofferdam placement will be delayed in that defined reach (encompassing RP8-RP8A) for one month to allow for hatching and emergence of larval lampreys. After that month has passed, another SCUBA survey must be carried out and once again:

Potentially Significant Impact Category Identified	Description of Mitigation
	(1) in the absence of lamprey redd(s) and/or nest building activity the cofferdam can immediately be installed, or (2) if lamprey redd(s) and/or nest building activity is occurring, works must be delayed in that defined reach for a further month. If works have not been achieved because of these restrictions, then the final SCUBA / snorkel survey shall occur in the third week of July in Year 2, at which time, if sea lamprey spawning activity is absent then the cofferdam can be installed immediately with no further timing restriction. If sea lamprey nesting activity was still recorded in the third week of July, the cofferdam installation must be delayed until the end of the 2nd week of August of Y2 between RP8 and RP8A to allow for any late emergence of larval lampreys. • Whilst the above timing restrictions appear laborious, they protect sea lamprey, whilst allowing for the possibility of completing critical instream repairs to the Quay Walls on the Ridgepool Road (RHS) during the low flow period in the River Moy. This will greatly reduce the potential for adverse effects that could arise from unexpected inundation of cofferdams by floods, since flooding has a lower probability of occurring May-July inclusive. • Records of the exact location and number of sea lamprey and/or redds observed in the above surveys shall be kept and submitted to NPWS and IFI.
4. Wildlife rescue and relocation on groyne area - Ridgepool LHS	• 1-tonne sandbag cofferdams (if required) must be placed in the channel on low tide. • Once in place the cofferdam shall be sealed on a low tide as this will reduce water volume and decreases probability of fish entrapment. • Once sealed, electrofishing will be conducted within the cofferdam under approval and supervision of IFI staff (subject to licence and agreement with IFI Ballina). Any rescued fish shall be temporarily held in containers of clean, well-oxygenated river water or immediately transferred to the outside of the cofferdam.
5. Protection of lamprey nursery habitat - Ridgepool LHS at Site RP5	• The stand of emergent reeds (*Sparganium erectum*) in front of Ballina Manor Hotel at Site RP5 (see **Appendix 9.6**) will be cordoned off marking the area as an exclusion zone. • A double line of silt fencing will be installed on the landward side of the emergent reed stand, extending all the way along the existing grassed bankside verge to prevent sediment loss from the access ramp and bankside works zone. • The ECoW will conduct a toolbox talk explaining the presence of larval lampreys and the importance of protecting the RP5 area from disturbance.
6. Wildlife rescue and relocation – larval lampreys Ridgepool RHS at Site RP11	• If possible, repairs to the river walls will be carried out without the use of instream cofferdams (i.e., using scaffold or platform from the footpath above) in which case the marginal sediment deposit on Ridgepool RHS between RP11 and the Upper Bridge: (see **Appendix 9.6**) will be treated as an exclusion zone (no disturbance). • If instream works are required in the vicinity of Site RP11, the sandbag cofferdam will be installed and sealed at low tide to help prevent fish entrapment. • Electrofishing will then be conducted by either IFI Ballina staff or by a qualified aquatic ecologist (Level 9 or higher) with electrofishing experience, licenced and under supervision by IFI staff. The aquatic ecologist will remain onsite during the initial pump-out and water draw down inside the cofferdam to observe any sign of lamprey ammocoetes that may emerge from silt accumulations in the RP11 to Upper Bridge reach. • Larval lamprey shall be captured by hand or pond net and temporarily be kept in a bucket of clean river water then transferred immediately outside of the cofferdam where they will move downstream and settle in suitable silt deposits which are widely available downstream of the Lower Bridge. • The ECoW will be present for the dewatering and records of type / number of trapped and released fish shall be kept by the ECoW. • The first pass of any earthmoving activity within the Ridgepool RHS RP11 to Upper Bridge cofferdam shall involve the digger removing the top layer of marginal silt to a depth of about 30-50 cm and spreading it out on a patch of the dewatered work zone so that lamprey ammocoetes can be collected and released. Juvenile lamprey will quickly re-burrow into suitable substrates once relocated (King, et al., 2008)

Potentially Significant Impact Category Identified	Description of Mitigation
8. Management of ingress water (Cofferdams on the River Moy)	• Cofferdams will be carefully managed On-site pumps must be present to dewater, as required, at cofferdam containment areas to maintain a dry working area. These areas will inevitably be subject to water ingress. • Pumped-out ingress water must not be directly discharged to either the River Moy or any adjoined drainage channels, unless treated before discharge. • In the absence of appropriate treatment, pump-out water must also not be directly discharged to the general environment at any other location. • On-site storage facilities for pump-out water (e.g., proprietary sedimentation tanks) must be of sufficient volume to hold the volumes of pump-out water encountered, and tank volume should be overcompensated by 10% so as to ensure adequate containment capacity, thus avoiding spills and overflows to the river. • Pump-out water can be treated on-site (e.g., sediment settlement and pH monitored) or can be removed off-site for discharge at a licenced treatment facility. • "Appropriate treatment" means attenuation and treatment that ensures discharge water does not exceed 25 mg/l suspended solids and must be within the pH bracket of ≥ 6 ≤ 9 (related to concrete usage.
8. Management of ingress water (Cofferdams on the River Moy)	• Cofferdams will be carefully managed On-site pumps must be present to dewater, as required, at cofferdam containment areas to maintain a dry working area. These areas will inevitably be subject to water ingress. • Pumped-out ingress water must not be directly discharged to either the River Moy or any adjoined drainage channels, unless treated before discharge. • In the absence of appropriate treatment, pump-out water must also not be directly discharged to the general environment at any other location. • On-site storage facilities for pump-out water (e.g., proprietary sedimentation tanks) must be of sufficient volume to hold the volumes of pump-out water encountered, and tank volume should be overcompensated by 10% so as to ensure adequate containment capacity, thus avoiding spills and overflows to the river. • Pump-out water can be treated on-site (e.g., sediment settlement and pH monitored) or can be removed off-site for discharge at a licenced treatment facility. • "Appropriate treatment" means attenuation and treatment that ensures discharge water does not exceed 25 mg/l suspended solids and must be within the pH bracket of ≥ 6 ≤ 9 (related to concrete usage).
Effects of bulk liquid concrete usage on aquatic receptors (if leakage or spillage occurs)	• At the new fishing access area on Ridgepool Road at Weir Building, where possible, pre-cast units will be used, e.g., steps, and pre-cast slabs. Any cast in-situ concrete usage will be carefully managed using Best Practice. Concrete materials cast in place will remain inside sealed formed structures until set. • It will be ensured that no concrete, cement, mortars, and other Portland cement, concrete debris and dust, wash or contact water enters any surface water. • Concrete delivery trucks will be washed-down at designated containment areas in the site compound and never to the river. Concrete wash-down water will be removed for disposal at a licenced facility.
River Moy (Downstream of Lower Bridge - N59 crossing)	
Timing Restrictions	• No timing restrictions on instream works as habitats are within the transitional water.
Wildlife rescue and relocation – larval lampreys LHS River Moy downstream of Lower Bridge (N59 crossing)	• If possible, repairs to the river walls will be carried out without the use of instream cofferdams, i.e., using the space available on the berms inside the existing river walls. • In the 120m LHS reach downstream of the Lower Bridge adjacent Bachelors Walk cofferdams are likely to be required as the berm is narrow and the Knockanelo culvert meets the Moy. • 1-tonne sandbag cofferdams (where required) must be placed in the channel on low tide. • Once in place the cofferdam shall be sealed on a low tide as this will reduce water volume and decreases probability of fish entrapment. • Electrofishing will then be conducted by either IFI Ballina staff or by a qualified aquatic ecologist (Level 9 or higher) with electrofishing experience, licenced and under supervision by IFI staff.

Potentially Significant Impact Category Identified	Description of Mitigation
	• The aquatic ecologist will remain onsite during the initial pump-out and water draw down inside the cofferdam to observe any sign of lamprey ammocoetes that may emerge from silt during the dewatering. Any rescued fish shall be temporarily held in containers of clean, well-oxygenated river water and immediately transferred to the outside of the cofferdam. Species are likely to be encountered include, at a minimum, eel and lamprey ammocoetes, but could include estuarine species such as grey mullet, flounder and possibly coarse species such as roach. • The ECoW will be present for the dewatering and records of type / number of trapped and released fish shall be kept by the ECoW. • The first pass of the earthmoving activity within the cofferdam shall involve the digger removing the top layer of marginal silt to a depth of about 30-50 cm and spreading it out on the nearby bank so that lamprey ammocoetes can be gathered by the ecologist into buckets of clean water and transferred to alternative habitat downstream. Juvenile lamprey will quickly re-burrow into suitable substrates once translocated (King, et al., 2008). • Larval lamprey shall be captured by hand or pond net and temporarily be kept in a bucket of clean river water then transferred immediately outside of the cofferdam where they will move downstream and settle in suitable silt deposits which are widely available downstream of the Lower Bridge. • The existing boulder riprap shall be removed and stockpiled on the bank for use in reinstatement following the works.
Water quality degradation affecting instream biota during flood wall construction on vegetated berms (Downstream Lower Bridge LHS and RHS)	• Where cofferdams and instream works are not required (owing to sufficient berm space), a double line of silt fencing will be installed along the riverbank between the wall construction zone and the river. The ECoW will be responsible for regular checks and will request the contractor to carry out maintenance to silt fencing if and when required to ensure its efficacy.
River margin reinstatement prior to cofferdam removal – Bachelors Walk LHS	• The existing boulder riprap material shall be reused in the bank/berm reinstatement following the temporary instream works. • Prior to cofferdam removal, the line of boulder riprap will be installed, and the river margin will be backfilled with clean earth and tamped down so as to recreate the riverside berm of the same width as the pre-existing condition. The berm shall be reinstated as described in Chapter 10: Terrestrial Biodiversity, to ensure that FS2 tall reed swamp habitat is replaced. • Stockpiled boulders shall be used and if additional rocks are required, these shall be locally sourced, clean, calcareous boulder and large cobble that are approved by IFI and that broadly mimics the pre-existing substrates. As set out above, the IFI is the appropriate body to be contacted by the ECoW to establish current (at the time) approved supplier(s) of such materials prior to the reinstatement period. • The ECoW will be responsible for implementing the above reinstatement measures for the River Moy channel margins along Bachelors Walk in conjunction with IFI Ballina and NPWS. • Replacement of boulder riprap along to river margin will encourage deposition of finer material and eventual sedimentation and regrowth of marginal plant species. This will in time also allow for re-establishment of juvenile lamprey populations at low levels as is the baseline condition. • All reinstatement within the cofferdam shall be carried out to match the profile of the bed level on the outside of the cofferdam, and at the upstream and downstream ends, such that there is no significant step-change in lateral or longitudinal riverbed profile. • The cofferdam shall be removed beginning downstream and working in an upstream direction to slowly submerge the newly reinstated river margin areas. This is to avoid wash-out of substrates owing to river flows from the upstream end.
Quignamanger	
Timing Restrictions	• Instream works period stipulated by IFI is May 1st to September 30th of any year.

Potentially Significant Impact Category Identified	Description of Mitigation
Water quality protection during culvert removal / installation (Creggs Road)	• The contractor will be required to notify IFI in advance of instream works and provide an updated detailed construction work plan for approval including any planning conditions and consequent environmental commitments before works commence. • Each section of culvert replacement must be installed in a 'dry' works area using an appropriate method of water management, e.g., dam and pump-over, temporary piping. • Works shall proceed in an upstream direction. • A schedule of works will be drawn up by the contractor to break the culvert replacement works into manageable sections (e.g., 30-50 m at a time) such that water management can be adequately controlled, thus preventing entrainment of sediment and other potentially polluting substances. • Where possible, the new culvert should be installed off-line with flow diverted from the old culvert following completion.
Water quality protection during culvert removal / installation (Quay Road)	• The Quay Road culvert must be installed in a 'dry' works area using an appropriate method of water management, e.g., dam and pump-over, temporary piping. • The contractor and ECoW will be required to notify IFI in advance of instream works and provide an updated detailed construction work plan for approval including any planning conditions and consequent environmental commitments before works commence. • There can be no discharge of any polluting substances (sediment, concrete, hydrocarbons) directly to the watercourse during the construction.
Management of ingress water ('dry' instream working areas of Quignamanger during culvert replacements)	• On-site pumps must be present to dewater and maintain 'dry' working containment areas to complete instream works. • Dewatering pumps to be placed in sumps surrounded by drainage stone. • There will be no dewatering discharge directly back to the Quignamanger or any adjoining drainage channel. • Ingress waters will be pumped out and discharged via a silt bag 30m away from the watercourse. The discharge point will be a vegetated area of land and will be surrounded by a triple line of staked silt fencing surrounding a circle of staked down strawbales wrapped in terram. Any outflow from the protected discharge point will be visually monitored to ensure there is no escapement of highly turbid water. If highly turbid water is observed works will be stopped by the ECoW and additional silt control measures will be implemented, e.g., use of settlement tank in series with silt bag. These mitigations will be overseen by the ECoW.
Protection of Tufa deposit *7220 Habitat	• Prior to instream works commencing for the Quay Road culvert (above) the stream must be surveyed by a qualified, experienced ecologist (Level 9 or higher) identifying the tufa cascades (these were located approximately 15 m upstream of the Quay Road culvert in 2023). This area must be cordoned off using hazard tape, upstream and downstream to delineate it as an exclusion zone. The ECoW will be responsible for ensuring that there is no tracking or walking through the stream, nor any other direct physical impact upon the tufa habitat within the exclusion zone. • The works area upstream of the existing Quay Road culvert shall be carefully planned by the contractor to only impact on a short section of the open channel leading into the proposed new culvert. This will be no more than 5 -7 m of channel upstream of the existing Quay Road culvert. The ECoW is responsible for ensuring this spatial restriction is adhered to.
Design Measures to be incorporated during construction	• Refer to Table 10.7 below, for design measures to be implemented in the construction phase relating to the regrading of the Quignamanger upstream of Quay Road culvert, i.e., baffles or step-pool design to facilitate fish passage and tufa deposition in the operational phase.
Bunree	
Timing Restrictions	• Instream works period stipulated by IFI is May 1st to September 30th of any year.
Water quality protection during culvert removal / installation	• Each section of culvert replacement must be installed in a 'dry' works area using an appropriate method of water management, e.g., dam and pump-over, temporary piping. • Works shall proceed in an upstream direction.

Potentially Significant Impact Category Identified	Description of Mitigation
	• A schedule of works must be drawn up to break the culvert replacement works into manageable sections (e.g., 30-50 m at a time) such that water management can be adequately controlled, thus preventing entrainment of sediment and other potentially polluting substances. • Where possible, the new culvert should be installed off-line with flow diverted from the old culvert following completion.
Management of ingress water ('Dry' instream working areas of Bunree during culvert replacements)	• On-site pumps must be present to dewater and maintain 'dry' working containment areas to complete instream works. • Dewatering pumps to be placed in sumps surrounded by drainage stone. • There will be no dewatering discharge directly back to the Bunree or any adjoining drainage channel. • Ingress waters will be pumped out and discharged via a silt bag 30m away from the watercourse. The discharge point will be a vegetated area of land and will be surrounded by a triple line of staked silt fencing surrounding a circle of staked down strawbales wrapped in terram. Any outflow from the protected discharge point will be visually monitored to ensure there is no escapement of highly turbid water. If highly turbid water is observed works will be stopped by the ECoW and additional silt control measures will be implemented, e.g., use of settlement tank in series with silt bag. These mitigations will be overseen by the ECoW.
Brusna (Glenree)	
Timing Restrictions	• Instream works period is stipulated by IFI as July 1st to 30th September 30th of any year. • Works near or over water within the SAC is stipulated May 1st to September 30th of any year.
Sediment loss controls during embankment construction - Brusna (Glenree)	• There must be a line of well-secured silt fencing between the proposed embankment construction and the river channel during all earthmoving works adjacent to the channel. This must be put in place in advance of any work commencing on-site. • The temporary access track and all works on formation of the embankment will be carried out on the outside of the proposed embankment, ensuring as little disturbance as possible to vegetated ground between the proposed embankment and the river. • Embankments will be formed, then firmly tamped down and reseeded immediately upon completion. The use of hydroseeding on the newly formed earth embankment is recommended to rapidly establish vegetative cover. • All drains and preferential flow pathways that connect to the River Brusna/Glenree from temporary works areas, site compounds and construction material storage areas must be subject, as appropriate to silt control measures in the form of e.g., bunds, geotextile sheeting, silt fencing to avoid entrainment and prevent sediment run-off into drains and the river. • Material storage areas and stock-piled spoil / earth shall be located outside the SAC boundary and not within 20 m of the River Brusna or any drain to same. In addition to silt fencing around loose material stockpiles (e.g., earth, gravel with high fine content) these shall be covered with geotextile during extended storage periods to avoid mobilisation of suspended solids.
Works near and over water – flood walls, bridge parapet	• There must be no discharge of deleterious substances, e.g., sediment, concrete rubble / dust or new liquid concrete, from the works areas to the river. All concrete waste will be immediately removed and disposed of at a licenced waste facility. The bridge parapet will be prefabricated and not involve use of bulk liquid concrete in proximity to the river.
Instream works Rathkip/Shanaghy Bridge	• A 'dry' working area must be formed at the Rathkip/Shanaghy Bridge, encompassing the reach subject to instream bed and bank protection replacement works. A suitable method to create the dry working area will be set out in the contractors detailed construction method statement and agreed with IFI prior to instream works commencing (noting that IFI have agreed in principle to the works subject to timing restrictions, plus methods to protect water quality and fish passage). • It is proposed that partial cofferdams covering alternate halves of the river shall be used to create the instream dry working area. At any one time the river will be flowing on the opposite half of the normal wetted width. This is to protect fish passage and

Potentially Significant Impact Category Identified	Description of Mitigation
	hydrological conditions. An alternative method such as a large pipe or flume capable of passing a 10% AEP flood event that achieves the same goals would be acceptable, i.e., it must create a dry working area. • Cofferdams can be constructed of small or large geotextile bags filled with clean sand, but there can be no use of soil or clay to bund the structure because the risk to water and habitat quality is too high in this SAC channel with high value salmonid habitat. Sandbags can be wrapped in impermeable geotextile if necessary to prevent excessive water ingress. • The height of the coffer dams must be higher than the 10% AEP flood flow plus freeboard (minimum top height of 14.32mOD + freeboard) to prevent consequences of, e.g., concrete, and other pollutant escapement, if unexpected flooding was to occur, noting that the instream works timing restriction means that works will occur in summer when flooding is least likely. • Access routes for material delivery to and from the cofferdam areas must be from each bank alternately, i.e., no passing of construction materials over water. • **Pre-construction Bathymetry Survey:** The river reach through Rathkip/Shanaghy Bridge will require pre-construction channel bathymetry survey in the reach covering a minimum of 50 m upstream and downstream of the bridge faces. Bathymetry survey will take place during the months of May to September inclusive to record the baseline condition, using both cross section and long section measurements. This will occur in the season before or early in the season of construction works commencing. This will record the existing bed levels so that they can be replaced like-for-like making sure that there is a suitable low flow channel and that the upstream and downstream ends of the new bed protection are drowned out at all times during the operation phase. The existing scour pool at the downstream side of the Rathkip/Shanaghy bridge will be retained with the same morphology and dimensions (depth, width, length) as pre-existing. The pool is an important feature in terms of fish lay-over during flood events given the elevated water velocities that occur (under baseline and post-scheme scenarios) in this reach of the river.
Management of ingress water ('Dry' instream working areas at Shanaghy Bridge)	• On-site pumps must be present to dewater and maintain 'dry' working containment areas to complete instream works. • Dewatering pumps to be placed in sumps surrounded by drainage stone. • There will be no dewatering discharge directly back to the Brusna (Glenree) or any adjoining drainage channel. • Ingress waters will be pumped out and discharged via a silt bag 30m away from the watercourse. The discharge point will be a vegetated area of land and will be surrounded by a triple line of staked silt fencing surrounding a circle of staked down strawbales wrapped in terram. Alternatively, a plan may be put in place to clean the water using a series of settlement tanks or system with similar effect (water filtration system). This allows treatment of water in an instance where vegetated land, if saturated, may not have capacity to adsorb water being removed even with strawbales and silt fencing. Any outflow from the protected discharge point will be visually monitored to ensure there is no escapement of highly turbid water. If highly turbid water is observed works will be stopped by the ECoW and additional silt control measures will be implemented, e.g., use of settlement tank in series with silt bag. A sample of the final discharge effluent will be taken by the ECoW to ensure suspended solids (SS) concentration does not exceed 25mg/l. These mitigations will be overseen by the ECoW.
Design Measures to be incorporated during construction	• Design measures are incorporated into the Scheme relating to the Rathkip/Shanaghy bridge scour protection (bed-protection), i.e., incorporation of low flow channel / depression and roughness elements (concrete conglomerate or inset rock/cobble) to prevent shallow laminar flows in the operational phase.
Direct impact on white-clawed crayfish during instream works	• Although crayfish are very unlikely to be present, for the avoidance of doubt, during initial water drawdown within the areas of water management (dam and pump-over on the Tullyegan) a qualified experienced ecologist will be present and shall have the appropriate licence from National Parks and Wildlife Service to capture any emerging crayfish, keep them in a bucket of clean river water and return them to the channel upstream of the works area. This is a once off operation (a few hours at most in each

Potentially Significant Impact Category Identified	Description of Mitigation
	location). Once the working area is dried out, there will be no further requirement for the crayfish licence holder to be present.
Channel reinstatement	• The Brusna channel will be reinstated prior to rewatering using clean washed gravels and cobbles of local origin (calcareous) and of an appropriate size, in agreement with IFI. This will allow recolonisation by macroinvertebrates and fish during operation.
Tullyegan	
Timing Restrictions	• Instream works period stipulated by IFI is May 1st to September 30th of any year.
Water quality protection during out-of-channel flood wall / embankment construction	• All drains and preferential flow pathways that connect to the Tullyegan Stream from the temporary work area must be subject, as appropriate, to silt control measures in the form of e.g., bunds, geotextile sheeting, silt fencing to avoid entrainment and prevent sediment run-off into drains and the river. • There must be no discharge of deleterious substances, e.g., sediment, concrete rubble / dust or new liquid concrete, from the works areas to the stream. All concrete waste will be immediately removed and disposed of at a licenced waste facility.
Water quality protection during instream flood wall / embankment construction	• A 'dry' instream works area must be created using an appropriate method of water management, e.g., dam and pump-over, temporary piping. • Prior to dewatering the dammed area, the stream will be de-stocked of fish. Fish removal shall be carried out by authorised personnel under electro-fishing licence and in agreement with, or under supervision of IFI Ballina. Fish must be kept in clean oxygenated water and returned to the channel upstream of the works area. • Before any excavation within the channel, the top 30 cm of bed material must be scraped off and stockpiled for use in reinstatement.
'Dry' working area ingress water – during instream works	• On-site pumps must be present to dewater and maintain 'dry' working containment areas to complete instream works. • Dewatering pumps to be placed in sumps surrounded by drainage stone. • There will be no dewatering discharge directly back to the Tullyegan or any adjoining drainage channel. • Ingress waters will be pumped out and discharged via a silt bag 30m away from the watercourse. The discharge point will be a vegetated area of land and will be surrounded by a triple line of staked silt fencing surrounding a circle of staked down strawbales wrapped in terram. Alternatively, a plan may be put in place to clean the water using a series of settlement tanks or system with similar effect (water filtration system). This allows treatment of water in an instance where vegetated land, if saturated, may not have capacity to adsorb water being removed even with strawbales and silt fencing. Any outflow from the protected discharge point will be visually monitored to ensure there is no escapement of highly turbid water. If highly turbid water is observed works will be stopped by the ECoW and additional silt control measures will be implemented, e.g., use of settlement tank in series with silt bag. These mitigations will be overseen by the ECoW.
Direct impact on white-clawed crayfish during instream works	• Although crayfish are very unlikely to be present, for the avoidance of doubt, during initial water drawdown within the areas of water management (dam and pump-over on the Tullyegan) a qualified experienced ecologist will be present and shall have the appropriate licence from National Parks and Wildlife Service to capture any emerging crayfish, keep them in a bucket of clean river water and return them to the channel upstream of the works area. This is a once off operation (a few hours at most in each location). Once the working area is dried out, there will be no further requirement for the crayfish licence holder to be present.
Channel reinstatement	• The Tullyegan channel will be reinstated prior to rewatering using clean washed gravels and cobbles of local origin (calcareous) and of an appropriate size, in agreement with IFI. This will allow recolonisation by macroinvertebrates and fish during operation.

10.5 Terrestrial Biodiversity Mitigation

10.5.1 Pre-Construction Phase

Table 10-6: Terrestrial Biodiversity Mitigation Measures for the Pre-Construction Stage

Location / Receptor	Description of Mitigation
Pre-Construction Surveys	
All Locations	• Baseline surveys indicate that a derogation licence is currently required for otter and an application for such a licence is underway. Updated pre-construction surveys by an experienced ecologist will be carried out for otter. This includes a survey of any otter breeding/resting sites identified in the current baseline within the ZoI of the Proposed Scheme (150 m for breeding sites, where access allows; noting that TII guidance recommends 20 m for non-breeding sites). These will be undertaken in a representative season to ensure accuracy. Otter surveys will be carried out in accordance with NRA guidance (NRA, 2008a). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will be required. • Pre-construction surveys by an experienced ecologist will be carried out for badger. This includes a survey of all areas within 150 m of the Proposed Scheme. These will be undertaken in a representative season to ensure accuracy. Badger surveys will be carried out in accordance with NRA guidance (NRA, 2008b). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will not be required. • Pre-construction surveys by an experienced ecologist will be carried out for Third Schedule IAPS within the ZoI of the Proposed Scheme. These will be undertaken in a representative season to ensure accuracy. Invasive species will be carried out having regard to guidance of Transport Infrastructure Ireland (TII 2020a, TII 2020b). • Pre-construction surveys by an experienced ecologist will be performed on sites where tree removal or removal of tree limbs is required. These surveys will be undertaken to determine the presence or absence of bat roosts or breeding birds, and these will be undertaken in a representative season to ensure accuracy. Bat surveys shall be carried out with reference to Bat Mitigation Guidelines for Ireland (v.2) (Marnell et al., 2022) and Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Ed.) (Collins, 2023). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will not be required for bats but may be required for breeding birds should clearance be required during the bird breeding season. • Pre-construction surveys by an experienced ecologist will be performed on structures to be impacted by the Proposed Scheme e.g. quay walls along the main channel of the River Moy. These surveys will be undertaken to determine the presence or absence of bat roosts and breeding birds, and these will be undertaken in a representative season to ensure accuracy. Bat surveys shall be carried out with reference to Bat Mitigation Guidelines for Ireland (v.2) (Marnell, et al., 2022)and Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Ed.) (Collins, 2023). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will not be required. • Pre-construction surveys by an experienced ecologist will be performed on the boat yard shed where a roosting bat was observed exiting during dawn surveys. This survey will be undertaken to determine the presence or absence of roosting bats, and it will be undertaken in a representative season to ensure accuracy. The surveyor will also use their professional judgement with respect to the need to survey any other buildings or structures within or adjacent to the Proposed Scheme boundary likely to provide roosting opportunities for bats. Bat surveys shall be carried out with reference to Bat Mitigation Guidelines for Ireland (v.2) (Marnell, et al., 2022) and Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Ed.) (Collins, 2023). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will not be required. • Breeding bird surveys will be undertaken to identify nest sites which are to be marked and avoided by construction if found until such time that the site is vacated by fledglings. Where bird or bat species are detected to be nesting or roosting, an exclusion zone will be determined by the ECoW, using best practice guidelines specific to the species. The same approach will be taken to wintering bird species. Breeding bird surveys shall be conducted with reference to the methodology described by Bibby et al.

Location / Receptor	Description of Mitigation
	(2000) and the Countryside Bird Survey Manual - Guidelines for Countryside Bird Survey participants (BirdWatch Ireland, 2012). • A season of overwintering waterbird usage of the River Moy Estuary shall be carried out prior to construction to ascertain if minimal usage of this area is typical for these species. • Based on the findings of the pre-construction surveys, the adequacy of the mitigation for each of these species set out in the EIAR will be reviewed and, if necessary, adjusted accordingly by the ECoW. The ECoW will also ensure that the CEMP will be updated accordingly. • The pre-construction surveys will also inform the need or otherwise for derogation licensing (as detailed below). Any adjustment to the mitigation measures will be agreed with the local authority in advance of them being implemented. The pre-construction surveys will be supplemented by further inspection by the ECoW (as deemed necessary by them) immediately prior to site clearance. • All surveys will be undertaken by suitably qualified ecologists with demonstrable experience in the survey and assessment of the feature.
Invasive Species	
All Locations	• The Local Authority shall appoint a suitably qualified contractor to deal with any Third Schedule Invasive Alien Plant Species within the proposed works areas. • This specialist will prepare an Invasive Alien Species Management Plan (IASMP) that will be followed during the eradication of the any IAS across the Proposed Scheme. Any invasive plant species identified that are likely to be disturbed by the Proposed Scheme works will be dealt with prior to construction works taking place in accordance with the management plan. Works to eradicate invasive species will be completed and signed off by suitably experienced personnel.
Otters and Badgers (Derogation Licensing)	
All Locations	• Baseline surveys indicate a derogation licence for otter is required and an application for such is underway. Mindful of the mobile nature of otters and badgers, the need for derogation licencing for any particular phase of works will need to be kept under review and informed by the findings of the pre-construction surveys • The level of surveying will need to be sufficient to inform any derogation licensing which may be required. The need for derogation licensing will be determined by the ECoW prior to any works commencing, including site preparation works. The need for derogation licences will be kept under review by the ECoW as the works progress based on the findings of the pre-construction surveys completed for Otter and Badgers.
Fencing	
All Locations	• As part of the enabling works, any vegetation within the Proposed Scheme boundary which is capable of being retained during the construction works will be fenced-off with suitable protective fencing and location to be specified by the ECoW. The fencing will form a clear barrier between retained habitats within and adjacent to the Proposed Scheme boundary which includes European Sites. This includes the retention of trees, hedgerow, woodland, grassland, aquatic features etc. The same measures as stipulated below with respect to avoiding unintended incursion will also be applied to these areas. • As part of the enabling works, any other vegetation within the Proposed Scheme boundary which is capable of being retained during the construction works will be fenced-off with suitable protective fencing and location to be specified by the ECoW. The fencing will form a clear barrier between retained habitats within and adjacent to the Proposed Scheme boundary which includes European Sites. This includes the retention of trees, hedgerow, woodland, grassland, aquatic features etc. The same measures as stipulated below with respect to avoiding unintended incursion will also be applied to these areas. • To avoid unintended incursion by personnel, equipment and materials, the construction site boundary will be fenced off and site access/egress points constructed. Only site access/egress points will be used by personnel and equipment. Signage will be placed at intervals along the fencing stating, “no access or storage of materials beyond this point” (or similar). The signage to face inwards into the construction site. As part of the on-site ECoW induction for construction personnel, it will be stated that there will be no access for personnel or equipment and no storage of construction materials beyond the fenced construction boundary.
Floating River Vegetation	
River Moy	• Prior to instream works along the main channel of the River Moy being undertaken, a full survey of floating river vegetation habitat shall be undertaken, including capturing the extent of this habitat to be disturbed and species composition.

10.5.2 Construction Phase

Table 10-7: Terrestrial Biodiversity Mitigation Measures for the Construction Stage

Location / Receptor	Description of Mitigation
Damage to Flora and Fauna	
All Locations	• In the event of damage occurring to protected flora/fauna or designated area, the cause of the incident will be identified. • If on-site vehicles or personnel were the cause of the incident, all works will cease until the Health and Safety Officer will declare the site a safe working area. • When the site is declared secure, an assessment of the incident will be carried out. • In the event of the death of any faunal species, species details, photographs and any other available information will be recorded. • The ECoW and a county council representative will be informed of the incident. • The NPWS will be notified of the incident by the ECoW. • The mitigation measures will be put in place to manage the incident.
Watching Brief during Site Clearance	
All Locations	• All vegetation removal and demolition of walls will be completed outside the breeding bird season (March to August, inclusive) unless no breeding birds are confirmed present by the ECoW immediately prior to the vegetation or structure being removed or unless required for the implementation of derogated measures with respect to otter or badger. • Where dense vegetation or inaccessibility prevents adequate determination of the presence or absence of otter holts or badger setts as part of the pre-construction surveys, these areas will require monitoring during vegetation clearance to ensure that any holts or setts present will be found and treated appropriately.
Invasive Alien Plant Species Management	
All Locations	• At the time of writing, the works will be completed with reference to the following guidance: – Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010) – Guidelines for the Management of Waste from National Road Construction Proposed development (NRA, 2014) – The management of Invasive Alien Plant Species on National Roads – Standard (TII, 2020a) – The management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020b) – Invasive Species Ireland guidance (http://invasivespeciesireland.com). • No vegetation removal or works resulting in earth disturbance will be completed in any area known to support Invasive Alien Plant Species (IAPS) until the eradication of the IAPS has been completed and signed off by suitably experienced personnel. • All machinery or equipment that may have worked in environments where invasive species are present shall be suitably cleaned by pressure washer before being used on site to prevent the spread of invasive species. Water used for this washing process shall always be intercepted and prevented from draining back into watercourses. • Where ongoing treatment of IAPS is occurring on stands in the vicinity of the proposed works area, appropriate exclusion fencing will be erected to prevent disturbance and spread of these stands. • Where ongoing treatment of IAPS is occurring on stands in the vicinity of the proposed works area, appropriate exclusion fencing will be erected to prevent disturbance and spread of these stands. • Adherence to IFI biosecurity protocol (Caffrey, 2010) for avoidance of spread of pathogens will be followed by contractors and surveyors. Careful disinfection and biosecurity measures is essential to prevent transfer of damaging pathogens, e.g., crayfish plague disease, between sites and river sub-catchments within and outside of the watercourses. This will apply to all personnel working in or near water, plus machinery that meets surface water and/or drainage to surface waters. • The invasive species management plan provides locations of invasive plants (e.g., Japanese knotweed) along open watercourses and works areas will be identified, with details of how the area will be treated to prevent spread and transfer of invasive species along river corridors.
Floating River Vegetation	
River Moy	• Ground protection mats e.g., bog matting, shall be used in each dry working area created via cofferdam placement to prevent against sediment compaction and disturbance.

Location / Receptor	Description of Mitigation
	• If recolonisation of the area has not occurred in the following growing season post disturbance, then propagules from nearby floating river vegetation habitat shall be used to reinstate the habitat. This may require the use of biodegradable matting on the riverbed to hold and contain propagules and to help prevent them from washing away. This is also dependant on sufficient sediment building up if extensive sediment disturbance had occurred. • All works will be undertaken with the supervision of a suitably qualified ecologist or ECoW.
Tall Herb Swamp	
Quignamanger, River Moy (Clare Street, Bachelors Walk)	• Works along both banks of the River Moy downstream of the Lower Bridge are to take place from the roadside to avoid damage to this habitat. • Fencing is to be erected at the boundary of the necessary works footprint within this habitat along all proposed works areas where this habitat occurs (Quignamanger, Clare Street, Bachelors Walk) to prevent unnecessary incursion of personnel and machinery. • At any one time a maximum length of 50m working area along Bachelors Walk and Clare Street is to be implemented. Works on additional 50m lengths will not commence until works on previous length have been completed and tall herb swamp habitat reinstated (see next point). • Prior to any works taking place within tall herb swamp habitat subsoil and topsoil within the proposed works area which is likely to be destroyed by the works is to be stripped, stored away from the works area, sprayed with water during dry weather as required to maintain sod integrity and placed back in situ post works to recolonise naturally in the first instance. This sod is to be replaced as soon as a section (maximum 50m length) of flood wall (in the case of the Moy main channel) or culvert (in the case of the Quignamanger) had been installed. • Ground protection mats shall be used, where subsoil and topsoil stripping is not necessary e.g., access routes for personnel.
Wet Grassland	
Bunree/Behy Road and Brusna	• Works on the culvert along the Bunree/Behy Road are to take place from the roadside with no footprint in the adjacent wet grassland field. Fencing is to be erected to at the edge of this field prior to works commencing to prevent accidental incursion. • Ground protection mats are to be used on the access route within the wet grassland field to prevent unnecessary damage to this habitat. Fencing is to be erected around the edge of the proposed works area in this field prior to works commencing to prevent accidental incursion and damage to the habitat.
Riparian Woodland	
Riparian Woodland (left-hand bank of the River Moy adjacent to the boatyard),	• Where possible, minimal disturbance of this habitat is to take place with structures to be set as far back from this habitat as practicable. • Planting of trees that will be undertaken for the Proposed Scheme will help minimise any effects of loss of riparian woodland. Planting will consist of the same species lost with trees sourced to be of Irish native provenance
Mixed Broadleaved Woodland	
Mixed Broadleaved Woodland (Tullyegan, the Quignamanger, the Brusna and the Bunree),	• Where possible, minimal disturbance of this habitat is to take place with structures to be set as far back from this habitat as practicable. • Planting of trees that will be undertaken for the Proposed Scheme will help minimise any effects of loss of riparian woodland. Planting will consist of the same species lost with trees sourced to be of Irish native provenance.
Hedgerows and Treelines	
Hedgerows and Treelines (Tullyegan, the Moy main channel and the Brusna)	• Where possible, minimal disturbance of this habitat is to take place with structures to be set as far back from this habitat as practicable. • Planting of trees that will be undertaken for the Proposed Scheme will help minimise any effects of loss of riparian woodland. Planting will consist of the same species lost with trees sourced to be of Irish native provenance.
Otter Holts and Badger Setts	
All Locations	This section will be relevant to Badgers if a sett is discovered during the Pre-Construction Survey. • No construction personnel or machinery will be used within 150m of otter holts / badger setts unless subject to the provisions of a derogation licence.

Location / Receptor	Description of Mitigation
	– Temporary boundary tape fencing (or similar) can used at the discretion of the ECoW to identify such holts / setts subject to such measures themselves not impacting on the use of the holt / sett. – Neither blasting nor pile-driving will be undertaken within 150m of active holt/sett during the breeding season, unless subject to provisions of a derogation licence. • It is assumed that all active holts/ setts at the time of construction and within very close proximity to the Proposed Scheme boundary will need to be closed in accordance with a derogation licence. • If holt / setts are to be closed (wholly or partially), this will be completed in accordance with the necessary derogation licence and with reference to the Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2008a) and the Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (NRA, 2006). • The need for further licencing is to be determined by the ECoW during pre-construction surveys and if any holts/ setts are encountered during vegetation clearance. The need for additional mitigation for derogation licensing purposes is to be reviewed and determined by the ECoW and relayed, as necessary to the local authority. • Where required, evacuation and destruction of holts/setts will be carried out under the supervision of an appropriately qualified ecologist under licence from the NPWS. The locations of such setts/ holts will be determined by the ECoW in liaison with the Contractor and the requirement of any derogation licence.
Otter and Badger Measures to Protect Against Mortality	
All Locations	• Any excavations greater in depth than 30cm which are left open overnight will either be temporarily covered over or a temporary ramp (e.g. scaffold board at suitable angle) will be inserted.
Otter Specific	
All Locations	• Currently, a single active holt has been identified within 10m of the Proposed Scheme boundary at the Brusna proposed works area. Works along the Brusna, therefore, will need a derogation licence and a licence application for derogation is underway.
Tullyegan and Brusna	• Night-time (including dawn and dusk) works along the Brusna and Tullyegan areas will be avoided.
Moy main channel, Brusna and Tullyegan.	• Where feasible, a 10 m buffer should be applied to all watercourses where otter were recorded across the Proposed Scheme i.e. Moy main channel, Brusna and Tullyegan.
River Brusna	• Two artificial holts will be created to compensate for the loss of the holt along the River Brusna. These two holts are to be located along the left hand bank of the River Brusna downstream of the Shanaghy bridge.
Quignamanger and River Moy	• Should night-time works be required along the River Moy and Quignamanger, the entire stretch/width of the river shall not be lit up while works are being undertaken, i.e. a dark stretch of the river should remain to facilitate the movement of otter past the works. – This can be achieved by using directional lighting (i.e. lighting which only shines on the proposed works and not nearby lands) to prevent overspill. This shall be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.
Badger Specific	
All Locations	• Badger setts within 150 m of the Proposed Scheme boundary will be confirmed and made available following the pre-construction surveys. • Currently, no setts have been identified within 150 m of the Proposed Scheme boundary, therefore, there is currently no need for a derogation licence with respect to badger. Should a derogation licence be required post pre-construction surveys, this licence could require this loss of sett(s) to be compensated through the construction of artificial sett(s)
Brusna and Tullyegan.	• As badger are most active at night, night-time works (including dawn and dusk) will be avoided in areas where badger are most likely to be active such as along the Brusna and Tullyegan.
Bats – Commuting and Foraging (Lighting)	
All Locations	• Construction operations during the hours of darkness will be kept to a minimum. If construction lighting is required during the bat activity period (April to September), lighting shall be directed away from all woodland and watercourse habitats. This can be achieved by using directional lighting (i.e. lighting which only shines on the proposed works and not nearby countryside) to prevent overspill. This shall be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.

Location / Receptor	Description of Mitigation
	• Where the removal of bankside vegetation is likely to result in light spill on previously unlit sections of watercourses and other habitats likely to be used by commuting and foraging bats, an assessment of the adjacent lighting shall be carried out by a bat specialist prior to any vegetation removal. If they don't already, these light sources, e.g. street lamps should consist of LED luminaires with a warm white light source (2700 Kelvin or lower) with a peak wavelength higher than 550 nm as per guidelines (BCT & ILP, 2023) Column heights should minimise light spill and glare visibility and only luminaires with a negligible or zero Upward Light Ratio and with good optical control should be considered. Furthermore, luminaires should always be mounted horizontally, with no light output above 90° and/or no upward tilt. Where these light sources do not meet relevant guidelines, changing to light sources that do meet guidelines shall be required. This may be relevant along the Main channel of the River Moy at the boat yard where a section of riparian woodland is to be removed and also along the Brusna where section of mixed broadleaved woodland is to be removed. Re-planting of lost vegetation to recreate a buffer can help minimise light spill onto these areas and should be undertaken.
Roosting Bats General	
All Locations	Given the current baseline, the Proposed Scheme is not considered to effect roosting bats, however, as bat roosts can be ephemeral and circumstances can change between initial surveys and the commencement of construction, the mitigation measures listed below are provided here on a precautionary basis and are measures which will avoid, minimise and mitigate construction phase impacts on roosting bats. • No demolition of structures or the removal of any trees with bat roost potential (potential to be determined by the ECoW) is to occur unless the ECoW has confirmed that the structures or trees do not support roosting bats (confirmed via survey) or unless the demolition/removal is completed under the provisions of a derogation licence. • Following the pre-construction survey, bat roosts located within the proposed works boundary will be clearly identified to all personnel working in the vicinity of the roost. • Temporary boundary tape fencing (or similar) can be used at the discretion of the ECoW to identify such roosts subject to such measures themselves not impacting on the use of the roost.
Roosting Bats Tree Felling	
All Locations	Where bats are recorded roosting in the trees scheduled for felling, the following mitigation will be required: • **Timing:** Tree-felling will occur in the period late September to late October, or early November, as per NRA Guidelines (NRA 2006a; NRA, 2006b). To carry out the works any later in the bat season creates an additional risk that bats may be in hibernation and thus unable to fly out from a tree that is being felled, although bats can be removed by hand by a licenced bat handler if required. Tree felling will be completed by Mid-November. • Trees with ivy-cover, once felled, will be left intact onsite for 24 hours prior to disposal to allow any bats beneath foliage to escape overnight. • If roosting or stranded bats are encountered on the Proposed Scheme, works shall immediately cease in that area and the local NPWS Conservation Ranger shall be contacted. If present, bats shall only be removed under licence from the NPWS. • Trees to be felled under the supervision of the ECoW (i.e. trees identified as having Potential Roost Features (PRFs) during the pre-construction survey) will be examined and where bats are found, they will be translocated to an area where bat boxes will already be installed on appropriate trees within the Proposed Scheme area. The proposed process for felling the trees with PRFs is outlined below: – The ECoW will be present during the tree felling works; – Tree(s) identified as having potential to support bats will be surveyed during the daytime for bats prior to felling, on the day the felling is due to take place. The bat specialist will inspect all potential bat roost features of the tree, including those above ground level. This will include visual inspection as well as use of an endoscope to inspect cavities/crevices. – Any bats found in the trees will be removed by hand to a bat box and will then be relocated to the bat boxes installed in advance of works. Records of any such activities will be maintained. – The tree and/or tree sections will be left on the ground for a minimum period of 24 hours to enable any unidentified bats residing in deeper crevices to make good their escape during night-time hours. – These trees will also be 'soft' felled. Soft felling shall include the following measures: ○ Felling to be undertaken under the supervision of the ECoW. ○ Felling of entire tree from base, allowing the tree to fall (i.e. no introduced force).

Location / Receptor	Description of Mitigation
	○ The ECoW shall inspect the tree for further evidence of bat roosting. If evidence is found, all works on that tree shall be halted and the local NPWS Conservation Ranger shall be contacted. No works on that tree shall be permitted without agreement from the NPWS. ○ Tree to be left in place (uncut) for 24hrs, after which, sectioning, chipping, and removal can take place.
Bat Roosting Lighting	
All Locations	• Construction operations during the hours of darkness will be kept to a minimum. • If construction lighting is required between April to September, lighting shall be directed away from all woodland and watercourse habitats using directional lighting. – This shall be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.
Roosting Bats Bat Boxes	
All Locations	• Nine no. bat boxes shall be erected along the Brusna, six no. bat boxes shall be erected along the northern section of the River Moy (i.e., downstream of the Lower Bridge), six no. bat boxes shall be erected along the Tullyegan, six no. bat boxes shall be erected along the newly opened channel along the Bunree, and six no. bat boxes shall be erected adjacent to the open channel of the Quignamanger. – Each box shall be placed in groups of three bat box per structure arranged at the same height facing north, south-east and south-west to ensure a range of temperatures for roosting bats. Suitable locations will be determined by the ECoW based on suitable locations available to erect them, proximity to artificial lighting and connectivity to foraging and commuting habitats. – In the absence of suitable structures (e.g. retained trees, bridge structures, buildings) to erect the boxes, they will be pole-mounted in suitable locations or mounted in suitable locations on built structures. – These boxes shall be away from any felling or trimming to ensure that they are not accidentally damaged or removed. – The bat boxes will be Schwegler-type (woodcrete) type boxes (or similar) and a range of different type boxes (e.g., 2f, 1FF, 3FF, 1FW, 1FE and 1FTH) will be used. These will be provided in addition to any mitigation required with respect to any derogation requirements which may be identified as a result of pre-commencement surveys.
Breeding Birds (Derogation License)	
All Locations	• Where nests are present, a buffer zone of at least 20 m will be cordoned off and the nests will either be left in-situ until the end of the bird nesting season or dealt with in accordance with the terms of a derogation licence sought from relevant bodies. • Buffer zones will vary dependant on species in question and the exact buffer zone for a particular species when encountered must be discussed with a professional ornithologist who must be contacted within 24 hours of the discovery of an occupied nest.
Breeding Birds (Protect against Mortality)	
All Locations	• Additionally, all vegetation removal or demolition of structures will be completed outside the breeding bird season (March to August, inclusive) unless no breeding birds are confirmed present by the ECoW immediately prior to the vegetation/structure being removed.
Breeding Birds (Bird Boxes)	
Brusna, Tullyegan, River Moy, Bunree, Quignamanger	• Bird boxes will be erected at suitable locations across all sections of the Proposed Scheme. Ten no. bird boxes shall be erected along the Brusna, six no. bird boxes shall be erected along the River Moy, six no. bird boxes shall be erected along the Tullyegan, six no. bird boxes shall be erected along the Bunree, and six no. bird boxes shall be erected along the Quignamanger. Suitable locations will be determined by the ECoW based on locations available to erect boxes and connectivity to foraging and commuting habitats. In the absence of suitable structures (e.g. trees, bridge structures, buildings etc.) to erect the boxes, they will be pole mounted in suitable locations. The bird-boxes will be Schwegler-type (woodcrete) boxes (or similar) and a range of different type boxes (e.g. 1B, 2H, 2MR etc.) suitable for all species likely to be using the adjacent habitats
IEF Specific	
Works along the River Moy SAC	• Planting of trees and shrubby species that will be undertaken for the Proposed Scheme will help minimise any effects of loss of SAC area. Planting will consist of the same species lost with trees/shrubs sourced to be of Irish native provenance.

10.6 Land, Soil, Geology & Hydrogeology Mitigation

10.6.1 Construction Phase

Table 10-8 Land, Soil, Geology and Hydrogeology Mitigation Measures for the Construction Stage

Location / Receptor	Description of Mitigation
Importation of Construction Materials	
All Locations	• The importation of surplus clean and inert excavated material from quarries or as a by-product from other sites will be undertaken. By-product will be subject to an Article 27 notification to the EPA in accordance with relevant waste legislation and taking account of the findings of the current EPA public consultation document 'Regulatory position on soil & stone by-products' published in October 2018.
Embankment Settlement	
All Locations	• Soft soils will be removed during the construction of the foundation to create a stable base and a geotextile membrane placed over the formation to strengthen the foundation. If a high-water table is encountered during excavation an appropriate backfill such a Class 6A material will be incorporated. • A barrier method such as a sediment barrier or silt fence will be placed on the river side of the embankment. • Permanent cut-off ditches on the land side of the embankment will be used to prevent over land flow.
Brusna and Tullyegan	• Embankments will be constructed of suitable compacted materials, tamped down, and reseeded immediately to ensure stability and to minimise the potential for erosion of sediments into the adjacent Brusna River and Tullyegan Stream.
Infiltration of Surface Runoff	
All Locations	• Where stockpiling of topsoil is required, stockpiles shall be limited to heights not exceeding two metres, shall be battered back to a stable slope, and shall not be unnecessarily trafficked. • Care will be taken in reworking this material to minimise the effects of weathering, dust generation, groundwater infiltration and generation of runoff. • Where compaction occurs due to vehicle and truck movements remediation works will be undertaken to reinstate the ground to a condition to at least equal to that of the original surface. Vehicles will minimise tracking over natural or unfinished surfaces and will not track over reinstated soils.
River Moy Main Channel	• There will be no stockpiles within the SAC and or within 20 m of the main channel of the River Moy or any drains that connect to the river.
Barrett Street, Ridgepool Road, Behy Road and Bonniconlon Road	• Construction compounds have been selected at the Old Ballina Diaries site, Mayo County Council (MCC) lands on Barrett Street and sites located on private lands at Ridgepool Road, Behy Road and Bonniconlon Road where there will be designated stockpiling areas. These locations will allow material to be delivered to central locations and is not bound by the works programmes at each embankment/flood wall works area.
Loss of Soil and Bedrock Reserves	

Location / Receptor	Description of Mitigation
All Locations	• Where possible the removal of topsoil will be avoided (except where topsoil will need to be removed for the placement of fill under embankments), temporary access roads and stockpiles in which case the topsoil will be stripped and assessed for reuse within the Proposed Scheme ensuring appropriate handling, processing and segregation of material. – The excavated material will be reused for side-slope protection of the new embankments at Rathkip and Shanaghy and Tullyegan Stream and regrading adjacent to the new flood walls. Excavations will be kept to a minimum using shoring or trench boxes. • A Soil Management Plan will be developed by the contractor as part of the CEMP. – This plan will identify actions on site to minimise the loss of topsoil and soils and its potential for erosion such as stabilising side surfaces to prevent erosion through appropriate slope angles. – Dewatering will be carried out where required prior to backfilling to avoid impacts to the water table and backfill material will be of appropriate composition to achieve compaction to avoid seepage of groundwater. The extent of dewatering required will be small and local in nature over a short timeframe and is therefore not expected to result in any significant impact on the hydrogeological regime and no groundwater wells were identified in proximity to the area of proposed works. Soils removed during excavations will be reinstated as soon as possible and suitable inert material will be used as infill to protect the quality of the surrounding subsoil. • Where surplus soil cannot be reused it will be removed off site for treatment, recycling, or disposal at an authorised waste management facility off site. – The Waste Management Plan will address the analysis of waste arisings, methods proposed for the prevention, reuse and recycling of wastes and material handling procedures. • In areas of soft soils and peat, excavate and replace options are proposed to achieve acceptable settlement limits.

Use of Concrete, Fuel, Oils or Chemicals (Accidental Spillage)	
All Locations	• Construction activities will be undertaken in strict compliance with measures set out in CIRIA's Control of water pollution from construction sites. Guidance for consultants and contractors (2001) to minimise the risk of transmission of hazardous substances to adjacent soils, groundwater, and watercourses. • Ensuring that all areas where liquids (including fuel) are stored, or cleaning is carried out, are in designated impermeable areas that are isolated from the surrounding area and within a secondary Containment system, e.g., by a roll-over bund, raised kerb, ramps or stepped access. • The location of any fuel storage facilities shall be considered in the design of the construction compounds. These are to be designed in accordance with relevant guidelines and codes of best practice and will be fully bunded. • Good housekeeping at the site (daily site clean-ups, use of disposal bins, etc.) during the entire construction phase. • Spill kit to be provided and to be kept close to the storage area. Staff to be trained on how to use spill kits correctly.

Encountering Contaminated Soils

Location / Receptor	Description of Mitigation
All Locations	• The appointed contractor will be responsible for regular testing of excavated soils to monitor the suitability of the soil for reuse. – If contamination is encountered suitable measures will be put in place to avoid mobilising the contamination based on best practice for contaminated land management. – Samples of ground suspected of contamination will be tested for contamination by the appointed contractor during the ground investigation. • The management of surplus excavated material or temporarily stored material at the site compounds will be determined by the classification of the material and will be stored in such a manner as to prevent disturbance of any existing contamination that may be present in the material itself or at the site compound. – After temporary storage, contaminated material will be disposed of to a suitably licensed or permitted sites in accordance with the current Irish waste management legislation. Any dewatering required in areas of contaminated ground shall be designed by the appointed contractor to minimise the mobilisation of contaminants into the surrounding environment.
Loss or Damage to Groundwater Dependent Terrestrial Ecosystems (GWDTE)	
Quignamanger Stream	• Any instream works will be undertaken during low flow conditions and water will either be diverted or over pumped. • Instream works are limited to the open section before the water flows under Quay Road. • The lower section of the Quignamanger Stream before the bridge has been designed with an open channel and allowed to flood to support and even improve existing growth of Tufa cascade.
In-Channel Works (Dewatering)	
All Locations	• In channel works and the placement of submersible pumps will be undertaken during low level conditions and within the seasonal restrictions placed on the programme using an appropriate method of water management, e.g., dam and pump-over, temporary piping. • To avoid the use of sheet piles, cofferdams for dewatering will be constructed using geotextile sandbags and silt netting to prevent the influx of water into the workings and also to prevent sediment from entering the river. • New culverts and culvert upgrades are required to be constructed in accordance with the requirements of the OPW and IFI.

10.7 Water Mitigation

10.7.1 Construction Phase

Table 10-9: Water Mitigation Measures for the Construction Stage

Location /Receptor	Description of Mitigation
General Hydrological Measures	
All Locations	• Following consultation with IFI, instream works are restricted to appropriate seasonal windows. • Instream works areas to be left clean of all residual construction waste and potential pollutants before re-flooding. • Backup pumps and generators to be in place where over pumping is taking place to mitigate flood risk. • If no foul sewer connection is available at the compound and works sites, foul water is to be collected and tankered away for treatment as needed. • Construction sequencing to proceed from downstream to upstream on all watercourses insofar as is possible. • The timing of the instream works will reduce the impact on aquatic wildlife and the dewatering requirements. • The timing of the instream works will reduce the likelihood of a high flow event occurring while they are taking place, minimising the potential increase in flood risk by occupation of the floodplain. • Best practices to be adhered to as outlined in publications by CIRIA (2001, 2006a, 2006b) and IFI (Guidelines on protection of fisheries during construction works in and adjacent to waters).
Brusna	• To minimise temporary reductions in floodplain storage on the Brusna, the instream works area cofferdam will have a top-level equivalent to the 50% AEP event. The sequencing will be such that the bridge parapet will be installed before the scour protection.

Location /Description of Mitigation Receptor	
	• The bridge parapet to be installed on the Brusna will be prefabricated to reduce the risk of cementitious pollution on site.
Limit Suspended Solids	
All Locations	• Placing silt fencing between works areas and pathways to watercourses • Passing sediment-laden runoff and dewatering effluent through settling tanks and silt bags prior to discharging to watercourses. • Ensuring dewatering pumps are placed in sumps surrounded by drainage stone. • Prioritising infiltration of silt-laden water to ground through soak pits and infiltration trenches where feasible. • Stockpiling only allowed in designated areas. • Constructing ditches and installing silt fencing around stockpile areas (restricted to the compounds). • Placing sandbags and/or straw bales as check dams in drainage ditches to attenuate runoff and reduce erosion. • Regular road washing to prevent build-up of mud from construction vehicles, which may runoff into watercourses. Wheel wash facilities to be provided at exit points of all compound sites. • Delineating buffer zones of at least 1m along greenfield riparian works areas within which tracking of machinery and storage of construction materials will be prohibited. • Reviewing earthworks programming when prolonged rainfall is forecast.
Limit Cementous Particles	
All Locations	• Having dedicated, suitably prepared concrete washout areas for concrete chute and bowser washout, and cleaning of concrete contaminated plant and materials. Signs will be erected at works sites to inform concrete delivery drivers that washout is not permitted outside these areas. • Ensuring disposal of raw or uncured waste concrete is controlled using approved waste disposal and/or concrete wash-out pits to ensure that seepage to drains from the site is avoided. • Water collected in wash pits will be tankered off-site for treatment at an appropriate licensed facility, ensuring none is allowed to overflow or infiltrate to ground. • Employing best practice in bulk-liquid concrete management addressing pouring and handling, secure shuttering / formwork, ensuring adequate curing times. Where shuttering is used, measures will be put in place to prevent against shutter failure and control storage, handling, and disposal of shutter oils. • Treating cement-laden runoff and dewatering effluent in settling tanks before allowing discharge to watercourses. • Dust suppression using water sprayers during demolition of quay walls or other activities resulting in the creation of cement dust.
Limit Hydrocarbons	
All Locations	• Training operatives in the use of spill kits and keeping spill kits at each work site. • Ensuring all fuels and oils are stored in bunded trays at least 20 m from any watercourses or surface water feature. Trays will be bunded to 110% of the capacity of the fuel volume. • Runoff from construction plant washdown to be collected and passed through an oil-water separator before release into the environment. • Staff parking to be restricted to designated areas. • Refuelling activities to be restricted to designated, bunded areas, at least 20 m from any watercourse or surface water feature. • All construction plant to be regularly maintained and checked for oil and fuel leaks before use. Drip trays to be available on site. • Consideration to be given to the use of biodegradable fuels and oils, where possible.
Limit Construction Debris	
All Locations	• Installing edge protection systems resembling cantilevered scaffolding over the River Moy at Emmet Street to prevent debris and sediment from wall reconstruction falling into the river. The decking shall include a toe board and be underlain by geotextile to trap sediments that wash through the floor boards. The supports for the scaffolding shall not rest within the watercourse. • A floating boom will be deployed underneath the works areas to contain any floating debris or oil spills from spreading. • The construction work and the storage of materials shall take place on the roadside and not on the scaffold overhanging the watercourse
Flood Preparedness	

Location /Receptor	Description of Mitigation
All Locations	• Monitoring the tide forecast. • Developing an emergency response and evacuation procedure for all works areas including removal of potential contaminants and construction plant.
River Moy Main Channel	• Checking water levels at Rahans gauge daily or twice daily during times of high flow when works are occurring in the vicinity of the River Moy.

10.8 Air Quality Mitigation

10.8.1 Construction Phase

Table 10-10: Air Quality Mitigation Measures for the Construction Stage

Location / Receptor	Description of Mitigation
Communication	
All Location	• The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details.
Site Management	
All Locations	• During working hours, dust control methods will be monitored in addition to the daily meteorological conditions. Dry and windy conditions are favourable to dust suspension. The below mitigations must be implemented during working hours and if undertaking dust generating activities during dry and windy weather conditions additional mitigations, localised to the works area, can be put in place as appropriate • A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out.
Preparing and Maintaining the Site	
All Locations	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. • Erect solid screens or barriers around dusty activities (such as stockpiles, excavations, material handling areas etc). or the site boundary that are at least as high as any stockpiles on site. • Avoid site runoff of water or mud, which when dried out can lead to dust emissions.
Vehicles / Machinery and Sustainable Travel	
All Locations	• Ensure all vehicles switch off engines when stationary - no idling vehicles • Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
Works	
All Locations	• Only use cutting, grinding, or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems. • Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. • Use enclosed chutes and conveyors and covered skips. • Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
Waste Management	
All Locations	• Bonfires and burning of materials is prohibited.
Measures Specific to Demolition	
All Locations	• Ensure effective water suppression is used during demolition works. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.

Location / Receptor	Description of Mitigation
Measures Specific to Track out	
All Locations	• Avoid dry sweeping of large areas. • Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. • Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. • Record all inspections of haul routes and any subsequent action in a site log book.
Medium Risk Area Measures	
River Moy and Quignamanger Works Areas	• Develop and implement a stakeholder communications plan that includes community engagement before works commence on site. Community engagement includes explaining the nature and duration of the works to residents and businesses. • Keep site fencing, barriers and scaffolding clean using wet methods. • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site keep covered. • Cover, seed, or fence stockpiles to prevent wind whipping. • Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials. • Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods. • Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place. • Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery. • For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust. • Hard surfaced haul routes (including public roads) must be regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned. • Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). • Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits. • Access gates to be located at least 10 m from receptors where possible.

10.9 Climate Mitigation

10.9.1 Construction Phase

Table 10-11:Climate Mitigation Measures for the Construction Stage

Location / Receptor	Description of Mitigation
All Locations	• Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. • Ensure all plant and machinery are well maintained and inspected regularly. • Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site. • Waste materials will be re-used on site where possible and where re-use is not possible on-site, they will be sent off-site for recycling, re-use or recovery. • Sourcing materials locally where possible to reduce transport related CO_2 emissions.

Location / Receptor	Description of Mitigation
Embodied Carbon Materials	• As a replacement for traditional precast concrete materials made with Portland cement mixes, the Proposed Scheme will use 50% ground granulated blast-furnace slag (GGBS) cement for all structural and non-structural precast structures; • Similarly, all concrete poured in-situ for the Proposed Scheme will consist of 50% GGBS cement; • All reinforcing steel employed on site will be 85% minimum recycled steel; and • The use of these low embodied carbon materials in construction will reduce the construction phase emissions ad comply with the requirements of CAP23 (also a key message in CAP24). • The use of non-concrete assets shall be optimised in the design e.g. gravel footpaths, grassed drains etc. to minimise the need for concrete. • All aggregates shall be secondary aggregates. Virgin aggregates shall only be employed where it is demonstrated that secondary aggregates are unsuitable for structural reasons and/or they are unavailable. • Wherever available, the contractor shall secure construction materials from local/regional sources or sources within the State to minimise material transport emissions and reduce life cycle carbon emissions associated with the construction materials. • For electricity generation at the construction compounds, hydrogen generators or electrified plant shall be utilised over traditional diesel generators. This shall also apply to lower powered mobile plant, as appropriate. • A regular maintenance schedule for all construction plant machinery shall be undertaken to maintain optimum machinery efficiency. • Sustainable timber post fencing will be specified over steel in boundary treatments where possible. • Engines will be turned off when machinery is not in use. • The use of private vehicles by construction staff to access the site will be minimised through the encouragement of use of public transport, encouragement of car sharing, and maximising use of local labour to reduce transport emissions

10.10 Noise & Vibration Mitigation

10.10.1 Preconstruction Phase

Prior to the commencement of construction, the contractor will set out and agree a schedule of noise monitoring with the Local Authority to include the number and locations at which noise monitoring will be carried out, the frequency and duration of the monitoring and the reporting of results.

10.10.2 Construction Phase

Table 10-12: Noise and Vibration Mitigation Measures for the Construction Stage

Location / Receptor	Description of Mitigation
Best Practice Management	
All Locations	Works will be carried out using Best Practicable Means (BPM) to minimise noise and vibration, such measures shall include: • Limiting the hours of construction to daytime only unless absolutely necessary. • Work practices, equipment noise control and screening shall be in compliance with BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise, and BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (together referred to as B.S. 5228). Typical work practices include: – Scheduling of noisy works to normal working hours. – Adopting quiet working methods, using plant with lower noise emission levels. – Adopting working methods that minimise vibration generation particularly with regard to demolition.

Location / Receptor	Description of Mitigation

- Plant such as pumps and generators used on or near sensitive locations will be contained within an acoustic enclosure.
- Plant and machinery used on-site will comply with the European Commission (EC) (Construction Plant and Equipment) Permissible, Noise Levels Regulations, 1988 (S.I. No. 320 of 1988).
- All noise producing equipment will comply with S.I. No 632 of 2001 European Communities (Noise Emission by Equipment for Use Outdoors) Regulations 2001.
- Ensuring that all plant is properly maintained, (mechanisms properly lubricated, faulty silencers replaced, worn bearings replaced, cutting tools sharpened etc.).
- Closing acoustic covers to engines when in use or idling.
- Use of electrically powered equipment in preference to internal combustion powered equipment.
- Use of hydraulic equipment in preference to pneumatic equipment.
- Use of wheeled plant in preference to tracked plant.
- Locating plant as far away from noise and vibration sensitive receptors as practicable.
- Installation of site hoardings or perimeter noise barriers.
- Use of temporary acoustic enclosures or screens around specific noisy static plant.
- Avoiding the unnecessary revving of engines and switch off equipment when not in use.
- Starting-up plant and vehicles sequentially rather than at the same time.
- Keeping internal haul routes well maintained to minimise impulsive noise and vibration from vehicles running over discontinuities in the running surfaces.
- Fitting rubber linings to chutes, hoppers and dumper vehicles to reduce impact noise from material transfer.
- Minimising drop heights of materials.
- Carrying out regular inspections of mitigation measures (BPM audits) to ensure compliance with noise and vibration commitments.
- Providing regular briefings for all site-based personnel so that noise and vibration issues (including the requirement to employ BPM at all locations at all times) are understood and that generic and site-specific mitigation measures are explained and adhered to.
- Ensuring that unloading is carried out within the work site rather than on adjacent roads or laybys.
- Phasing of materials deliveries to be controlled on a ‘just in time’ basis to minimise noise and congestion on roads around the site.
- A formal stakeholder engagement process shall be put in place for the duration of the construction phase, including the provision of information to local residents about noise and vibration monitoring results, works likely to cause significant noise or vibration and/or works planned to take place outside of core working hours.
- Channels of communication between the Contractor, the relevant Planning Section (Local Authority) and residents will be established at project commencement.
- Records of any noise complaints relating to the construction works will be investigated as soon as possible and reported to the Local Authority.

- Where works need to be completed outside normal working hours or where proposed works indicate that the noise or vibration levels may be exceeded, permission for these works must be sought from the Local Authority in advance of any works taking place.
- The application for such works will require a detailed noise control plan and follow up report to be prepared. This plan will include
  - (i) A justification for the works being carried out in the manner proposed,
  - (ii) An assessment indicating what alternatives have been considered,
  - (iii) A statement of the noise control measures from B.S. 5228 to be adopted and how Best Practicable Means will be used to control noise,
  - (iv) An activity specific noise monitoring programme including contact details for persons with the authority to cease working if required by the Local Authority. Each follow up report will include details of any complaints received and the action taken to address such complaints.
- A noise and vibration monitoring programme will be implemented for the duration of the construction phase.
- Full details of the Contractor’s provision for noise and vibration monitoring and procedures including provisions for publication of monitoring results will be submitted to and approved by the Local Authority prior to commencement of work. The Local Authority shall have discretion to vary the monitoring requirements and publication of results during the course of construction.

Location / Receptor	Description of Mitigation
Rock Breaking and Consaws Noise Management	
All Locations	• Full acoustic screening of rock breakers and consaws has been assumed for the assessment of noise from construction activities. – Site hoarding or temporary noise barriers will be used to block line of site from rock breaking or consaw activities where Noise Sensitive Locations (NSLs) are located within 25 m of these activities. – Locations where rock breakers and consaws are used will not be known until construction is in progress and therefore locations of the temporary noise barriers will be determined at construction stage. • A formal stakeholder engagement process will be put in place for the duration of the construction phase, including the provision of information to local residents regarding works likely to cause significant noise or vibration and/or works planned to take place outside of core working hours and also establish a process for handling all enquires including complaints.

10.11 Material Assets: Utilities Mitigation

10.11.1 Construction Phase

Table 10-13: Waste Management Mitigation Measures for the Pre-Construction Stage

Location / Receptor	Description of Mitigation
All Locations	• All existing services will be confirmed prior to construction using service records, further Ground Penetrating Radar (GPR) surveys and slit trenches to ensure that their position is accurately identified before excavation works commence across all sections of the Proposed Scheme. • Enabling works on utilities shall be programmed to maintain connections, or at least minimise downtimes, to public and private customers where conflicts arise. • Early consultation shall be undertaken with service providers to enable providers to reroute their service during non-peak periods to maintain connections to customers. • For unknown utilities encountered during construction works, further liaison with utility providers will be required to establish the preferred solution. • Where diversions, or modifications are required to utility infrastructure, it will be planned in advance by the appointed contractor and adequate notice (not less than 14 days) will be given to all impacted properties. • Where works are required in and around known utility infrastructure, precautions will be implemented by the appointed contractor to protect the infrastructure from damage and avoid unplanned interruptions. • Safety procedures will be put in place to minimise the risk to utility provider personnel and the general public during works on services. Protection measures will include warning signs and markings indicating the location of utility infrastructure, safe digging techniques in the vicinity of known utilities, and in certain circumstances where possible, isolation of the section of infrastructure during works in the immediate vicinity. • Alternative connections shall be provided before any connections are severed. Supply to existing services will be maintained as far as possible during construction. • All proposed relocation / diversion works shall be delivered through the appropriate service provider processes e.g. Uisce Eireann Developer Services – Diversion process. • Works effecting underground services shall be carried out strictly in accordance with the Health and Safety Authority Code of Practice for Avoiding Danger from Underground Services (HSA, 2016). • Works affecting electricity services must also be carried out strictly in accordance with the Code of Practice for Avoiding Danger from Overhead Electricity Lines (ESB, 2019). Where construction equipment passes under lines, goalpost barriers will be established within a lateral distance of 6 m either side of the line, ensuring that tall vehicles will not come into contact with OHLs during construction. A no-tip zone will also be established within 10 m of power lines. All proposed poles will be placed at a sufficient distance from proposed earthworks.

10.12 Material Assets: Waste Management Mitigation

10.12.1 Construction Phase

Table 10-14: Waste Management Mitigation Measures for the Construction Stage

Locations/Description of Mitigation Receptors	
General Measures	
All Locations	• **Source Segregation:** Source separating wastes into dry mixed recyclables, biodegradable, and residual wastes. Clear labelling of waste bins, containers, skip containers and storage areas, including waste stream colour coding and photographs as appropriate. • **Waste Auditing:** The name, address and authorisation details of all facilities and locations to which waste and materials are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility. Records will show material, which is recovered, and which is disposed. • **Appropriate Storage:** Ensuring that all areas where liquids (including fuel) are stored, or cleaning is carried out, are in designated impermeable areas that are isolated from the surrounding area and within a secondary containment system, e.g., by a roll-over bund, raised kerb, ramps or stepped access. The location of any fuel storage facilities shall be considered in the design of the construction compounds. These are to be designed in accordance with relevant guidelines and codes of best practice and will be fully bunded. Good housekeeping at the site (daily site clean-ups, use of disposal bins, etc.) is to be conducted during the construction phase. • **Efficient Removal:** Where possible the removal of topsoil will be avoided, and all topsoil shall be assessed for reuse within the Proposed Scheme ensuring appropriate handling, processing and segregation of material. The excavated material will be reused for side-slope protection of the new embankment at Shanaghy and regrading adjacent to the new flood walls. This plan will identify actions on site to minimise the loss of topsoil and soils. Soils removed during excavations will be reinstated as soon as possible and suitable inert material will be used as infill to protect the quality of the surrounding subsoil. The WMP will address the analysis of waste arisings, methods proposed for the prevention, reuse and recycling of wastes and material handling procedures. • **Hazardous Waste:** If unforeseen waste or hazardous material is encountered during the course of the Proposed Scheme, the appropriate authorities will be notified, and the material will be deposited at an appropriate waste facility. • Concrete waste will be dealt with using an Article-28 notification. These notifications will allow the concrete waste to be fully recovered. By-product notifications (under Article 27 of the EC Waste Directive Regulations 2011) provide an opportunity for reuse of surplus clean soil & stone material arising from construction activity. At the time of construction, options for Article 27 by-product status will be reviewed, subject to waste management and planning requirements being fully met.
Waste Management Plan	
All Locations	• A Waste Management Plan (WMP) shall be prepared by the appointed Contractor to deliver the mitigation presented in this chapter of the EIAR. The WMP will be prepared in accordance with the Best Practice Guidelines for the Preparation of Resources & Waste Management Plans for Construction and Demolition Projects (EPA, 2021). • The WMP will, as a minimum address the following aspects of the Proposed Scheme: – Analysis of the waste arising/material surpluses – Methods proposed for the prevention, reuse, and recycling of wastes – Material handling procedures – Proposals for disposal of waste at appropriately licensed facilities only – Proposals for education and a workforce and plan dissemination programme. – The contractor will be obliged to implement and maintain the measures and actions contained within in the EIAR during the construction phase. Measures to be implemented on site shall include:

10.13 Material Assets: Land & Properties Mitigation

10.13.1 Construction Phase

Table 10-15: Land & Property Mitigation Measures for the Construction Stage

Locations / Receptors	Description of Mitigation
All Locations	• 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. Any necessary permanent restoration of fences, walls, or hedges will be completed without unreasonable delay after works have concluded in the area. • Permanent and temporary landtake will be dealt with by way of compensation. Matters of compensation are dealt with by agreement or through the CPO process. • 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.

10.14 Archaeological, Architectural & Cultural Heritage Mitigation

10.14.1 Construction Phase

Table 10-16 Archaeological Mitigation Measures Construction Phase- All Locations

Locations / Receptors	Description of Mitigation
All Locations	• Licenced archaeological monitoring of all ground reduction/topsoil stripping areas within the design footprint and works areas (including compensatory woodland planting areas, temporary storage/compound areas and in-river works areas), during construction stage. • Any identified built heritage features sited along access routes or immediately adjacent to works areas and/or along streetscapes, shall be protected by temporary hi-visibility fencing measures, where required, to avoid any inadvertent strike damage by vehicular movements. • Detailed surveys of historic walls, steps etc. to be retained as part of the Scheme (mainly at Emmet Street River Boundaries) will be required to enable quantification and preparation of specifications for repair and restoration works. • Any commemorative wall-mounted plaques or free-standing artwork installed by the local community (in particular along Ridgepool Road) will require careful removal, temporary storage, and reinstatement post-works, in consultation with relevant local community groups. • All mitigation measures are subject to statutory prior agreement by National Monuments Service/National Museum of Ireland.

Table 10-17: Moy Area Construction Stage Mitigation Measures

Receptor Ref.	Type	Mitigation Measures
MA030-055---	Castle - unclassified	None required
RPS 31	Dillon Terrace	Protective temporary hi-visibility fencing, if required
RPS 4	Ballina House gate-lodge	Protective temporary hi-visibility fencing, if required

Receptor Ref.	Type	Mitigation Measures
Bachelors Walk walling	Flood walls (west riverbank)	Preservation by record (to include for townland boundary element UCH11): written, digital/photogrammetry survey and drawing, including tie-in with Lower bridge, with photographic built heritage record. To also include sample drawn and survey section through walling prior to removal as part of advance works programme. Re-use of salvaged stone where feasible. Submission of digital record to Irish Architectural Archive (IAA) and Ballina Library On-site archaeological monitoring during wall removal and ground reduction measures for new hard defences, within works area, including in-river
31204099	House	None required
UCH11	Townland boundary	On-site archaeological monitoring during vegetation clearance, adjacent flood wall removal and ground reduction measures for new hard defences, within works area, including in-river.
UCH17	Stone steps	Protective temporary hi-visibility fencing around the steps to avoid damage from access along the berm.
MA030-056001-/ RPS 11/ NIAH 31204105 / UCH15 / UCH10	Lower Bridge	Protective temporary hi-visibility fencing (with 5m buffer at stone culvert area UCH10 if feasible). Removal of existing flood walling by hand at tie-in points with wingwalls, to avoid any inadvertent damage. On-site archaeological monitoring during adjacent flood wall removal and ground reduction measures for new hard defences, within works area, including in-river. Should any sub-surface/underwater features be encountered these will be preserved in situ or by record (full excavation) as appropriate. Hydrological impact of accretion extension on the water flow to be monitored to avoid potential scouring impact to bridge.
MA030-056002- / UCH15	Gatehouse	On-site archaeological monitoring during adjacent flood wall removal and ground reduction measures for new hard defences, within works area, including in-river. Should any sub-surface/underwater features be encountered these will be preserved in situ or by record (full excavation) as appropriate.
Clare Street (Howley Street) walling	Flood walls (east bank)	Preservation by record: written, digital/photogrammetry survey and drawing, including tie-in with Lower bridge, with photographic built heritage record. To also include sample drawn and survey section through walling prior to removal as part of advance works programme. Re-use of salvaged stone where feasible. Submission of digital record to Irish Architectural Archive (IAA) and Ballina Library On-site archaeological monitoring during wall removal and ground reduction measures for new hard defences, within works area, including in-river.
CH01	Stone wall access crossover and steps	Preservation by record: written, digital/photogrammetry survey and drawing, with photographic built heritage record. Re-use of salvaged stone where feasible Submission of digital record to Irish Architectural Archive (IAA) and Ballina Library.
CH02	Stone wall access crossover and steps	Preservation by record: written, digital/photogrammetry survey and drawing, with photographic built heritage record. Re-use of salvaged stone where feasible Submission of digital record to Irish Architectural Archive (IAA) and Ballina Library.
CH03	Access steps and pier (2nd ed OS)	Preservation by record: written, digital/photogrammetry survey and drawing, with photographic built heritage record. Re-use of salvaged stone where feasible. Submission of digital record to Irish Architectural Archive (IAA) and Ballina Library.
CH04	Marian Shrine (1954)	Protective temporary hi-visibility fencing and exclusion zone during works
RPS 8	St Muredach's College (gates and railings)	Protective temporary hi-visibility fencing, if required
31204120	St Muredach's House	None required
31204121	House	None required
31204116	School	Protective temporary hi-visibility fencing, if required
31204114	St Muredach's Cathedral Cross	None required (in Cathedral grounds)

Receptor Ref.	Type	Mitigation Measures
RPS 29	St Muredach's Cathedral	Protective temporary hi-visibility fencing
Cathedral Road walling	Amenity area (east bank)	Preservation by record: written, and photographic built heritage record of existing amenity area in context of landscape setting (Upper and Lower Bridges). Submission of digital record to Irish Architectural Archive (IAA) and Ballina Library. On-site archaeological monitoring during paving/amenity space removal and ground reduction measures for new raised platform, within works area
CH05	Riverside stone paved platform adjacent Upper Bridge	Protective temporary hi-visibility fencing, if required
CH06	Cut dressed stone drainage feature	Protective temporary hi-visibility fencing, if required
31204122	House	None required
31204123	House	None required
31204124	House	None required
31204127	Post Box	None required
RPS 32 & 31204132	House	None required
MA030-074001- / RPS 30 / NIAH 31204112	Religious house - Augustinian friars	Protective temporary hi-visibility fencing
MA030-074002-/ RPS 30 / NIAH 31204112	Building	Protective temporary hi-visibility fencing
MA030-074003- / RPS 30 / NIAH 312041123-	Graveyard	Protective temporary hi-visibility fencing
MA030-091---	Redundant record	Not Applicable
Pearse Street (incl Emmet Street in part)	Architectural Area of Conservation	Protective temporary hi-visibility fencing, if required
NIAH 31204106 / UCH14	Quays – Emmet Street	Preservation by record: written, and photographic built heritage record of existing quay walls with railings in context of existing urban landscape setting (Upper and Lower Bridges). Submission of digital record to Irish Architectural Archive (IAA) and Ballina Library. Careful dismantling and rebuilding of existing ashlar walling and glass panel inserts per detailed Project Conservation Architect specification and instruction; use of match stone for blocking of current rail openings.
NIAH 31204110	Miller's House	None required
RPS 28 / NIAH 31204108	House (Pair)	Protective temporary hi-visibility fencing
NIAH 31204107	Commercial premises	Protective temporary hi-visibility fencing

Receptor Ref.	Type	Mitigation Measures
NIAH 31204090	Heffernan's House	None required
NIAH 31204089	Post Box	None required
RPS 33 / NIAH 31204104 / UCH12	Upper Bridge	Protective temporary hi-visibility fencing. Removal of existing flood walling by hand at tie-in points with southerly wingwalls, to avoid any inadvertent damage. On-site archaeological monitoring during adjacent flood wall removal and ground reduction measures for new hard defences, within works area (including in-river). Should any sub-surface/underwater features be encountered these will be preserved in situ or by record (full excavation) as appropriate. Hydrological impact of accretion extension on the water flow to be monitored to avoid potential scouring impact to bridge.
RPS 35 / NIAH 31204103 / UCH13	Salmon Weir (incl IFI building)	Preservation by record: written, and photographic built heritage record of existing walling at Ridgepool Road in context of existing urban landscape setting (Salmon Weir). Removal of existing flood walling by hand at tie-in points at IFI building, to avoid any inadvertent damage. On-site archaeological monitoring during adjacent flood wall removal and ground reduction measures for new hard defences, within works area, including in-river. Should any sub-surface/underwater features be encountered these will be preserved in situ or by record (full excavation) as appropriate.
CH07	Gallowglasses Massacre 1586	On-site archaeological monitoring during all flood wall removal and ground reduction measures for new hard defences, within works area. Should any sub-surface features be encountered these will be preserved in situ or by record (full excavation) as appropriate.
CH18	Memorial Monument	Careful removal prior to construction stage to a designated storage location for safe-keeping for re-installation upon completion of works. The removal, storage, and re-installation plan to be agreed with local community group and artist in advance of works.
Ridgepool Rd walling	Flood walls (east bank)	Preservation by record: written, digital photogrammetry survey and drawing, including tie-in with Upper Bridge, with photographic built heritage record. To also include sample drawn and survey section through walling prior to removal. Re-use of salvaged stone where feasible. Submission of digital record to Irish Architectural Archive (IAA) and Ballina Library. On-site archaeological monitoring during wall removal and ground reduction measures for new hard defences, within works area, including in-river.
UCH16	Misc Objects (underwater)	On-site archaeological monitoring at all in-river works areas. Should any underwater finds be encountered, these will be removed, recorded, stored, and archived as appropriate.
Barret Street (riverside) railings	Flood walls (west bank)	On-site archaeological monitoring during wall removal and ground reduction measures for new hard defences, within works area
NIAH 31204097	Water Pump	None required

Table 10-18: Brusna (Glenree) Area Construction Stage Mitigation Measures

Receptor Ref.	Type	Mitigation Measures
MA030-075----	Enclosure	None required
MA030-076----	Ringfort - rath	None required
MA030-077---	Ringfort - rath	None required
CH08	Fording point and stepping stones	On-site archaeological monitoring during ground reduction measures for new hard defences, within works area, including in-river
CH09	Weir (River Brusna)	On-site archaeological monitoring during ground reduction measures for new hard defences, within works area, including in-river

Receptor Ref.	Type	Mitigation Measures
CH10	Fording point and stepping stones	None required
UCH08	Townland boundary	Preservation by record: written, digital drawing and photographic archaeological/built heritage record in advance of construction. On-site archaeological monitoring during in-river works.
UCH07	Possible Weir	Preservation by record: written, digital drawing and photographic archaeological/built heritage record in advance of construction. On-site archaeological monitoring during in-river works.
CH11	Rathkip Bridge	Careful routing of site traffic to avoid inadvertent damage to parapets
CH12	Tuck Mill (1st ed OS)	None required
CH13	Flax Mill and sluice (3rd ed OS)	None required
CH14	Rathkip amenity area	Direct liaison with community to scope feasibility and/or need for re-siting at an appropriate alternative location nearby

Table 10-19: Tullyegan Area Construction Stage Mitigation Measures

Location Receptor		Mitigation Measures
31303016	Railway bridge	None required
CH15	Engine House (pumping)	None required
CH16	Rahans bridge	Protective temporary hi-visibility fencing to west parapet, if required
UCH09	Townland boundary	Preservation by record: written, digital drawing and photographic archaeological/built heritage record in advance of construction.

Table 10-20: Bunree/Behy Road Area Construction Stage Mitigation Measures

Receptor Ref.	Type	Mitigation Measures
MA030-055----	Castle - unclassified	None required
MA030-058----	Ringfort - rath	None required
MA030-059----	Megalithic tomb - court tomb	None required
MA030-093----	Quignalecka	None required
RPS 6 / NIAH 31303031	Bridge	None required
NIAH 31303032	Store/ warehouse	None required
UCH02	Townland boundary	Preservation by record: written, digital drawing and photographic archaeological/built heritage record in advance of construction.
UCH03	Townland boundary	On-site archaeological monitoring during in-stream works.
UCH04	Townland boundary	Preservation by record: written, digital drawing and photographic archaeological/built heritage record in advance of construction.
UCH05	Stone culvert	None required
UCH06	Possible stone culvert	None required

Table 10-21: Quignamanger Area Construction Stage Mitigation Measures

Receptor Ref.	Type	Mitigation Measures
MA030-037---RPS 3/ Co007 / NIAH 31303019	Monument	None required
MA030-038----	Enclosure	None required
MA030-039----	Enclosure	None required
RPS 1 / NIAH 31303025	Shipwreck	None required
CH17	Quay View House (levelled)	Preservation by record: written, digital survey and drawing, including tie-in with Upper Bridge, with photographic built heritage record. To also include sample drawn and survey section through walling prior to removal. Re-use of salvaged stone where feasible. Submission of digital record to Irish Architectural Archive (IAA) and Ballina Library. On-site archaeological monitoring during ground reduction measures for new hard defences, within works area. Followed by preservation by record of any sub-surface foundation remains/upstanding footings (written, digital survey and drawing, photographic record and any archaeological -based recording methods as appropriate – contexts, stratigraphy, finds etc).
UCH01	Townland boundary	Preservation by record: written, digital drawing and photographic archaeological/built heritage record in advance of construction.

10.15 Landscape & Visual Mitigation

10.15.1 Construction Phase

Table 10-22 Landscape and Visual Environmental Commitments for the Construction Stage

Receptor Ref.	Mitigation Measures
Visual Receptors **All Locations**	• The storage compound areas will be reinstated to former use upon completion of the works. • Vehicles exiting compound areas will be subject to wheel wash facilities or road sweepers shall be used to maintain clean roads. • Any lighting used will be kept to a minimum, providing for site safety only and shall be directed into the compound and away from adjacent residential properties. Lighting at the site compound shall be shielded to avoid light spill onto adjacent properties and roads. • Prior to commencement of construction, existing trees which are to be retained will be protected with fencing to ensure no works or storage of materials occurs within the root protection zones identified in the tree survey carried out by a qualified arborist. The tree protection works will be in accordance with BS 5837:2012 Trees in relation to construction. • Ash trees suffering from ash-dieback will be removed as part of the scheme.
Vegetation Planting	
River Moy	• The existing ash trees suffering from ash dieback on Ridgepool Road are to be replaced with healthy semi-mature street trees in buildouts between parking spaces. • The existing lime trees on Cathedral Road will be supplemented with trees of the same species and size to complete a continuous avenue of trees along the length of the street. • New street trees to the replace the trees lost on Clare Street located will be planted in special triangular wall build-outs. • Woodland planting suitable for river banks is proposed on the north western part of the River Moy to screen the boatyard and dairy buildings. There is also planting proposed for the riverside park on the north-eastern bank of the River Moy. Here the planting is to be located at a minimum of 3 m behind the existing features of the park. The planting is also intended to compensate for the loss of riverside vegetation in other areas.

Receptor Ref.	Mitigation Measures
Quignamanger Stream	• Planting to compensate for the loss of riverside vegetation in other areas at the junction of Creggs Road and Quay Road.
Bunree / Behy Road Stream	• Significant proportion of the shrubs and trees are to be planted on either side of new open channel in the green area in the Moyvale Park housing estate to the western end of this sub-study area. They are to have thorns to deter access to water
Brusna (Glenree) River	• Planting to compensate for the loss of riverside vegetation in other areas and to enhance the riverbank vegetation cover in this area.
Tullyegan Stream	• native woodland planting will be planted adjacent to a downstream stretch of the Tullyegan Stream in the Rehins Fort housing estate to compensate for vegetation loss due to the Proposed Scheme
Built Vernacular	
All Locations	• Reuse of materials, particularly reclaimed stone in the existing walls, where appropriate, is proposed to help blend the new structures into the surrounding landscape and increase the sustainability of the Proposed Scheme. • Any additional new stone required for the stone facing will be sourced as locally as possible to match or complement the stone to be found on the existing bridges, other surrounding structures and the stone to be reused.

11 ENVIRONMENTAL MONITORING

The Contractor will undertake regular environmental inspections and will provide relevant records to the EnvCoW and ECoW when and as requested.

The EnvCoW will undertake monthly compliance environmental audits. The Contractor is to maintain a record of all completed audits, and records of corrective action and close outs. The EnvCoW will be assisted by the ECoW and the Project Archaeologist to address any findings related to the protection of biodiversity, water quality and heritage, respectively.

Specific measures related to the relevant disciplines are set out below.

11.1 Traffic & Transportation Monitoring

11.1.1 Construction Phase

None Required.

11.2 Population and Human Health Monitoring

11.2.1 Construction Phase

None Required.

11.3 Aquatic Biodiversity Monitoring

11.3.1 Construction Phase

Table 11-1: Aquatic Biodiversity Environmental Monitoring at Construction Stage

Location	Description of Monitoring
Daily Site Monitoring Procedure	
All Locations	• All water quality protection mitigation/ control measures shall be inspected daily by the ECoW during specific construction area working days with any maintenance and repairs carried out immediately. All environmental monitoring and checklists shall be recorded and added to the CEMP on a daily basis.
Weather Monitoring	
All Locations	• Future seven-day forecasts will be checked daily by the ECoW, with construction works programmed accordingly if heavy rainfall is forecast. Prior to any forecast heavy rainfall, the ECoW will ensure that all sediment loss prevention measures and environmental controls are functioning correctly. During and immediately after heavy periods of rain, earthmoving activities must be reviewed with temporary restrictions where necessary.
Visual Checks	
All Locations	• Underpinning the monitoring approach will be daily visual checks conducted by the ECoW to ensure all mitigation measures are implemented as set out in the CEMP. These visual checks will include checks on integrity of all on-site mitigation infrastructure, e.g. silt fencing, attenuation / treatment tanks, on-site drainage flow paths etc. Any required maintenance will be carried out immediately. • Daily visual checks for evidence of silt plumes and oil slicks will also be carried out at watercourses and drainage ditches surrounding works areas. • Daily visual check of turbidity levels and measurements using a calibrated hand-held probe at upstream and downstream of each discrete, active works area. • Daily visual check of pH using a calibrated hand-held probe upstream and downstream at each discrete, active works area. • During daily checks, the ECoW will have powers to stop works if there are obvious sediment plumes observed in watercourses or obvious erodible sediment sources along any pathways from construction areas to drains and/or watercourses. In the instance that works must stop, the source(s) and/or reasons for observed sediment loss will be identified and controls will be

bolstered through additional silt fencing and check-dams or pump-out and removal to a licenced waste treatment facility.

Water Sampling Schedule

All Locations

- The ECoW will collect samples once weekly to be tested for suspended solids at locations upstream and downstream of each discrete construction work area. The downstream sampling point must be in the main channel below the mixing zone for the potential works area run-off so as to reflect assimilated concentrations. The sampling day cannot be altered based on weather conditions, as this will ensure capture of a random sample of rainfall and flow conditions.
- In addition, the ECoW will target a minimum of two high flow events per month and sample suspended solids upstream and downstream of each active works zone. This is to provide an efficacy record for sediment loss control measures during times of active rainfall.

Water Quality Sampling Triggers

All Locations

- The ECoW must tabulate the once weekly upstream and downstream suspended solids results for the freshwater River Moy and the Brusna (Glenree) River as these are the more sensitive receptors. The rolling average of downstream (mixed) suspended solids concentration must not exceed 10 mg/l if the upstream concentration is ≤100mg/l. Suspended solids concentration downstream must not exceed 5% of the upstream level if the upstream concentration is >100mg/l.
- If the emerging rolling average is exceeding these thresholds, then The ECoW will have powers to stop works and instruct additional efforts to be made to reduce suspended sediment sources and control pathways by strengthening the sediment control measures.
- Alternatively, the contractor may employ alarmed turbidity sondes (installed and maintained by a company that specialises in this type of monitoring) to measure real-time turbidity upstream and downstream of the works areas during construction on the Brusna (Glenree). A site-specific, laboratory based correlation between suspended solids levels (mg/l) and turbidity (NTU) must be made for each location. Following that, the sonde notification alarm will be set to indicate when the downstream NTU level (in-channel) exceeds 25 mg/l. If this is higher than the corresponding real-time upstream NTU, all works will cease until the source of the increased turbidity is identified and rectified (if caused by the construction works). If the increase in turbidity is determined to not be attributable to the construction works, the works will continue. The use of alarmed turbidity sondes for the freshwater River Moy (Ridgepool) would not be useful because of its tidal nature (causing water to back up from downstream and confound readings).
- The trigger levels for pH are determined by the allowable concentrations under the Salmonid regulations, i.e. 6.0≤ pH ≤9.0. The mean pH measured in the River Moy at EPA River Station 34M021100 (Ardnaree Bridge) between 2007-2023 is 8.03 (n=270 samples). If a pH >9.0 is measured in the watercourse using a calibrated hand-held probe, all upstream concreting works must cease until the pH has returned to an acceptable level and control measures have been reviewed.

Cofferdam Pump-out Water Management

River Moy, Brusna (Glenree)

Pump-out water is highly likely to be contaminated with suspended solids and potentially concrete/mortar and hydrocarbons. Pump-out water will not be discharged directly to the River Moy or the Brusna (Glenree) without treatment. For the purposes of this project, “appropriate treatment” means:

- For discharges back to the freshwater River Moy (i.e., dewatering at Ridgepool) or the Brusna (Glenree) suspended solids in the final effluent may not exceed 25mg/l and pH must be in the range 6.0-9.0. These thresholds are as stipulated in Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016).
- Ingress waters to containment areas on smaller tributaries where there are culvert works (Bunree, Quignamanger) and flood wall works (Tullyegan) and also at the Brusna (Glenree) River in relation to bridge work cofferdams can be pumped out and discharged via a silt bag 30m away from the watercourse. The discharge point will be a vegetated area of land and will be surrounded by a triple line of staked silt fencing surrounding a circle of staked down strawbales wrapped in terram. Any outflow from the protected discharge point will be visually monitored to ensure there is no escapement of highly turbid water.

In the event that instream works are required downstream of the Lower Bridge (i.e., LHS adjacent to Bachelors Walk), pump-out waters resulting from cofferdam ingress can be returned to the River Moy at a concentration of up to 250mg/l suspended solids. The rationale for this is: (1) such a concentration ought to be attainable relatively rapidly from bank-side settlement treatment train (discharge via tank and silt bag, and (2) within the estuarine river reach there are unlikely to be significant effects on aquatic biota unless downstream (mixed) concentrations exceed 1000mg/l suspended solids for >1 day (Wilber and Clarke, 2001; Boelhert and Morgan 1985 cited Kerr 1995). The discharge TSS limit applied is 25% of this value and there is huge dilution in this part of the tidal River Moy. Visual monitoring for any obvious plumes will be conducted in this reach along with the weekly and monthly

	upstream/downstream sampling as set out in this table above. In the event of highly turbid water escapement from the construction site, the ECoW will have the power to stop works until such time as sediment loss mitigation measures are strengthened.
Biological Water Quality Monitoring	
River Brusna	To remain compliant with WFD objectives, status cannot deteriorate from high. Pre- and post-construction Q-values will be undertaken upstream and downstream of the works area on the River Brusna at locations shown in Figure 9 5.

11.4 Terrestrial Biodiversity Monitoring

11.4.1 Construction Phase

Table 11-2 Construction Phase Biodiversity Monitoring

Location	Description of Monitoring
Quignamanger, River Moy (Clare Street, Bachelors Walk)	• The ECoW will undertake regular monitoring of habitat restoration undertaken to inform any adaptive mitigation measures as required and report such monitoring to relevant parties. All re-instated or indirectly impacted vegetation will be inspected at the completion of construction at which time the ECoW will report to the local authority and other relevant parties on habitat condition. If the condition of the habitat is unsatisfactory the ECoW will determine whether collection of local seed is additionally required to achieve effective vegetation restoration and take appropriate steps to source and sow such seed. Only seeds of native Irish provenance shall be used should such a measure be necessary.
All Locations	• All vegetation removal shall be monitored by the ECoW to ensure there is no disturbance of any protected species e.g. otter, badger, birds, bats, stoat, hedgehog etc. If disturbance occurs, the ECoW will treat each species appropriately, e.g. contact NPWS for otter and bats, relocate hedgehogs, translocation of frog spawn or tadpoles etc.
All Locations	• The ECoW is responsible for all monitoring duties and shall not delegate duties to other staff. The only exception is for unforeseen absence and annual leave cover, in which case the Site Manager shall appoint a suitably qualified back-up ECoW to temporarily fulfil the role. Training for each member of staff on their specific area of responsibility to implement environmental controls shall be carried out before the commencement of that operation. A record of all training carried out shall be maintained in the CEMP.

11.5 Land, Soil, Geology & Hydrogeology Monitoring

11.5.1 Construction Phase

Table 11-3: Land, Soil, Geology and Hydrogeology Environmental Monitoring at Construction Stage

Location	Description of Monitoring
Embankment Monitoring	
Embankment Construction at Rathkip, Shanaghy and along the Tullyegan Stream	• The appointed contractor shall monitor settlement every two to three days using settlement plates during and after embankment construction at Rathkip and Shanaghy and along the Tullyegan Stream.
Excavations Monitoring	
All Locations	• Records shall be kept of all truck movements relating to the removal of site clearance vegetation, topsoil and construction soil. The records shall include quantity, nature/ type and quality of the material and the excavation and disposal locations. Excavations shall be monitored during earthworks to ensure the stability of side slope and that excavated soils meet the Waste Acceptance Criteria (WAC) testing classifications and descriptions.

11.6 Water Monitoring

11.6.1 Construction Phase

Please see **Section 11.3** for details.

11.7 Air Quality Monitoring

11.7.1 Construction Phase

Table 11-4: Air Quality Environmental Monitoring Activities for the Construction Stage

Location	Description of Monitoring
Best Practice Management	
All Locations	• During working hours, dust control methods will be monitored in addition to the prevailing meteorological conditions. • Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks (by visual inspection) of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary. • Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

11.8 Climate Monitoring

11.8.1 Construction Phase

None Required.

11.9 Noise & Vibration Monitoring

11.9.1 Construction Phase

Table 11-5: Noise and Vibrations Environmental Monitoring Activities for the Construction Stage

Location	Description of Monitoring
All Locations	• The schedule of noise monitoring (as agreed pre construction with the Local Authority) include the number and locations at which noise monitoring will be carried out, the frequency and duration of the monitoring and the reporting of results. • No specific requirements for vibration monitoring have been identified, however should this be required a similar process to the above for noise will be followed by the contractor.

11.10 Material Assets: Utilities Monitoring

11.10.1 Pre-Construction Phase

Table 11-6: Material Assets: Utilities Environmental Monitoring Activities for the Construction Stage

Location	Description of Monitoring
All Locations	• Further investigations into utilities will be necessary during the detailed design stage. Methods such as ground penetrating radar (GPR), slit trenching and consultation in the verge areas can be used to verify or locate existing services.

11.10.2 Construction Phase

None Required.

11.11 Material Assets: Waste Monitoring

11.11.1 Construction Phase

Table 11-7: Material Assets: Waste Environmental Monitoring Activities for the Construction Stage

Location	Description of Monitoring
All Locations	• Records shall be kept of all truck movements relating to the removal of site clearance vegetation, topsoil and construction soil. The records shall include quantity, nature/ type and quality of the material, and the excavation and disposal locations. • Records shall be kept on the quantity, nature/ type and quality of all waste leaving the construction site including individual waste and typical construction site waste. • Segregation of construction site waste shall be carefully monitored with waste audits taking place at regular intervals.

11.12 Material Assets: Land & Properties Monitoring

11.12.1 Construction Phase

None Required.

11.13 Archaeological, Architectural & Cultural Heritage Monitoring

11.13.1 Construction Phase

Table 11-8: Archaeological, Architectural & Cultural Heritage Environmental Monitoring Activities for the Construction Stage

Location / Receptor	Description of Monitoring
All Locations	• Licenced archaeological monitoring of all ground reduction/topsoil stripping areas within the design footprint and works areas (including compensatory woodland planting areas, temporary storage/compound areas and in-river works areas). • On-site Licenced archaeological monitoring during wall removal and ground reduction measures for new hard defences, within works area, including in-river works. • On-site archaeological monitoring during vegetation clearance, flood wall removal and ground reduction measures for new hard defences, within works area, including in-river. • Should any sub-surface/underwater features be encountered these will be preserved in situ or by record (full excavation) as appropriate. Followed by preservation by record of any sub-surface foundation remains/upstanding footings (written, digital survey and drawing, photographic record and any archaeological -based recording methods as appropriate – contexts, stratigraphy, finds etc). • Hydrological impact of accretion extension on the water flow to be monitored to avoid potential scouring impact to following bridges (MA030-056001-/ RPS 11/ NIAH 31204105 / UCH15 / UCH10) (. RPS 33 / NIAH 31204104 / UCH12).

11.14 Landscape & Visual Monitoring

11.14.1 Construction Phase

Table 11-9: Landscape and Visual Environmental Monitoring Activities for the Construction Stage

Location / Receptor	Description of Monitoring
All Locations	Protection of the existing trees to be retained will be monitored during construction in accordance with BS 5837:2012 Trees in relation to construction.

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