BALLINA FLOOD RELIEF SCHEME

Volume D: Natura Impact Statement

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Prepared by:	Prepared for:
RPS	**Mayo County Council**

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

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

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EXECUTIVE SUMMARY

RPS were commissioned by Mayo County Council to prepare a Natura Impact Statement (NIS) with respect to the Ballina Flood Relief Scheme. A Stage 1 – Screening Assessment was undertaken for the Proposed Scheme (RPS, 2024).

The Proposed Scheme was subject to an Appropriate Assessment screening which confirmed that in the absence of mitigation measures the Proposed Scheme works have the potential to result in likely significant effects on European Site(s), either alone or in combination with other plans or projects. Likely significant effects were identified on four European Sites: River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA. As a result, an NIS has been prepared, which considers whether the Proposed Scheme will result in adverse effects on the integrity of any European Site and, where necessary and possible, identifies appropriate mitigation to address such effects.

The Appropriate Assessment screening for the Proposed Scheme concluded that the construction and/or operational and maintenance phases of the Proposed Scheme has the potential to affect the River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA via hydrological, hydrogeological, direct disturbance or indirect disturbance pathways on qualifying interest (QI) or Special Conservation Interest (SCI) species. The screening concluded that there is potential for likely significant effects on the following QIs and SCIs: sea lamprey, brook lamprey, salmon, otter, white-clawed crayfish, estuaries, mudflats and sandflats not covered by seawater at low tide, Atlantic salt-meadows, harbour seal, ringed plover, golden plover, grey plover, sanderling, dunlin, bar-tailed godwit, curlew, redshank, wetland and waterbirds, tufted duck, common scoter, common gull and Greenland white-fronted goose.

To reduce the effects on the River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and/or Lough Conn and Lough Cullin SPA that are likely to arise as a result of the Proposed Scheme, mitigation measures to be implemented have been set out in this NIS. These mitigation measures set out clear commitments for surface water management, otter protection measures, noise and vibration protection measures and measures to prevent environmental incidents and accidents, amongst others, during construction of the Proposed Scheme. A number of operational and maintenance phase mitigation measures have also been outlined.

Assessments of adverse effects on each of these QIs and SCIs were carried out with reference to their conservation objectives with respect to the River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA. Following a comprehensive evaluation of the potential direct, indirect and cumulative effects on the QIs and SCIs of the River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA and the implementation of the proposed mitigation measures, it has been concluded by the authors of this report that all reasonable scientific doubt has been removed and that there will be no adverse effects on the integrity any European Site as a result of the Proposed Scheme either alone or in-combination with other plans or projects.

1 INTRODUCTION

1.1 Purpose of Document

RPS was commissioned by Mayo County Council to complete a Natura Impact Statement (NIS) to inform the Competent Authority's Appropriate Assessment (AA) with respect to the proposed Flood Relief Scheme (FRS) within Ballina town, (Co. Mayo) (hereafter collectively referred to as the "Proposed Scheme").

The need for preparing an NIS was confirmed following the completion of an AA Screening for the Proposed Scheme which concluded that likely significant effects (LSE) on European Sites during its implementation could not be ruled out. Both the AA Screening and NIS have been prepared with reference to the European Communities (Bird and Natural Habitats) Regulations 2011, as amended, which transposes into Irish law the EU Habitats Directive.

This report assesses whether the proposed development will have an adverse effect on the integrity of any European Site on the basis of objective evidence and in view of best scientific knowledge and with reference to published Conservation Objectives (COs) of those Sites.

This document has been prepared by qualified and experienced RPS ecologists with specialist inputs as needed, particularly with respect to aquatic ecology.

The document is structured as follows:

- **Section 2 – Legislative Context and Guidance** sets out the Guidance and Approach which was used to complete Stage 2 – Appropriate Assessment
- **Section 3 – Project Description** sets out the Proposed Scheme which has been subject to Stage 1 – Screening Assessment.
- **Section 4 – Methodology** summarises the methodology of the ecological survey work which has been completed to inform Stage 1 – Screening Assessment.
- **Section 5 – Existing Environment** summarises the findings of the ecological survey work which has been completed to inform Stage 1 – Screening Assessment.
- **Section 6 – Stage 2 Natura Impact Statement** assesses whether the Likely Significant Effect (LSE) identified at Stage 1 will result in any adverse effects on the integrity of any European Site and considers in-combination effects.
- **Section 7 – Mitigation Measures** sets out any mitigation measures which will be implemented to avoid adverse effect on the integrity of those European Sites.
- **Section 8 – Monitoring** sets out the monitoring requirements for the Proposed Scheme which checks that proposed systems are operating as intended.
- **Section 9 – Residual Effects** which states the final predicted or intended effects on the Conservation Objectives of each identified European Site after mitigation measures have been implemented.
- **Section 10 – NIS Concluding Statement**

2 LEGISLATIVE CONTEXT AND GUIDANCE

2.1 Legislative Context

This section sets out the international and national legislation which details the requirements for Natura Impact Statements where there is potential for significant environmental effects on Natura Sites and their qualifying interests from the construction, operational or implementation of projects and/or plans.

2.1.1 European Context

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as "The Habitats Directive", provides protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of a European Union (EU)-wide network of sites known as Natura 2000 (hereafter referred to as 'European Sites').

The requirements of the Directive have been transposed into Irish legislation principally through the Birds and Natural Habitats Regulations (BNHR) 2011, as amended and Part XAB of the Planning and Development Act 2015 (as amended).

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of European Sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (AA):

> *"Any plan or project not directly connected with or necessary to the management of the [European] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."*

Article 6(4) states:

> *"If, in spite of a negative assessment of the implications for the [European] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted."*

Each European Site has assigned COs and a list of Qualifying Interest (QIs) and/or species of Special Conservation Interest (SCIs). The CO concept appears in the eighth recital of Directive 92/43/EEC which reads: "*whereas it is appropriate, in each area designated, to implement the necessary measures having regard to the conservation objectives pursued*". Article 1 then explains that "*conservation means a series of measures required to maintain or restore the natural habitats and the populations of species of wild fauna and flora at a favourable status*".

The National Parks and Wildlife Service (NPWS) publish conservation objectives for European Sites on their website. NPWS advise in the general introductory notes of their site-specific conservation objectives (SSCO) series publications, that an appropriate assessment based on their "*published conservation objectives will remain valid even if the conservation objective targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out*". NPWS advise that to assist in that regard, it is essential that the date and version are included when objectives are cited.

2.1.2 National context

In the context of the Proposed Scheme, the requirement (to screen) for AA under the Habitats Directive is transposed by the Planning and Development Acts (2010 to 2018 as amended); 'the Planning Acts', and the Planning and Development Regulations (2010 to 2018, as amended).

Under Section 177U (4) of the Planning Acts', the competent authority shall determine that an AA of a proposed development is required if it cannot be excluded, on the basis of objective information, that the

proposed development, individually or in combination with other plans or projects, will have a significant effect on a European Site(s).

Under Section 177V (2) the competent authority shall take into account each of the following matters in their AA determination:

(a) The NIS (defined below)

(b) Any supplemental information furnished in relation to an NIS

(c) If appropriate, any additional information sought by the planning authority and furnished by the applicant in relation to a NIS

(d) Any additional information furnished to the competent authority at its request in relation to a NIS

(e) Any information or advice obtained by the competent authority

(f) If appropriate, any written submissions or observations made to the competent authority in relation to the application for consent for proposed development

(g) Any other relevant information.

Under the Planning Acts (177T), an NIS is defined as *"a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed development, on its own or in combination with other plans or projects, for one or more than one European site, in view of the conservation objectives of the site or sites'. The NIS must 'include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for one or more than one European site in view of the conservation objectives of the site or sites".*

2.2 Guidance and Approach

This document has been prepared with reference to the following guidance and principles.

The principal national and European guidelines have been followed in the preparation of this document. The following list identifies these and other pertinent guidance documents:

- DoEHLG (2009, rev. 2010) *Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities.* Department of the Environment, Heritage and Local Government
- EC (2000) *Communication from the Commission on the Precautionary Principle.* Office for Official Publications of the European Communities, Luxembourg
- EC (2006) Nature and biodiversity cases: Ruling of the European Court of Justice
- EC (2007) *Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC* – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission.
- EC (2013) *Interpretation manual of European Union Habitats.* Version EUR28. European Commission, DG Environment, Nature ENV B.3
- EC (2014) Article 6 of the Habitats Directive: Rulings of the European Court of Justice
- EC (2019) Commission notice "*Managing Natura 2000 sites, The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*". Brussels, 21.11.2018, C (2018) 7621 final. European Communities, Luxembourg
- EC (2020) Commission Notice 7730 '*Guidance document on wind energy developments and EU nature legislation*', Office for Official Publications of the European Communities, Luxembourg
- EC (2021a) (Amended) *Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC,* Office for Official Publications of the European Communities, Luxembourg. European Commission
- EC (2021b) (Amended) Commission notice "*Guidance document on the strict protection of animal species of Community interest under the Habitats Directive*". Brussels, 21.10.2021, C (2021) 7301 final. European Commission

- NPWS (2013a) *Ireland's Summary Report for the period 2008 – 2012 under Article 12 of the Birds Directive*. National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland
- NPWS (2019a) *The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview*. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill
- NPWS (2019b) *The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments*. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill
- NPWS (2019c) *The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments*. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill
- OPR (2021) *Practice Note PN01: Appropriate Assessment Screening for Development Management.* Office of the Planning Regulator, Dublin 7, Ireland.

The Commission's 2018 Notice (EC, 2019) and both European and national case law have been reviewed and have informed the approach and content of this document in relation to key issues including the interpretation of concepts of site integrity, the absence of lacunae and the use of mitigation measures, amongst others.

3 PROJECT DESCRIPTION

This section describes the site and its location of the Proposed Scheme.

3.1 Location of the Proposed Scheme

The River Moy flows through Ballina and is the main source of flooding in the town. Ballina is located just upstream of the Moy Estuary and the reach of the Moy downstream of the Salmon Weir in Ballina 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 current Proposed Scheme includes flood relief measures in Ballina for the River Moy and the following tributaries: Quignamanger Stream, Bunree Stream, Brusna River and the Tullyegan Stream.

The area in which the current Proposed Scheme will be located (red-line boundary area) is shown in **Figure 3-1.** This also includes the pre-development 1% AEP (Annual Exceedance Probability) flood extents.

The area of the proposed works is also shown in **Figure 3-2** and includes the area where physical works will be undertaken as part of the construction phase of the Proposed Scheme including, the location of areas required for:

- The development of flood defences i.e. flood walls, embankments including adjacent areas required for the construction of such defences.
- The upgrade of existing flood management infrastructure e.g. culverts, including areas to be disturbed during such upgrade activities.
- Compound areas to be used during the construction phase of the Proposed Scheme.
- Road lane closures required to facilitate construction works.

The overall area footprint to be disturbed by the Proposed Scheme including temporary compounds is approximately 12.7 ha.

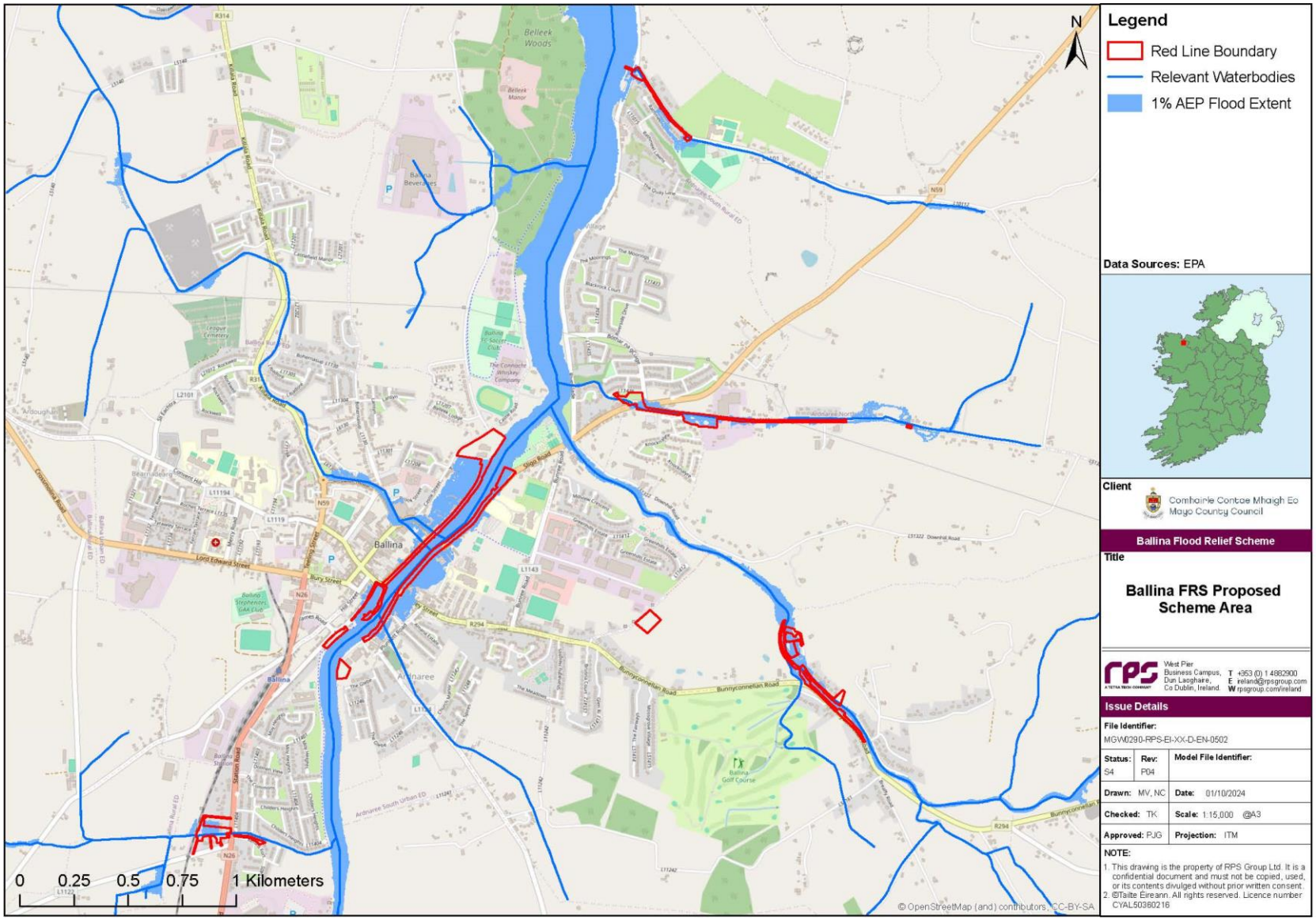

Figure 3-1 Ballina Flood Relief Scheme (FRS) Scheme Area (Including 1 % AEP Flood Risk Areas)

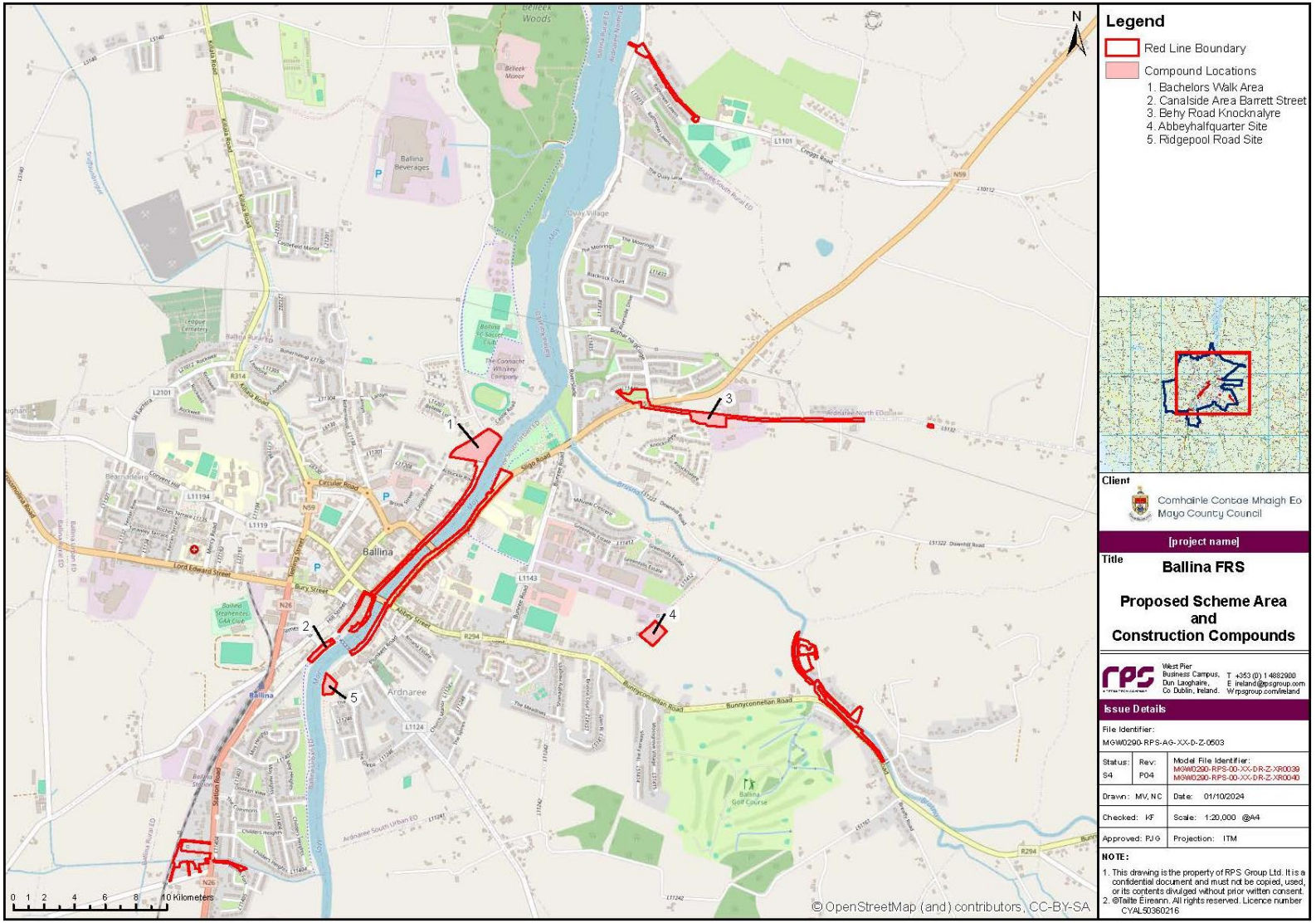

Figure 3-2: Ballina FRS Area of Proposed Works and Construction Compounds

3.2 Site Description

Ballina Town is the second-largest town in County Mayo with a population of 10,409. It lies at the mouth of the River Moy near Killala Bay in the north of the county. It is a designated Key Town (Tier 1) as per the Mayo County Development Plan (MCDP) 2022-2028 and functions as the main economic driver for a large area of north Mayo. Due to its proximity to County Sligo, the town also serves as the main economic, commercial, social and educational centre for parts of west Sligo. This makes Ballina an important asset to the wider region, alongside its historical, ecological and archaeological significance, and tourism potential.

The River Moy rises in Sligo's Ox Mountains and is roughly 100 km long. For the greater part of its length, it flows south-westward, entering County Mayo and flowing near Swinford before passing through Foxford then turning north near the village of Kilmore and heading for Ballina Town, where it enters the Atlantic Ocean at Killala Bay along the Mayo-Sligo border.

Almost the entire freshwater element of the River Moy is a designated Special Area of Conservation (SAC), along with its tributary the Brusna River which also forms part of the Proposed Scheme. The River Moy SAC (Site Code: 002298) contains habitats and species listed in Annexes I and II of the EU Habitats Directive.

The River Moy is known for its exceptional salmon fishery, with Ballina referred to as "*The Salmon Capital of Ireland*". The River Moy is Ireland's most productive salmon river, with over one fifth of all salmon angling catch nationally (23 %) caught by rod and line on the River Moy System in 2020. Salmon fishing is a major component of tourism in Ballina, particularly at the Ridgepool and Cathedral Beat in the centre of the town.

There are two Architectural Conservation Areas (ACAs) within the Scheme Area as follows:

- Crocketstown ACA which includes the Ballina Quay
- Pearse Street ACA located closer to the centre of town which includes the historic commercial core of the town centre and features several historic laneways that run down to Emmet Street and the River Moy.

Of note are the bridges, Salmon Weir on the River Moy and the adjacent Ardnaree Abbey, located along Cathedral Road.

The Lower Bridge (originally New Bridge) is a four-arch road over river bridge built 1833-35 spanning the River Moy. The Upper Bridge (originally Arran Bridge) is a five-arch road over river bridge built 1835-36, spanning the River Moy at the southern end of Ballina town environs. Further south, the Salmon Weir which is recorded by Lewis *c.* 1837 as extant (and rebuilt) is an important element of the built heritage fabric of Ballina. It has been recently subject to improvement/restoration works in 2010/11.

Sections of reaches along the River Moy are heavily modified. The Salmon Weir footbridge, Salmon Weir, Upper Bridge and Lower Bridge all span the entire width of the river in Ballina town and thus influence the flow regime within the river channel. The Salmon Weir pedestrian bridge is supported by a single pier in the centre of the channel, while the Salmon Weir itself spans 9 piers in total. There are also several bridges and structures to support road and rail routes across the tributaries to the River Moy.

The tributaries which form part of the Proposed Scheme are also heavily modified with culverts, except for the Brusna River. The Quignamanger Stream additionally has an existing diversion culvert operating in the lower reach before discharging into the Moy via a culvert under Quay Road. The Bunree Stream conveys flow via numerous culverts. The Tullyegan Stream incorporates several short culverts.

3.3 Scheme Design

3.3.1 Objectives

The aim of the Proposed Scheme is to protect the community of Ballina from flooding. The Target Standard of Protection (SoP) for areas at risk of flooding within the community is 1 % of the AEP for fluvial areas and 0.5 % AEP for coastal flood events. The design life of the Proposed Scheme is 50 years. The adaptability of the Proposed Scheme to climate change has also been considered (see **Section 3.3.4**).

Where possible, opportunities for the enhancement of the amenity value of the river have also been identified. The importance of Ballina in terms of natural, built and cultural heritage, the River Moy and Brusna River as SACs, as well as the value of the River Moy in terms of salmon production and the significance of angling for the town of Ballina, have been recognised as part of the development of the Proposed Scheme.

3.3.2 Potential flood risks

Flood modelling undertaken by RPS showed that there is the potential for flooding in Ballina from the River Moy and the following tributaries: Quignamanger Stream, Bunree Stream, Brusna River, Tullyegan Stream and Knockanelo Stream (RPS, 2023). Each area is considered a hydraulically discrete area. The lower reaches of the tributaries may be influenced by flood levels on the River Moy; however, those levels are not expected to change significantly with the application of flood relief measures. The flows into the River Moy from the tributaries are considered small relative to the flows in the River Moy. It is not expected that changes in flows on the tributaries will alter the flood risk and mechanisms on the River Moy.

An overview of the areas where flood risks have been identified in Ballina are shown in **Figure 3-1** and the proposed works for each area are indicated in **Figure 3-8** to **Figure 3-12**. Table 3-1 presents the receptors at risk during the design flood event.

Table 3-1: **Receptors at Risk**

	Residential properties	Commercial properties	Other receptors at risk
Moy	198 fluvial (149 coastal)	65 fluvial (35 coastal)	N59 Sligo Road, Ridgepool Road, The Brook Road, Abbey Street, Cathedral Road, Cathedral Close, Clare Street, Riversdale Road, Barrett Street, Tolan Street, Pawn Office Lane, Moy Lane Pairc an Easpaig Ballina Quay Play Park (confluence with Brusna) 2 Wastewater Pumping Stations Ashpool car park
Quignamanger	20	1	Playing field Creggs Road, Quay Road Wastewater Pumping Station
Bunree	5	3	Behy Road, N59 Sligo Road, Quignalecka Road Water Pumping Station
Brusna	3	0	R294, Shanaghy Heights road, N59 Sligo Road
Tullyegan	2	0	-
Total	**228**	**69**	-

3.3.3 Freeboard

A freeboard assessment was undertaken to determine a suitable freeboard for each reach of flood defence (RPS, 2023). Freeboard is usually applied to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood, such as uncertainty of the effect of bridges, hydrological uncertainty, uncertainty in model roughness, etc. The Preferred Scheme includes an allowance for freeboard to account for this uncertainty in the analysis. For the 1% AEP flood event, a percentage increase of up to 101 % was applied to the Quignamanger, Bunree, Tullyegan and Knockanelo stream inflows. For the Brusna River, a 37 % increase was applied to the 1 % AEP inflows, and for the River Moy, a 5 % increase was applied to the 1 % AEP inflows. The final design will account for effects of superelevation on bends where required.

In general, a higher freeboard is required than the standard heights used in Ireland (0.3 m for flood walls and 0.5 m for embankments) along the smaller watercourses. Where the freeboard assessment identified reaches of defence with a freeboard of less than the standard freeboard height, the standard heights were retained. Where culverts have been identified as the emerging preferred option, the hydraulic model was used to up-size the culverts to be able to convey the freeboard flows. The freeboard requirements are shown in Table 3-2.

Table 3-2: Freeboard Requirements

Watercourse	Emerging preferred option	Freeboard requirements
Moy	Flood walls	Freeboard assessment showed that the nominal freeboard of 0.3 m is adequate
Quignamanger	Culvert upgrade and flood walls	Increase culvert upgrade from 1.2 m diameter to 1.5 m diameter. Freeboard to certain reaches of flood wall increased to 0.4 m
Bunree	New culvert	Increase the lower section of the new culvert from 1.2 m diameter to 1.5 m diameter.
Brusna	Flood walls and embankments	Freeboard to certain reaches of flood wall increased to 0.44 m and flood embankment increased to 0.64 m. The length of defence increased by approximately 20 m.
Tullyegan	Flood walls	Average freeboard increased to 0.62 m. Length of defence increased by approximately 60 m.

3.3.4 Scheme Resilience to Climate Change

Under present-day conditions, the River Moy at Ballina is classified as tidally influenced due to its proximity to Killala Bay. Flooding in Ballina primarily occurs due to two main factors: the extremely high tide levels in the River Moy and the combined impact of intense upstream fluvial flows. The main flood mechanisms on the tributaries are short, intense heavy rainfall events. The presence of obstructions or debris in the river channel or at structures leads to water overflow onto the floodplain, and this flow backs up when met with elevated water levels in the River Moy.

Climate change projections have been considered for two potential future scenarios, which can be taken to represent the year 2100:

- The Mid-Range Future Scenario (MRFS) represents the central projections for the impact of climate and other future catchment changes, such as urbanisation and land-use changes, on Flood Risk Management in Ireland. Peak flows are anticipated to increase by 20 % under the MRFS.
- The High-End Future Scenario (HEFS) represents projections at the high end of what could happen if the worst climate and catchment changes are realised. For the HEF Scenarios, peak flows are projected to rise by 30 %.

These predicted increases are anticipated across all tributaries within the catchment.

The adaptability of the Proposed Scheme to the pressures of climate change conditions has been assessed to determine the design changes of the Proposed Scheme to provide for climate change and future proofing following the current design life of 50 years (RPS, 2023b):

- **River Moy –** Constructing the wall foundations to accommodate a wall height to the 1 % AEP HEFS SoP in case the walls have to be raised to reach the SoP in the future.
- **Quignamanger Stream –** The design is cognitive that an additional flood bypass culvert may be required in the future to convey the 1 % AEP HEFS flow. Modelling indicates a second circular culvert of 1.5 m diameter discharging direct to the River Moy is required but this is subject to detailed design.
- **Bunree Stream –** Upsizing the proposed culvert to convey the 1 %AEP HEFS flow. Modelling indicates a circular culvert of 1.5 m diameter, changing into a 1.8 m diameter is required but this is subject to detailed design.
- **Brusna River –** Constructing the wall foundations to accommodate a wall height to the 1 % AEP HEFS SoP in case the walls have to be raised to reach the SoP in the future and securing land to accommodate a larger flood embankment to the 1 % AEP HEFS SoP.
- **Tullyegan Stream –** Constructing the wall foundations to accommodate a wall height to the 1 % AEP HEFS SoP in case the walls have to be raised to reach the SOP in the future and securing land to accommodate a larger flood embankment to the 1 % AEP HEFS SoP.

3.4 Overview of the Proposed Scheme

The following sections provide an overview of the works to be carried out on the River Moy and the tributaries. A summary of the Proposed Scheme is provided in Table 3-3 with a description of the works to be carried out described in the sections that follow.

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 3-3: 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 existing 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
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.
Bunree Stream	Existing culverts and open reaches along Behy Road from Behy Business Park to N59	New culvert
	Existing culvert downstream of N59 in public open space	Replace existing culvert with open channel
		Regrade channel bank where possible to achieve a stepped/gentler slope
	Field bridge	New culvert
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
Tullyegan Stream	Between N26 and railway crossing	Flood walls and embankment

3.4.1 River Moy

The River Moy as it flows through Ballina Town is unable to convey the flow during a flood event. Several properties in Ballina Town are thus at risk of flooding. This is contributed to by both fluvial flows down the river and tidal surge up the river as far as the Salmon Weir. The following roads are impacted by the modelled flooding along with the properties in that area; Ridgepool Road, Barrett Street, Cathedral Road,

Emmet Street, Clare Street and Bachelors Walk. Clare Street includes Howley Terrace but will be referred to as Clare Street in this assessment. Refer **Figure 3-3** to **Figure 3-7** for examples of the existing flood defences along the River Moy.

Figure 3-3 River Moy Existing Infrastructure – Looking D/S from the Salmon Weir Pedestrian Bridge (RHS – Ridgepool Road/ LHS – Ballina Manor/Apartments)

Figure 3-4 River Moy Existing Infrastructure – Looking U/S from the Upper Bridge (LHS – Ridgepool Road/ RHS – Ballina Manor/Apartments)

Figure 3-5 River Moy Existing Infrastructure – Looking U/S from Cathedral Road Plaza (RHS – Emmett Street/ LHS – Cathedral Road)

Figure 3-6 River Moy Existing Infrastructure – Looking D/S from the Lower Bridge (RHS – Clare Street/ LHS – Bachelors Walk)

Figure 3-7 River Moy Existing Infrastructure – Looking U/S from Clare Street (RHS – Bachelors Walk/ LHS – Clare Street)

The fluvial design event is the dominant cause of flooding from the Salmon Weir to approximately the mid-point between Upper Bridge and Lower Bridge. Downstream of this point, tidal surge is the dominant cause of flooding.

The proposed works on the right-bank of (looking downstream) the River Moy (**Figure 3-8**) include flood walls of up to 1.25 m height along the left and right banks of the river. This is an increase of up 0.5 m on the existing walls. The new walls (replacing the existing walls) will start upstream of the Salmon Weir, at the pedestrian bridge and finish at Clare Street at Tom Ruane Park. Where required flood defence heights are lower along the section of Ridgepool Road opposite the Inland Fisheries Ireland (IFI) Building, a lower height (700 mm approximately) wall will be constructed with a railing placed above the wall.

The existing Weir Building on Ridgepool Road will form part of the flood defence measures and will be waterproofed as necessary. Public access to the religious grotto on Clare Street will also be maintained by placing the wall behind the structure.

Flood defences on the left-bank of the river will begin at the existing flood defence at the Ballina Arts Centre and end at the old Ballina Dairies site north of Bachelors Walk. New walls will be constructed to replace existing walls where required. Glass walling in combination with flood walling will be used in front of the Ballina Manor Hotel/ apartments and the IFI Building to maintain views from affected properties. At Emmet Street the existing railings will be replaced with a combination of new flood walls and glass walls. In the location of existing historic steps, 900 mm glass walls will be installed. The existing walls on Emmet Street will be carefully dismantled and reconstructed due to their historical significance. The proposed works on the left-bank of the river (looking downstream) on the River Moy include flood walls of up to 1.3 m height along the left banks of the river. This is an increase of up 0.6m on the existing walls.

Along the left bank of the River Moy adjacent to the Salmon Weir and the Ballina Arts Centre, realignment of the groyne, as agreed with IFI, is proposed as a fisheries enhancement measure. Biodiversity enhancement will be provided along the River Moy in the form of bird boxes and bat boxes.

The pavement along these sections will be removed and replaced to accommodate the foundation of the new walls and drainage. The route of the flood walls will generally follow the line of existing walls and will tie

into existing walls, bridges and/or high ground. The existing walls will therefore need to be removed to allow new flood walls to be constructed. This will be required along the banks of Ridgepool Road, Cathedral Road, Clare Street and Bachelors Walk.

Mayo County Council (MCC) is in the process of developing a Public Realm Scheme for the town of Ballina. The Proposed Scheme provides for a new public open space area on Cathedral Road which will be incorporated into the broader Ballina Public Realm in the future (see **Section 3.5.3**).

Existing angling access points along the right bank will be maintained post construction. An additional angling access point will be provided immediately downstream of the Weir Building. A wheelchair accessible angling access point will be provided on Clare Street.

3.4.2 Quignamanger Stream

The Quignamanger is a small watercourse with numerous culverted sections with a maximum diameter of 0.7m. It has been modified further with the addition of a storm diversion culvert. The Quignamanger stream is dry under ordinary low flows as the majority of upstream flows are diverted down the 0.9 m diversion culvert, re-joining the Quignamanger Stream just upstream of Quay Road. During a flood event the diversion culvert reaches capacity resulting in out of bank flooding, which travels overland through Rathmeel Lawns housing estate and Creggs Road. Additional head losses were identified at the diversion culvert's outlet where a weir and flap valve system are located. The culvert which conveys flow under Quay Road is also undersized.

The proposed works involve the replacement of the existing 0.9 m piped diameter diversion culvert with a larger 1.5 m diameter piped culvert for part of the upstream section and a 2 m wide by 1 m deep box culvert along the downstream section to minimise the amount of regrading required in the stream. The existing flap valve at the point where the culvert discharges back into the river channel, just before intersection of Creggs and Quay Roads will also be removed. The new diversion culvert will be designed to only operate during high flows and ordinary low flow to the main channel will be reinstated.

Flood walls will be installed along the open reach of the channel upstream of Quay Road. The open reach has been planned to allow for the protection of sensitive habitat located in this area (Petrifying springs with tufa formation (Cratoneurion) [7220] , which is a priority Annex I habitat, but it is not a QI of any European Sites in the Zone of Influence of the Proposed Scheme)When the lower reach of the Quignamanger channel upstream of the existing Quay Road culvert is graded down into the new enlarged Quay Road culvert, rather than leaving a uniformly sloping channel, the design shall include a series of fixed rock or concrete baffles or step-pools (ensuring a low- flow notch) using natural rock and cobble to create turbulent flow. The flood walls will have a maximum height of 1.1 m. The culvert under Quay Road which conveys water to the River Moy will also be upgraded to a 2 x 1 m box culvert. The existing culvert downstream of Quay Road will be removed to allow for an open channel discharge to the River Moy. The proposed works to be carried out on the Quignamanger Stream are shown in **Figure 3-9**

3.4.3 Bunree/Behy Road Stream

The Bunree is a small watercourse with numerous culverts of various shapes and sizes. Many of these culverts are undersized and constrict the flow so that out of bank flooding occurs upstream of the inlets. Out of bank flooding therefore occurs in numerous locations along Behy Road.

The proposed works (see **Figure 3-10**include the installation of a new culvert which would replace the existing culvert and the existing sections of open channel. The culvert will follow the existing stream channel. A new 1.5 m culvert will be installed at the upstream section of the works from Behy Business Park. The section near the Knocknalyre housing estate will be increased to a 1.8 m diameter culvert. A 1.5 m diameter piped culvert will also be installed to upgrade an existing field bridge access upstream of the works. A culverted section downstream of the N59 at Moyvale Park, which causes a constriction to flood flows, will be removed and the open channel reinstated. The RHB of this open channel will be regraded to form a gentle/stepped slope.

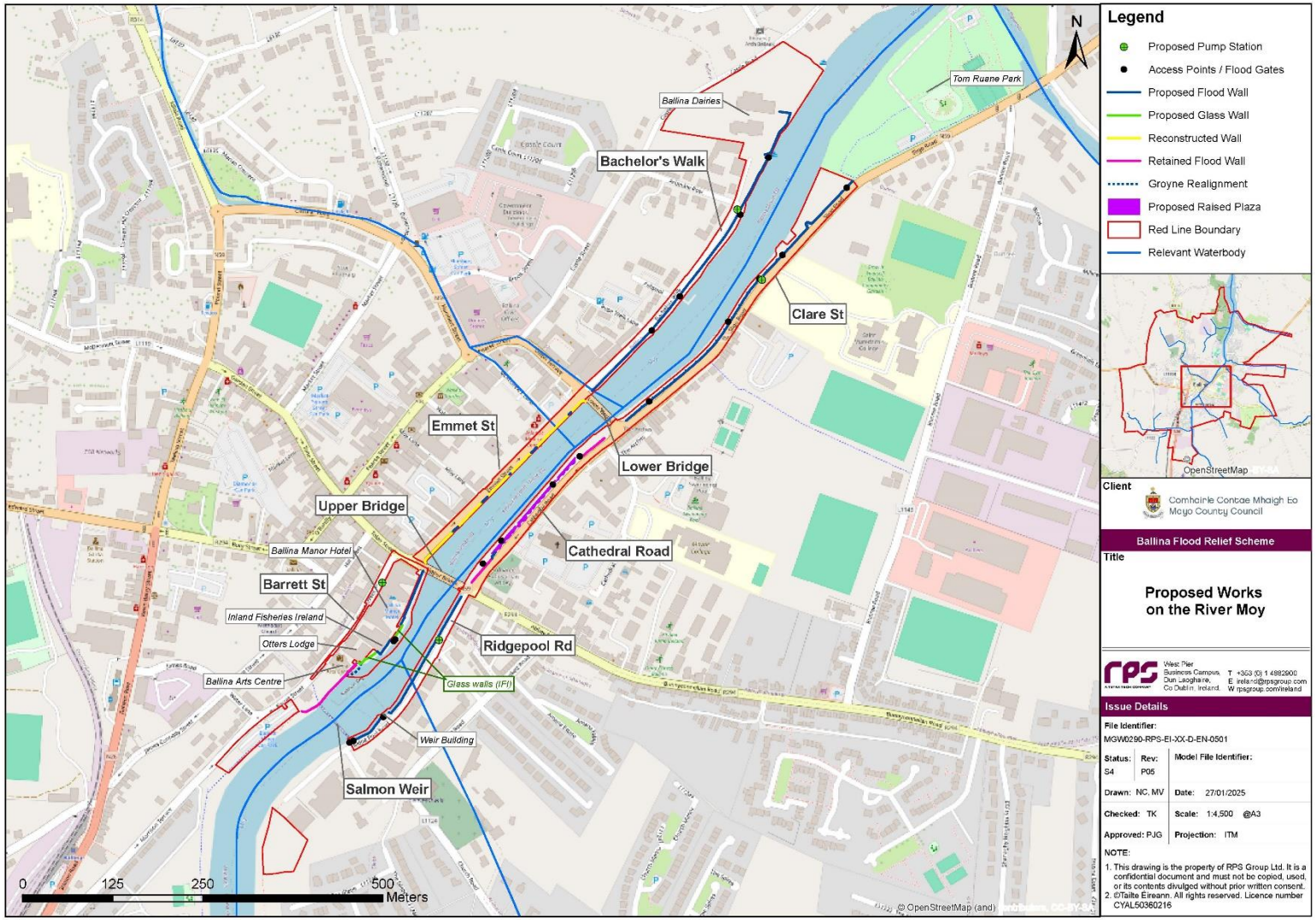

Figure 3-8: Proposed Works to be Carried out on the River Moy

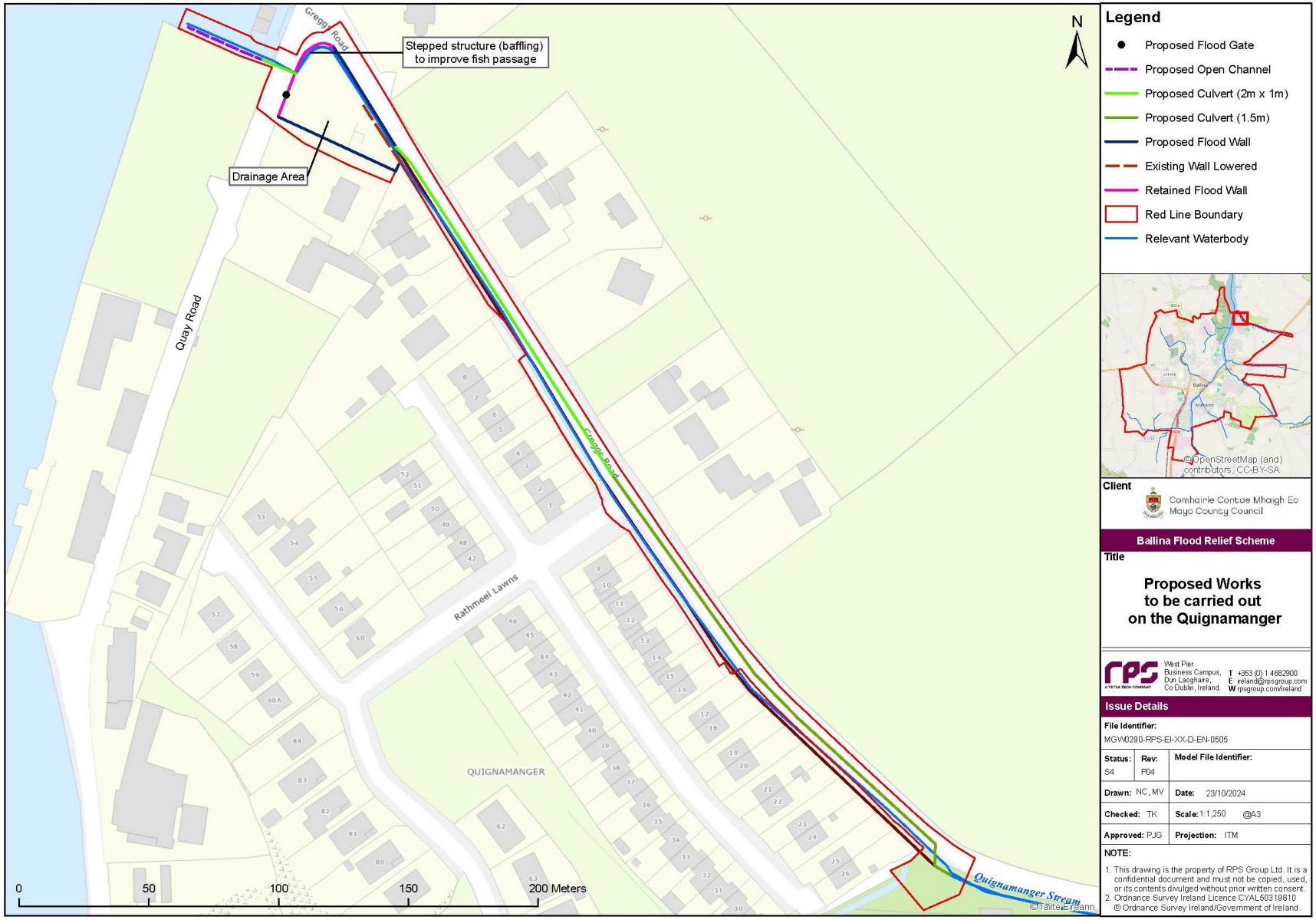

Figure 3-9: Proposed Works to be Carried out on the Quignamanger.

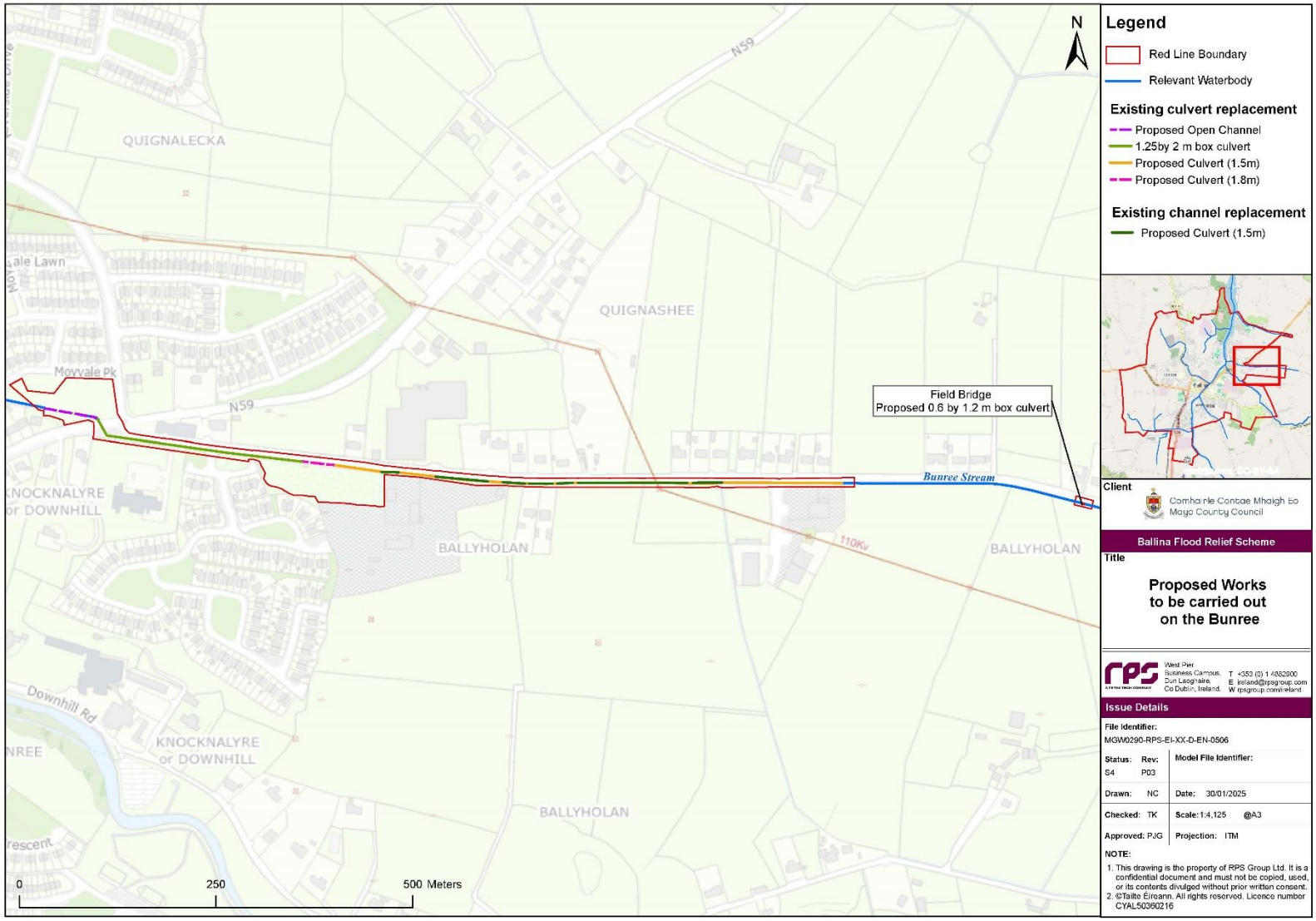

Figure 3-10: Proposed Works to be Carried out on the Bunree Stream

3.4.4 Brusna (Glenree) River

The Brusna (Glenree) is a medium sized river. A section of the river, in the Rathkip/Shanaghy area, shows a potential flood risk to properties and infrastructure. The road bridge, the only access to and from Rathkip/Shanaghy area, also constricts the flow creating higher than normal water levels upstream of the bridge.

The proposed works on the Brusna (Glenree) River (see **Figure 3-11)** include hard defences consisting of flood walls and embankments. Flood walls and embankments are required on both sides of the river upstream of the access bridge. Flood walls and embankments are required on the right-hand bank of the river downstream of the bridge. The maximum height of flood walls and embankment is approximately 1.7 m. There are no existing walls in most of the locations where flood walls are proposed, it being mostly fenced or enclosed in hedgerows. Flood walls and embankments have been set back from the river to minimise the removal of trees and protect the riparian zone. Two otter holts are proposed to be constructed downstream of the bridge crossing on the left bank as outlined in **Section 7.1.10**. Embankments will allow for access/habitat for wildlife and bat and bird boxes are being provided to enhance biodiversity.

Flood levels would be higher than deck level of the bridge to Rathkip/Shanaghy area, therefore a reinforced concrete beam spanning the river on the upstream side of the bridge is required to prevent overtopping and remove any additional loading to the bridge. The beam will be connected to the upstream side of the bridge. The beam will be installed using a crane located on the southern left bank of the river. The beam will be supported on 2 proposed reinforced concrete piers. The piers will tie into the proposed flood walls on either side of the bridge. The existing railing will be reinstalled along the proposed beam to ensure fall protection height is provided. Construction of the beam will not block access across the bridge and access to the houses on the other side of the river will be maintained. The beam, scour protection, and proposed replacement bank retaining walls is shown in **Figure 3-25** in **Section 3.7.7**.

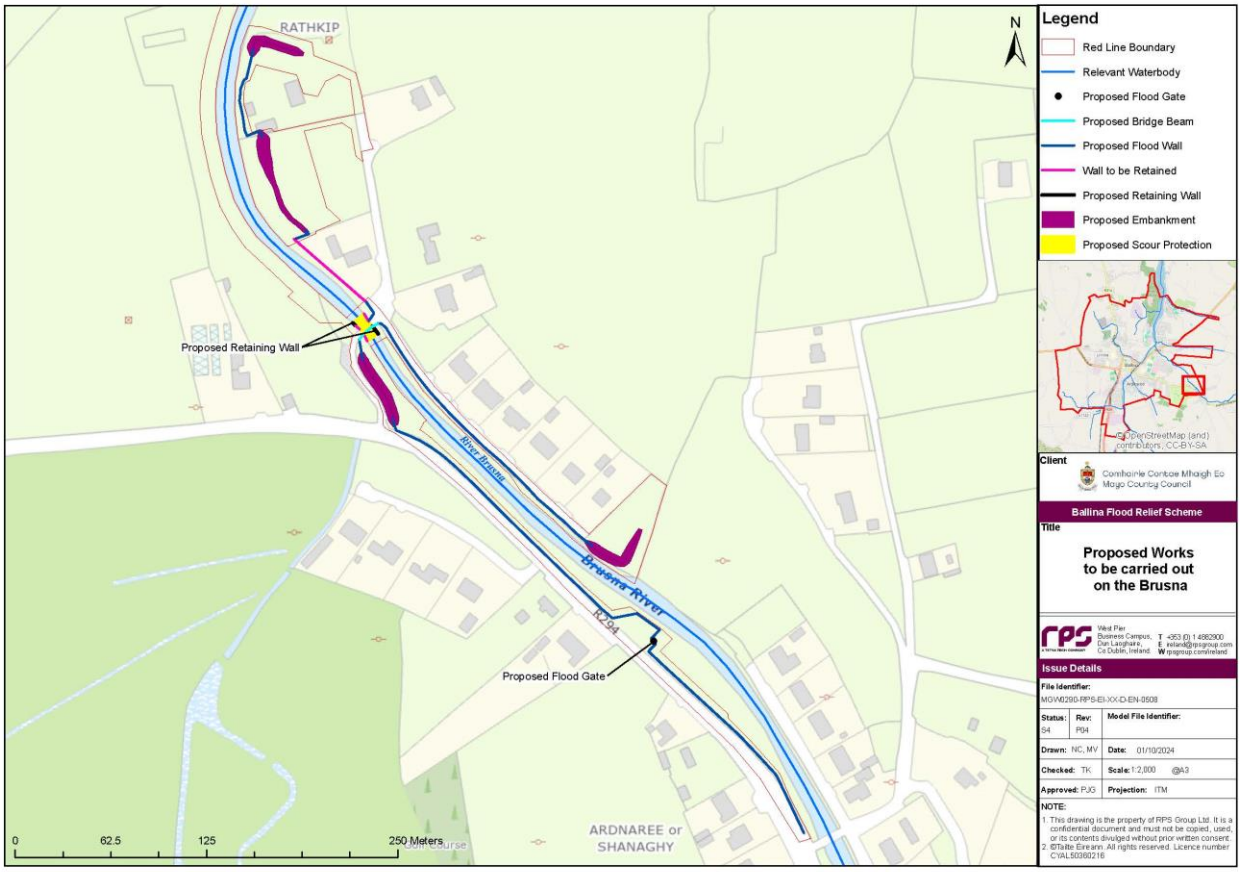

Figure 3-11: Proposed Works to be Carried out on the River Brusna

3.4.5 Tullyegan Stream

The Tullyegan is a small, mainly open watercourse located at the southern end of Ballina. Hydraulic modelling showed that during the 1 % AEP flood event out of bank flooding occurs. This is due to a downstream constriction at the N26 road bridge resulting in flows backing up increasing water levels upstream.

Flood walls on the north bank are to be constructed to the same height as the existing walls which range from 1.4 to 2.96 m. The embankment on the north bank has a maximum height of 1.5 m. Flood walls on the southern bank of the stream have a maximum height of 1 m (see **Figure 3-12**). Some of the right bank/southern wall will be set back from the riverbank in order to prevent the removal of trees which line the riverbank. An embankment will be installed on the left bank where the flood defence ties in with the Iarnród Éireann/Irish Rail embankment. This is to facilitate the movement of otters, as suitable otter habitat was identified at this location.

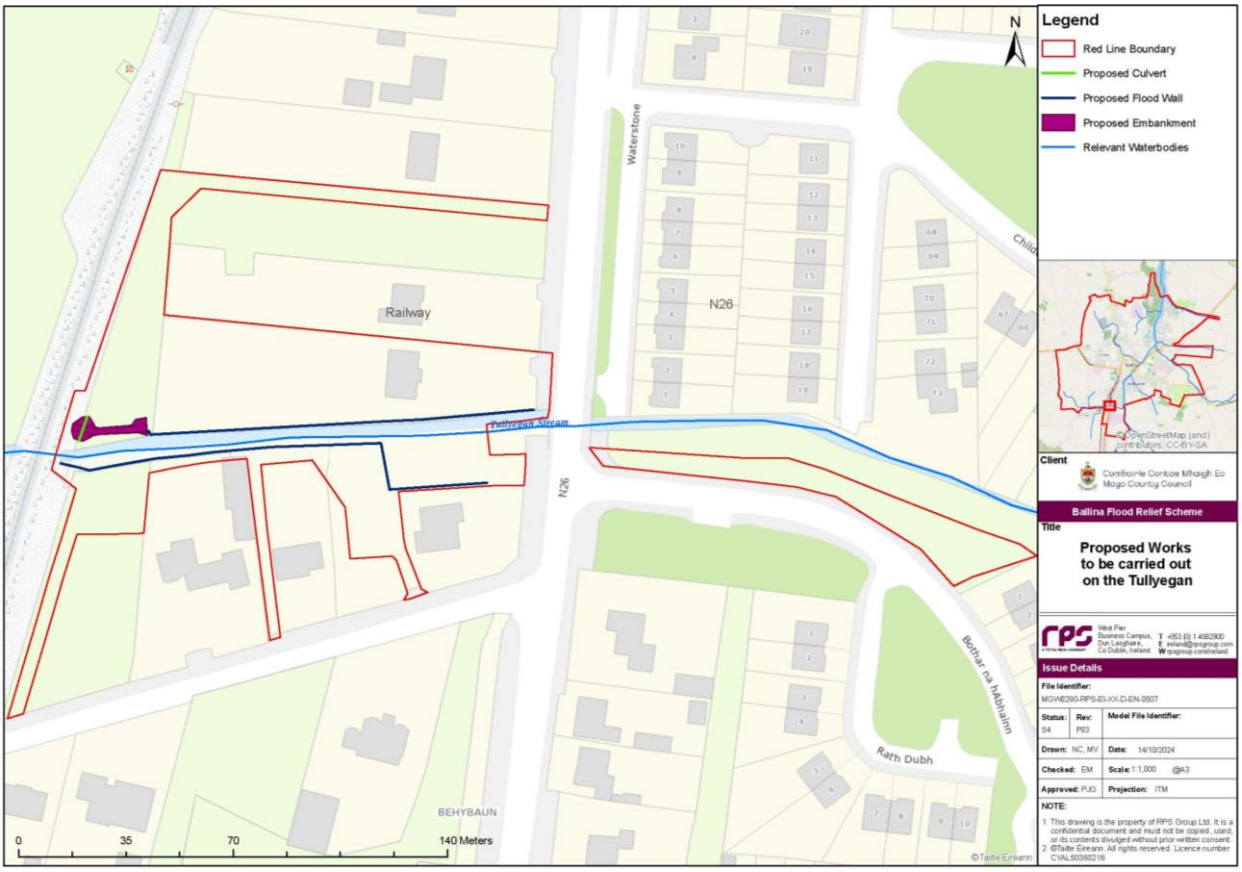

Figure 3-12: Proposed Works to be Carried out on the Tullyegan Stream

3.5 Proposed Scheme Elements

This section describes all the flood relief defences that form part of the Proposed Scheme. It also details the temporary ancillary infrastructure elements that are required to facilitate the construction of the Proposed Scheme.

3.5.1 Flood Walls

A typical flood wall detail to be used on the River Moy and other areas is shown in **Figure 3-13**. The majority of flood walls will consist of reinforced concrete with a suitable foundation, stone cladding along the face and of varying height.

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

- Stripping and storage of topsoil for reuse (where there is no existing wall, i.e. along the Tullyegan, Brusna and Quignamanger river channels).
- Removing existing footpaths and some trees will be required along the River Moy.
- Excavation to the required depth will be undertaken typically up to 2 m below existing ground level.
- Installation of a cut off lean mix or clay core beneath the wall foundation.
- Blinding concrete will be placed to enable the fixing of steel reinforcement for the base of the wall.
- Shuttering will be placed to enable pouring of the base of the wall.
- The wall reinforcement steel will then be fixed and shuttered before pouring the walls.
- It may be necessary to utilise a crane and excavator to 'skip' the concrete into some of the higher sections of wall or use a concrete pump.
- Cladding of the walls in stone.
- In-situ reinforced concrete will be designed to account for the saline environment (increased cover etc.) and consideration of Ground Granulated Blast-Furnace Slag (GGBS) to increase technical performance and minimise environmental impact.

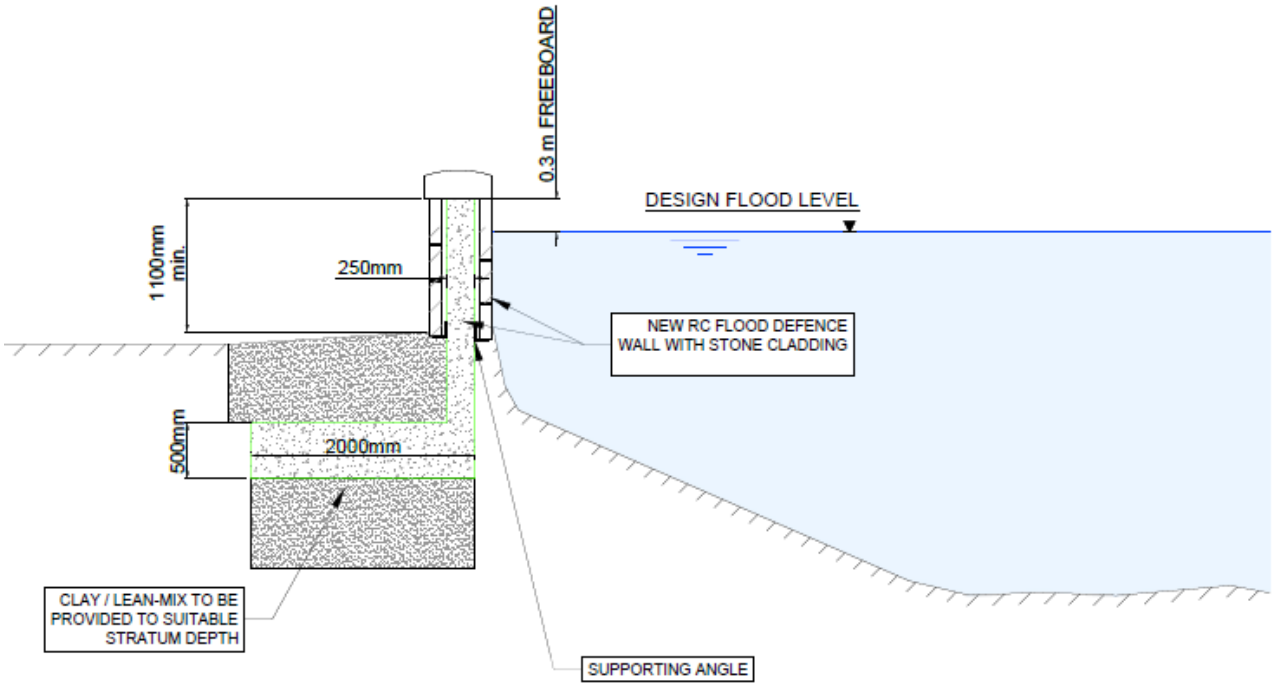

Figure 3-13: Typical Cross Section Detail of Flood Wall–- River Moy

3.5.2 Embankments

Embankments are proposed on the River Brusna and on the Tullyegan Stream.

Embankments will be constructed of impermeable clay with a capping of topsoil of approximately 150 mm depth to allow for landscaping.

The construction of the flood embankments will involve the following construction methodology:

- Stripping and storage of topsoil for reuse.

- Import and storage of suitable clay material to form the core of the embankment by lorry and road. This will be stored within the working area and brought to required locations using an excavator and dumper.
- Excavate cut off trench approximately 1 m below the embankment and fill with impermeable clay to prevent seepage.
- Place and compact impermeable clay until the defences have reached the necessary height. Embankment front and back slopes will be profiled to meet the required gradient of up to 1 in 3. The embankment will then be topsoiled with a suitable, biodegradable geotextile and sown in grass. The geotextile will protect the embankment from erosion until such times as the vegetation has been established.
- A back drain will be required at the rear toe of the embankment. A trench will be excavated to facilitate the laying of typically a 100 mm diameter perforated drainage pipe in clean stone. Manholes will be required at 90 m intervals or at changes of direction of the back drains. Outfalls from this rear drain, passing beneath the earth embankment and discharging to the river will be required. These will need to be flapped to prevent backflow during times of flood.
- A typical embankment structure is shown in **Figure 3-14**.

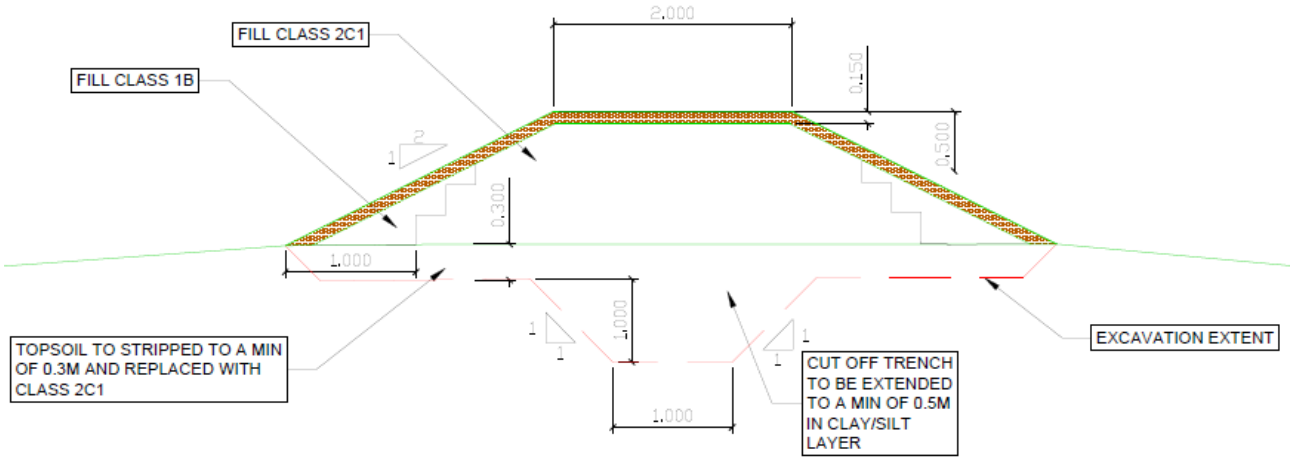

Figure 3-14: Typical Embankment Details

3.5.3 Public Open Space

The plaza opposite Muredach's Cathedral along Cathedral Road will be modified for incorporation into the future planned Ballina Public Realm. This will involve the development of a raised platform to a height of approximately 0.8 m. Existing pedestrian access to the river will be maintained, including provision for accessible access. The proposed design of the public open space at Cathedral Road is shown in **Figure 3-15**.

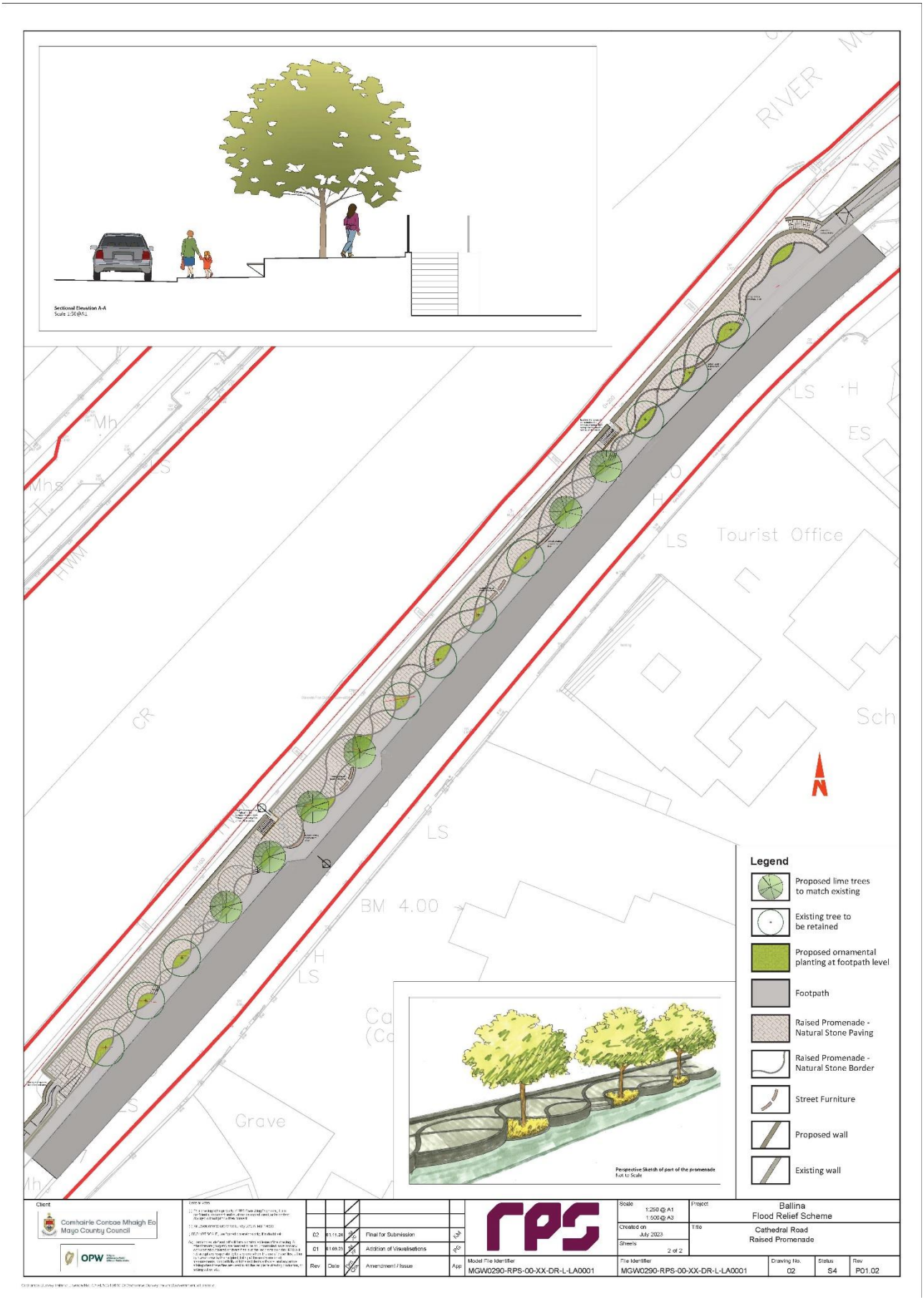

Figure 3-15: Proposed Public Open Space on Cathedral Road

3.5.4 Surface Water Drainage

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

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

Pumping stations will be installed at the following locations:

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

The locations of the pumping stations are given in **Figure 3-8**. Existing surface water discharges will be retained along the remainder of the Proposed Scheme.

3.5.5 Bridge Works

Along the River Moy, new flood walls will tie into the existing bridges. The Proposed Scheme will not result in any alterations to the Upper, Lower and Pedestrian bridges or the Salmon Weir.

The access bridge to Rathkip/Shanaghy area on the Brusna River will be reinforced to protect the bridge during flood events.

3.5.6 Diversion of Utilities

A review of existing utilities and associated infrastructure was undertaken as part of the design development process. The utility providers identified within, or adjacent to, the footprint of the Proposed Scheme include:

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

. Any interactions with utilities linked to each of the providers will be considered on an individual basis and each conflict location will be discussed with the relevant utility provider.

3.5.7 Amenity Access to the River Moy

Access to the River Moy for recreational activities and anglers along the Proposed Scheme is required. Access types include vehicular, pedestrian and accessible entry. Current access points are shown in **Figure 3-16**. Such access points to the River Moy will be maintained through ramps, stiles or flood gates. It is intended to retain all existing access points with access to be improved where practical. Public access to the religious grotto on Clare Street will also be maintained by placing the wall behind the structure.

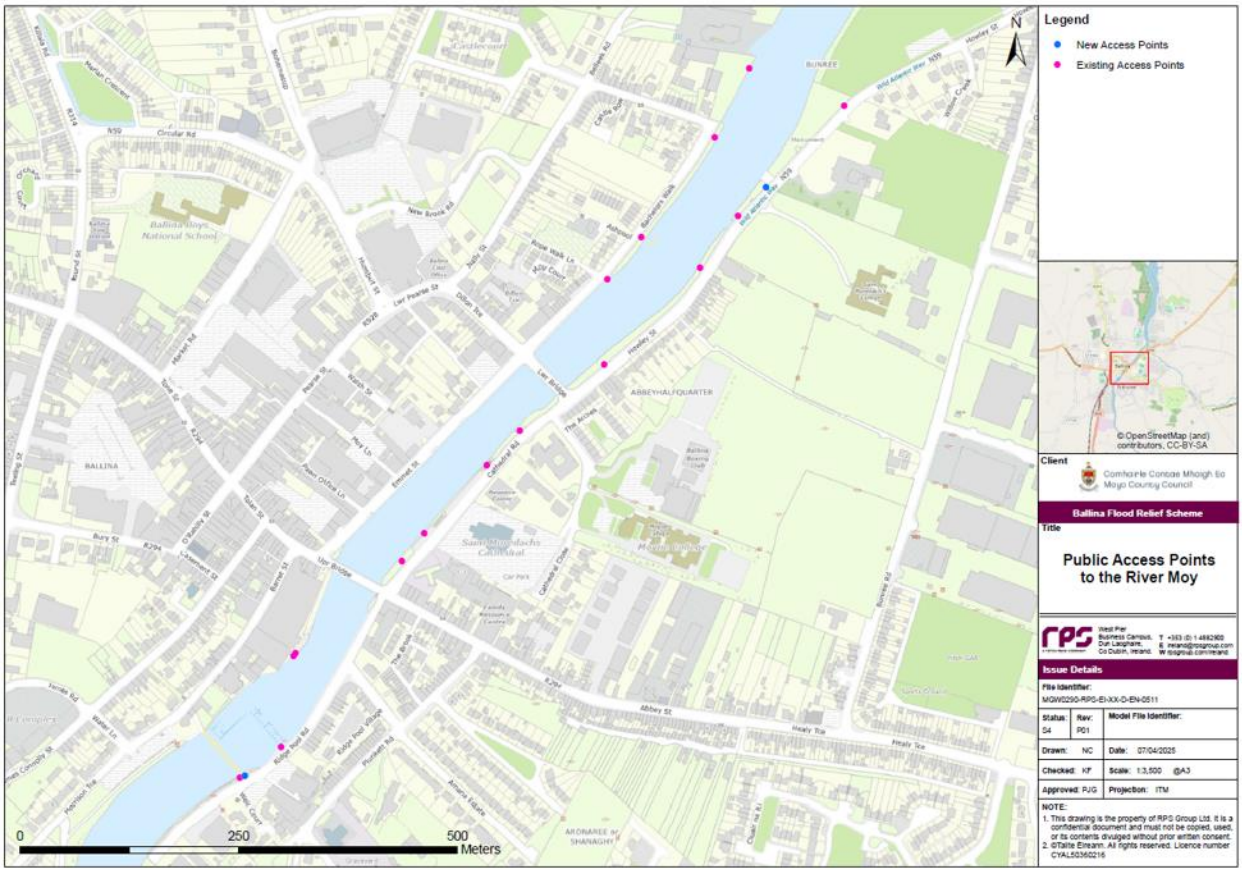

Figure 3-16: Public Access Points to the River Moy

3.5.8 Lighting Design

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

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

3.5.9 Construction Compounds

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

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

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

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

3.6 Separate Consents/Licences

In addition to a grant of approval by An Bord Pleanála for the construction and operation of the Proposed Scheme, the following consents/licences are required:

- A Maritime Area Consent (MAC) in accordance with the Maritime Area Planning (MAP) Act 2021.
- Derogation licences from National Parks and Wildlife Service.
- Section 50 consent from the Office of Public Works (OPW).

3.7 Construction Phase

This section of the report sets out the order programme of works for the construction phase and details the main elements that will be undertaken during this phase, all of which have been considered in this NIS and accompanying EIAR.

3.7.1 Construction Programme and Phasing

Construction activities are planned to take place during a single construction campaign lasting 36 months. Refer to Figure 3-17 for details. 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 angling and sea lamprey 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. This means instream works, including advance bankside works that could disturb the fishing amenity cannot commence in Ridgepool or Salmon Weir until at earliest **August 1st of Y1** of the work programme. The only exception being that instream works cannot occur until the end of Week 2 of August of Y1 as set out in **Section 7.1.12** of this NIS (**Mitigation: Specific River Moy (Ridgepool) Measures**) in relation to sea lamprey habitat protection at specific points within the Ridgepool (Sites RP2A, RP8-RP8A, see **Appendix F** for locations). Works on Barrett St are not to not disrupt angling in front of Ballina Manor Hotel until August 1st Y1.
  - Once the above restrictions are adhered to, instream works may then continue in the freshwater River Moy (Ridgepool and Salmon Weir) through the remainder of Y1.
  - **Year 2 (Y2)** – The access ramp / cofferdam work areas on the LHS in front of Ballina Manor Hotel / IFI Building / Otters Holt Apartments 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 7.1.12** of this NIS (Mitigation: Specific River Moy (Ridgepool) Measures) in relation to sea lamprey habitat protection regarding the timing of placement of cofferdams that cover the reach that includes Sites RP8 to RP8A (see **Appendix F** 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 works that are not "instream", i.e., the diversion culvert replacement and the bankside flood walls.
  - Instream works for the Quay Road culvert replacement and regrading of the bed are allowed in **May to September inclusive**. No instream works are allowed during fish breeding season – October to April inclusive.
- **Bunree Stream (any year):**
  - Instream works are allowed in **May to September inclusive**. No instream works are allowed during fish breeding season – October to April inclusive.
- **Brusna River (any year):**
  - Instream works are allowed in **July to September inclusive**. No instream works during fish breeding season – October to June inclusive.
  - Near-bankside works in relation to embankment construction are allowed in **May to September inclusive**. This is to avoid excessive sediment washout and ensure revegetation of the embankment slopes during fish breeding season.
- **Tullyegan Stream (any year):**
  - Instream works are allowed in **May to September inclusive**. No instream works are allowed during fish breeding season – October to April inclusive.

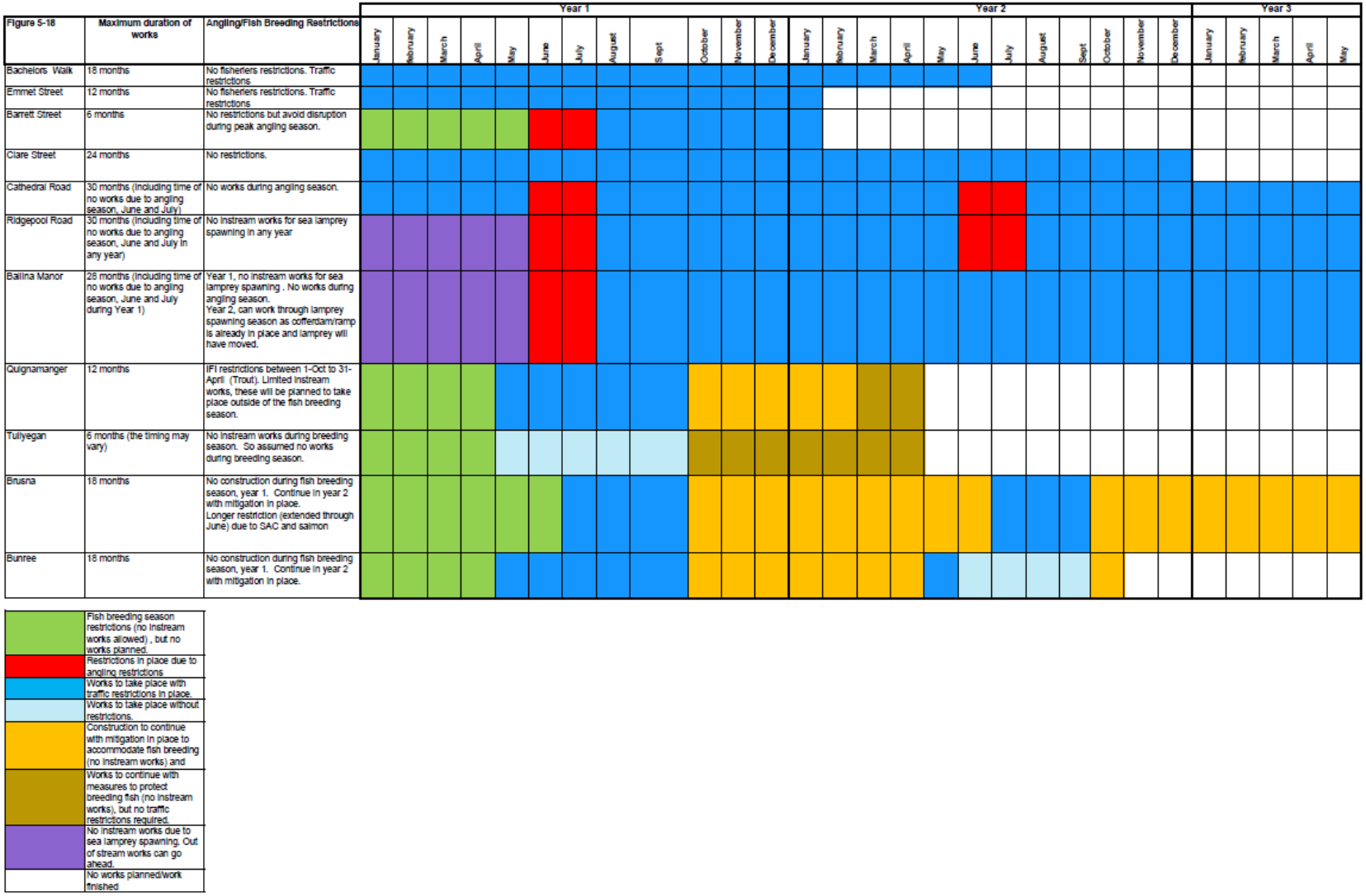

Figure 3-17 Indicative Construction Programme for the Proposed Scheme

3.7.2 Site/Ground Investigation Works

Table 3-4 identifies ground investigation (GI) locations that were screened in for having a potential impact on European sites. All screened in locations are along the River Brusna. Screened in GI locations are shown in **Figure 3-18** and are all located adjacent to the River Brusna**.**

Table 3-4: GI Locations to be Screened into AA

GI Point	Reason
BH44	Within 15 m of IAPS
BH45	Within 150 m of otter holt (approximately 36 m)
BH46	Within 150 m of otter holt (approximately 44 m)
BH47	Within 150 m of otter holt (approximately. 95 m)
ST37	Within 150 m of otter holt (approximately 10 m) Within 25 m of IAPS
ST38	Within 150 m of otter holt (approximately 23 m)
ST39	Within 150 m of otter holt (approximately 88 m) Within 10 m of IAPS
ST40	Within 150 m of otter holt (approximately 88 m)
ST42	Within 12 m of IAPS
ST41	Within 28 m of IAPS
TP23	Within 150 m of otter couch (approximately 95 m)
TP24	Within 150 m of otter holt (approximately 125 m)
TP25	Within 150 m of otter holt (approximately 29 m) Within 15 m of IAPS
TP26	Within 150m of otter holt (approximately 22 m)
TP27	Within 150 m of otter holt (approximately 80 m) Within 5 m of IAPS
TP28	Within 10 m of IAPS
TP29	Within 16 m of IAPS
TP30	Within 29 m of IAPS
TP31	Within 19 m of IAPS
TP32	Within 22 m of IAPS

Figure 3-18 Screened GI Locations

These site investigation works will be required to inform the detailed design phase of the project and prior to the commencement of the construction works.

3.7.3 Site Preparation

The appointed contractor will conduct site clearance works including felling of trees and removal of vegetation from the working areas within the lands made available for the Proposed Scheme Vegetation removal will include tree, shrub, invasive alien species and hedge removal to allow for construction activities to take place. Vegetation clearance will be kept to the minimum required to facilitate construction. The majority of this vegetation will be mulched for reuse on site or for transport off-site to a licensed composting facility at another location. to facilitate construction works. Estimated quantity of vegetation removal is listed in **Table 3-5.** Details regarding compensatory planting areas is provided in **Section 3.7.8.**

Table 3-5 Proposed Vegetation Clearance Quantity

Watercourse	Vegetation Type	Clearance
Moy	Trees	62 no.
	Other vegetation	700 m^2
Quignamanger	Trees	28 no
	Other vegetation	400m^2
Brusna	Trees	26 no
	Other vegetation	1400 m^2

Watercourse	Vegetation Type	Clearance
Bunree	Trees	6 no
	Other vegetation	500m^2
Tullyegan	Trees	5 no
	Other vegetation	140m^2

3.7.4 Demolition Works

In addition to vegetation removal, it is proposed to demolish the majority of existing flood walls to allow for the installation of new flood walls as well as the removal of existing culverts to allow for the installation of new culverts (See **Table 3-6**). Where possible material will be reused in the construction of new infrastructure i.e., for cladding of new flood walls. Material that cannot be reused will be disposed at a licenced waste disposal facility.

Table 3-6 Proposed Demolition Works

Watercourse	Demolition Works	Demolition
Moy	Demolition of masonry stone clad wall	800 m^3
Quignamanger	Removal of existing culvert	375 m
	Demolition of existing stone clad and retaining wall	100 m^3
Bunree	Demolition of stone clad/masonry wall	50 m^3
Brusna	Demolition of masonry wall	50 m^3

3.7.5 Advance Works

It is proposed that advance works may be undertaken on both Bachelors Walk and Clare Street. The works will include demolition and reconstruction of 10 linear metres of existing quay wall along both streets to create sample sections of finished wall to determine extent of existing stone that could be reused in the final design.

The 10 m section of wall on both Bachelors Walk and Clare Street form part of the aforementioned walls to be upgraded. As such, these advance works will be subject to the same constraints and mitigation measures identified for the permanent works in these areas.

3.7.6 Excavations

It is expected that more than 23,830 m^3 of soil and stone material will arise as a result of the Proposed Scheme. Excavated material as part of the construction works will generally consist of:

- Class 5A Fill (Topsoil)
- Class 1 or 2 Fill (Soil)
- Class 1 or 6 Fill (Rock)
- Class U1 (Soil)
- Class U1 (Pavement).

There will be some opportunities for reuse on site as, for example trench backfill. Off-site reuse options for surplus clean and inert excavated material include reuse as a by-product on other construction sites subject to Article 27 notification to the EPA. Where reuse cannot be employed, there is option for recovery at suitable authorised waste facilities i.e. facilities which have been granted a Certificate of Registration, Waste Facility Permit or EPA license. A total of 18,260 m^3 of excavation waste is proposed to be disposed. A

summary of the estimated excavated and fill quantities associated with the Proposed Scheme is provided in **Table 3-7.**

Table 3-7 Excavations Required as Part of Construction Works

Watercourse	Excavation Works	Excavation m³	Strategy m³	
			Disposal	Reuse
Moy	Flood Wall - Excavation	5,190	5,190	
	PS and drainage pipework excavation	3,840	1780	2,060
Quignamanger	Flood wall - Excavation	360	360	
	Culvert Excavation	2,340	1,400	940
Brusna	Earth Embankment Cut Off Trench	225	225	
	Back Drain	215	215	
	Flood Wall - Excavation	2,630	2,630	
Bunree	Culvert Excavation	5,400	5,400	
Tullyegan	Earth Embankment Cut Off Trench	30	30	
	Back Drain	30	30	
	Flood Wall - Excavation	1000	1000	

3.7.7 Sediment and Erosion Control

A robust sediment control system will be provided in all works areas, including appropriate erosion and silt controls (e.g. settling ponds/tanks, silt fence, silt curtains) to prevent any flow of surface water from the site into the River Moy and its tributaries.

Silt fences, sandbags and/or silt curtains will be used to keep dust and debris out of the river when demolishing existing walls.

A site-specific Construction Method Statement (CMS) will be prepared by the Contractor which will be underpinned by all the measures set out in the Construction Environmental Management Plan (CEMP) which supports this EIAR. 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 CEMP will incorporate all elements of the CEMP that accompanies the planning application for the Proposed Scheme.

3.7.8 Proposed Planting

Planting to offset tree and vegetation loss and where appropriate to provide screening is described for each area below and can be seen in the drawings in **Appendix A**.

3.7.8.1 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 replace the trees lost on Clare Street will be planted in special triangular wall buildouts.

Woodland planting suitable for riverbanks is proposed on the northwestern 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 offset for the loss of riverside vegetation in other areas.

3.7.8.2 Quignamanger Stream

Planting to offset for the loss of riverside vegetation in other areas at the junction of Creggs Road and Quay Road.

3.7.8.3 Bunree/Behy Road Stream

Significant proportion of the shrubs and trees 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 proposed works area. They are to have thorns to deter access to water.

3.7.8.4 Brusna (Glenree) River

Planting to offset for the loss of riverside vegetation in other areas and to enhance the riverbank vegetation cover in this area.

3.7.8.5 Tullyegan Stream

As there was no space adjacent to the areas where flood defences are to be built, native woodland planting is to be planted adjacent to a downstream stretch of the Tullyegan Stream in the Rehins Fort housing estate to offset for vegetation loss due to the Proposed Scheme.

3.7.9 Instream Works

Instream works will be required to facilitate construction activities in certain parts of the Proposed Scheme. Works will be undertaken during low level conditions as far as practicable and within the seasonal restrictions placed on the programme (**Section 3.7.1**). Works on the River Moy and Brusna Stream are within the boundary of the River Moy SAC and Killala Bay/Moy Estuary SAC. Historical fishing access to the river will be maintained where possible and additional new access points will be provided as part of the Proposed Scheme (see **Figure 3-16**, above).

3.7.9.1 River Moy – Ridgepool Road (RB) and Bank at Ballina Hotel/Apartments (LB)

Instream works may be required to allow for the replacement of the quay walls that run parallel to Ridgepool Road. This will be accomplished by the installation of cofferdams constructed using 1-tonne sandbags or similar. If used, the 1-tonne sandbags will be filled with smaller sandbags. This will reduce the risk of sediment entering the river and allow for the sandbags to be filled on site. The instream works footprint will extend approximately 5 m from the existing quay wall on Ridgepool Road. **Figure 3-4**, above, shows that during low tide (and low flow), the affected river margin area of this tidally influenced reach of the freshwater Moy adjacent to the quay wall becomes naturally dewatered (dries out) in accordance with tidal cycles, hence the habitat is ephemeral for instream biota. Instream working areas will be limited to 50 m lengths at any one time in this area. The maximum instream works footprint along Ridgepool Road is approximately 1,320 m^2. The majority of works should be able to be completed from the roadside, limiting the need for instream works. Detail on the River Moy Temporary Works (Ridgepool Road) is illustrated in **Figure 3-19**.

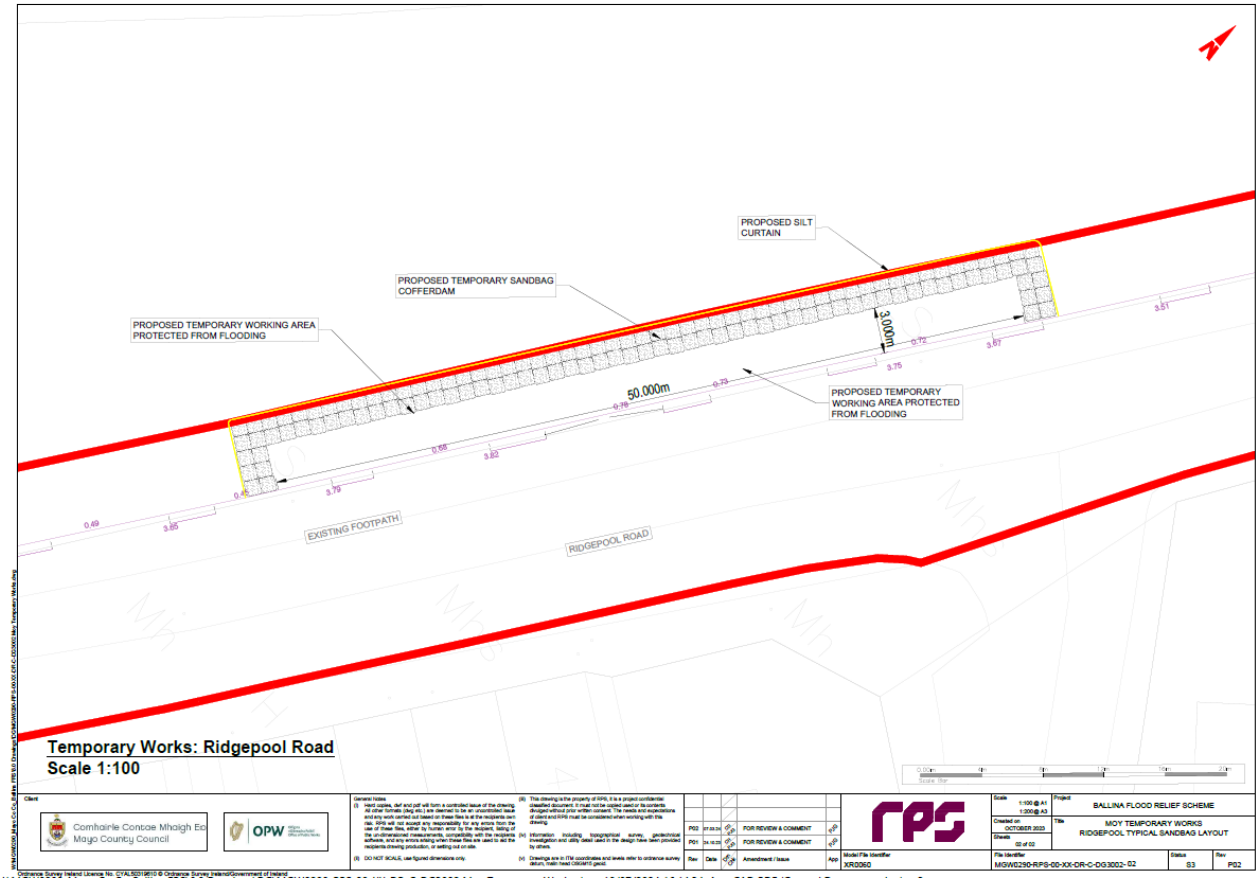

Figure 3-19: River Moy Temporary Works (Ridgepool Road)

The walls along Ridgepool Road will need to be cleaned to complete a detailed structural assessment of the walls. These works will be completed in advance of detailed design. Typical repair detail is indicated in **Figure 3-20**.

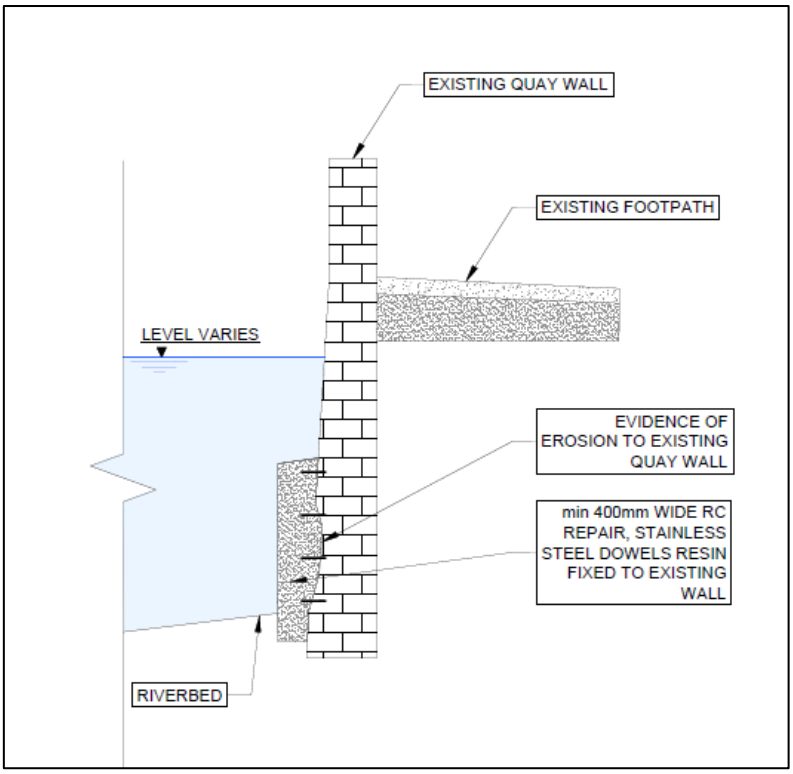

Figure 3-20:Typical Erosion Repair Detail

Instream works will be required on the left bank of the river (in front of Ballina Manor Hotel/Apartments) to allow for the installation of flood walls. This will be accomplished by the installation of a stone ramp in front of the IFI building and warehouse to provide access to the Otters Lodge apartment building upstream of the warehouse. A cofferdam will also be constructed upstream of the ramp to allow for safe working conditions in this area. The stone ramp will be constructed from rock filled bags (filled with washed stone) so that there is no source of fine sediment washout. Access to this area will be via the area in front of the Ballina Manor Hotel/Apartments and through to the front of the IFI building (see **Figure 3-21**). Machinery and materials will be craned in from the Upper Bridge. The maximum instream works footprint along on the left bank of the river (in front of Ballina Manor Hotel/Apartments) is approximately 2,300 m^2.

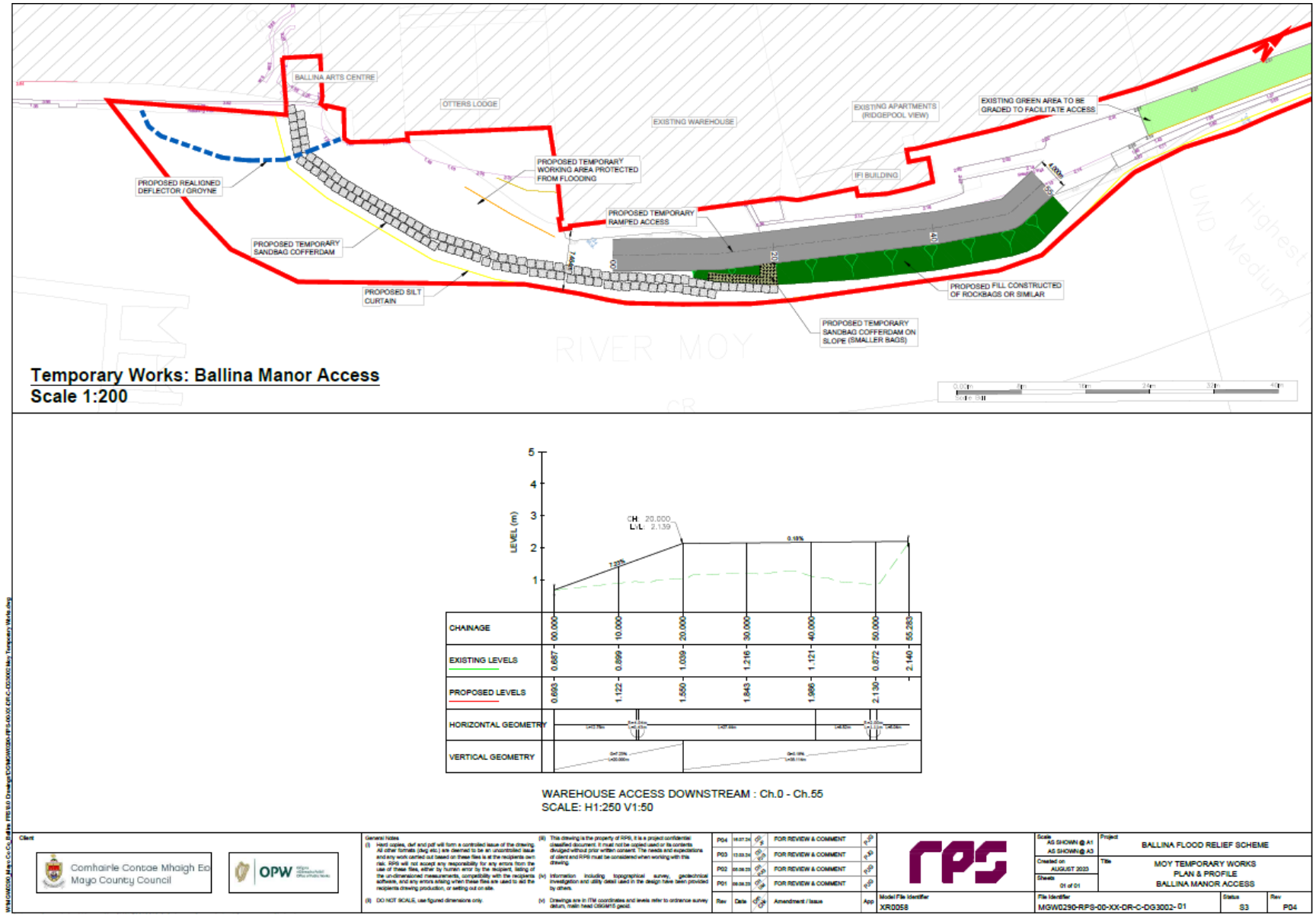

Figure 3-21: River Moy Temporary Works (Ballina Manor Hotel/Apartments)

Additional channel improvements were identified through consultation with IFI. IFI habitat specialists provided a preliminary proposed plan for the instream enhancement within Ridgepool, as detailed in **Figure 3-22**. This will involve the reshaping of the existing deflector (or 'groyne') (See **Figure 3-23**) located near the Ballina Arts Centre to promote fisheries habitat improvement in this area. These works are in the proximity of the proposed construction access ramp and thus it was agreed that they can be incorporated into the Proposed Scheme development.

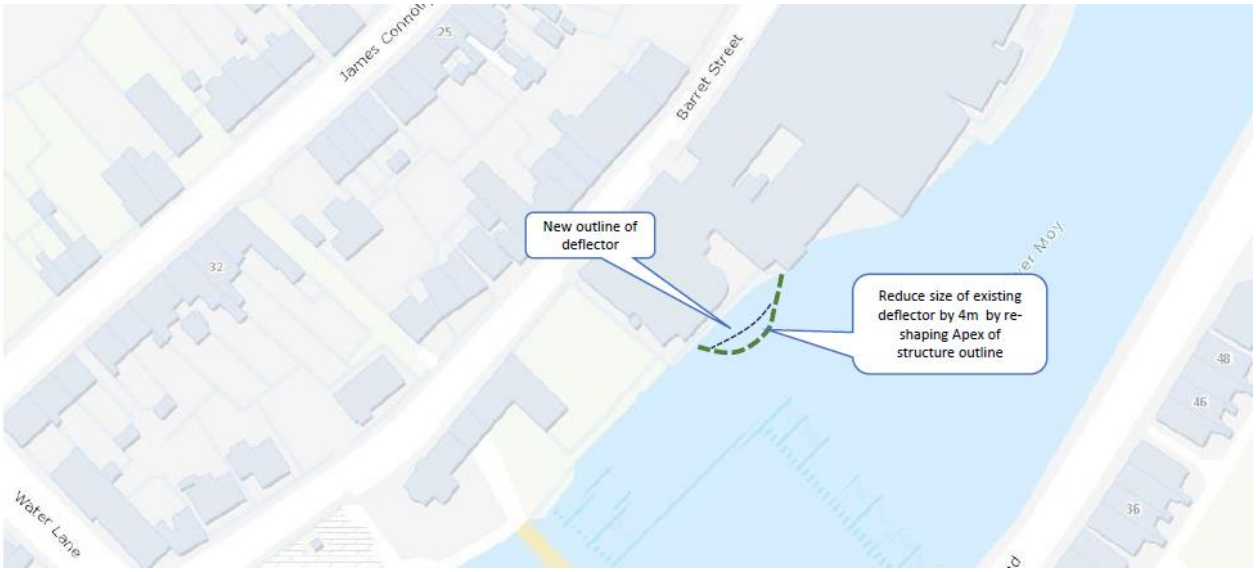

Figure 3-22: IFI Preliminary Plan for Instream Enhancement of Ridgepool

Figure 3-23: View of Deflector ('Groyne') to be realigned

3.7.9.2 River Moy–Emmet Street

There are no instream works proposed along Emmet Street. All works will be done from the roadside with appropriate sediment control measures in place to avoid material entering the river. A containment area by way of hanging or standing scaffold will be placed along the river side of the existing wall during the works.

3.7.9.3 River Moy-Bachelors Walk

The majority of works along Bachelors Walk will be completed without the need for instream works, with exception of the section from the Lower Bridge to Rope Walk Lane (approximately 100 m). However, there is limited larval lamprey habitat in this initial reach because of historical modifications that include a line of large boulder rip-rap reinforcement, set a distance up to 2.5-3.5 m out from the wall. The boulder rip-rap limits the deposition of fine silt in which larval lampreys burrow. The boulder rip-rap has developed into a wild riparian flood berm (see **Figure 3-24**). This berm area will be utilised for construction works with a cofferdam installed outside the berm to facilitate works. The instream works footprint will be a maximum of 500 m^2. Appropriate sediment control measures will be in place to avoid material entering the river.

Temporary sandbag cofferdams may be used to dry out the berm area for flood wall construction on the berms. The impact assessment was undertaken using the assumption that instream works are involved in this section of the river.

Further downstream the riparian area widens and as such, no instream works are anticipated to be required for works in the section from Rope Walk Lane to Arbuckle Row.

Figure 3-24: View of the Area of Proposed Bachelors Walk Instream Works

3.7.9.4 River Moy–- Cathedral Road

There are no instream works proposed along Cathedral Road. All works will be done outside the riverbank with sediment control measures in place to avoid material entering the river.

There are rock “deflectors” installed along both sides of the river at Cathedral Rd and Emmet St. IFI have indicated that they may consider removal of some of these deflectors in the future. As there are no instream works proposed at this location, these works have not been captured as part of the Proposed Scheme.

3.7.9.5 River Moy–- Clare Street

There are no instream works proposed along Clare Street. All works will be done outside the riverbank with sediment control measures in place to avoid material entering the river.

3.7.9.6 Quignamanger Stream

The majority of works on the Quignamanger consist of the replacement of the existing diversion culvert and as such are not instream works. Instream works, as detailed below, will be undertaken during low flow conditions and water will either be over-pumped to create a dry working area.

The lower section of the Quignamanger stream before the existing Quay Road culvert has an open channel and supports a short section of petrifying spring* [7220] habitat within the river channel. The source water for the spring is upstream of the existing culvert system and is not affected by the Proposed Scheme during construction or operation. As this habitat is not a QI of any of the European Sites within the Zone of Influence of the Proposed Scheme, it is not dealt with further in this NIS.

Some regrading of the existing stream bed will be required to allow the installation of the diversion culvert and the upgraded culvert crossing the Quay Road. The instream works footprint is approximately 200 m^2.

The proposed instream works for the Quignamanger Stream are as follows:

- In stream works at the head of the diversion culvert to facilitate tie-in to the Quignamanger Stream and existing main channel culvert.
- Instream works to facilitate the tie in of the upgraded diversion culvert to the drainage area. Instream works will be minimal to facilitate the tie-in and will include minimal regrading of the stream bed.
- Lowering of the inner wall running along the open channel within the drainage area to facilitate flooding along the left bank of the stream. Works can be done during the diversion culvert tie-in and can be accessed from the left bank to avoid instream works.
- Replacement of culvert under Quay Rd to a box culvert, including some regrading upstream of the new culvert to accommodate a stepped structure (baffling) to improve fish passage.
- Existing culvert downstream of Quay Rd will be removed to allow for open channel discharge to River Moy.

The proposed instream works upstream will be at the head of the diversion culvert where it will tie into the main culvert and the Quignamanger stream. The proposed instream works downstream of the Quignamanger are shown in **Figure 3-25**.

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THE QUAY ROAD

RIVER MOY

EXISTING CULVERT TO BE REPLACED

PROPOSED FLOOD GATE

EXISTING CULVERT DOWNSTREAM OF QUAY RD TO BE REMOVED TO ALLOW FOR OPEN CHANNEL DISCHARGE TO RIVER MOY

EXISTING WALL TO BE LOWERED TO BANK LEVEL

REGRADING REQUIRED TO ACCOMMODATE A STEPPED STRUCTURE (BAFFLING)

REGRADING OF THE BED IN THIS AREA IS NOT REQUIRED DUE TO USE OF BOX CULVERT

EXISTING 700Ø MAIN CULVERT TO BE RETAINED

DG0003-32

DG0003-33

464

460

440

420

400

380

360

340

320

6.47m

2.33m

4.27m

4.20m

3.75m

4.41m

QMH07

GREGGS ROAD

MINIMAL IN-STREAM WORKS REQUIRED TO ACCOMMODATE CULVERT TIE IN

BED OF EXISTING DRAIN

EXISTING DIVERSION CULVERT TO BE REPLACED WITH 1000x2000mm BOX CULVERT

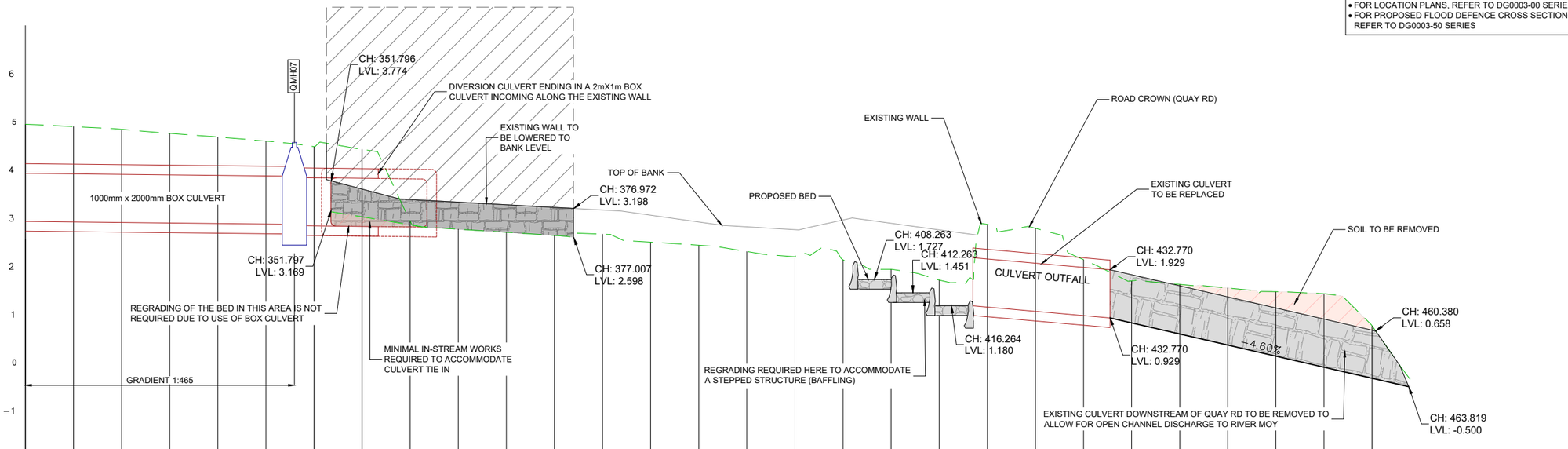
DIVERSION CULVERT ENDING IN A 2mX1m BOX CULVERT INCOMING ALONG THE EXISTING WALL.

0.00m 10m 20m 30m 40m 50m

Scale Bar

PROPOSED FLOOD DEFENCE PLAN - QUIGNAMANGER - 03 OF 03

Scale: 1:500 @ A3



PROPOSED FLOOD DEFENCE LONGITUDINAL SECTION - QUIGNAMANGER - 03 OF 03

Scale: Horiz. 1:250, Vert. 1:50 @ A1

Scale: Horiz. 1:500, Vert. 1:100 @ A3

- FOR LAYOUT PLANS, REFER TO DG0003-10 SERIES
- FOR LOCATION PLANS, REFER TO DG0003-00 SERIES
- FOR PROPOSED FLOOD DEFENCE CROSS SECTIONS, REFER TO DG0003-50 SERIES

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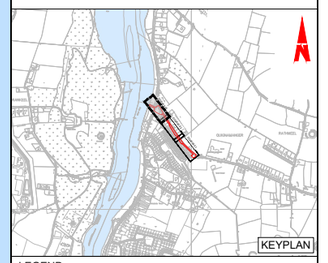

LEGEND:

- PROPOSED REDLINE BOUNDARY
- EXISTING GROUND LEVEL
- EXISTING WALL TO BE RECONSTRUCTED
- FLOOD WALL TO BE RETAINED
- PROPOSED FLOODGATE
- PROPOSED GLASS WALL
- PROPOSED RC FLOOD WALL
- PROPOSED TOE OF RC FLOOD WALL
- PROPOSED 1.5mØ CULVERT
- PROPOSED 2.0x1.0m CULVERT
- PROPOSED OPEN CHANNEL CLAD IN STONE
- EXISTING FOOTPATH
- EXISTING ROAD
- PROPOSED NATURAL STONE PAVING
- PROPOSED REPURPOSED CONCRETE BLOCK PAVING
- PROPOSED EMBANKMENT
- TREES TO BE RETAINED
- TREES REQUIRING REMOVAL DUE TO POOR HEALTH
- TREES REQUIRING REMOVAL DUE TO CONSTRUCTION
- NEW TREES TO BE PLANTED

Rev	Date	Drn	Chk	Amendment / Issue	App
A1 C01	07/04/25	JB	MH	AUTHORISED & ACCEPTED FOR PLANNING	PJG
P02	27/03/25	JB	MH	REVIEW & AUTHORISATION	PJG
S4 P01	20/01/25	BH	VF	REVIEW & AUTHORISATION	PJG

Client: Comhairle Contae Mhaigh Eo / Mayo County Council; OPW Oifig na nOibreacha Poiblí / Office of Public Works

MAKING COMPLEX EASY
Lyrr 2, IDA Business & Technology Park, Mervue, Galway
T +353 91 400200
W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

Project: **BALLINA FLOOD RELIEF SCHEME PLANNING APPLICATION**

Title: PROPOSED FLOOD DEFENCE PLAN & LONGITUDINAL SECTION - QUIGNAMANGER (03 of 03)

Model File Identifier: N/A

File Identifier: MGW0290-RPS-00-XX-DR-C-DG0003-33

Created on	Sheets	
20/11/2024	04 of 04	
Scale: AS STATED @ A1, AS STATED @ A3	Status: A1	Rev: C01

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3.7.9.7 Bunree/Behy Rd

Along the Bunree/Behy Road Stream existing open channels will be culverted as part of the Proposed Scheme. The culvert downstream of the N59 at Moyvale Park, which causes a constriction to flood flows, will be removed and the open channel in this section reinstated. Instream works will be undertaken during low flow conditions and water will either be diverted, or over-pumped. The instream works footprint is approximately 900 m^2.

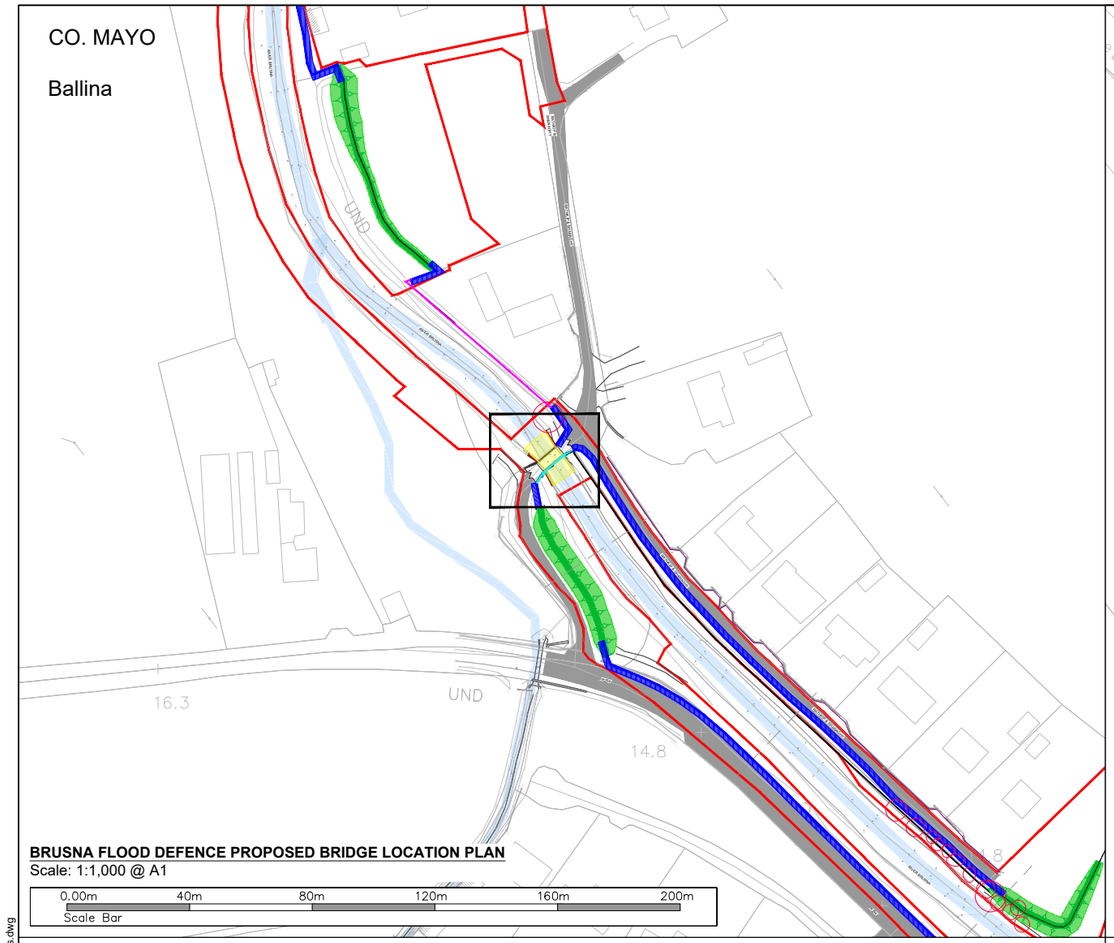
3.7.9.8 Brusna River

The majority of works along the Brusna River will be completed without the need for instream works.

The existing bridge has bank and bed scour protection extending 6 m upstream and downstream of the respective bridge parapet faces. The existing bed scour protection is comprised of a conglomerate of concrete and cobble/gravel, which has eroded in the mid-channel. This existing scour protection will be replaced in a like for like manner to ensure no change in habitat. In stream works will be restricted to July through September. Water management measures will be put in place to avoid sediment and construction related discharges entering the water. The instream works footprint is approximately 300 m^2. The proposed instream works for the Brusna River are shown in **Figure 3-26**.

CO. MAYO

Ballina



BRUSNA FLOOD DEFENCE PROPOSED BRIDGE LOCATION PLAN
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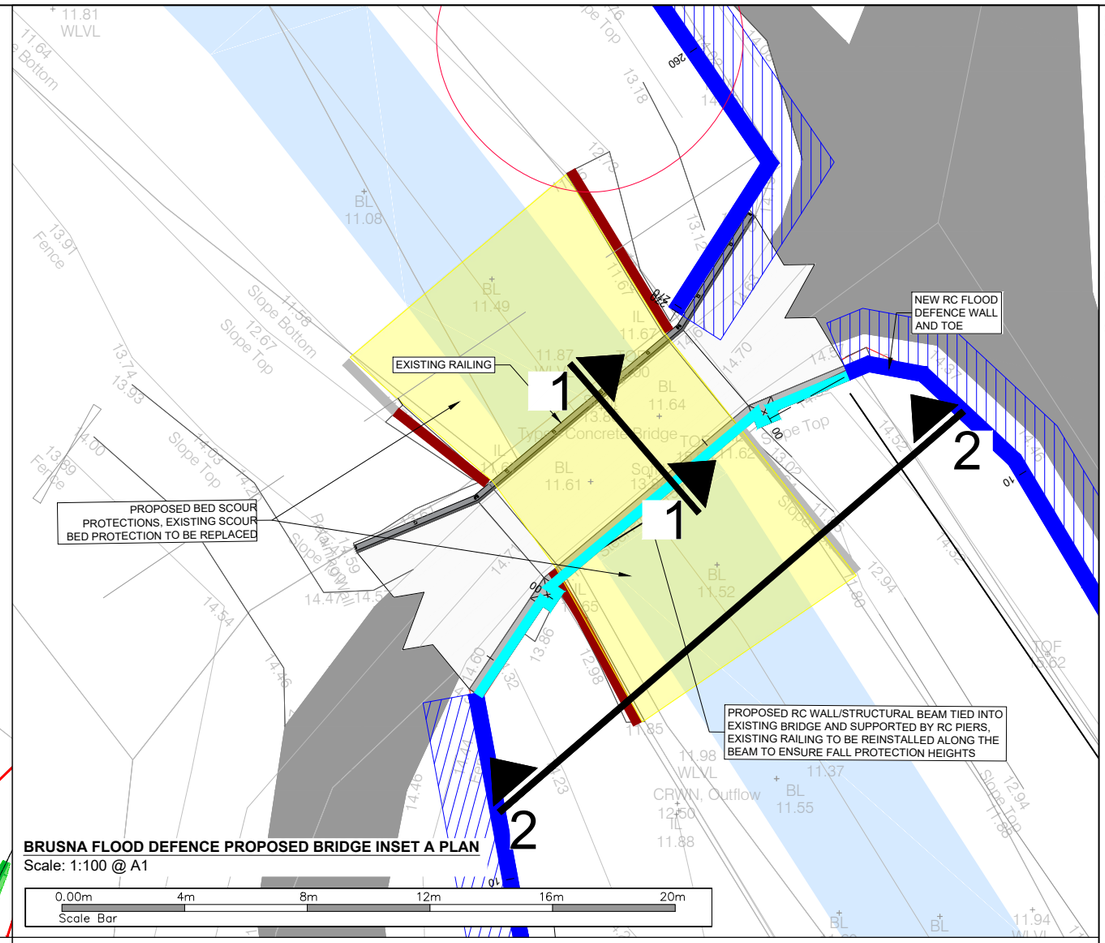
Scale Bar



BRUSNA FLOOD DEFENCE PROPOSED BRIDGE INSET A PLAN
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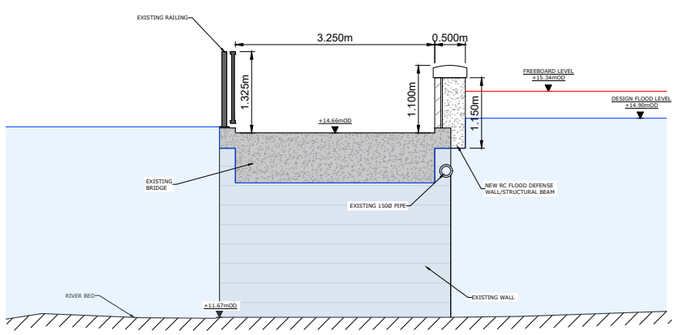
Scale Bar



BRUSNA FLOOD DEFENCE PROPOSED BRIDGE CROSS-SECTION 1-1
BRUSNA BRIDGE
Scale: 1:50 @ A1

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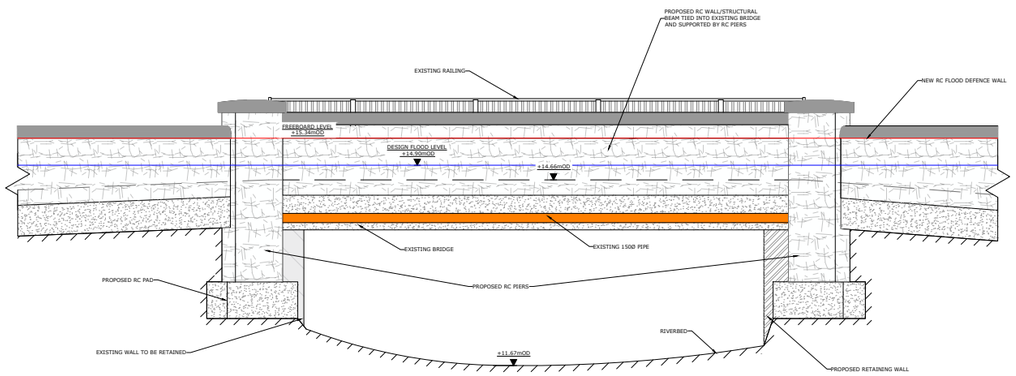
Scale Bar



BRUSNA FLOOD DEFENCE PROPOSED BRIDGE CROSS-SECTION 2-2
BRUSNA BRIDGE
Scale: 1:50 @ A1

0.00m 2m 4m 6m 8m 10m
Scale Bar

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- FOR LAYOUT PLANS, REFER TO DG0005-10 SERIES
- FOR PROPOSED FLOOD DEFENCE PLAN & LONGITUDINAL SECTIONS, REFER TO DG0005-30 SERIES
- FOR CROSS SECTION A-A & B-B, REFER TO DG0005-51
- FOR CROSS SECTION C-C & D-D, REFER TO DG0005-52
- FOR CROSS SECTION E-E & F-F, REFER TO DG0005-53
- FOR CROSS SECTION 1-1 & 2-2, REFER TO DG0005-54

Rev	Date	Dim Chk	Amendment / Issue	App
A1 C01	07/04/25	SB IMH	AUTHORISED & ACCEPTED FOR PLANNING	PJG
S4 P01	20/1/25	SB IS	REVIEW & AUTHORISATION	PJG

Client: Comhairle Contae Mhaigh Eo / Mayo County Council; OPW Oifig na nOibreacha Poiblí / Office of Public Works

RPS MAKING COMPLEX EASY
Lyrr 2, IDA Business & Technology Park, Mervue, Galway
T +353 91 400200
W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

Project
BALLINA FLOOD RELIEF SCHEME PLANNING APPLICATION

Title
PROPOSED FLOOD DEFENCE CROSS SECTIONS - BRUSNA (1-1 & 2-2)

Model File Identifier
N/A

File Identifier
MGW0290-RPS-00-XX-DR-C-DG0005-54

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21/11/2024	05 of 05	
Scale: AS STATED @ A1 / AS STATED @ A3	Status: A1	Rev: CO2

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Figure 3-27: View of the Area of the Proposed Brusna Instream Works (looking NW)

3.7.9.9 Tullyegan Stream

Construction of the walls along the Tullyegan Stream will require some instream works. A temporary cofferdam or piped flume may be required. The proposed instream works for the Tullyegan Stream are shown in **Figure 3-28**. The instream works footprint is 900 m^2.

Figure 3-28: Tullyegan Instream Works

3.7.10 Risk of Flooding During Construction

There is a possibility that a flood will occur on the River Moy or its tributaries during the construction phase. The total duration of construction is approximately 36 months, noting that there are discrete works areas meaning shorter construction durations in each individual location. Low lying areas along the River Moy (e.g. Bachelors Walk) are typically subject to flooding on roadways during high winter

tides. Measures will need to be put in place to ensure these areas do not become more vulnerable to flooding during construction. This will include some or all of the following measures:

- Monitoring of tides and weather events using a forecasting service (Met Éireann).
- Phasing of the works with maximum use of the summer period to ensure existing defences are not removed in areas at risk during high flow / high-tide events.
- Use of temporary flood defence measures in areas of works (e.g. sandbags, water dam structures or similar).
- Removal and subsequent rebuilding of existing flood defences in discrete sections to minimise flood risk.

Along the tributaries flood risk will be managed by:

- Monitoring of weather events using a forecasting service (Met Éireann) to ensure works do not proceed when excessive rainfall is forecast.
- Phasing of the works to ensure existing defences are not removed in areas at risk during high-tide and/or rainfall events (e.g. Quignamanger Stream).
- Completion of the works in short sections to minimise flood risk.

3.8 Construction Management

This section gives an overview of the elements that will require management during the construction phase such as the programme, construction hours, traffic management, personnel safety and licencing obligations, to ensure the Proposed Scheme is constructed in a manner that will result in no significant environmental effects during the construction phase.

3.8.1 Construction Environmental Management Plan

The planning application is supported by the development of a Construction Environmental Management Plan (CEMP). The CEMP will provide detail on the mitigation measures for the protection of the environment and human health as identified in this NIS (and also in the associated Environmental Impact Assessment Report (EIAR)) and will be implemented by the appointed contractor.

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

3.8.2 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.

3.8.3 Traffic Management

3.8.3.1 Construction Traffic

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)

For the purpose of the traffic assessment, a total of 3-4 crews operating at all times has been assumed. Total traffic movements will depend on construction methodology and actual number of crews during construction stage.

3.8.3.2 Haul/Access Routes

Haul routes have been identified for the 5 no. number construction compounds. Delivery of materials and other infrastructure associated with the Proposed Scheme will be carried out using Heavy Goods 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.

Access routes for implementing the construction works associated with the River Moy in Ballina have been identified and illustrated in **Figure 3-29** to **Figure 3-31.** Construction traffic will access the temporary construction compound via the N59 National Road. Additionally, construction traffic will be prohibited from travelling on Castle Road or L-1120 Belleek Road.

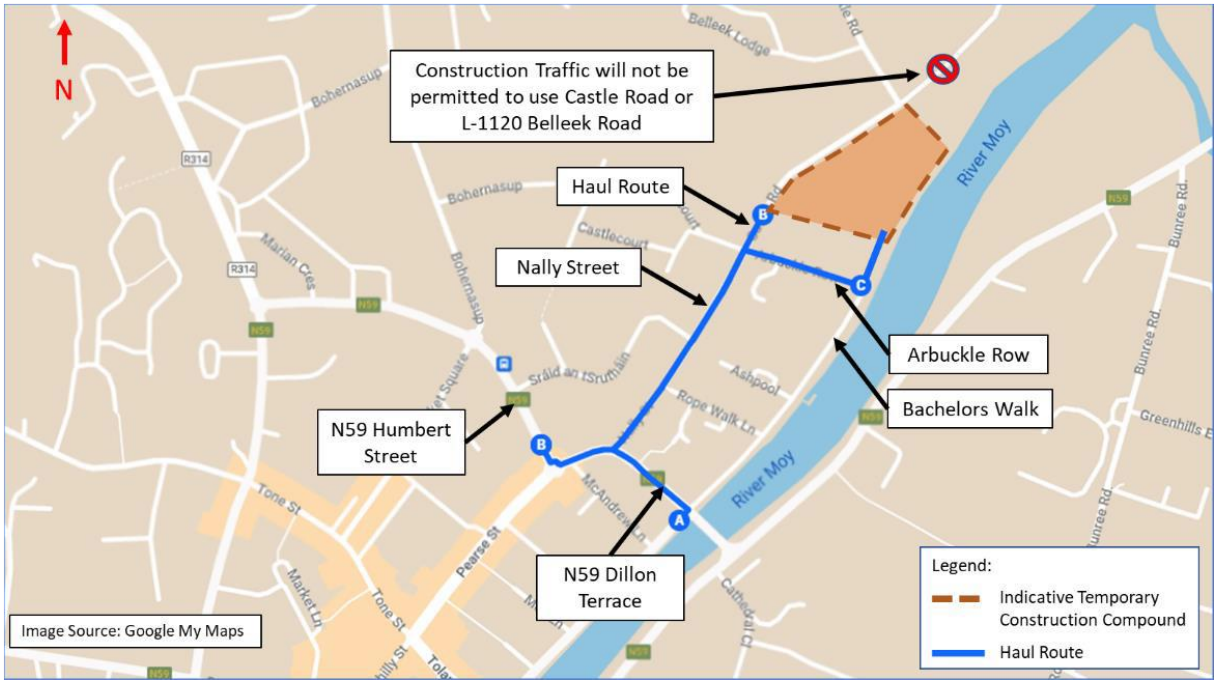

Figure 3-29 Construction traffic haul route (River Moy works) – (1 of 3)

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

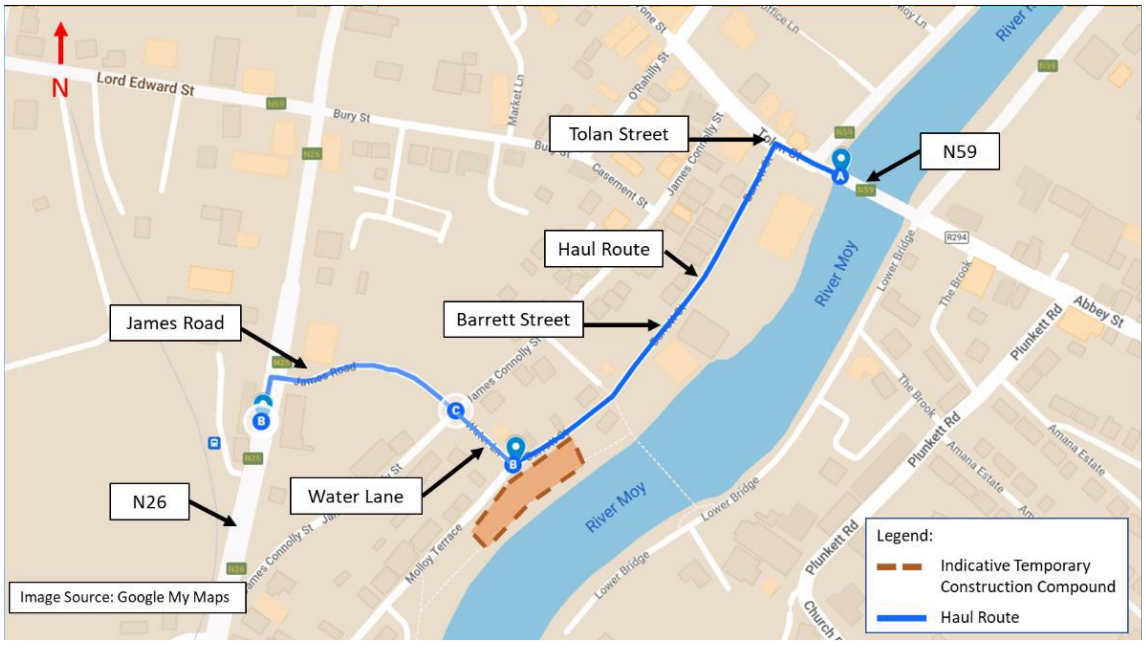

Figure 3-30 Construction traffic haul route (River Moy works) – (2 of 3)

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

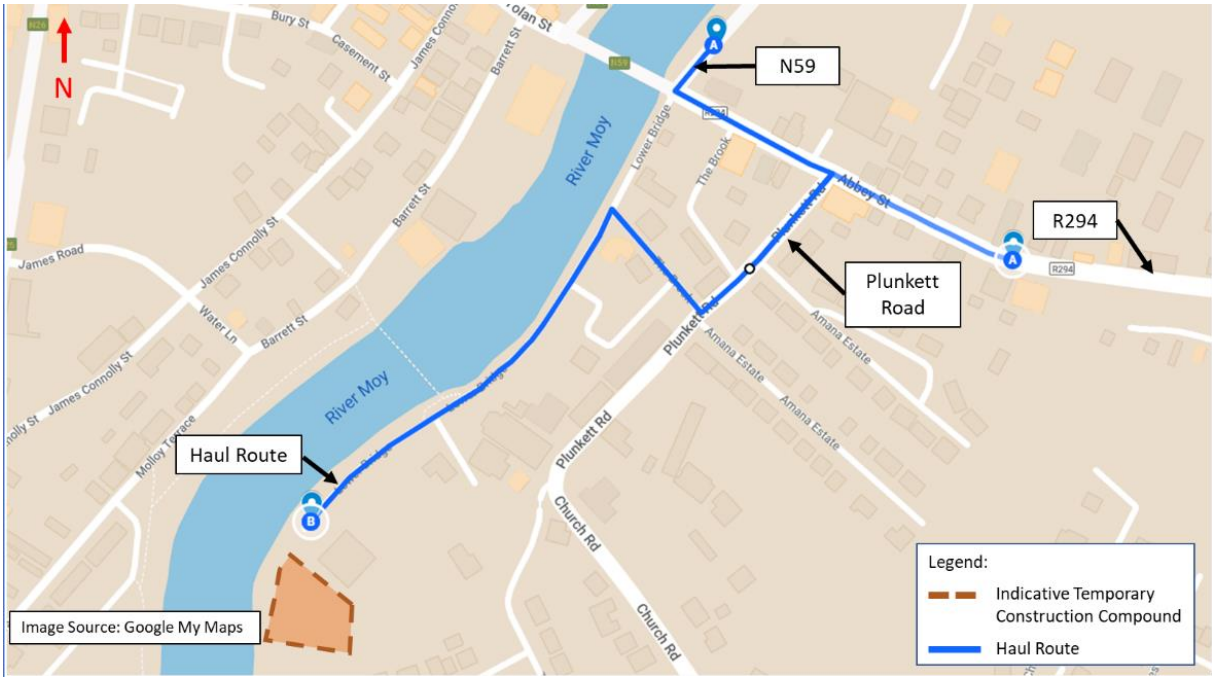

Figure 3-31 Construction traffic haul route (River Moy works) – (3 of 3)

Construction traffic will access the temporary construction compound on Behy Road via the N59 National Road as per **Figure 3-32.** Additionally, construction traffic will be prohibited from travelling east of the temporary construction compound on Behy Road.

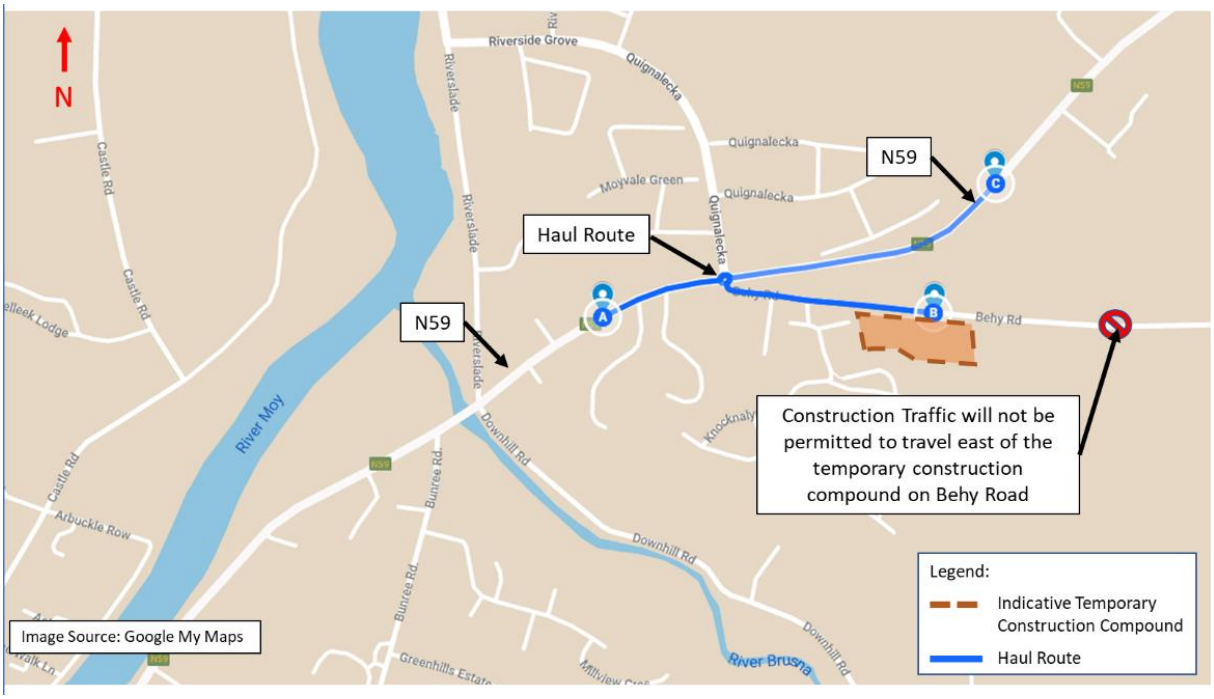

Figure 3-32: Construction traffic haul route (Bunree Stream Works Area)

Construction traffic will access temporary construction compound on Bonniconlon Road for works on the River Brusna via the R294 Regional Road as shown in **Figure 3-33.**

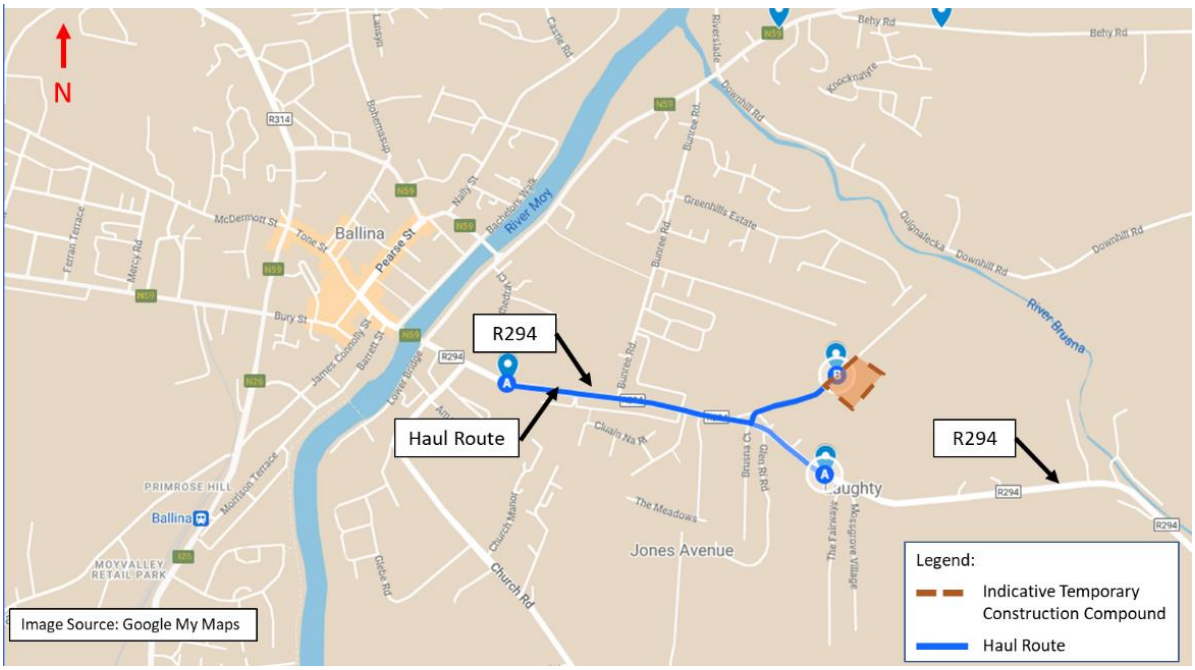

Figure 3-33: Construction traffic haul route (River Brusna Works Area)

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

3.8.3.3 Road/Lane Closures

A number of proposed road/lane closures and diversions are required for the construction activities to be undertaken. Streets and roads impacted include Creggs Road, Quay Road, Nally Street, Bachelor's Walk, Tolan Street, Barratt Street, Emmet Street, N59 Cathedral Road, N59 Clare Street, R294 Abbey Street/Healy Terrace, R294 (Brusna (Glenree) River), Bunree Road, Behy Road, O'Rahilly Street, Bury Street and Ridgepool Road.

3.8.4 Construction Plant

As indicated in **Section 3.7.1**, activities will run simultaneously within 3 to 4 different areas of the Proposed Scheme. The following plant could be required (to be confirmed by appointed contractor) for the purposes of construction activities.Table 3-8 outlines the equipment required within the construction plant.

Table 3-8: Construction Plant List

Equipment	Description
Mobile telescopic crane	Used for installation/removal of 1-ton sandbags for cofferdams
Chain saw	Tree felling, likely only in use for 2 or 3 days
Mini excavator with hydraulic breaker	Breaking out footpaths etc., 1 day or less at any given location
Mini tracked excavator	Trench excavation for foundations

Equipment	Description
Articulated dump truck (tipping fill)	Loading/unloading of truck with rubble/fill
Concrete pump + cement mixer truck (discharging)	Concrete pours at construction stage
Dumper (idling)	General use
Vibratory roller	Only to be used for 1 or 2 weeks (not in tandem w/ excavator or concrete truck)
Mini planer	May not be required
Articulated dump truck	1 per hour
Hand-held circular saw (petrol)	Cutting footpaths, road surface etc., 1 day or less at any given location, stone cladding of walls

3.8.5 Construction Personnel

It is anticipated that 20 to 25 persons will be involved in the construction activities with 5 to 6 persons working in different areas simultaneously.

All project personnel and contractors will be required to be fully compliant with their responsibilities as defined by:

- The Safety, Health and Welfare at Work Act 2005
- The Safety, Health and Welfare at Work (General Application) Regulations 2007-2020
- The Safety, Health and Welfare at Work (Construction) (as Amended) Regulations 2013-2021
- 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

3.8.6 Water Management

During construction, water management measures will be implemented to prevent surface water runoff and pollution of the River Moy and its tributaries.

All works will be completed in accordance with the following guidance, which the contractor is required to adhere to during construction phase:

- Construction Industry Research and Information Association (CIRIA) guidance – Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (CIRIA, 2001)
- Control of Water Pollution from Linear Construction Project: Technical Guidance (CIRIA, 2006a)
- Control of Water Pollution from Linear Construction Projects. Site Guide (CIRIA, 2006b)
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016)

There will be no direct discharge of water from any element of the works without suitable attenuation and treatment. Treated water will be discharged back into the watercourse. Where over pumping is proposed (e.g. Bunree) treatment and/or settlement of water may be required prior to discharging back to the watercourse.

3.8.7 Construction Lighting

During construction, lighting will be minimised and will be designed to avoid any ecological impacts. Lighting will be required during hours of darkness. Low-energy LED options will be utilised where feasible. Emergency back-up lighting will be provided.

Security lighting will be required at night-time in designated areas such as compounds. Directional lighting will be used to ensure minimal disturbance to bats by avoiding light spill onto boundary features (hedgerows, scrub, and trees) and by avoiding uplighting.

3.8.8 Construction Waste

During construction, emissions and residues will arise from the following:

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

Each of these emissions and residues will be addressed in the appropriate manner and in accordance with applicable best practice guidelines.

3.8.9 Resource Management

The principal objective of sustainable resource and waste management is to use material resources more efficiently, to reuse, recycle and recover material and reduce the amount of waste requiring final disposal.

Section 3.7 provides details on the anticipated quantities of materials that will arise during site clearance, demolition and excavations. One of the key objectives is to ensure the reuse of material generated by the construction of the Proposed Scheme where feasible and fit for purpose.

The main types of materials that will be brought to site during the construction phase include granular material, earthworks, concrete, steel reinforcement, pipework and stone.

Materials with a reduced environmental impact will be incorporated into the design through either the re-use of materials or incorporation of recycled materials in place of conventional building materials. The following materials will be considered for the construction phase:

- GGBS and Pulverised Fuel Ash - Used as replacements for Portland cements to increase sustainability and reduce carbon footprint of civil and structural works.
- Reuse of stone from the demolition of existing walls.
- Locally sourced and supplied, where possible, stone, bricks, pavers, coping etc.

3.8.10 Commitments Register

A register of the environmental commitments (i.e. the mitigation measures and monitoring to be undertaken during the construction phase, operational and maintenance phase of the Proposed Scheme) will be provided as part of the planning application.

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

up to ensure adequate implementation of the Schedule of Environmental Commitments which will include representatives from MCC and OPW.

3.9 Operation and Maintenance Phase

The operational and maintenance phase of the Proposed Scheme will not require any additional dedicated employees. It is expected that the operation and maintenance activities required will be undertaken by existing MCC maintenance personnel.

The following sections provides a description of the operations associated with the maintenance of the Proposed Scheme.

An operation and maintenance programme will be prepared for the Proposed Scheme. **Table 3-9** provides a description of the expected maintenance activities required for the Proposed Scheme.

Table 3-9: Operational and Maintenance Activities

Element	Activity	Frequency
Flood walls (including glass)	Inspections	Annually
	Window cleaning	Annually
	Repairs	As req
	Vegetation control	Annually
Pumping stations	Inspections	Bi-annually
	Repairs	As req
Open space	Inspections	Monthly
	Repairs	As req
	Replanting and landscaping	As req
Stormwater drains	Inspections	Bi-annually
	Repairs	As Req
	Petrol interceptor emptying and cleaning	Quarterly
Open Channel[1]	Channel maintenance	Annually
	Vegetation control	Annually
	Removal of trash	As req
Culverts	Inspections	Annually
	Repairs	As required
	Removal of trash and vegetation	Quarterly
Embankments	Inspections and maintenance	Annually
	Vegetation control	Annually
	Vermin control	Bi-annually
	Back drainage improvements	Bi-annually
Flood Gates	Inspections	Bi-annually
	Repairs	As required
Sour Protection (River Brusna)	Inspections	Annually
	Repairs	As required

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

3.9.1 Waste Arisings and Management

No significant waste is predicted during the operational and maintenance phase of the Proposed Scheme.

3.9.2 Emissions

Surface water will be discharged to the River Moy and petrol interceptors will be added to all outfalls discharging to the River Moy. There will be no point source of emissions to air resulting from the operation of the Proposed Scheme. During flood events surface water will be pumped to the River Moy.

4 METHODOLOGY

4.1 Desk Study

A desk study was completed to identify relevant European Sites and information regarding their QIs, SCIs and Conservation Objectives etc. While the distributions of the QI habitats for which the European Sites are selected are typically restricted to the individual Site, QI/SCI species can range well beyond the boundaries of the Site *e.g.* bird species or otter (*Lutra lutra*). The desk study established, from available publications and other publicly available resources, the known distributions and potential presences of such species beyond the defined boundaries of the European Sites for which they are listed as QIs/SCIs. The exercise collated information available from the following sources and it informs the source-pathway-receptor (S-P-R) model analysis:

- Surveys of flora, fauna, and habitats available at Heritage Councils mapping website (https://heritagemaps.ie/WebApps/HeritageMaps/index.html). Study area: 10km hectads G21, G22.
- Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. 2013. *Bird Atlas 2007–11: The Breeding and Wintering Birds of Britain and Ireland*. BTO Books, Thetford. Study area: 10km hectads G21, G22.
- BirdWatch Ireland (https://birdwatchireland.ie/) including Irish Wetland Bird Survey (IWeBS) data Study area: 10km hectads G21, G22 and any IWeBS sites deemed to be connected to the Proposed Scheme via foraging distances of SCI species.
- Distribution records for QI and SCI species of Natura 2000 Sites held online by the National Biodiversity Data Centre (NBDC) (www.biodiversityireland.ie/). Study area: 10km hectads G21, G22.
- Environmental Protection Agency (EPA) online interactive mapping tools (https://gis.epa.ie/EPAMaps) and (https://www.catchments.ie/maps/) for water quality data including surface and ground water quality status, and river catchment boundaries. Study area: groundwater catchment and Water Framework Directive (WFD) Management Units intersected by the Proposed Scheme.
- Geohive online Environmental Sensitivity Mapping tool (https://airomaps.geohive.ie/ESM/). Study area: 10km hectads G21, G22.
- Geological Survey Ireland (GSI) (https://www.gsi.ie/en-ie/Pages/default.aspx). Study area: groundwater catchment and WFD Management Units intersected by the Proposed Scheme.
- Information on ranges of Annex I habitats and mobile QI populations in Volume 1 of NPWS' Status of EU Protected Habitats and Species in Ireland (NPWS, 2019a) and associated digital shapefiles. Study area: 10km hectads G21, G22.
- Information on the location, nature and design of the Proposed Scheme.
- Information on the River Basin Management Plan 2018 – 2021 – (DHPLG, 2018a) and the Water Action Plan 2024 A River Basin Management Plan for Ireland (DEHLGH, 2024). Study area: WFD water bodies intersected by the Proposed Scheme.
- Inland Fisheries Ireland (IFI) and Water Framework Directive (WFD) fish survey data. Study area: WFD Management Units intersected by the Proposed Scheme.
- Mapping of Natura 2000 Site boundaries and Conservation Objectives for relevant sites, available online from the NPWS included site synopses, Natura 2000 Standard Data forms and Conservation Objective Supporting Documents where available (https://www.npws.ie/protected-sites). Study area: all sites considered to be connected to the Proposed Scheme.
- Office of Public Works (OPW) drainage maintenance maps and data (https://www.floodinfo.ie/map/drainage_map/) Study area: WFD Management Units intersected by the Proposed Scheme.
- Ordnance Survey of Ireland – Mapping and Aerial photography (www.osi.ie). Study area: 150 m buffer around the redline of the Proposed Scheme.

- Department of Housing, Planning, Community and Local Government – online land-use mapping (https://viewer.myplan.ie/). Study area: 150 m buffer around the redline of the Proposed Scheme.
- OPWs national flood information portal, Flood Maps (www.floodinfo.ie). Study area: WFD Management Units intersected by the Proposed Scheme.
- Photographs and aerial imagery. Study area: 150 m buffer around the redline of the Proposed Scheme.

4.2 Field Survey

To establish the baseline conditions, multidisciplinary and taxon-specific surveys were undertaken between 2020 and 2023 during optimum seasons for habitats and species in question. The scope of the study area, illustrated in **Figure 4-1**, reflected the geographical extent of the project. The works proposed across the various works areas within this study area are outlined in **Section 3.** The surveys undertaken are summarised in the subsections below, and the findings are provided in **Section 5.1.6.**

- Habitat surveys (summer 2022 and spring 2023)
- Invasive alien plant species (IAPS) surveys (summer 2022 and spring 2023)
- Otter surveys (summer 2022 and spring 2023)
- Over-wintering waterbird surveys (winter 2022 – 2023)
- Aquatic surveys – including instream habitat survey and descriptions; biological water quality classification (Q-Value Assessment); white-clawed crayfish survey/ habitat assessment; fisheries habitat assessment (2021-2023); larval lamprey spot-check surveys; Ridgepool instream survey.

4.2.1 Terrestrial Habitat Survey

Site surveys were carried out on the 12th, 13th and 14th July 22nd August and 20th September 2022 and on the 4th and 5th May 2023 to classify habitats occurring within the survey area with reference to the Heritage Council's habitat classification system (Fossitt, 2000). The survey area for the habitat surveys was all land within approximately 100 m from each proposed works area (**Figure 4-2**). The mapping of habitats had cognisance of the Heritage Council's mapping methodology (Smith *et al*., 2011). The information gained from the survey was used to describe habitat features, and to direct further habitat and species-specific survey work to inform this assessment and to keep the baseline up to date. Target notes were recorded as necessary on maps in the field to identify the location of additional ecological features.

Habitat surveys recorded species using an ordinal abundance scale, the DAFOR scale, as detailed in Smith *et al*., (2011). The DAFOR scale records each species' abundance as Dominant, Abundant, Frequent, Occasional, or Rare based on a semi-quantitative description of each category. Indicator species for different habitat types or conditions and rare or declining species identified on relevant Red Lists (Wyse-Jackson *et al.,* 2016: Lockhart *et al.*, 2012), if present, were also noted.

Vascular plant nomenclature follows Stace (2019). Any bryophyte nomenclature follows the British Bryological Society (Atherton *et al.,* 2010).

4.2.2 Invasive Alien Plant Species Surveys

Specific Invasive Alien Plant Species (IAPS) surveys were undertaken on 7th and 27th June 4th and 5th July 22nd August and 20th September 2022 and also on the 3rd and 4th of May 2023. These surveys recorded the presence and location of IAPS. For the purpose of this assessment, IAPS are those contained within the Third Schedule to the European Communities (Birds and Natural Habitats) Regulations, as amended. Each IAPS survey was undertaken by a qualified ecologist. During these surveys, information of IAPS was recorded including the species present, the location of the species and the approximate extent of the infestation. Infestation intensities, approximate extent of infestation and additional information in relation to the infestation were all logged and recorded on survey data loggers. The survey area for the IAPS surveys was all land within approximately 100 m from each proposed works area (**Figure 4-2**).

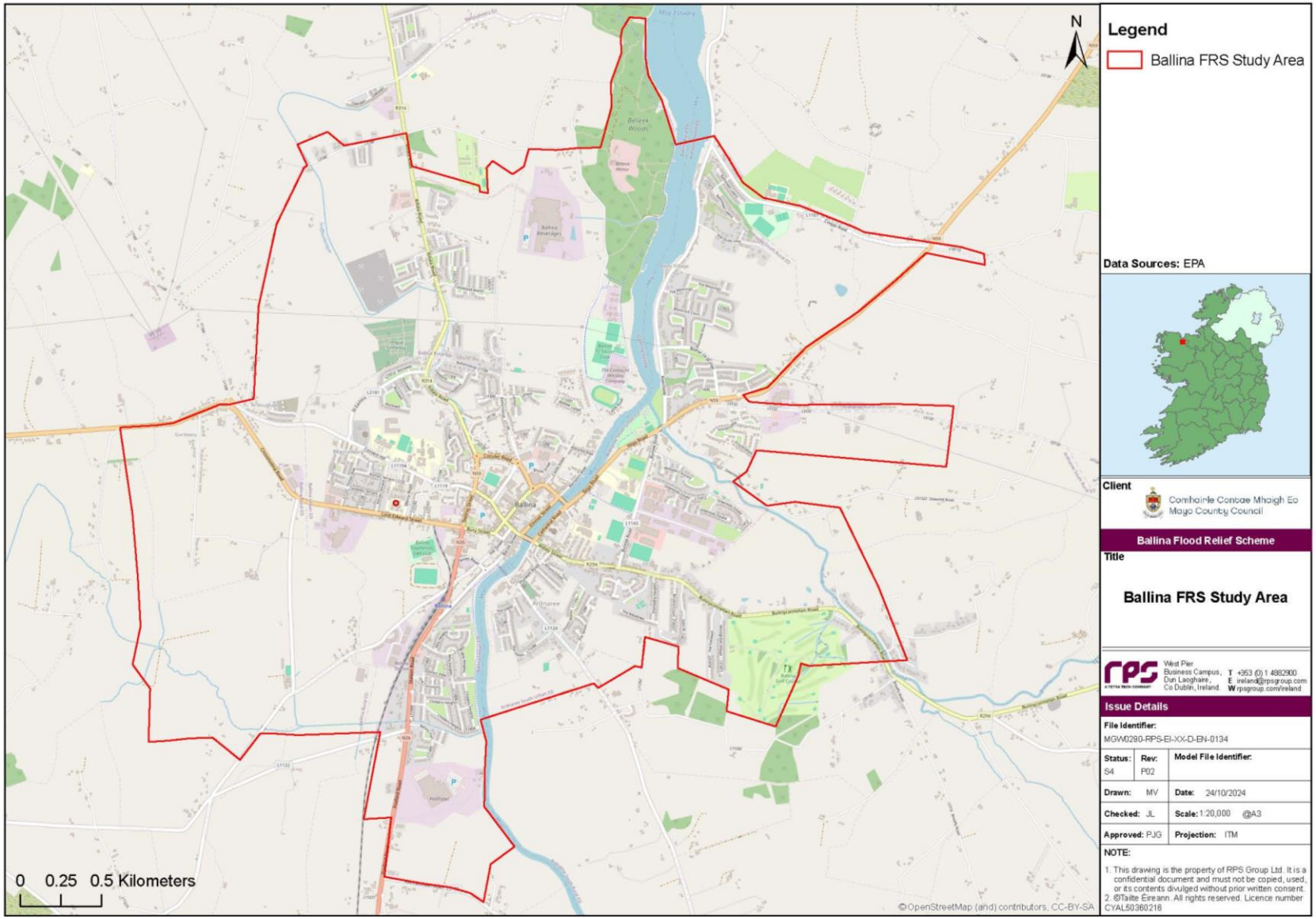

Figure 4-1 Proposed Scheme Study Area

Figure 4-2 Habitat and IAPS Survey Area (i.e. 100m buffer from the redline)

4.2.3 Otter Surveys

An ecological survey was conducted on the 7th and 27th June 4th and 5th July 22nd August and 20th September 2022 and on the 4th and 5th May 2023 for observations of otter and otter signs (e.g. footprints, spraints, holts etc.). These surveys were undertaken to confirm the presence or absence of otter activity, including breeding or resting locations (e.g. holts, couches etc.), for all land within 150 m of the proposed work's areas and to detail otter activity and the locations of such activity.

The surveys were conducted with reference to TII's Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (2008) and with reference to the National Otter Survey of Ireland 2010-2012 (Reid *et al*., 2013).

On the 21st of September 2022 a trail camera was set up on the banks of the River Brusna adjacent to a potential otter holt identified during earlier surveys. This camera was set up by an RPS ecologist with a licence to photograph/film wild animals from the NPWS (Licence No. 197/2022) and was removed 8 days later on the 29th of September 2022.

4.2.4 Over-wintering Waterbird Surveys

Given the proximity and interconnectivity between the Proposed Scheme and Killala Bay/Moy Estuary Special Protection Area (SPA) (site code 004036) and the potential for indirect/ex-situ impacts on the Special Conservation Interests (SCI) of Lough Conn and Lough Cullin SPA (site code 004228), over-wintering avifaunal surveys were completed. These surveys were undertaken to ascertain the level of avifaunal usage within the footprint of the Proposed Scheme and to assess whether the Proposed Scheme area and its environs supported suitable feeding or roosting over-wintering habitat for avifauna associated with these SPAs. Surveys were completed in winter 2022/23 on the following dates: 24th November and 20th December 2022 and the 19th January 20th February and 27th March 2023. Surveys covered a range of tidal cycles in an attempt to capture the varied land use of SCI species throughout the tidal cycle.

Site walkovers were completed over a period of two hours each, once a month, from November 2022 to March 2023 following an adapted methodology based on Wetland Bird Survey (WeBS) Core Counts (Gilbert *et al.,* 1998). During these walkovers, all bird species were recorded using British Trust for Ornithology (BTO) codes, along with peak count and activity.

Two sites (Site 1 and Site 2: **Figure 4-3** and **Figure 4-4,** respectively) adjacent to the proposed works areas were assessed for overwintering waterbird usage. Site 1 encompassed the Moy estuary and habitats adjacent to the Quignamanger proposed works area while Site 2 encompassed the Moy estuary and other habitats within the centre of Ballina town, adjacent to the proposed areas of work along the main channel of the River Moy. A 300 m buffer was applied to the red line boundary of the proposed works, based on the study of waterbird disturbance responses to construction by Cutts *et al*. (2013). All habitats within this 300 m buffer that was deemed suitable to support foraging over-wintering waterbirds that could be accessed on the day or was visible from public areas was surveyed.

Figure 4-3 Overwintering Waterbird Study Area – Site 1

Figure 4-4 Over Wintering Waterbird Study Area - Site 2

4.2.5 Aquatic Surveys – QI Fish and Invertebrates

4.2.5.1 Survey Schedule

Aquatic field studies were conducted on 21-22 July 2021; 10-12 July 2022 and 11-12 September 2023 covering reaches of watercourse where works are proposed.

The target Qualifying Interests for aquatic ecology surveys for this NIS were salmon, sea lamprey, brook lamprey and white clawed crayfish. The locations surveyed are tabulated, described and mapped as shown in **Appendices B, C** and **D**. The aim of surveys was to characterise instream habitats in terms of presence/absence or potential habitat for QI aquatic Annex II species and where possible establish biological water quality as an indicator of habitat quality for aquatic biota. Fieldwork was conducted in good weather conditions with low water levels and good water clarity. Within the constraints imposed by access (e.g., overgrown channels, private land), all intersections between surface waters and the proposed works areas were subject to survey for the purpose of establishing possible effects on QI species and their habitats.

Locations of survey reference points were recorded (Irish Transverse Mercator (ITM)) using hand-held Global Positioning System (GPS). Photographs provide a record of representative views of each survey reach at select locations (**Appendix E**).

Types of survey(s) conducted at selected points on each watercourse are shown in **Table 4-1**. Specific survey site details are listed in **Appendix B** and **Appendix C**, which includes stream order, EPA name and River Water Body (RWB) code, plus current EPA ecological status (2016-2021). Maps showing specific survey locations are in **Appendix D**.

Table 4-1 Ecological Evaluation Criteria – Watercourses

Watercourse	Survey Date(s)	Locations	Survey Types
River Moy	21-22 July 2021 11-12 July 2022 11-12 Sept. 2023	Salmon Weir to the pontoon on Bachelors Walk with focus on proposed temporary instream works areas associated with flood defence wall construction	Fisheries habitat assessment; general habitat description; instream plant community description; juvenile lamprey presence/absence sampling; instream habitat survey (Ridgepool)
Brusna/Glenree	July 2022 11 Sept 2023	Select locations between R294/Shanaghy Heights junction and River Moy confluence with focus on proposed flood defence wall/embankment areas. Instream habitat survey at Rathkip/Shanaghy Bridge to determine baseline conditions of riverbed/bank	Q-value sample and analysis; fisheries habitat assessment; general habitat description; juvenile lamprey spot-checks; white clawed crayfish presence/absence sampling; instream habitat survey (Rathkip/Shanaghy Bridge)
Tullyegan	11 July 2022	Select locations between Tullyegan/Raish townlands and River Moy confluence	Q-value sample and analysis; fisheries habitat assessment; general habitat description, white clawed crayfish presence/absence sampling
Bunree/Behy Road	11 July 2022	Select locations between Quignashee townland and River Moy confluence	Q-value sample and analysis; fisheries habitat assessment; general habitat description
Quignamanger	10 July 2022 11-12 Sept. 2023	Select locations between Quignalegan/Quignashee townlands and the River Moy confluence, with focus on the area at the corner of Cregg Rd and Quay Rd.	Q-value sample and analysis; fisheries habitat assessment; general habitat description; white clawed crayfish presence/absence sampling; water chemistry sampling and analysis

4.2.5.1.1 General Habitat Descriptions

Each channel was walked and accessed at select locations focusing on areas where scheme measures were proposed. River and stream habitats were visually assessed to characterise bankside and in-channel habitats. Site habitat characteristics recorded included: substrate and flow types, depth and width, aquatic

plant community, shading, surrounding land-use and general morphological character. Habitat characteristics were assessed based broadly on criteria for river hydromorphology using the principles of the River Hydromorphology Assessment Technique (RHAT) (NIEA, 2014) and were recorded as part of characterising surface waters in relation to supporting QI habitat requirements. The locations surveyed are tabulated, described and mapped as shown in **Appendices B, C** and **D** with photographs of these locations in **Appendix E**.

4.2.5.1.2 Fisheries Habitat Assessment

Field-based fisheries habitat assessments were conducted at all sites, involving walking the channels of each potentially affected watercourse reach, visually assessing the principle in-channel and bank-side habitats (e.g., substrates, flow type), and the suitability of the latter as spawning and or nursery sites for the relevant QIs i.e., Atlantic salmon, brook lamprey and sea lamprey.

4.2.5.1.3 Biological Water Quality Assessment (Q-value)

Biological water quality in Ireland is assessed using the Q-value metric and is an important determinant of habitat suitability and forms part of the Conservation Objectives for salmon and lampreys. This system is based on field sampling and observations, which evaluates habitat quality and macroinvertebrate diversity and abundance to interpret WFD ecological status as set out in **Table 4-2**. The Q-value assists in the detailed characterisation of water and habitat quality given that water quality is a primary determinant of habitat quality for aquatic organisms.

Potentially affected watercourses were sampled in accordance with EPA protocols to determine Q-value and water quality implications. This involved taking 2-minute, travelling kick-samples in the fast flowing (riffle) area of each stream using a professional long-handled sampling net (250 mm width, mesh size 0.25mm). Riffle areas of watercourses received preference in sampling, as the fauna of riffles tends to be more sensitive to pollution impacts. Stone washing was employed to ensure “clinging” species were adequately collected. Samples were identified on the bankside using a large white tray with a volume of water covering the contents to record relative abundance of aquatic macroinvertebrates (identified to species level where possible; family level at minimum). The abundance of each group and sensitivity to pollution are then used to assign Q-value in accordance with published methods (Toner *et al.,* 2005).

The Ecological Quality Ratio (EQR) represents the relationship between the values of the biological parameters observed for a given body of surface water and the values for these parameters in reference (pristine) conditions applicable to that body. The EQR classifies sites according to ecological quality status as required by river basin management planning under the WFD. It allows comparison of water quality status across the European Union since each member state has an EQR value for ‘High’; ‘Good’, ‘Moderate’, ‘Bad’ and ‘Poor’, based on an intercalibration of boundaries between water quality categories (McGarrigle & Lucey, 2009). Under the WFD, all surface waters must be maintained or restored to at least Good Ecological Status (Q4) within specific timeframes as set out in the River Basin Management Plans (RBMPs) and high-status waters (Q4-5 and Q5) must not suffer deterioration.

Table 4-2: Ecological Evaluation Criteria – Q-value for Watercourses

Q-value	EQR*	Quality Indication	Water Quality	Ecological Status
Q5	1.0	Unpolluted	Good	High
Q4-5	0.9	Unpolluted	Fair-to-Good	
Q4	0.8	Unpolluted	Fair	Good
Q3-4	0.7	Slightly Polluted	Doubtful-to-Fair	Moderate
Q3	0.6	Moderately Polluted	Doubtful	Poor
Q2-3	0.5	Moderately Polluted	Poor-to-Doubtful	
Q2	0.4	Seriously Polluted	Poor	Bad
Q1-2	0.3	Seriously Polluted	Bad-to-Poor	

** Ecological Quality Ratio*

4.2.5.1.4 White-clawed Crayfish Presence/Absence Survey

Instream habitat patches were manually searched for a time period of no less than 30 minutes targeting at least 50 habitat patches per survey area for presence of white clawed crayfish (*Austropotamobius pallipes*) using a variety of recognised techniques (Peay, 2003) including lifting and disturbing large rocks and cobbles, hand searching of undercuts, hollows and crevices and pond sweeping among emergent aquatic macrophytes. Two sites on each of the Tullyegan and Brusna (Glenree) River were searched, and one site on the Quignamanger (TE1, TE3, BR2, BR5, QG1: **Appendices B, C, D** and **E**). Bunree was unsuitable for crayfish survey, being virtually dry (or very low volume) and drained/culverted. The tidal River Moy is not suitable habitat for freshwater crayfish.

4.2.5.1.5 Juvenile Lamprey Spot-checks

During walkover surveys of all watercourses, selected spots in river margin areas with stable silt deposits were gently disturbed into a standard pond net to check presence or likely absence of juvenile lamprey (ammocoetes). Any juveniles detected were recorded (numbers) and returned to the silty marginal areas amongst emergent vegetation where they quickly re-burrow into the substrates. The method did not allow for differentiation between sea, river and brook lamprey species (*Petromyzon marinus, Lampetra fluviatilis* and *Lampetra planeri*, respectively) but determined habitat suitability and distribution of juvenile lampreys. All three species of larval lamprey have the same habitat requirements and would be equally affected with respect to any proposed instream works. The potential distribution of each species was inferred from previous juvenile lamprey surveys which showed broad distribution of *P. marinus* and *Lampetra* spp. throughout the Moy catchment (O'Connor, 2004).

4.2.5.1.6 Ridgepool Survey

Detailed instream surveys (snorkel and wading) were conducted within the Ridgepool on 22nd July 2021 and 12th September 2023. The aim of the surveys was to identify habitats within the footprints of proposed temporary work areas within the Ridgepool as to whether they constitute potential sea lamprey spawning or nursery habitats. The focus was to support the determination of effects (if any) of temporary instream works on attributes and targets relating to Conservation Objective for sea lamprey. Habitats for salmon were also noted. The methodology is set out in the full report presented in **Appendix F**.

4.2.5.1.7 Floating River Vegetation

Floating river vegetation (FRV) habitat is the common name for Habitat 3260: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. The habitat is listed on Annex I of the Habitats Directive and requires protection within designated European sites. The River Moy is not designated for FRV habitat, but its occurrence was recorded because FRV is often a component of salmonid waters. Within the freshwater and estuarine tidal reaches of the River Moy its presence contributes to cover for migrating fish, although boulders, deeper glides, turbulent riffles and turbidity also provide cover in the lower river reaches. FRV has a broad classification, covering rivers from upland bryophyte and macroalgal dominated stretches, to lowland depositing rivers with pondweeds and starworts (EC, 2013; (Hatton-Ellis, 2003). Many of the species named as components of FRV habitat are widespread and common in Irish rivers including, *Ranunculus* spp., *Myriophyllum* spp*., Callitriche* spp*., Berula erecta, Zannichellia palustris, Potamogeton* spp. and the aquatic moss *Fontinalis antipyretica.* FRV assessments were made from both banksides of the riverine Moy (with occasional in-channel wading, where depth allowed and with permission from IFI to enter angling waters). The presence/absence and broad coverage of indicator species were then used, where relevant, to assess distribution of FRV habitat in relation to proposed measures.

4.3 Data Limitations and Difficulties Encountered

4.3.1 Desk Based Study

Sources of desk study information are neither exhaustive nor necessarily easily available, and an extensive effort was made to obtain ecological data in the public domain to inform the description of the baseline environment and its assessment. Additional information, not in the public domain, is likely to exist, but could

not be obtained or assessed here. This limitation is acknowledged and incorporated into the assessment and is deemed to not affect the certainty or predictability of the assessment.

Species records data held by record centres and statutory bodies (such as the NBDC and NPWS) are often provided on an *ad-hoc* basis by recorders. These records can only provide an indication of what species might be found in an area; they do not constitute full and complete species lists. Absence of certain species from these sources does not confirm absence of these species from the area.

4.3.2 Field Survey

The receiving environment (i.e. baseline condition) may naturally vary through seasons and between years and surveys undertaken can only provide a snapshot of the ecological features present at the time of the surveys. All reasonable effort has been made to address this (e.g. multiple site visits, combined use of desk and field survey data) and the limitation is acknowledged. Once incorporated into the assessment the limitation is deemed to not affect the certainty or predictability of the assessment.

4.3.2.1 Otter

Due to difficult terrain in some parts of the survey area e.g. dense sections of scrub along the Bunree and Tullyegan riverbanks, some areas were inaccessible. Binoculars were used, where possible, to survey such areas. Once incorporated into the assessment the limitation is deemed to not affect the certainty or predictability of the assessment.

4.3.2.2 Invasive Alien Plant Species

Due to difficult terrain in some parts of the survey area e.g. dense sections of scrub along the Bunree and Tullyegan riverbanks, some areas were inaccessible. Binoculars were used, where possible, to survey such areas. Once incorporated into the assessment the limitation is deemed to not affect the certainty or predictability of the assessment.

4.3.2.3 Harbour Seal

No specific field surveys were undertaken for harbour seal (a QI of Killala Bay/Moy Estuary Special Area of Conservation (SAC)) as desktop studies indicated that they did not use the estuary adjacent to the proposed works areas, however, there were a number of incidental observations of this species adjacent to the proposed works areas during the over-wintering waterbirds surveys. As these incidental observations confirmed that harbour seal are using the estuary, it was consequently considered that presence/absence surveys would provide no additional information in this regard. The potential impacts of the project on harbour seal are addressed within the assessment, and once incorporated this limitation is deemed to not affect the outcome or certainty of the assessment.

4.3.2.4 Overwintering waterbirds

The survey work for the overwintering waterbirds was carried out between November 2022 and March 2023. Therefore, it is limited to the mid and late winter period of a single season. However, given the availability of existing waterbird data for the area and the limited overlap of the Proposed Scheme area with overwintering waterbird habitat, it is considered that there is sufficient information available for the assessment. Once incorporated into the assessment the limitation is deemed to not affect the certainty or predictability of the assessment.

A small number of areas within the 300 m buffer devised for over-wintering waterbird surveys could not be accessed or could not been seen on the day of the survey e.g. within Site 1 a visual could not be obtained of certain sections of the agricultural land parcels to the north-east of the site due to the topography of the area. Once incorporated into the assessment, this limitation is deemed to not affect the certainty or predictability of the assessment.

4.3.2.5 Aquatic Surveys

Access to the Ridgepool was restricted by the angling amenity value of the reach. This was overcome by booking a time with IFI to access the pool to conduct instream surveys. Marginal habitats of the Ridgepool, i.e., those subject to proposed instream works, could also be viewed from the bankside at low flow/low tide when they became largely dewatered meaning ephemeral river margin habitats were visually open to characterisation in terms of substrate types and fisheries potential. In addition, areas that typically dewater in the tidal Moy are unsuitable for lamprey spawning or nursery and have ephemeral value for migrating salmon, therefore observations from the bankside which clearly demonstrated the marginal areas that dry out at low tide enhanced the baseline characterisation of habitat suitability for fish because the river margins are the areas potentially directly affected by proposed construction work.

Permission was obtained from IFI staff to carry out instream survey to help identify potential sea lamprey habitats of the Ridgepool on 12th September 2023. There were no fishing bookings that day meaning no disruption to the angling amenity. Lamprey nest building activity has been observed in discrete areas of the Ridgepool on occasion by IFI staff. Sea lamprey spawning typically occurs in mid-May to June and as late as mid-July. It was not possible to conduct instream habitat surveys in the Ridgepool during spawning season owing to angling amenity restrictions and high-water levels in summer (2023) when the proposed instream works footprint was fully clarified. That being said, the surveys carried out in September 2023 coincided with very low flows and low tide (82 percentile daily mean water level for the tidal Moy, with low tide level of 0.552 representing 95th percentile based on OPW data derived for the period 2007 to 2023). In addition, earlier survey of the Ridge Pool marginal area was conducted on 22nd July 2021 during extreme low flow/low tide (95th percentile daily mean water level with low tide level at 99th percentile of water levels on the tidal Moy). Such conditions on both occasions were amenable to assessing marginal and near margin habitats of the Ridgepool in relation to potential sea lamprey spawning and nursery habitat. In addition, on a precautionary basis, and to cover any uncertainty and natural variability in terms of low flow and wetted channel width that could support sea lamprey spawning in any year, timing restrictions and stringent mitigations have been included for works in the Ridgepool to avoid any likely or significant effects on this species.

5 EXISTING ENVIRONMENT

5.1 Desk Study

5.1.1 Site Location

The Proposed Scheme is located within the town of Ballina, Co. Mayo and environs. It consists of a number of separate proposed works areas across five watercourses – Tullyegan, Moy, Bunree/Behy Road, Quignamanger and Brusna. The scheme area spans two separate 10 km grid squares – G21 and G22.

Ballina town consists of residential and commercial properties and associated infrastructure while the surrounding landscape is primarily agricultural with residential properties and associated infrastructure.

The Proposed Scheme overlaps with three Natura 2000 sites – The River Moy SAC (site code: 002298), Killala Bay/Moy Estuary SAC (site code: 000458) and Killala Bay/Moy Estuary SPA (site code: 004036) (**Figure 5-1**).

5.1.2 Relevant Surface Waters

The Proposed Scheme is located within the Moy and Killala Bay catchment and the Leaffony_SC_010, Glenree_SC_010, Moy_SC_090 and Moy_SC_100 sub-catchments. The Proposed Scheme includes five watercourses within these sub-catchments.

The Quignamanger and Bunree watercourses are within the Leaffony_SC_010 sub-catchment and both are culverted for the majority of their length within and adjacent to the Proposed Scheme. No Q-Value monitoring by the EPA has been undertaken on either of these watercourses. The WFD status of both the Quignamanger and Bunree (waterbody name: Dooyeaghny_or_Cloonloughan_010) for the 2016-2021 period is classified as “good”, as assessed via modelling. Both these watercourses have also been highlighted for review to assess their risk of not achieving WFD objectives (based on WFD risk for the 3rd Cycle of the WFD).

The Brusna (EPA name Glenree_34) watercourse is located within the Glenree_SC_010 sub-catchment and is covered by the SAC designation. This watercourse was assigned a Q-value of 4-5 (high status) in 2022 by the EPA at a monitoring station approximately 220 m upstream of the Proposed Scheme area (station name and code: Ford u/s Rathkip RS34G010100). Another monitoring station approximately 1.4 km downstream of the Proposed Scheme area (station name and code: Bunree Bridge RS34G010200) was also assigned a Q-value of 4-5 (high status) in 2022 by the EPA. Sampling carried out on the Brusna in September 2023 at Site BR2 (**Appendices B, C, D** and **E**) also returned Q4-5, representing ‘high’ status. The WFD status of the River Brusna (waterbody name: Glenree_030) is classified as ‘good’ based on EPA data for the 2016-2021 period. The river water body is compliant with WFD objectives and currently meets the SAC Conservation Objective target of Q4 ‘good’ status for salmon and lamprey habitat.

The Tullyegan watercourse is located within the Moy_SC_100 sub-catchment. No Q-Value monitoring by the EPA has been undertaken on this channel. The Tullyegan has been extensively drained and realigned with the lower reaches heavily channelised. The WFD status of the Tullyegan (waterbody name: Tullyegan_010) for the 2016-2021 period is classified as “moderate”, as assessed by EPA modelling. The Tullyegan has been highlighted for review to assess its risk of not achieving WFD objectives (based on WFD risk for the 3rd Cycle of the WFD).

The River Moy within and downstream of Ballina town, where works are proposed, is at the centre of a number of different sub-catchments including Leaffony_SC_010, Moy_SC_090 and Moy_SC_100. This river was assigned a Q-value of 3-4 (‘moderate’ status) in 2022 by the EPA at a monitoring station approximately 90 m upstream of the of the Proposed Scheme area (station name and code: 1 km u/s Ardnaree Br (LHS) RS34M021050). The WFD status of the River Moy (waterbody name: Moy_120) for the 2016-2021 period is classified as ‘moderate’. This does not comply with WFD objectives, nor with the SAC Conservation Objective target of Q4 ‘good’ status for salmon and lamprey habitat.

The River Moy is a transitional waterbody downstream of the Upper Bridge in the centre of Ballina town (i.e. downstream of the R294). The WFD status of the Moy Estuary (waterbody name and code: Moy Estuary IE_WE_420_0300) for the EPA 2016-2021 monitoring period is “moderate”. Whilst this is not compliant with WFD objective of ‘good’ status, there is no supporting water quality target within the SAC Conservation

Objectives for the estuarine River Moy. The estuary is considered to be 'at risk' of not achieving its WFD objectives (based on WFD risk for the 3rd Cycle of the WFD).

5.1.3 Relevant Groundwaters

The Proposed Scheme lies entirely within the Ballina (IE_WE_G_0035) groundwater body (GWB). The WFD status of this groundwater body for the 2016-2021 period is classified as 'good', i.e., compliant with WFD objectives. The aquifer type underlying the site is a 'regionally important karstified aquifer' (GSI, 2023)[2]. Groundwater vulnerability across the Proposed Scheme has a range of different classes including 'rock at or near the surface or karst', 'extreme', 'high' and 'moderate'. Given the high level of interaction between ground and surface waters in karstified catchments, 'good' status of the groundwater body helps support CO targets for salmon and lamprey habitats of River Moy SAC.

5.1.3.1 Regional Hydrogeology

The Ballina GWB is a productive karstic GWB composed of the Dinantian Pure Bedded Limestones with karstified cavities at depth. Although groundwater flow through karst areas is complex and unpredictable, groundwater flow within the study area is expected to be reflective of topography and flow towards the River Moy.

The aquifers in the productive Ballina GWB supply a number of high yielding wells such as Knockbaun, Cullens, Corry (Ballina GWB Description, GSI. 2004). Flow paths can be up to several kilometres in length with flow velocities rapid and variable and occurring within large conduit systems. Groundwater discharges locally to small springs, streams and rivers. However, owing to the poor productivity of these aquifers baseflow proportion of total streamflow is considered to be small. Flow paths are likely to up to 150 m with shallow groundwater flow dominating.

The Geological Survey Ireland (GSI) summary of initial characterisation document for the Ballina GWB (GSI, 2004) describes the groundwater and surface water interactions within the Ballina groundwater body:

> "There is a high degree of interconnection between groundwater and surface water. The close interaction between surface water and groundwater in karstified aquifers is reflected in their closely linked water quality. Any contamination of surface water is rapidly transported into the groundwater system, and vice versa."

[2] Geological Survey Ireland Spatial Resources https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228 Accessed 10/02/2023

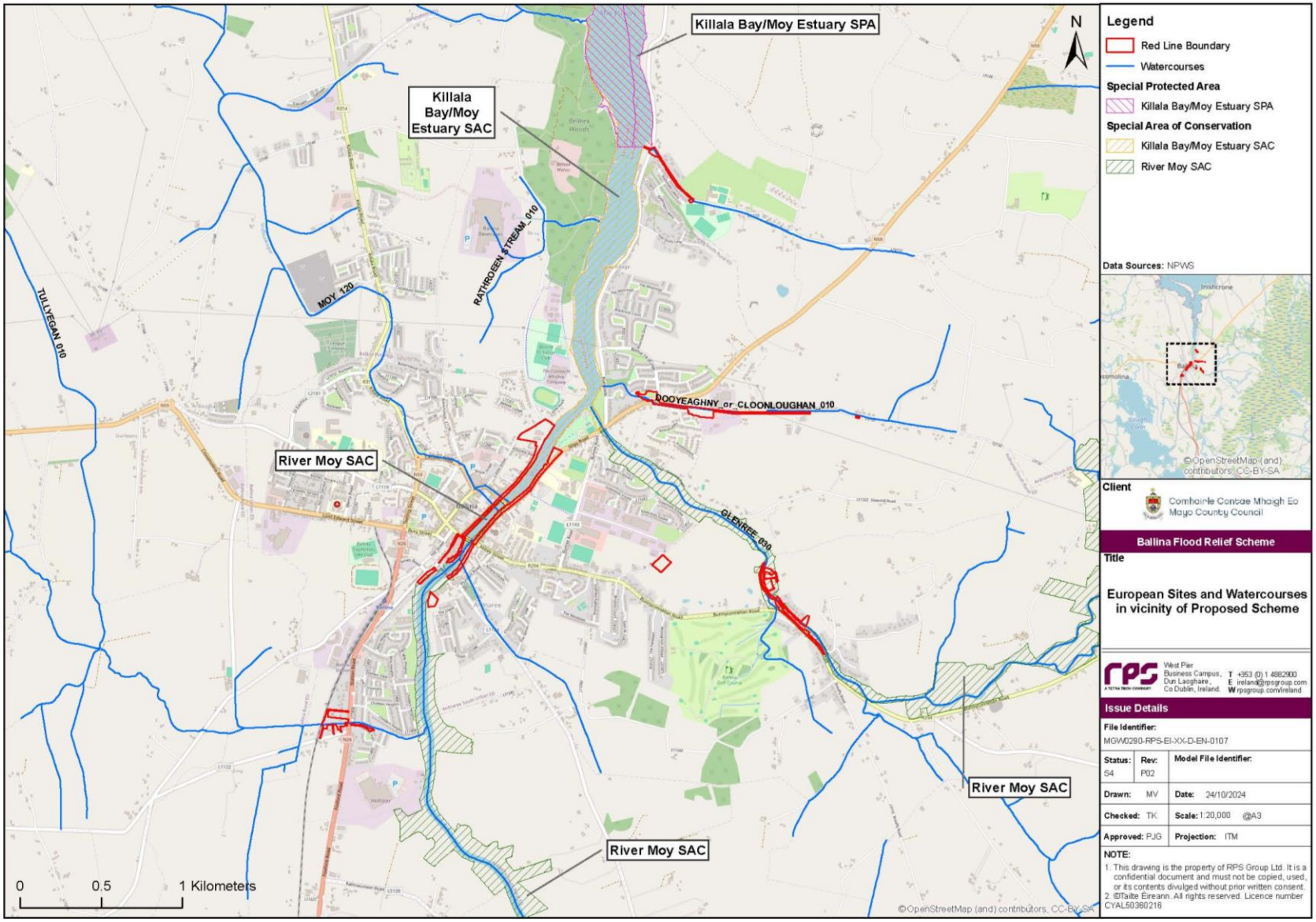

Figure 5-1 European Sites in close proximity to the Proposed Scheme

5.1.4 Fauna

5.1.4.1 Review of Existing Records

The primary QI and SCI fauna of relevance to this NIS are mobile fauna, namely otter, salmon (*Salmo salar*), brook lamprey (*Lampetra planeri*), sea lamprey (*Petromyzon marinus*), white-clawed crayfish (*Austropotamobius pallipes*), harbour seal (*Phoca vitulina)* and SCI bird species listed for SPAs within the Zone of Influence (ZoI). The ZoI of the project is the geographical area over which it could affect the receiving environment in a way that could have LSEs directly or indirectly on European Site(s).

Using the National Biodiversity Data Centre (NBDC) database and records obtained from the National Parks and Wildlife's Service (NPWS) protected and threatened species database, records of designated species for the SACs (River Moy SAC; Killala Bay/Moy Estuary SAC) and SPAs (Killala Bay/Moy Estuary SPA; Lough Conn and Lough Cullin SPA) within the ZoI of the Proposed Scheme were obtained and assessed for whether each species has been recorded as present within the Proposed Scheme environs (**Table 5-1**). Records greater than 10 years old have been excluded from this assessment with the exception of Bird Atlas 2007-2011 (Balmer *et al*., 2013) data. A full list of QI and SCI species returned from this NBDC data search for grid squares G21 and G22 are provided in **Appendix G**.

Table 5-1 NBDC and NPWS records (grid squares G21 and G22) of QI/SCI species listed for European Sites within the ZoI of the proposed development.

Common Name	Scientific Name	Date of Last Record	Designation*	Grid Square
European otter	*Lutra lutra*	NBDC - 2017	EU Habitats Directive Annex II, Annex IV Wildlife Acts	NBDC - G22
Sea lamprey	*Petromyzon marinus*	NBDC - 2022	EU Habitats Directive – Annex II OSPAR	NBDC – G21
Freshwater white-clawed crayfish	*Austropotamobius pallipes*	NBDC - 2016	EU Habitats Directive – Annex II, V Wildlife Acts	NBDC – G22
Harbour seal	*Phoca vitulina*	NBDC – 2014 NPWS - 2013	EU Habitats Directive – Annex II, V Wildlife Acts	NBDC – G21, G22 NPWS – G22
Eurasian curlew	*Numenius arquata*	NBDC – 2019	EU Birds Directive – Annex II, Section II BoCCI – Red List Wildlife Acts	NBDC – G21, G22
Golden plover	*Pluvialis apricaria*	NBDC – 2011 (Bird Atlas)	EU Birds Directive – Annex I; Annex II, Section II; Annex III, Section III BoCCI – Red List Wildlife Acts	NBDC – G21, G22
Grey plover	*Pluvialis squatarola*	NBDC – 2011 (Bird Atlas)	BoCCI – Red List Wildlife Acts	NBDC – G22
Ringed Plover	*Charadrius hiaticula*	NBDC – 2011 (Bird Atlas)	BoCCI – Amber List Wildlife Acts	NBDC – G22
Sanderling	*Calidris alba*	NBDC – 2011 (Bird Atlas)	-	NBDC – G22
Redshank	*Tringa totanus*	NBDC – 2011 (Bird Atlas)	BoCCI – Red List Wildlife Acts	NBDC – G21, G22
Tufted Duck	*Aythya fuligula*	NBDC – 2011 (Bird Atlas)	EU Birds Directive – Annex II, Section I; Annex III, Section II BoCCI – Amber List Wildlife Acts	NBDC – G21, G22
Common scoter	*Melanitta nigra*	NBDC – 2011 (Bird Atlas)	EU Birds Directive – Annex II, Section II; Annex III, Section III BoCCI – Red List Wildlife Acts	NBDC – G21
Common gull	*Larus canus*	NBDC – 2011 (Bird Atlas)	BoCCI – Amber List Wildlife Acts	NBDC – G21, G22
Dunlin	*Calidris alpina*	NBDC – 2011 (Bird Atlas)	EU Birds Directive – Annex I	NBDC – G22

Common Name	Scientific Name	Date of Last Record	Designation*	Grid Square
			BoCCI – Red List Wildlife Acts	
Bar-tailed godwit	*Limosa lapponica*	NBDC – 2011 (Bird Atlas)	EU Birds Directive – Annex I BoCCI – Red List Wildlife Acts	NBDC – G22

*BoCCI: Gilbert. G., Stanbury, A., Lewis, L. (2021) Birds of Conservation Concern in Ireland 2020-2026, Irish Birds 9: 523 – 544. Wildlife Acts: Wildlife Acts 1976 to 2022. EU Birds Directive: Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.

Using data, including digital shapefiles obtained from the NPWS 2019 Article 17 reporting database regarding QI populations in NPWS' "Status of EU Protected Habitats and Species in Ireland" (NPWS, 2019a,b,c) the locations of observations, the distribution and the range of designated species for the SACs and SPAs considered to be within the ZoI of the Proposed Scheme were obtained and assessed for whether each species has been recorded as present within the Proposed Scheme environs (**Table 5-2**). Distribution and range differ in that distribution relates to the 10 km grid squares that intersect all known locations for an Annex I habitat type while "…range describes roughly the spatial limits within which the habitat or species occurs" (Evans & Arvela, 2011).

Table 5-2 Range and Distribution of Annex II species identified in the NPWS Article 17 that are associated with the European Sites within the ZoI of the Proposed Scheme as database.

Annex II Species	Distribution	Range
1092 White-clawed crayfish	G22	G21, G22
1095 Sea Lamprey	G21	G21, G22
1096 Brook Lamprey	G21	G21
1106 Atlantic Salmon	G21, G22	G21, G22
1355 Otter	G22	G21, G22
1014 Narrow-mouthed Whorl Snail	G22	G22

Note that the Fish Health Unit at Ireland's Marine Institute confirmed the presence of crayfish plague (*Aphanomyces astaci*) in the Moy catchment using environmental DNA (eDNA) sampling in 2021 (MI, 2022). Crayfish plague is an introduced fungal disease that causes mass mortality of white-clawed crayfish, is gradually working its way through the catchment.

5.1.4.2 I-WeBS Survey Data

Records were obtained from BirdWatch Ireland's Irish Wetland Bird Survey (I-WeBS) database for the Killala Bay site (I-WeBS site code: 0D407) and for the Mount Ready subsite (I-WeBS subsite code: 0D412) of the Killala Bay site, both of which are adjacent to the Quignamanger proposed works area (**Figure 5-2**) for the winter seasons 2017/18 through 2021/22. Data were supplied by the Irish Wetland Bird Survey (I-WeBS), a scheme coordinated by BirdWatch Ireland under contract to the National Parks and Wildlife Service (NPWS) of the Department of Housing, Local Government and Heritage. These data were used to provide an insight into the winter bird species and numbers of same that are likely to occur adjacent to or near the Proposed Scheme.

A wetland is considered important in an all-Ireland context if it regularly holds 1% or more of one species, subspecies or population of waterbirds occurring in Ireland, and of international importance if it regularly supports the same proportion (i.e. 1%) of the relevant international population. As per the recommendations of the Ramsar Convention, key sites identified because of the numbers of birds should support such numbers on a regular basis (usually calculated as the mean winter maximum for the last five winters)[3]. Annual peak counts recorded for a number of species observed during the winter bird surveys were greater than the corresponding 1% national or 1% international significance thresholds (as per Lewis *et al*., 2019) for those species.

[3] Data Request Interpretive Notes – Irish Wetland Bird Survey (I-WeBS)

5.1.4.2.1.1 Killala Bay Site

Thirty-one wintering bird species were recorded within the Killala Bay site across all five survey seasons for which data were obtained (**Appendix H**). Of these 31 species, ten are listed as SCI of either Killala Bay/Moy Estuary SPA or Lough Conn or Lough Cullin SPA (tufted duck, common scoter, ringed plover, golden plover, grey plover, sanderling, dunlin, bar-tailed godwit, curlew, redshank) (**Table 5-3**).

No SCI species of Killala Bay/Moy Estuary SPA or Lough Conn and Lough Cullin SPA was recorded in internationally important numbers.

The Killala Bay site was deemed to support numbers of national importance of three SCI species of Killala Bay/Moy Estuary SPA (ringed plover, sanderling, redshank) as each of these species was deemed to be regularly occurring (i.e. occurred on site every year/season for the last 5 years/seasons) and the mean count of each of these species (i.e. the mean of the last 5 years of peak yearly counts for each species) is above the 1% national threshold as provided by Lewis *et al.* (2019). No SCI species of Lough Conn and Lough Cullin were recorded in nationally important numbers.

The peak mean winter maximum for the past 5 winters (2017/18 to 2021/22), the national and international thresholds and the national long-term trends for these ten SCI bird species is outlined in **Table 5-3** while these data for the 31 species recorded form the Killala Bay IWeBS site are outlined in **Appendix H**.

5.1.4.2.1.2 Mount Ready Subsite

Thirty-two waterbird species were recorded within the Mount Ready subsite of the Killala Bay site (**Appendix H**). Of these 32 species six are listed as SCI of Killala Bay/Moy Estuary SPA (golden plover, grey plover, dunlin, bar-tailed godwit, curlew, redshank) and one (common gull) is listed as an SCI of Lough Conn and Lough Cullin SPA (**Table 5-4**).

No data were available for this subsite for the 2017/18 and 2018/19 seasons, meaning data were only available for the 2019/20, 2020/21 and 2021/22 seasons. As a result, it could not be determined whether nationally/internationally important numbers of waterbirds were present given the lack of data.

The peak mean winter maximum for the past 3 winters (2019/20 to 2021/22), the national and international thresholds and the national long-term trends for the six SCI bird species are outlined in **Table 5-4** while these data for the 32 species recorded form the Mount Ready IWeBS subsite are outlined in **Appendix H**.

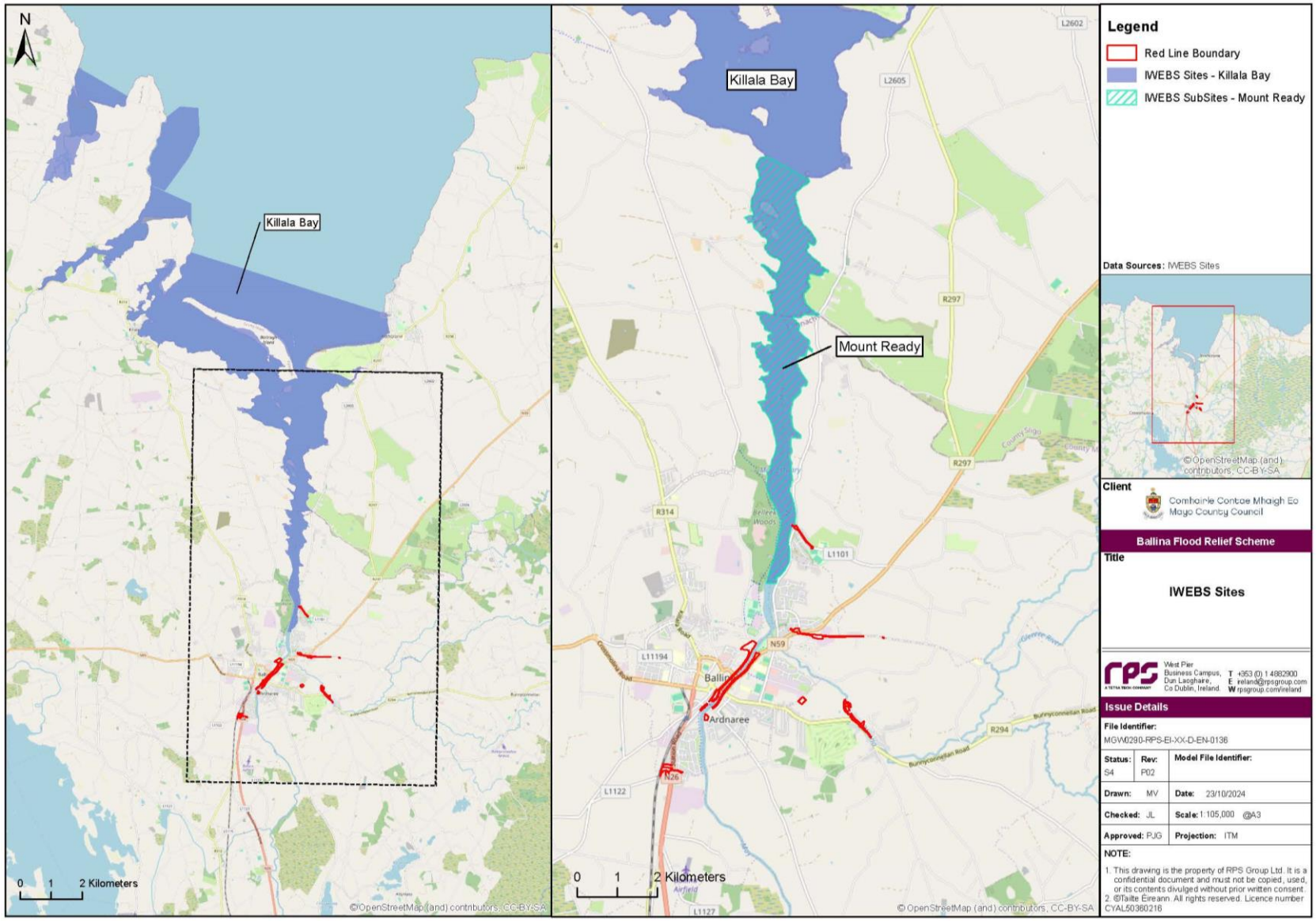

Figure 5-2 I-WeBS Killa Bay site and Mount Ready Subsite

Table 5-3 BirdWatch Ireland database results for Killala Bay I-WeBS Site (Site Code 0D407) of SCI species of Killala Bay/Moy Estuary SPA and/or Lough Conn and Lough Cullin SPA.

Common Name	Scientific Name	Annex I Species	SPA Species#	Season of Last Record	Peak*	National (1%) Threshold^	International (1%) Threshold^	National Long-term Trend+	Long-term Trend for Killala Bay+
Tufted duck	*Aythya fuligula*	N	L. Conn	*2021/22*	*10*	*270*	*8,900*	No data	No data
Common scoter	*Melanitta nigra*	N	L. Conn	*2021/22*	*502*	*110*	*7,500*	No data	No data
Ringed plover	*Charadrius hiaticula*	N	Killala	*2021/22*	*401*	*120*	*540*	Intermediate decline	Intermediate decline
Golden plover	*Pluvialis apricaria*	Y	Killala	*2021/22*	*378*	*920*	*9,200*	Large decline	Large decline
Grey plover	*Pluvialis squatarola*	N	Killala	*2021/22*	*52*	*30*	*2,000*	Large decline	Large decline
Sanderling	*Calidris alba*	N	Killala	*2021/22*	*214*	*85*	*2,000*	Stable or increasing	Stable or increasing
Dunlin	*Calidris alpina*	N	Killala	*2021/22*	*731*	*460*	*13,300*	Large decline	Large decline
Bar-tailed godwit	*Limosa lapponica*	Y	Killala	*2021/22*	*211*	*170*	*1,500*	Large decline	Large decline
Curlew	*Numenius arquata*	N	Killala	*2021/22*	*544*	*350*	*7,600*	Large decline	Large decline
Redshank	*Tringa tetanus*	N	Killala	*2021/22*	*375*	*240*	*760*	Moderate decline	Moderate decline

#L. Conn: Lough Conn and Lough Cullin SPA; Killala: Killala Bay/Moy Estuary SPA.
**Peak numbers for the previous 5 winters i.e. 2017/18 through 2021/22*
^Thresholds relate to site importance at both national and international level. A site is deemed to support numbers of international importance if it regularly supports 1% or more of the international threshold of one species or subspecies of waterbird. A site is deemed to support numbers of national importance if it regularly supports 1% or more of the all-Ireland estimate of a species. 1% threshold numbers follow those provided in Lewis et al. (2019)
+I-WeBS Trends Report 1994/95 – 2019/20 (Kennedy et al., 2022)

Table 5-4 BirdWatch Ireland database results for the Mount Ready subsite (Subsite Code 0D412) within the Killala Bay I-WeBS site (Site Code 0D407) of SCI species of Killala Bay/Moy Estuary SPA and/or Lough Conn and Lough Cullin SPA.

Common Name	Scientific Name	Annex I Species	SPA#	Season of Last Record	Peak*	National (1%) Threshold^	International (1%) Threshold^	National Long-term Trend+	Long-term Trend for Killala Bay+
Golden Plover	*Pluvialis apricaria*	Y	Killala	*2020/21*	*58*	*920*	*9300*	Large decline	Large decline
Grey Plover	*Pluvialis squatarola*	N	Killala	*2020/21*	*2*	*30*	*2000*	Large decline	Large decline
Dunlin	*Calidris alpina*	N	Killala	*2021/22*	*255*	*460*	*13300*	Large decline	Large decline
Bar-tailed Godwit	*Limosa lapponica*	Y	Killala	*2021/22*	*40*	*170*	*1500*	Large decline	Large decline
Curlew	*Numenius arquata*	N	Killala	*2021/22*	*127*	*350*	*7600*	Large decline	Large decline

Common Name	Scientific Name	Annex I Species	SPA#	Season of Last Record	Peak*	National (1%) Threshold^	International (1%) Threshold^	National Long-term Trend+	Long-term Trend for Killala Bay+
Redshank	*Tringa totanus*	N	Killala	*2021/22*	*118*	*240*	*2400*	Moderate decline	Moderate decline
Common Gull	*Larus canus*	N	L. Conn	*2021/22*	*123*	-	-	No data	No data

#L. Conn: Lough Conn and Lough Cullin SPA; Killala: Killala Bay/Moy Estuary SPA.
**Peak numbers for the previous 3 winters i.e. 2019/20 through 2021/22*
^Thresholds relate to site importance at both national and international level. A site is deemed to support numbers of international importance if it regularly supports 1% or more of the international threshold of one species or subspecies of waterbird. A site is deemed to support numbers of national importance if it regularly supports 1% or more of the all-Ireland estimate of a species. 1% threshold numbers follow those provided in Lewis et al. (2019)
+I-WeBS Trends Report 1994/95 – 2019/20 (Kennedy et al., 2022)

5.1.5 Habitats

5.1.5.1 2019 Article 17 Annex I Habitats

A search of the NPWS 2019 Article 17 Reporting GIS and Metadata[4] and the ESM Webtool[5] indicated a number of different Annex I habitats in the wider vicinity of Ballina, primarily associated with Killala Bay/Moy Estuary (**Figure 5-3**). Annex I habitats identified within these databases in the vicinity of Ballina included:

- 7130 Blanket Bog
- 1130 Estuaries
- 1140 Tidal Mudflats and Sandflats
- 1160 Large Shallow Inlets and Bays
- 1210 Annual Vegetation of Drift Lines
- 1230 Vegetated Sea Cliffs
- 1310 Salicornia Mud
- 1330 Atlantic Salt Meadows
- 1410 Mediterranean Salt Meadows
- 2110 Embryonic Shifting Dunes
- 2120 Marram Dunes
- 2130 Fixed Dunes
- 2190 Humid Dune Slacks
- 91D0 Bog Woodland
- 4010 Wet Heath
- 4030 Dry Heath

Ten of these Annex I Habitats (1130, 1140, 1210, 1230, 1310, 1330, 2110, 2120, 2130, 2190) are QI of Killala Bay/Moy Estuary SAC and were recorded within the confines of this SAC. The remaining Annex I Habitats (1160, 91D0, 4010, 4030) are not listed as QI of any nearby SAC and were recorded outside the confines of any European Site. The 2019 Article 17 database identified a further twelve Annex I habitats whose range and/or distribution covers one or both of the 10 km grid squares (i.e., G21 and G22) within which the Proposed Scheme falls. Table 5-5 outlines these Annex I habitats. Habitats 7150, 7230 and 91E0 are QI of the River Moy SAC. Two Annex I habitats observed within the NPWS 2019 Article 17 reporting database occur within the Proposed Scheme study area (**Figure 5-3**). These two habitats (1130 Estuaries and 1140 Tidal Mudflats and Sandflats) are both QI of the Killala Bay/Moy Estuary SAC. Estuaries [1130] lie directly adjacent to the Moy main channel, Moy Quay Road and Quignamanger Proposed Scheme works areas while Tidal Mudflats and Sandflats [1140] are directly upstream of the Moy Quay Road and directly downstream of the Quignamanger Proposed Scheme works area. Blanket Bog [7130] and Wet Heath [4010] were not recorded within the study area. Blanket Bog [7130] and Wet Heath [4010] were recorded approximately 1.8 km south-west of the Tullyegan Proposed Scheme works area while Wet Heath [4010] was also recorded approximately 3.5 km west of the Tullyegan Proposed Scheme works area.

Table 5-5 Range and distribution of Annex I habitats identified in the NPWS Article 17 database.

Annex I Habitat	Distribution	Range
7150 *Rhynchosporion* Depressions	G21	G21, G22
7220 Petrifying Springs	G21	G21, G22
7230 Alkaline Fens	G21	-
91E0 Residual Alluvial Woodland	-	G21, G22
3110 Oligotrophic Isoetid Lake	-	G21
3130 Mixed Najas flexilis Lake	G21, G22	G21, G22
3140 Hard-water Lake	G21, G22	G21, G22
3160 Acid Oligotrophic Lake	-	G21, G22
3260 Floating River Vegetation	G21, G22	G21, G22
6230 Species Rich Nardus Grassland	-	G21
4060 Alpine and Boreal Heaths	-	G21
8220 Siliceous Rocky Slopes	-	G21

[4] NPWS Article 17 GIS and Metadata Downloads https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17
[5] Environmental Sensitivity Mapping (ESM) Webtool https://enviromap.ie/ Accessed 20th February 2023

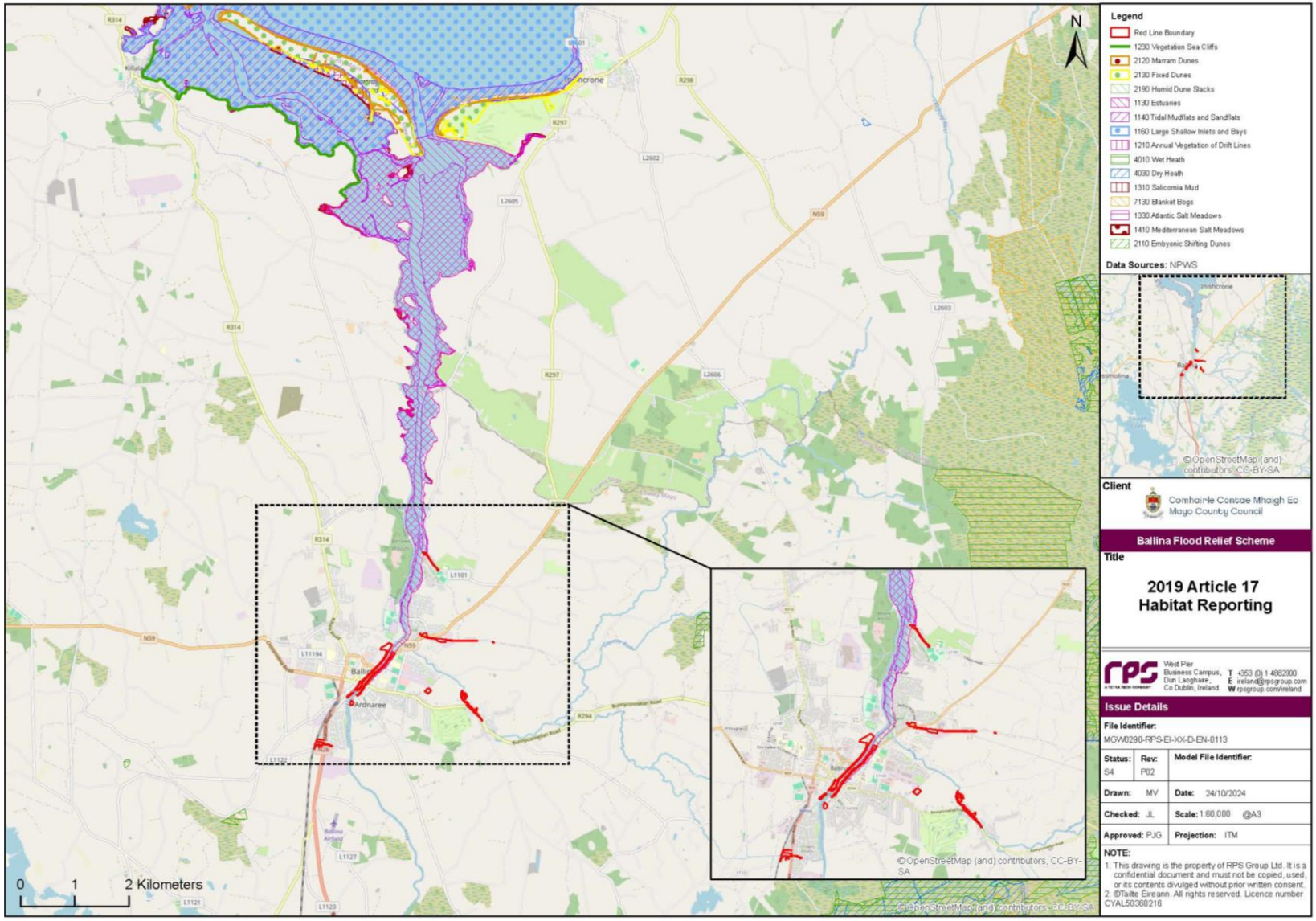

Figure 5-3 Annex I Habitats in the Wider Vicinity of the Proposed Scheme Area. Data Obtained from the NPWS 2019 Article 17 GIS and Metadata Database

5.1.6 Invasive Alien Plant Species

A number of IAPSs were identified from an NBDC data search of the two 10 km grid squares across which the Proposed Scheme is located (G21, G22) (**Table 5-6**). IAPS contained within the third schedule to the European Communities (Birds and Natural Habitats Regulations) 2011 (as amended) identified in the desk study include: Giant hogweed (*Heracleum mantegazzianum*), Himalayan knotweed (*Koenigia polystachya*), Japanese knotweed (*Reynoutria japonica*), three-cornered leek (*Allium triquetrum*) and rhododendron (*Rhododendron ponticum*).

Table 5-6 NBDC database records of IAPS for G21 and G22 grid squares

Common name	Scientific name	Year of last record	Grid Square	Status*
Butterfly-bush	*Buddleja davidii*	2022	G21; G22	Medium Impact
Cherry laurel	*Prunus laurocerasus*	2022	G21; G22	**High Impact**
Himalayan honeysuckle	*Leycesteria formosa*	2022	G22	Medium Impact
Himalayan knotweed	*Koenigia polystachya*	2015	G22	**SI 477** Medium Impact
Japanese knotweed	*Reynoutria japonica*	2022	G21; G22	**SI 477** **High Impact**
Rhododendron	*Rhododendron ponticum*	2022	G22	**SI 477** **High Impact**
Sycamore	*Acer pseudoplatanus*	2022	G21; G22	Medium Impact
Three-cornered leek	*Allium triquetrum*	2022	G21; G22	**SI 477** Medium Impact
Traveller's-joy	*Clematis vitalba*	2015	G21; G22	Medium Impact
Virginia-creeper	*Parthenocissus quinquefolia*	2015	G22	Medium Impact
Wall cotoneaster	*Cotoneaster horizontalis*	2015	G21; G22	Medium Impact
Giant hogweed	*Heracleum mantegazzianum*	2010	G22	**SI 477** **High Impact**

**Impact (High, Medium) status based on Kelly et al (2013); SI 477 refers to the Third Schedule of Irish Statutory Instrument S.I. No. 477 of 2011 (European Union (Birds and Natural Habitats) Regulations 2011. Note: this SI has been amended by S.I. No. 293 of 2021.*

5.1.7 Aquatic Species

5.1.7.1 Atlantic Salmon

5.1.7.1.1 River Moy

The River Moy is recognised as one of the most important salmon rivers in Ireland, famous for the Ridgepool and Cathedral pool angling beats in Ballina. The theoretical Conservation Limit (CL)[6] set for the Moy by the Standing Scientific Committee on Salmon (SSCS) is currently 16,736 fish annually (Millane et al. , 2023). Unlike many rivers in Ireland, the Moy exceeds this level by a substantial margin, which allows for direct harvest of salmon on an annual basis by recreational anglers. The Moy has the highest salmon population in Ireland, with a forecasted return surplus for 2023 (numbers above CL) being 12,159, equating to 173% of CL. There are a series of four fish counters located on the Ballina Salmon Weir providing a partial fish count each year. Counts for 2020-2022 are shown in **Table 5-7** (IFI 2021, 2022, 2023), demonstrating the bulk of returning fish are grilse (one sea winter salmon), with a healthy proportion of larger spring salmon (multi sea winter). Note that the majority of fish travelling upstream do so through the central “King’s gap” on the Salmon Weir at the head of the Ridgepool without being counted, hence the counts provided in **Table 5-9** are only a proportion of the returning numbers.

[6] Conservation Limit (CL) = scientifically derived sustainable stock level, i.e., the number of returning salmon that would be required to maintain the carrying capacity of the system based on its accessible area of fluvial habitat.

Table 5-7 River Moy Fish Counter Data 2020-2023

Year	2020	2021	2022	2023
Spring Salmon	1,238	1,012	1,134	1,998
Grilse	8,151	8,869	7,868	4,158
Late Summer Salmon	1,962	973	2,452	868

IFI Ballina further provided a breakdown of Moy salmon count data between 2012 and 2018 (**Table 5-8** and **Table 5-9**; **Figure 5-4** and **Figure 5-5**), which demonstrate upstream and downstream salmon run timing past the Salmon Weir. The data shows an upward migration peak in July/August, with downstream migration (smolts) timing variable, but more common July to October.

Table 5-8 Upstream Salmon Movement by Month (Fish Numbers)

Upstream Salmon	2012	2013	2015	2016	2017	2018
April	4				12	
May	94	88	118		69	
June	771	1223	359		556	
July	3327	5757	3158	1482	2312	1146
August	2919	1762	1080	1813	3039	2415
September	711	232	1531	228	316	108
October	22		58	53	76	14

Table 5-9 Downstream Salmon Movement by Month (Fish Numbers)

Downstream Salmon	2012	2013	2015	2016	2017	2018
April	0					
May	11	33	1		14	
June	20	15	16		35	
July	36	36	30	24	48	114
August	15	81	34	13	33	82
September	123	29	61	21	2	13
October	61		31	30	24	21

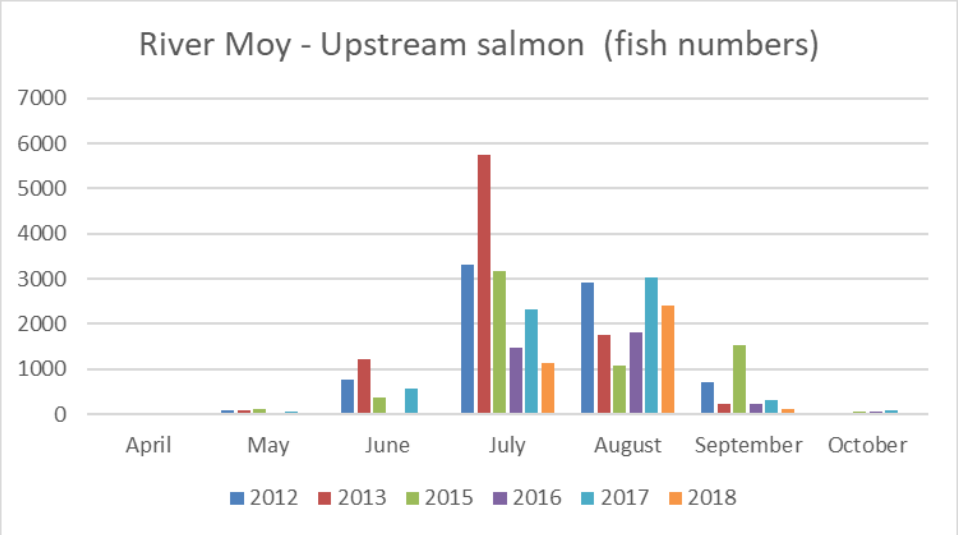

Figure 5-4 Upstream Salmon Movement by Month (Fish Numbers)

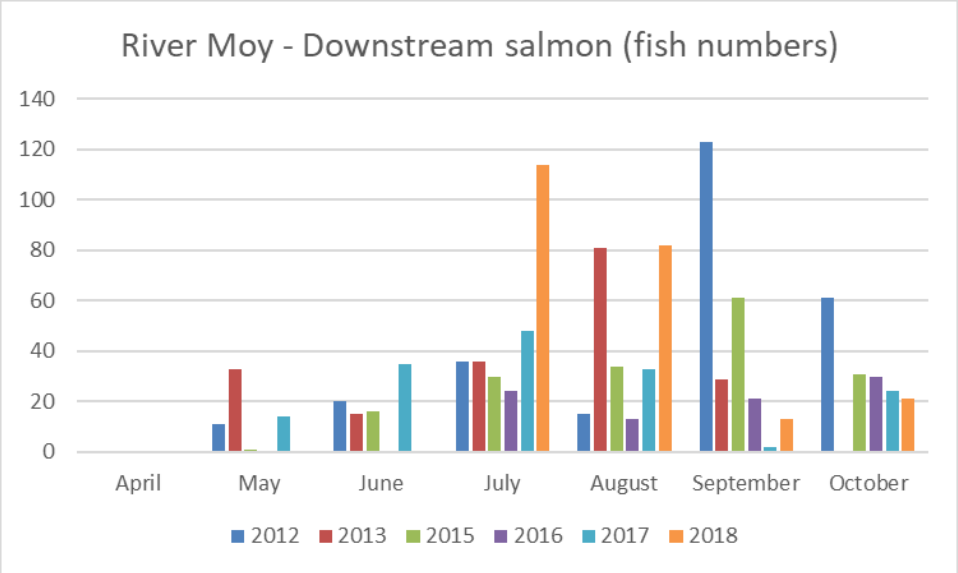

Figure 5-5 Downstream Salmon Movement by Month (Fish Numbers)

The abundant salmon population in the system is supported by good to high water quality (Q4 on the River Moy; Q4-5 on Brusna (Glenree) River according to EPA data 2022) combined with good quality spawning and nursery habitats throughout most of the upper main channel and upper catchment tributaries. The river also benefits from the fact that most of its fluvial habitats are accessible to salmon despite the presence of the Salmon Weir in Ballina.

5.1.7.1.2 Brusna (Glenree) River

IFI conduct Catchment-Wide Electro-Fishing (CWEF) on the Brusna River as part of fisheries conservation management. CWEF involves electrofishing a range of sites throughout the subject catchment within the period July-September (inclusive) of that year. Average catchment-wide salmon fry captured in the Brusna per 5 minutes of CWEF in the years 2009, 2013 and 2014 were ~5.00, 14.16 and 14.74, respectively. The catchment was also surveyed in 2020, returning a catchment-wide average abundance of 6.73 salmon fry/5 min. The 2020 survey was not completed, so the data was not considered an accurate representation of the current density index (Holmes, et al., 2022). On rivers like this where data on adult salmon returns are unavailable or limited, a threshold of 17 salmon fry/5 min is required to open the river for angling on a catch and release basis. The Brusna currently fails this threshold, meaning it is closed to angling and also

indicating that salmon stocks are not as abundant as they ought to be for such a system, with good salmonid habitat and good-to-high water quality throughout. The CL for the Brusna is currently 1,096 fish (Millane *et al*., 2023), but the low CWEF indicates this CL is not being met. The reason for low CWEF is considered likely to be owing to hydromorphological (hydraulic) conditions as a result of historical and ongoing maintenance as part of the Moy arterial drainage scheme (Channel C1/5).

5.1.7.2 Sea and Brook Lamprey

5.1.7.2.1 Freshwater and Estuarine River Moy

O'Connor (2004) carried out juvenile lamprey surveys covering 75 sites throughout the Moy catchment using electrical fishing methods. At least two species were confirmed: sea lamprey (*Petromyzon marinus*) and brook/river lamprey (*Lampetra* spp.) with *Lampetra* sp. comprising 84.9% of the lamprey abundance. Overall, juvenile lampreys were present at 62% of the 75 sites examined. Juvenile sea lampreys were quite widely recorded, constituting 18% of the total number of juveniles captured (O'Connor, 2004 cited in (King, et al., 2008)) and were present at 24% of catchment sites. Sea lamprey larvae (ammocoetes) were generally confined to the Lower River Moy but were also present in some of the tributaries (e.g., River Deel upstream of Lough Conn) proving this migratory species can access at least parts of the upper catchment.

The sites electrofished within Ballina (and within the overall Ballina FRS proposed scheme footprint) were only positive for larval sea lamprey, whilst further upstream between Ballina and Foxford, larvae of both sea lamprey and brook/river lamprey were present. The reach within Ballina and specifically the Ridgepool were identified as an area "*that may be of importance for sea lamprey spawning*". It is noted that mean minimum densities of lamprey recorded in the Moy catchment were significantly lower than those recorded in similar surveys of other large Irish rivers, e.g., Slaney and Munster Blackwater, which was attributed by the author to the impact of the Moy's extensive historical and ongoing arterial drainage schemes (O'Connor, 2004).

5.1.7.2.2 Brusna

A series of natural cascades and falls on the lower reaches of the Brusna River is clearly passable by (at least some) salmonids but appears to be a barrier to upstream migration by lampreys. Sea lamprey (*P. marinus*) and river/brook lamprey (*Lampetra* spp.) were present below the falls, but with no evidence upstream. Sea lampreys dominated the juvenile lamprey population of the lower Brusna (O'Connor 2004). A site located on the right-hand side bank, downstream of the N59, recorded 12 no. sea lamprey and 1 no. *Lampetra* spp. Overall, mean sea lamprey density on the lower Brusna (0.2 per m^2) was similar to the River Moy main channel (0.28 per m^2), while mean *Lampetra* spp. density (0.02 per m^2) was much lower than that of the Moy (0.61 per m^2).

5.2 Field Study

5.2.1 Site Description & Habitat Survey

The proposed flood relief scheme is located along the main channel of the River Moy within the confines of Ballina town and across a number of tributaries of the Moy (Brusna (Glenree), Bunree, Tullyegan and Quignamanger) along the outskirts of the town.

5.2.1.1 Main Channel of the River Moy

The proposed works area on the main channel of the River Moy runs for approximately 1.4 km from upstream of the Salmon Weir at Ridgepool in the Old Ballina Dairies Yard (**Figure 3-2**). This section includes works at bachelor's Walk, Clare Street, Emmet Street, Cathedral Road, Ridgepool Road and at Ballina Manor Hotel and apartments. This entire proposed works area runs adjacent to or lies within the River Moy SAC or Killala Bay/Moy Estuary SAC (**Figure 5-1**).

The primary habitat observed along this section of the Proposed Scheme was buildings and artificial surfaces (BL3) with lower abundances of (mixed) broadleaved woodland (WD1), amenity grassland (GA2) and ornamental/non-native shrub (WS3) (**Figure 5-6**). Other habitats present included riparian woodland (WN5), scrub (WS1), scattered trees and parkland (WD5), recolonising bare ground (ED3), dry meadows and grassy verges (GS2), dry calcareous and neutral grassland (GS1), reed and large sedge swamp (FS1) and improved agricultural grassland (GA1).

Figure 5-6 Habitat Mapping - River Moy Proposed Works Area

The riparian habitat consisted of tall herb swamp (FS2) with species present including purple loosestrife (*Lythrum salicaria*), marsh ragwort (*Jacobaea aquatica*), meadowsweet (*Filipendula ulmaria*), reed canary-grass (*Phalaris arundinacea*), water plantain (*Alisma plantago-aquatica*), spikerush (*Eleocharis* sp.), marsh bedstraw (*Galium palustre*), branched bur-reed (*Sparganium erectum*), water figwort (*Scrophularia auriculata*), water dropwort (*Oenanthe* sp.), silverweed (*Potentilla anserina*), remote sedge (*Carex remota*), common valerian (*Valeriana officinalis*), yellow flag iris (*Iris pseudacorus*), angelica (*Angelica sylvestris*), common club-rush (*Schoenoplectus lacustris*) and marsh marigold (*Caltha palustris*). Certain sections of FS2 are commensurate with the Annex I habitat *Hydrophilous tall herb fringe communities of plains and of the montane to alpine level* [6430]. Habitat 6430 is not a QI of any European Site in the ZoI of the Proposed Scheme and is therefore, not dealt with further in this NIS.

The river Moy is classified as a depositing/lowland river (FW2) upstream of the Upper Bridge in the centre of Ballina town and as tidal (tidal rivers CW2) downstream of the Upper Bridge. Tidal rivers are commensurate with the Annex I Habitat *Estuaries* [1130]. *Estuaries* are a QI of Killala Bay/Moy Estuary SAC. Two pockets of mud shore (LS4) were recorded within the river channel upstream and downstream of the proposed works area at Quignamanger. This habitat is commensurate with the Annex I Habitat *Mudflats and sandflats not covered by sea water at low tide* [1140] which is a QI of Killala Bay/Moy Estuary SAC.

Floating river vegetation was observed within the River Moy channel for the entire length of the upstream works i.e. from The Salmon Weir to Ballina Boat Yard. Floating river vegetation is designated as an Annex I habitat - *Watercourses of plain to montane levels with* Ranunculion fluitantis *and* Callitricho-Batrachion *vegetation* [3260]. The botanical species observed within this habitat included water crowfoot (*Ranunculus* sp.), spiked water-milfoil (*Myriophyllum spicatum*), perfoliate pondweed (*Potamogeton perfoliatus*), fennel pondweed (*Stuckenia pectinatus* (*P. pectinatus*)), bright-leaved pondweed (*P. gramineus x P. perfoliatus* (*P. x nitens)),* unbranched bur-reed (*Sparganium emersum*), branched bur-reed (*Sparganium erectum*), yellow water-lily (*Nuphar lutea*) and moss (*Rhynchostegium* sp.). Floating species in the slower-flowing areas of the channel (e.g., around the pontoon adjacent to Bachelors Walk) included Canadian waterweed (*Elodea canadensis*) and pond water-starwort (*Callitriche stagnalis*). Habitat 3260 is not a QI of any European Sites within the ZoI of the Proposed Scheme.

A number of Japanese knotweed (*Reynoutria japonica*), three-cornered leek (*Allium triquetrum*), hybrid bluebell (*Hyacinthoides x massartiana*) and Spanish bluebell (*Hyacinthoides hispanica*) infestations were observed across this proposed works area.

5.2.1.2 Brusna (Glenree)

The proposed works area along the Brusna (Glenree) river encompasses an approximate length of 700 m of the river and are almost entirely within the townland of Rathkip adjacent to the R294 and Rathkip/Shanaghy (**Figure 3-2**). A high percentage of the proposed works are also within the River Moy SAC (**Figure 5-1**). The river here was classified as a depositing/lowland river (FW2) (**Figure 5-7**). Vegetation observed within and at the edges of this river included drab brook-moss (*hygrohypnum luridum*), water figwort, water mint (*Mentha aquatica*) and lesser water-parsnip (*Berula erecta*).

The river here had artificial embankments on both banks which were primarily dominated by (mixed) broadleaved woodland (WD1). Woody species present in these woodlands included alder (*Alnus glutinosa*), sycamore, (*Acer pseudoplatanus*), ash (*Fraxinus excelsior*), hawthorn (*Crataegus monogyna*), bramble (*Rubus fruticosus* agg.) and ivy (*Hedera hibernica*). Ground flora species included hogweed (*Heracleum sphondylium*), false brome (*Brachypodium sylvaticum*), cow parsley (*Anthriscus sylvestris*) and hart's tongue fern (*Asplenium scolopendrium*).

A number of sections of dry meadow and grassy verges (GS2) were observed adjacent to the river. Species present within this habitat included common valerian, ribwort plantain (*Plantago lanceolata*), meadowsweet, water figwort, self-heal (*Prunella vulgaris*), Yorkshire fog (*Holcus lanatus*), false oat-grass (*Arrhenatherum elatius*), dandelion (*Taraxacum officinale* agg.), meadow buttercup (*Ranunculus acris*), ox-eye daisy (*Leucanthemum vulgare*), red clover (*Trifolium pratense*), glaucous sedge (*Carex flacca*), sweet vernal-grass (*Anthoxanthum odoratum*), cocks-foot (*Dactylis glomerata*), bush vetch (*Vicia sepium*), white clover (*Trifolium repens*), knapweed (*Centaurea nigra*), daisy (*Bellis perennis*), ragwort (*Jacobaea vulgaris*), spear thistle (*Cirsium vulgare*), yarrow (*Achillea millefolium*), common spotted orchid (*Dactylorhiza fuchsia subsp. fuchsia*) and hogweed. Amenity grassland (GA2) and ornamental non-native shrub (WS3) were also present adjacent to the proposed works area, primarily associated with residential properties. Habitats associated with adjacent agricultural land included Improved agricultural grassland (GA1), wet grassland (GS4), hedgerows (WL1), treelines (WL2) and dense bracken (HD1).

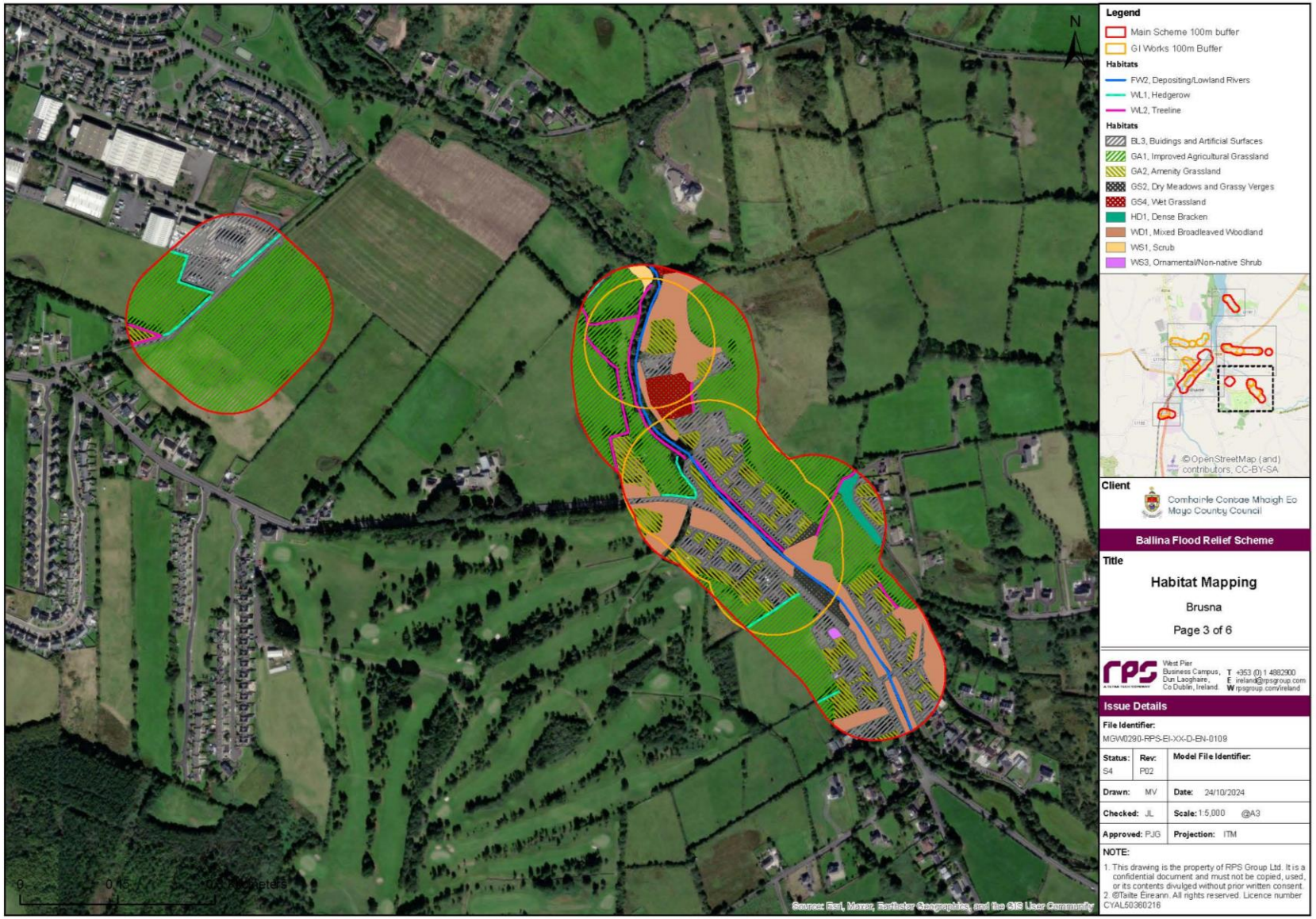

Figure 5-7 Habitat Mapping - Brusna Proposed Works Area

A number of IAPS infestations were observed across the Brusna proposed works area including a stand of Japanese knotweed which was recorded in the corner of an agricultural land parcel approximately 10 m from the proposed works area. A rhododendron (*Rhododendron ponticum*) bush was also observed within a section of mixed broadleaved woodland approximately 15 m from the proposed works area. A number of three-cornered leek, Spanish bluebell and hybrid bluebell infestations were also recorded from across the Brusna proposed works area both within and outside the proposed works areas.

No Annex I habitats were observed in close proximity to the proposed works area at this site.

5.2.1.3 Bunree

The proposed works area on the Bunree river runs parallel to the Behy Road located on the north-eastern outskirts of Ballina town (**Figure 3-2**). The works are proposed to run from the green area adjacent to Moyvale Park in an easterly direction for approximately 1.4 km along the Behy Road. Works are approximately 275 m upstream of the Killala Bay/Moy Estuary SAC (**Figure 5-1**).

The Bunree was classified as a depositing/lowland River (FW2) and has been culverted in a number of areas across the proposed works area (**Figure 5-9**). Other habitats present included buildings and artificial surfaces (BL3), which comprises residential and commercial properties and road infrastructure, and associated amenity grassland (GA2) and ornamental/non-native shrub (WS3). A number of sections of mixed broadleaved woodland (WD1) were observed within the western half of the proposed works area with species such as ash, oak (*Quercus* sp.) and sycamore present. Small sections of scattered trees and parkland (WD5) and immature woodland (WS2) were also observed on the day of the survey. Adjacent agricultural land parcels consisted of improved agricultural grassland (GA1), wet grassland (GS4) and scrub (WS1) with associated field boundaries, hedgerows (WL1) and treelines (WL2). Species present within the scrub habitat included gorse (*Ulex europaeus*), willow (*Salix* sp.) and brambles. A section of dense bracken (HD1) was observed adjacent to one section of wet grassland. Recolonising bare ground occurred at three separate locations within the vicinity of the Bunree/Behy Road proposed works area. Species present in this habitat included oxeye daisy, colt's foot (*Tussilago farfara*), brambles, red clover, fox and cubs (*Pilosella aurantiaca*), cat's ear (*Hypochaeris radicata*), dandelion, knapweed and ribwort plantain. Other habitats observed across this proposed works area included drainage ditches (FW4) and spoil and bare ground (ED2).

A species rich section of wet grassland (GS4) was present to the south of Behy Road opposite the Steeltech Sheds Mayo commercial property. Species present in this area included sharp-flowered rush (*Juncus acutiflorus*), silverweed, Yorkshire fog, common spotted orchid, sweet vernal grass, soft rush (*Juncus effusus*), red clover, ribwort plantain, purple loosestrife, tormentil (*Potentilla erecta*), common valerian, creeping buttercup, ox-eye daisy, meadowsweet, water figwort, meadow buttercup, yellow rattle (*Rhinanthus minor*), meadow vetchling (*Lathyrus pratensis*), great willowherb (*Epilobium hirsutum*), common vetch (*Vicia sativa*), bush vetch, star sedge (*Carex echinata*), heath spotted orchid (*Dactylorhiza maculata*), purple moor-grass (*Molinia caerulea*), heath wood-rush (*Luzula multiflora*), tawny sedge (*Carex hostiania*), marsh cinquefoil (*Comarum palustre*), marsh bedstraw, marsh ragwort, marsh marigold, spear thistle, ling (*Calluna vulgaris*), bell heather (*Erica cinerea*), quaking grass (*Briza media*), meadow thistle (*Cirsium dissectum*), black bog rush (*Schoenus nigricans*), flea sedge (*Carex pulicaris*), glaucous sedge and lesser stitchwort (*Stellaria graminea*). This land parcel contained pockets of the Annex I habitat *Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)* [6410]. Habitat 6410 is not a QI of any European Sites within the ZoI of the Proposed Scheme.

5.2.1.4 Tullyegan

Works are proposed to occur on both banks of the Tullyegan downstream of the railway bridge at the boundary of Behybaun and Commons townlands for an approximate length of 325 m **(Figure 3-2**). The proposed works area is approximately 300 m upstream of the River Moy SAC (**Figure 5-1**).

The Tullyegan was classified as a depositing/lowland river (FW2) at the proposed works area (**Figure 5-10**). In-stream vegetation along this section of the Tullyegan included fool's watercress, branched bur-reed, water mint (*Mentha aquatica*), marsh marigold and water figwort. The dominant habitats in the wider area were buildings and artificial surfaces (BL3) and amenity grassland (GA2) which were primarily composed of residential properties and associated gardens. Railway and road infrastructure is also included in the buildings and artificial surfaces (BL3) habitat.

Figure 5-8 Habitat Mapping - Bunree/Behy Road Proposed Works Area

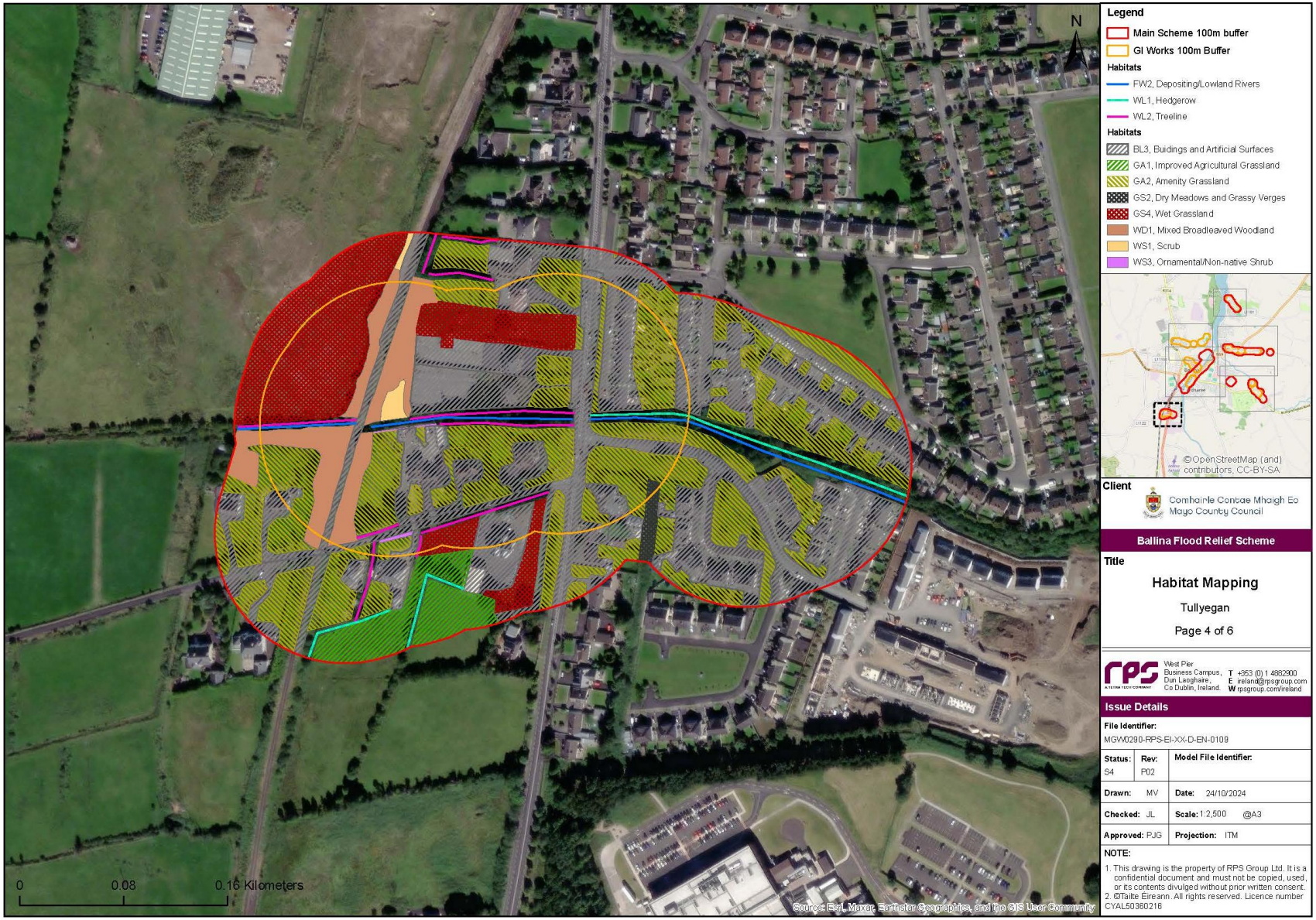

Figure 5-9 Habitat Mapping - Tullyegan Proposed Works

Both banks of the Tullyegan at the proposed works area were artificially raised. The right-hand side bank (while looking downstream) was primarily grassy in the upstream reaches (i.e., close to the railway bridge) with a beech hedge (ornamental/non-native shrub WS3) bordering the adjacent property. Further downstream this grassy bank contains a higher density of woody species (treeline WL2) with species such as ash, sycamore and conifer trees present. The left-hand bank of the Tullyegan adjacent to the railway bridge is covered with bramble dominated scrub (WS1). Further downstream where the wall associated with the adjacent residential property starts this scrub becomes a treeline (WL2) with alder, willow and ash trees. Mixed broadleaved woodland (WD1) is present parallel to the railway line on both sides with species such as hawthorn, ash and blackthorn present. A wet grassland (GS4) field is also present to the north-west of the railway line.

No Annex I habitats were observed in close proximity to the proposed works area at this site.

5.2.1.5 Quignamanger

The proposed works area along the Quignamanger spans a distance of 475 m from the edge of Heffernan Park/Ballina Rugby Club to the confluence of the stream with the River Moy (**Figure 3-2**). Killala Bay/Moy Estuary SAC and SPA are located within the works area at the confluence of the River Moy and Quignamanger stream (**Figure 5-1**). The Quignamanger was classified as a depositing/lowland river (FW2) at the proposed works area, and it has been culverted for a significant length along the route (**Figure 5-11**).

The dominant habitats in the wider area were buildings and artificial surfaces (BL3) and amenity grassland (GA2) which were primarily composed of residential and commercial properties, road infrastructure and associated gardens or green areas and playing fields. A number of agricultural land parcels of improved agricultural grassland (GA1) were to the east of the proposed works area while mixed broadleaved woodland (WD1) was dispersed throughout the proposed works area. A section of scrub (WS1) was also present adjacent to the open section of the Quignamanger stream at the junction of Quay Road and Creggs Road. A section of tall-herb swamp (FS2) is present at the confluence of the Quignamanger and Moy River. Species present within the FS2 habitat include reed canary grass, water figwort, water dropwort, great willowherb, common valerian, marsh ragwort and creeping thistle. A small number of willow trees are present in this area also. Due to the higher percentage of reeds and lower abundances of herbaceous species within this section of tall herb swamp habitat it was considered to not be commensurate with the Annex I habitat *Hydrophilous tall herb fringe communities of plains and of the montane to alpine level* [6430].

The Moy estuary (tidal rivers CW2) is adjacent to the western extent of the proposed works area. Tidal rivers are commensurate with the Annex I Habitat *Estuaries* [1130]. *Estuaries* are a QI of Killala Bay/Moy Estuary SAC. A pocket of mud shore (LS4) was also recorded within the river channel downstream of the proposed works area. This habitat is commensurate with the Annex I Habitat *Mudflats and sandflats not covered by sea water at low tide* [1140] which is a QI of Killala Bay/Moy Estuary SAC. Another Annex I habitat, *Petrifying Springs with tufa formation (Cratoneurion) [7220],* was observed in the downstream reaches of the Quignamanger watercourse. Petrifying springs are not a QI of any European Sites within the ZoI of the Proposed Scheme.

Figure 5-10 Habitat Mapping - Quignamanger Proposed Works Area

5.2.2 Invasive Alien Plant Species

Of the five Third Schedule IAPS returned from the desk study, three species were observed during surveys in 2022 and 2023 (Japanese knotweed, rhododendron and three-cornered leek). A further two Third Schedule IAPS, not identified during the desktop study were also observed during field surveys (Spanish bluebell (*Hyacinthoides hispanica*) and hybrid bluebell (*Hyacinthoides x massartiana*). **Appendix I** details the locations and descriptions of each IAPS stand observed across the scheme area. **Figure 5-11** provides an overall view of each IAPS stand while **Appendix J** show the locations of each IAPS stand in further detail. A significant number of these stands especially along Bachelors Walk and the Brusna are likely to interact with the proposed works areas. The presence of IAPS is relevant to this NIS in relation to potential for disturbance/transference with potential effects on QI habitats and species.

5.2.3 Otter

Numerous signs of otter (spraints, slides, couches, holts) and potential signs of otter (mammal trails) were observed during surveys indicating a high level of otter activity throughout the Proposed Scheme area. Most of the otter evidence records occurred on the banks of the Brusna and Tullyegan watercourses. A single occupied holt was confirmed by camera trapping on the banks of the Brusna River in close proximity (approximately 10 m) to the proposed work's area. This holt has the potential[7] to be a natal holt as two otter (mother and cub) were observed exiting the holt on the video images. Of the eight days the camera was in position, otter were observed exiting or entering the holt on six of these days/nights.

Figure 5-12 provides an overview of the otter signs observed across the Proposed Scheme while **Appendix K** and **Appendix L** outline the location and description of these signs across the Proposed Scheme area in further detail. The location of holts and potential holts have not been included to protect the location of these features.

5.2.4 Harbour Seal

No dedicated surveys were undertaken for harbour seal as records and the conservation objectives for Killala Bay/Moy Estuary SAC indicate that their resting, moulting and breeding sites are located approximately 7 km downstream of Ballina town while their habitat is considered to consist of the entire estuary area. A desktop study of available datasets provided no indication that this species utilises the estuary adjacent to the proposed work's areas. A number of live harbour seal, however, were observed in the vicinity of Ballina town and the Quay Road during the 2022/23 over-wintering bird surveys.

[7]Natal holts are normally located away from areas of potential flooding (NIEA, 2011) and far from other potential otter traffic to avoid aggression (NPWS, nd). Therefore, it may not necessarily be the case that it is a natal den.

Figure 5-11 Locations of Each IAPS Stand Observed across the Proposed Scheme. Appendices I and J Outline These Locations in Further Detail

Figure 5-12 Otter Signs Observed During Surveys Across the Scheme Area. Appendices K and L Outline These Locations in Further Detail

5.2.5 SCI Bird Species

5.2.5.1 Over-wintering Bird Surveys

Table 5-10 outlines the details of each winter 2022/23 bird survey site visit. During these surveys, across both sites (i.e. overwintering waterbird survey Site 1 and Site 2 as outlined in **Figure 4-3** and **Figure 4-4**, respectively), 13 over-wintering SCI waterbird species were recorded (**Figure 5-13, Figure 5-14, Figure 5-15**):

- Bar-tailed godwit (*Limosa lapponica*)
- Black-headed gull (*Larus ridibundus*)
- Common gull (*Larus canus*)
- Cormorant (*Phalacrocorax carbo*)
- Curlew (*Numenius arquata*)
- Grey heron (*Ardea cinerea*)
- Herring gull (*Larus argentatus)*
- Mallard (*Anas platyrhynchos)*
- Oystercatcher *Haematopus ostralegus*
- Redshank (*Tringa totanus*)
- Teal (*Anas crecca)*
- Whooper swan (*Cygnus cygnus)*
- Wigeon (*Anas Penelope)*

Table 5-10 Summary of Site-Specific Overwintering Waterbirds Survey Data

Date	Start - Finish Time	Site surveyed	Weather	Sunrise	Sunset	High tide	Low tide
24/11/2022	11:20 – 13:20	*Site 1*	Southerly wind, Beaufort 5. Heavy rain. Moderate visibility (1-3 km) and 8/8 cloud cover.	08:22	16:24	06:28/ 18:39	12:13
24/11/2022	09:15 – 11:15	*Site 2*	Southerly wind, Beaufort 5. Light showers. Moderate visibility (1-3 km) and 8/8 cloud cover.	08:22	16:24	06:28/ 18:39	12:13
20/12/2022	13:37 – 15:37	*Site 1*	South-south-westerly wind, Beaufort 4. Light showers. Moderate visibility (1-3 km) and 8/8 cloud cover.	08:49	16:13	09:33	17:34
20/12/2022	11:30 – 13:30	*Site 2*	South-south-westerly wind, Beaufort 4. Light showers. Moderate visibility (1-3 km) and 8/8 cloud cover.	08:49	16:13	09:33	17:34
19/01/2023	10:05 – 12:05	*Site 1*	West-south-westerly wind, Beaufort 1. Dry. Good visibility (3-5 km) and 6/8 cloud cover.	08:44	16:51	16:59	10:18
19/01/2023	12:10 – 14:10	*Site 2*	West-south-westerly wind, Beaufort 2. Dry. Good visibility (3-5 km) and 1/8 cloud cover.	08:44	16:51	16:59	10:18
20/02/2023	11:25 – 13:25	*Site 1*	South-westerly wind, Beaufort 4. Dry. Good visibility (3-5 km) and 6/8 cloud cover.	07:47	17:55	18:31	12:41
20/02/2023	09:10 – 11:10	*Site 2*	South-westerly wind, Beaufort 4. Light drizzle. Good visibility (3-5 km) and 8/8 cloud cover.	07:47	17:55	18:31	12:41
27/03/2023	13:40 – 15:40	*Site 1*	South south-westerly wind, Beaufort 4. Light drizzle. Excellent	06:35	18:53	06:47	12:56

Date	Start - Finish Time	Site surveyed	Weather	Sunrise	Sunset	High tide	Low tide
			visibility (>5 km) and 8/8 cloud cover				
27/03/2023	11:30 – 13:30	*Site 2*	South south-westerly wind, Beaufort 5. Dry. Excellent visibility (>5 km) and 5/8 cloud cover.	06:35	18:53	06:47	12:56

Twelve over-wintering SCI waterbird species were observed during winter surveys at Site 1 (Quignamanger) (**Table 5-11; Figure 5-13, Figure 5-14, Figure 5-15**). Three species (bar-tailed godwit, curlew, redshank) are SCI species of Killala Bay/Moy Estuary SPA while common gull is an SCI species of Lough Conn and Lough Cullin SPA.

Site 1 (which lies partially within Killala Bay/Moy Estuary SPA) did not contain sufficient numbers of overwintering waterbirds to indicate the site supported internationally or nationally important numbers of overwintering waterbirds. Peak counts of observed overwintering waterbird species at this site included: 19 bar-tailed godwit, 4 common gull, 4 curlew and 50 redshank, all lower than the 1% threshold of the international and national numbers or, for gull species, 1% National Mean/Peak numbers as provided in Lewis *et al*. (2019) (**Table 5-11**). The result of the overwintering waterbird surveys for the 2022/23 season show that Site 1 was not a national or internationally important in-land or high tide roost site for overwintering waterbirds in the winter of 2022/23.

Nine SCI over-wintering waterbird species were observed during winter surveys at Site 2 (Moy main channel) (**Table 5-11**). One species (redshank) is an SCI species of Killala Bay/Moy Estuary SPA while common gull is an SCI species of Lough Conn and Lough Cullin SPA.

Peak counts of observed overwintering waterbird species at Site 2 (Moy main channel) were all lower than the 1% threshold for internationally and nationally important numbers or, for gull species, 1% National Mean/Peak numbers as provided in Lewis *et al*. (2019) (**Table 5-11**). The result of the overwintering waterbird surveys for the 2022/23 season show that Site 2 was not a national or internationally important in-land or high tide roost site for overwintering waterbirds in the winter of 2022/23. One individual common gull was recorded at this site in December 2022 and February 2023. This species is an SCI of Lough Conn and Lough Cullin SPA, designated for their breeding populations.

The result of the overwintering waterbird surveys for the 2022/23 season show that both Site 1 and Site 2 did not support nationally or internationally important numbers of overwintering waterbirds in the winter of 2022/23 as no international or national threshold was met for any over-wintering SCI waterbird species observed during the Winter 2022/23 survey period. Peak counts for each overwintering waterbird species per site can be found in **Table 5-11**.

5.2.5.2 Breeding Bird Surveys

Breeding bird surveys were undertaken as part of the overall suite of ecological surveys for the Environmental Impact Assessment for the Ballina FRS. These surveys have not been described within this NIS as the SCI bird species of SPAs adjacent to the Proposed Scheme have been designated for their overwintering populations and not their breeding populations. However, common gull (*Larus canus*) which is an SCI species of Lough Conn and Lough Cullin has been designated within this SPA for its breeding population. Incidental records of common gull were observed during the breeding bird surveys across the Proposed Scheme in the summer of 2022. Given the overland distance (approximately 5 km) between the SPA and the Proposed Scheme in combination with the foraging distance of common gull (50 km (Woodward *et al.,* 2019)), it is considered that there is potential for ex-situ foraging connectivity between the SPA and the Proposed Scheme area for breeding common gull.

Figure 5-13 SCI Waders and Waterbirds Observed During Overwintering Waterbird Surveys in Winter 2022/23. BA Bar-Tailed Godwit; CA Cormorant; CU Curlew; H. Grey Heron; OC Oystercatcher; RK Redshank

Figure 5-14 SCI Gull Species Observed During Overwintering Waterbird Surveys in Winter 2022/23. BH Black-headed Gull; CM Common Gull; HG Herring Gull

Figure 5-15 SCI waterfowl species observed during overwintering waterbird surveys in winter 2022/23. MA Mallard; T Teal; WN Wigeon; WS Whooper Swan

Table 5-11 Monthly peak counts of SCI overwintering waterbird species recorded during winter 2022/23 surveys which were undertaken specifically for the Ballina FRS and relevant thresholds and SPA population numbers (Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA).

SCI species		Peak Count					Designated Sites and thresholds (Burke *et al*., 2018)				
Common name (BTO Code)	Scientific name	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	International Threshold	National Threshold	National Mean/Peak*	SPA population (NPWS, 2020a, b)	Peak count as a % of the SPA population
Site 1 – Quignamanger											
Bar-tailed godwit **(BA)**^	*Limosa lapponica*	0	19	0	0	0	1500	170	NA	335	5.7%
Black-headed gull **(BH)**	*Larus ridibundus*	69	33	52	142	3	31000	NA	48821/57892	NA	NA
Common gull **(CM)**+	*Larus canus*	0	2	1	4	0	16400	NA	21438/30216	80[$]	5%
Cormorant **(CA)**	*Phalacrocorax carbo*	2	7	8	7	6	1200	110	NA	NA	NA
Curlew **(CU)**^	*Numenius arquata*	1	2	0	4	2	7600	350	NA	561	0.74%
Grey heron **(H.)**	*Ardea cinerea*	3	3	4	1	1	5000	25	NA	NA	NA
Herring gull **(HG)**	*Larus argentatus*	1	19	2	4	5	14400	NA	11524/13959	NA	NA
Mallard **(MA)**	*Anas platyrhynchos*	0	0	13	2	0	53000	280	NA	NA	NA
Oystercatcher **(OC)**	*Haematopus ostralegus*	24	7	10	13	7	8200	610	NA	NA	NA
Redshank **(RK)**^	*Tringa totanus*	3	7	0	31	50	760	240	NA	300	16.7%
Teal **(T.)**	*Anas crecca*	0	13	0	7	0	5000	360	NA	NA	NA
Wigeon **(WN)**	*Anas penelope*	3	0	0	0	0	14000	560	NA	NA	NA
Site 2 – Moy Main Channel											
Black-headed gull **(BH)**	*Larus ridibundus*	15	52	10	15	0	31000	NA	48821/57892	NA	NA
Common gull **(CM)**+	*Larus canus*	0	1	0	1	0	16400	NA	21438/30216	80[$]	1.25%
Cormorant **(CA)**	*Phalacrocorax carbo*	0	4	1	3	0	1200	110	NA	NA	NA
Grey heron **(H.)**	*Ardea cinerea*	1	1	0	1	2	5000	25	NA	NA	NA
Herring gull **(HG)**	*Larus argentatus*	0	1	3	0	0	14400	NA	11524/13959	NA	NA
Mallard **(MA)**	*Anas platyrhynchos*	0	0	0	1	0	53000	280	NA	NA	NA
Oystercatcher **(OC)**	*Haematopus ostralegus*	0	2	0	0	0	8200	610	NA	NA	NA
Redshank **(RK)**^	*Tringa totanus*	0	1	2	0	0	760	240	NA	300	0.7%
Whooper swan **(WS)**	*Cygnus cygnus*	0	0	2	0	0	340	150	NA	NA	NA

**Peak counts were compared to National Mean/Peak numbers as provided in Lewis et al. (2019) when national thresholds (Burke et al., 2018) were not available. ^SCI species of Killala Bay/Moy Estuary SPA. +SCI species of Lough Conn and Lough Cullin SPA. [$]Given Lough Conn and Lough Cullin SPA is classified for reproducing (breeding) common gull, this figure (80) was obtained by doubling the population given in the standard data form (i.e. 40) (NPWS, 2020b) as the figure within the standard data form represents a pair.*

5.2.6 Atlantic Salmon

5.2.6.1 River Moy

The River Moy main channel in Ballina is approximately 68m wide at the weir crest, narrowing to ~50m width through the Ridgepool and Cathedral pool. The channel spans the estuarine and freshwater interface of the lower river, also forming the interface between the Killala Bay/Moy Estuary SAC and the River Moy SAC. The boundary between SACs is at the "Upper Bridge" (downstream end of the Ridgepool), but the river levels are tidally influenced as far as the Salmon Weir at the upstream end of the Ridgepool. For this reason, the subject reach of the Moy in Ballina has importance for salmon primarily as an inward/outward migration route only. See Section 5.1.7 which sets out data from IFI fish counters located on Ballina Salmon Weir. The vast salmon spawning and nursery waters of the Moy main channel and its tributaries are upstream of Ballina and are not impacted by the Proposed Scheme. This is important to the overall impact assessment set out later in this document, as the Proposed Scheme does not impinge on any sensitive spawning and nursery areas for Atlantic salmon in the Moy main channel.

5.2.6.2 Brusna River

The Brusna River (EPA name Glenree) is a moderately large river that flows westwards from the Ox Mountains to meet the tidal River Moy at Ballina. The potentially affected reaches near the Rathkip/Shanaghy Bridge are generally 10-12 m wide, forming a series of shallower riffle/runs (average ~30 cm deep) and deeper glides with occasional pools. Hydromorphology is reasonably natural despite the urban setting, although evidence of historical modifications exists in the form of overgrown boulder riprap along both banks, and probable straightening and deepening in the past. Instream habitats comprise riffle-run flow over substrates of cobble and gravel, with very little fine sediment accumulation, the latter indicating strong spates. The potentially affected reach is good salmon nursery habitat with patches of good spawning habitat, although the reach clearly undergoes strong spate flow (as evidenced by lack of fines and coarseness of the substrates) which is not ideal for salmon spawning. The river corridor is almost fully tree-lined on the true right bank (i.e., facing downstream) with scattered trees on the true left bank providing good cover to salmon and helping regulate instream temperature. A series of natural bedrock cascades and rapids, plus a disused weir occur upstream of the N59 bridge. These obstacles are passable by migrating salmon at least on occasion as salmon are recruiting in the Brusna, as set out in Section 5.1.7, above).

5.2.6.3 Moy Tributaries

Bunree and Tullyegan are unsuitable for salmon, mainly owing to small size and low water volume, but also because of impaired hydromorphology (drainage and culverting), paucity of suitable spawning substrates and sub-optimal water quality (representative of 'poor' (Q3) or 'moderate' (Q3-4) status).

The Quignamanger is completely unsuitable for salmon spawning and nursery owing to extensive existing culverting and calcareous concretions arising from tufa formations. Juvenile salmon (parr or smoults) were observed foraging in the approximately 50 m open stretch of the lower Quignamanger (just upstream of the existing Quay Road culvert) in both May and September 2023. The channel there is not suitable for spawning, but salmon (perhaps outwards migrating smolts) appear to be accessing the area from the River Moy and foraging, possibly as supplementary nursery habitat during the outward migration. In any case the Quignamanger adjoins the Killala Bay/Moy Estuary SAC for which salmon is not a QI species.

In conclusion, the Quignamanger, Bunree and Tullyegan do not contribute or support the CO targets for salmon in the River Moy SAC and are scoped out of further consideration in this NIS.

5.2.7 Sea and Brook Lamprey

5.2.7.1 Freshwater and Estuarine River Moy

Given the potential importance of the Ridgepool to sea lamprey, a detailed instream survey was conducted on 12 September 2023. Detailed habitat descriptions and a discussion on sea lamprey spawning and nursery habitat of the Ridgepool are presented in **Appendix F: Ridgepool Instream Survey**. The Ridgepool (Salmon Weir to Upper Bridge) and Cathedral pool (Upper Bridge to Lower Bridge) have quite turbulent, higher velocity central channel flows, mainly at low tide and at periods of low flow owing to the presence of

rapids over the weir and intermittent paired deflectors in the Cathedral pool. Substrates comprise a combination of bedrock (highly scoured at the Salmon weir), boulder, cobble, gravel and coarse and fine sand. The river margins become largely dewatered at low tide (during low flow). River margin habitats in the faster water reaches of Ridgepool and Cathedral pool are markedly different to those present downstream of the Lower Bridge, being more eroding than depositing type habitats.

The Moy downstream of the Lower Bridge (N59) can be classed as a laminar glide with slow flowing margins, especially along the left-hand side (LHS) inside and upstream of the floating dock at Bachelors Walk. Both banks form a stable berm inside the existing river walls downstream of the Lower Bridge, supported by a row of boulder riprap that is exposed at low tide. The boulder riprap captures pockets of sediment below the low tide level, forming silt accumulations where larval lamprey were captured (up to 5 lamprey/5 min search) during spot-check surveys of 2022-2023.

Figure 5-16 shows locations on the River Moy in Ballina where larval lampreys were present and indicates the reaches where larval lamprey are likely to occur as there is suitable marginal habitat (silt accumulations). Unmarked river margin areas are entirely unsuitable for lamprey nursery as they are eroding (lacking silt depositions) and/or dewater at low tide. For details on the potential sea lamprey spawning area in Ridgepool see **Appendix F**. Note that the Salmon Weir was assessed by IFI as part of the National Barriers Programme (IFI, 2024). The weir itself does not present a barrier to fish passage but the natural rock outcrop upstream of the weir was noted as a potential barrier to fish migration (at least under certain flow conditions). This may explain why some sea lamprey end up spawning in the Ridgepool even though the tidal nature of the pool makes it sub-optimal for lamprey spawning.

In conclusion, sea lamprey nest building and spawning activity has previously been reported by IFI staff in the Ridgepool, and patches of larval lamprey nursery habitat occur within the River Moy in discrete areas in proximity to the proposed flood relief works. Brook lampreys are unlikely to be spawning in the tidal river Moy, but it cannot be ruled out that larvae from nearby upstream tributaries could drift downstream and settle in the lamprey nursery habitats as indicated in **Figure 5-16**.

5.2.7.2 Brusna (Glenree) River

Despite manual searches of marginal silt areas in the proposed works area in the vicinity of Rathkip/Shanaghy Bridge, no larval lampreys were captured during field sampling for the current project. It is concluded that the Brusna (Glenree) River does not support anadromous sea lamprey owing to the migration barrier formed by cascades and an historic weir between the N59 crossing Shanaghy/Rathkip Bridge. The Brusna has little to no importance for brook lamprey in the study reach owing to hydraulic conditions that do not facilitate silt deposition. The affected reach of the Brusna is therefore not considered to contribute to or significantly support CO targets for sea lamprey or brook lamprey of the River Moy SAC.

5.2.8 White-clawed Crayfish

The affected reach of the tidal River Moy in Ballina is entirely unsuitable for freshwater, white-clawed crayfish. Bunree is unsuitable for crayfish, being virtually dry (or very low volume) and drained/culverted. Manual searches on each of the Tullyegan stream and Brusna (Glenree) River (Sites TE1, TE3, BR2, BR5: **Appendices B, C, D** and **E**) revealed potential crayfish habitats consisting of flattish cobbles over gravel, with occasional patches of emergent marginal vegetation, but no crayfish were detected despite very focused manual searching. The Quignamanger (Site QG1**: Appendices B, C, D** and **E**) had largely unsuitable substrates (either soft sediment or highly calcified) but did comprise areas of woody debris and occasional calcareous cobble. The habitat had some potential for crayfish upstream of the proposed culvert works, but none were detected by manual searching. Habitat between the proposed culvert works and the Moy confluence was completely unsuitable for crayfish, and none were detected using manual searching. The Marine Institute, as part of the National Crayfish Plague Surveillance Program detected crayfish plague (*Aphanomyces astaci*) in the Moy catchment using eDNA sampling in 2020 and 2021 at sites upstream of Foxford (MI, 2022). The introduction appears to have occurred between 2018/2019 and 2020, as the Moy was negative for crayfish plague eDNA until 2020 (MI, 2020). When an outbreak of plague is occurring, it spreads both upstream and downstream of the active “kill-zone”, wiping out crayfish in its wake. It appears that crayfish recolonisation can occur after a plague event (as it has in the River Boyne for example), but there is still little information available as to the timeline for recovery, if at all, depending on the catchment. The Conservation Objectives for the River Moy SAC (NPWS, 2016) state that crayfish are absent on the Moy main channel. However, eDNA sampling at Ballina (salmon weir footbridge) during 2020 was positive for crayfish and negative for plague (MI, 2022). Note, however, that a positive result for crayfish DNA does not

delineate how far upstream the source animal / population occurs. There is evidence that DNA in river environments can travel considerable distances downstream providing positive results despite the source population being well upstream. For example, downstream eDNA detection distances have been reported: 22.8 km for rare frogs in a headwater stream catchment (Villacorta-Rath *et al.,* 2021), 9 km for *Unio tumidus*, a lake dwelling freshwater mussel (Deiner and Altermatt, 2014), 7 km for freshwater crayfish in a stream catchment in south-west Germany (Chucholl *et al.,* 2021). Therefore, a positive crayfish DNA sample above the salmon weir in Ballina could be detecting crayfish located well upstream of the Proposed Scheme. On the basis of focused manual searching surveys conducted for this project, white-clawed crayfish were not found to be present and are extremely unlikely within the Proposed Scheme study area. Whilst habitats within the proposed works areas of the Quignamanger, Bunree and tidal River Moy are not suitable for the species, using the precautionary principle, this species was scoped in for consideration in this NIS with regard to the River Brusna and the Tullyegan Stream to avoid any doubt as to conclusions.

5.2.9 Aquatic QI Habitats

Two aquatic QI habitats are considered to be within the ZoI of the Proposed Scheme. These are estuaries [1130] and mudflats and sandflats not covered by sea water at low tide [1140]. Both of these habitats are QIs of Killala Bay/Moy Estuary SAC and both are within the proposed works areas.

Habitat 1140 (Mudflats and sandflats) and Habitat 1130 (Estuaries) within the proposed works areas are classified as 'Estuarine muddy sand dominated by *Hediste diversicolor* and *Heterochaeta costata* community complex' (NPWS, 2012). This community complex is recorded quite extensively, intertidally on the eastern shore of the Moy Estuary and occurs upstream and downstream of the Quignamanger stream confluence with the tidal River Moy. The sediment is comprised of muddy sand, with silt-clay and very fine sand fractions ranging from 21 to 41% and 14 to 55%, respectively and coarse material is generally less than 7% (NPWS, 2012). The community complex is characterised by the polychaete *Hediste diversicolor* and the oligochaete *Heterochaeta costata*. The relevant Conservation Objective targets for the QI habitats 1130 and 1140 in proximity to the Proposed Scheme are:

- **Target 1** - Permanent habitat area of 'Estuarine muddy sand dominated by *Hediste diversicolor* and *Heterochaeta costata* community complex' is stable or increasing (~54 ha), subject to natural processes.
- **Target 4 -** Conserve the 'Estuarine muddy sand dominated by *Hediste diversicolor* and *Heterochaeta costata* community complex' in a natural condition. This is defined by the attribute that significant continuous or ongoing disturbance of the community should not exceed an approximate area of 15% of the interpolated area of the community type. (NPWS, 2012).

Figure 5-16 Lamprey Nursery Habitat - River Moy, Ballina

6 APPROPRIATE ASSESSMENT – STAGE 2: NATURA IMPACT STATEMENT

6.1 Introduction

Following on from the Stage 1 – Screening Assessment, it has been concluded that the Proposed Scheme has potential for LSEs on four European Sites due to the activities associated with the construction phase and/or the operational and maintenance phase of the Proposed Scheme. LSEs have been identified with respect to the following European Sites and its associated QIs:

- River Moy SAC (Site Code: 002298)
- Killala Bay/Moy Estuary SAC (Site Code: 000458)
- Killala Bay/Moy Estuary SPA (Site Code: 004036)
- Lough Conn and Lough Cullin SPA (Site Code: 004228)

A Stage 2 - NIS has been prepared based on the Proposed Scheme description set out in **Section 3** of this document and with reference to the Conservation Objectives for the European Sites listed above. The assessment considers whether the Proposed Scheme will result in an adverse effect on the integrity of these European Sites.

The integrity of a European Site is defined as

> "…*the coherent sum of the site's ecological structure, function and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated*".

The published guidance states that the integrity of a European Site relates to its Conservation Objectives. The effects of the Proposed Scheme are assessed against these Conservation Objectives, as published by the National Parks and Wildlife Service (NPWS).

6.2 Summary of Stage 1 – Screening Assessment

Based on the Source-Pathway-Receptor model (see **Appendix M**), the Stage 1 - Screening Assessment for the Ballina FRS (RPS, 2024) concluded that the potential effects arising from the Proposed Scheme are as follows:

- Disturbance of QI/SCI species from the construction and/or operational and maintenance phases of the of the Proposed Scheme. Sources of disturbance include the noise, vibration, dust and vehicle emissions associated with construction traffic and activities and the disturbance arising from the presence and activities of construction personnel. Disturbance may also arise from the spread of IAPS which may hinder foraging activities and/or the movement of QI species throughout their environment. These effects are likely to extend into areas beyond the Proposed Scheme boundary.
- Hydrological effects arising from the construction and/or operational and maintenance phases of the of the Proposed Scheme. These effects can arise from a number of different sources including an accidental release of pollutants (e.g., suspended solids, silt, concrete, fuels, oils and lubricants) which could be released from the site (e.g., from machinery or during construction activities) into the surface water network. This could cause a consequent reduction in water quality in European Sites hydrologically linked via the surface water network to the site during the works. Certain IAPS can also result in a reduction in surface water quality as their presence on riverbanks as they die back in the autumn/winter months can cause riverbank erosion and subsequent sedimentation of the watercourse. Instream works can also cause barriers to migratory species while the construction of flood relief measures can cause changes to the hydraulic character of affected watercourses in addition to creating habitat fragmentation.
- Hydrogeological effects arising from the construction and/or operational and maintenance phases of the of the Proposed Scheme. These effects can arise from a number of different groundwater interference sources. Groundwater interference is deemed to involve changes in flow, yield and quality of the groundwater body arising from works which may extend into the water table in certain conditions.

The Stage 1 Screening Assessment concluded that there was a potential pathway for impact from the Proposed Scheme on a number of different QI and SCI species of River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA which are outlined in **Table 6-1**.:

Table 6-1 QI and SCI of the European Sites in ZoI of Proposed Scheme that have been screened in for further assessment

European Site	Connectivity	QI/SCI	Location Relative to the Proposed Development	Potential Pathway for Impacts
River Moy SAC (002298) (NPWS, 2016)	The Proposed Scheme is located within the River Moy SAC with works required within the river itself in addition to several tributaries which flow into the SAC. Therefore, there is direct hydrological connectivity between the scheme area and the SAC. The SAC is located within multiple groundwater bodies including the Ballina (IE_WE_G_0035) and Ballina Gravels Group 1 (IE_WE_G_0113) groundwater bodies. The scheme area intersects these two groundwater bodies therefore there is potential for hydrogeological connectivity between the SAC and the scheme area.	1095 Sea lamprey (*Petromyzon marinus*)	Potential to occur within the Proposed Scheme study area within the main channel of the River Moy and Moy estuary. Lamprey juveniles were recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		1096 Brook lamprey (*Lampetra planeri*)	Potential to occur within the Proposed Scheme study area within the main channel of the River Moy, Moy estuary and tributaries. Lamprey juveniles were recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		1106 Salmon (*Salmo salar*)	Potential to occur within the Proposed Scheme study area within the main channel of the River Moy, Moy estuary and tributaries. This species was recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		1355 Otter (*Lutra lutra*)	Potential to occur within the Proposed Scheme study area within the main channel of the River Moy, Moy estuary and tributaries. This species was recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases An active otter holt was found within 10m of works along the Brusna river and as such noise and vibration has the potential to impact upon otter within the holt. This QI is brought forward for further assessment. The spread of IAPS due to the proposed works has the potential to cause the degradation of habitat (e.g. bankside habitat) used by this species.
		1092 White-clawed crayfish (*Austropotamobius pallipes*)	Potential to occur within the Proposed Scheme study area within the Rivers Brusna or Tullyegan.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance

European Site	Connectivity	QI/SCI	Location Relative to the Proposed Development	Potential Pathway for Impacts
			This species was not recorded during baseline surveys.	during the Construction Phase.
Killala Bay/Moy Estuary SAC (000458) (NPWS, 2012)	The Proposed Scheme is located within the Killala Bay/Moy Estuary SAC with works required within the Moy estuary (IE_WE_420_0300) itself. Therefore, there is direct downstream hydrological connectivity between the Proposed Scheme area and SAC. The Proposed Scheme area and SAC are both located within the Ballina (IE_WE_G_0035) groundwater body. Therefore, there is potential for hydrogeological connectivity between the SAC and the Proposed Scheme area.	1130 Estuaries	This habitat occurs within the Proposed Scheme area. This habitat was recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		1140 Mudflats and sandflats not covered by seawater at low tide	This habitat occurs within the Proposed Scheme area. This habitat was recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Within the SAC, this habitat occurs approximately 1.6 km downstream of the Proposed Scheme within the River Moy Estuary. This habitat was not recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases.
		1095 Sea lamprey (*Petromyzon marinus*)	Potential to occur within the Proposed Scheme study area within the main channel of the River Moy, Moy estuary and tributaries. Lamprey juveniles were recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		1365 Harbour seal (*Phoca vitulina*)	Potential to occur within the Proposed Scheme study area within the main channel of the River Moy, Moy estuary and tributaries. This species was recorded during baseline surveys	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases.
Killala Bay/Moy Estuary SPA (004036) (NPWS 2013b)	The Proposed Scheme is located within the Killala Bay/Moy Estuary SPA with works required within Moy estuary (IE_WE_420_0300) itself. Therefore, there is direct connectivity between the Proposed Scheme area and the SPA. The Proposed Scheme is located within the Killala Bay/Moy Estuary SPA with works required within the Moy estuary	A137 Ringed plover (*Charadrius hiaticula*)	Potential to occur within or adjacent to the Proposed Scheme study area. This species was not recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		A140 Golden plover (*Pluvialis apricaria*)	Potential to occur within or adjacent to the Proposed Scheme study area. This species was not recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		A141 Grey plover (*Pluvialis squatarola*)	Potential to occur within or adjacent to the	Via hydrological and hydrogeological pathways

European Site	Connectivity	QI/SCI	Location Relative to the Proposed Development	Potential Pathway for Impacts
	(IE_WE_420_0300) itself. Therefore, there is direct downstream hydrological connectivity between the Proposed Scheme area and SPA. The Proposed Scheme area and SPA are both located within the Ballina (IE_WE_G_0035) groundwater body. Therefore, there is potential for hydrogeological connectivity between the SPA and the Proposed Scheme area.		Proposed Scheme study area. This species was not recorded during baseline surveys.	during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		A144 Sanderling (*Calidris alba*)	Potential to occur within or adjacent to the Proposed Scheme study area. This species was not recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		A149 Dunlin (*Calidris alpina*)	Potential to occur within or adjacent to the Proposed Scheme study area. This species was not recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		A157 Bar-tailed godwit (*Limosa lapponica*)	Potential to occur within or adjacent to the Proposed Scheme study area. This species was recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases.
		A160 Curlew (*Numenius arquata*)	Potential to occur within or adjacent to the Proposed Scheme study area. This species was recorded during baseline surveys.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		A162 Redshank (*Tringa totanus*)	Potential to occur within or adjacent to the Proposed Scheme study area. This species was recorded during baseline surveys	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases
		A999 Wetland and waterbirds	This SCI occurs within the Proposed Scheme study area.	Via hydrological and hydrogeological pathways during the Construction and/or Operational Phases and via direct disturbance during the Construction and/or Operational Phases.
Lough Conn and Lough Cullin SPA (004228) (NPWS, 2022)	This SPA is located upstream of the Proposed Scheme area, therefore no suitable hydrological connectivity between the Proposed Scheme area and the SPA exists. The SPA and scheme area are both located within the Ballina (IE_WE_G_0035)	A061 Tufted duck (*Aythya fuligula*)	Potential to occur within or adjacent to the Proposed Scheme study area. This species was not recorded during baseline surveys.	Via direct or indirect disturbance on ex-situ SCI species during the Construction and/or Operational Phases.
		A065 Common scoter (*Melanitta nigra*)	Potential to occur within or adjacent to the Proposed Scheme study area.	Via direct or indirect disturbance on ex-situ SCI species during the

European Site	Connectivity	QI/SCI	Location Relative to the Proposed Development	Potential Pathway for Impacts
	groundwater body. Therefore, there is potential for hydrogeological connectivity between the SPA and the scheme area. However, the groundwater flows towards the nearest rivers and lakes, therefore groundwater is most likely to flow from the Proposed Scheme to the River Moy. Consequently, it is not expected that there will be any hydrogeological impacts.		This species was not recorded during baseline surveys.	Construction and/or Operational Phases.
		A182 Common gull (*Larus canus*)	Potential to occur within or adjacent to the Proposed Scheme study area. This species was recorded during baseline surveys.	Via direct or indirect disturbance on ex-situ SCI species during the Construction and/or Operational Phases.
		A395 Greenland white-fronted goose (*Anser albifrons flavirostris*)	Potential to occur within or adjacent to the Proposed Scheme study area. This species was not recorded during baseline surveys.	Via direct or indirect disturbance on ex-situ SCI species during the Construction and/or Operational Phases.

The Stage 1 Screening Appraisal also concluded that there was no potential pathway for impact from the Proposed Scheme on a number of QI and SCI of the River Moy SAC, Killala Bay/Moy Estuary SAC, and Lough Conn and Lough Cullin SPA which are listed in **Table 6-2** and as such, they are not included for further assessment in this document.

Table 6-2 QI and SCI of the European Sites in ZoI of Proposed Scheme That Have Been Screened Out for Further Assessment

European Site	Connectivity of European Site	QI/SCI*	Location Relative to the Proposed Scheme	Potential Pathway for Impacts on QI/SCI
River Moy SAC (002298) (NPWS, 2016	The Proposed Scheme is located within the River Moy SAC with works required within the river itself in addition to several tributaries which flow into the SAC. Therefore, there is direct hydrological connectivity between the scheme area and the SAC. The SAC is located within multiple groundwater bodies including the Ballina (IE_WE_G_0035) and Ballina Gravels Group 1 (IE_WE_G_0113) groundwater bodies. The scheme area intersects these two groundwater bodies therefore there is potential for hydrogeological connectivity between the SAC and the scheme area.	7110 Active raised bogs*	Within the SAC, this habitat occurs >45km upstream from the Proposed Scheme in the vicinity of Charlestown. This habitat was not recorded during baseline surveys.	No – not within the ZoI of the Proposed Scheme. This habitat is restricted to the upper reaches of the River Moy system.
		7120 Degraded raised bogs still capable of natural regeneration	Not mapped for this SAC, however, it is likely to occur in similar locations to 7110 above, as per CO. This habitat was not recorded during baseline surveys.	No – not within the ZoI of the Proposed Scheme. This habitat is restricted to the upper reaches of the River Moy system.
		7150 Depressions on peat substrates of the Rhynchosporion	Not mapped for this SAC, however, it is likely to occur in similar locations to 7110 above, as per CO. This habitat was not recorded during baseline surveys.	No – not within the ZoI of the Proposed Scheme. This habitat is restricted to the upper reaches of the River Moy system.
		7230 Alkaline fens	The full extent of this habitat is not mapped for this SAC; however, an extensive area is known to occur approximately 45km upstream of the Proposed Scheme. This habitat was not recorded during baseline surveys.	No – not within the ZoI of the Proposed Scheme as this habitat is upstream of the Proposed Scheme and was not recorded during baseline surveys.
		91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	Within the SAC this habitat occurs on the banks of Lough Conn and Lough Cullin >20km upstream of the Proposed Scheme. This habitat was not recorded during baseline surveys.	No – not within the ZoI of the Proposed Scheme and this habitat was not recorded during baseline surveys. .
		91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) *	Within the SAC, this habitat occurs on the banks of Lough Conn >20km upstream of the Proposed Scheme. This habitat was not recorded during baseline surveys.	No – not within the ZoI of the Proposed Scheme and this habitat was not recorded during baseline surveys.
Killala Bay/Moy Estuary SAC	The Proposed Scheme is located within the Killala Bay/Moy Estuary SAC with works required within the Moy estuary	1210 Annual vegetation of drift lines	Within the SAC, this habitat occurs approximately 8km downstream of the Quignamanger Proposed Scheme works area at Bartragh Island.	No – this habitat is not considered to be within the ZoI of the Proposed Scheme due to distance downstream and dilution effect of the Moy estuary should a pollution event occur.

European Site	Connectivity of European Site	QI/SCI*	Location Relative to the Proposed Scheme	Potential Pathway for Impacts on QI/SCI
(000458) (NPWS, 2012)	(IE_WE_420_0300) itself. Therefore, there is direct downstream hydrological connectivity between the Proposed Scheme area and SAC. The Proposed Scheme area and SAC are both located within the Ballina (IE_WE_G_0035) groundwater body. Therefore, there is potential for hydrogeological connectivity between the SAC and the Proposed Scheme area.		This habitat was not recorded during baseline surveys.	
		1230 Vegetated Sea cliffs of the Atlantic and Baltic coasts	This is a coastal habitat that Article 17 mapping indicates is, at its closest point, approximately 7.5 km downstream of the Quignamanger Proposed Scheme works area. This habitat was not recorded during baseline surveys.	No – this habitat is not considered to be within the ZoI of the Proposed Scheme given the nature of this habitat (i.e. coastal), the distance from the Proposed Scheme and the high level of dilution afforded by the Moy estuary should an unexpected pollution event occur.
		1310 S*alicornia* and other annuals colonising mud and sand	Within the CO for this SAC, this habitat is documented to occur approximately 7km downstream of the Quignamanger Proposed Scheme works area at Bartragh Island. Article 17 reporting also indicates that this location is the closest to the Proposed Scheme where this habitat has been recorded. This habitat was not recorded during baseline surveys.	No - there is potential for this habitat to occur approx. 1.6 km downstream of the Proposed Scheme, however, at this distance, this habitat is not considered to be within the ZoI of the Proposed Scheme due to the dilution effect of the Moy estuary, should an unexpected pollution event occur.
		2110 Embryonic shifting dunes	Within the SAC, this habitat occurs approximately 10 km downstream of the Quignamanger Proposed Scheme works area at Bartragh Island. This habitat was not recorded during baseline surveys.	No – this habitat is not considered to be within the ZoI of the Proposed Scheme given the distance from the Proposed Scheme and the high level of dilution afforded by the Moy estuary should an unexpected pollution event occur.
		2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	Within the SAC, this habitat occurs approximately 7.5 km downstream of the Quignamanger Proposed Scheme works area at Bartragh Island. This habitat was not recorded during baseline surveys.	No – this habitat is not considered to be within the ZoI of the Proposed Scheme given the distance from the Proposed Scheme it occurs, and the high level of dilution afforded by the Moy estuary should an unexpected pollution event occur.
		2130 Fixed coastal dunes with herbaceous vegetation (grey dunes) *	Within the SAC, this habitat occurs approximately 7.5 km downstream of the Quignamanger Proposed Scheme works area at Bartragh Island. This habitat was not recorded during baseline surveys.	No – this habitat is not considered to be within the ZoI of the Proposed Scheme given the distance from the Proposed Scheme it occurs, and the high level of dilution afforded by the Moy estuary should an unexpected pollution event occur.
		2190 Humid dune slacks	Within the SAC, this habitat occurs approximately 9 km downstream of the	No – this habitat is not considered to be within the ZoI of the Proposed Scheme given the distance from the Proposed Scheme it occurs,

European Site	Connectivity of European Site	QI/SCI*	Location Relative to the Proposed Scheme	Potential Pathway for Impacts on QI/SCI
			Quignamanger Proposed Scheme works area at Bartragh Island. This habitat was not recorded during baseline surveys.	and the high level of dilution afforded by the Moy estuary should an unexpected pollution event occur.
		1014 Narrow-mouthed whorl snail (*Vertigo angustior*)	Within the SAC, this species occurs approximately 3.5 km downstream of the Quignamanger Proposed Scheme works area on a tributary flowing into the Moy Estuary. This species was not recorded during baseline surveys.	No – this species is not considered to be within the ZoI of the Proposed Scheme as it is located on a tributary approximately 100 m upstream of the confluence of this tributary the Moy estuary.
Lough Conn and Lough Cullin SPA (004228) (NPWS, 2022)	This SPA is located upstream of the Proposed Scheme area, therefore no suitable hydrological connectivity between the Proposed Scheme area and the SPA exists. The SPA and scheme area are both located within the Ballina (IE_WE_G_0035) groundwater body. Therefore, there is potential for hydrogeological connectivity between the SPA and the scheme area. However, the groundwater flows towards the nearest rivers and lakes, therefore groundwater is most likely to flow from the Proposed Scheme to the River Moy. Consequently, it is not expected that there will be any hydrogeological impacts.	A999 Wetlands and waterbirds	Approximately 6km, from Ballina town centre	No – not considered to be within the ZoI of the Proposed Scheme as there is no connectivity between this location and the Proposed Scheme.

**Denotes a Priority Habitat*

Table 6-3 outlines the Conservation Objectives (CO) of the QI/SCI receptors potentially affected by the Proposed Scheme as identified within Stage 1 – Screening Assessment**.** These receptors will be carried through to the detailed impact prediction stage of this NIS.

Table 6-3 Conservation Objectives of the QI/SCI receptors potentially affected by the Proposed Scheme

European Site	QI/SCI	Conservation Objective
River Moy SAC (002298) (NPWS, 2016)	1095 Sea lamprey (*Petromyzon marinus*)	To maintain the favourable conservation condition of sea lamprey in River Moy SAC
	1096 Brook lamprey (*Lampetra planeri*)	To maintain the favourable conservation condition of brook lamprey in River Moy SAC
	1106 Salmon (*Salmo salar*)	To maintain the favourable conservation condition of salmon in River Moy SAC
	1355 Otter (*Lutra lutra*)	To maintain the favourable conservation condition of otter in River Moy SAC
	1092 White-clawed crayfish (*Austropotamobius pallipes*)	To maintain the favourable conservation condition of white-clawed crayfish in River Moy SAC
Killala Bay/Moy Estuary SAC (000458) (NPWS, 2012)	1130 Estuaries	To maintain the favourable conservation condition of estuaries in Killala Bay/Moy Estuary SAC
	1140 Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of mudflats and sandflats not covered by seawater at low tide in Killala Bay/Moy Estuary SAC
	1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	To maintain the favourable conservation condition of Atlantic salt meadows (Glauco-Puccinellietalia) in Killala Bay/Moy Estuary SAC
	1095 Sea lamprey (*Petromyzon marinus*)	To maintain the favourable conservation condition of sea lamprey in Killala Bay/Moy Estuary SAC
	1365 Harbour seal (*Phoca vitulina*)	To maintain the favourable conservation condition of harbour seal in Killala Bay/Moy Estuary SAC
Killala Bay/Moy Estuary SPA (004036) (NPWS, 2013b)	A137 Ringed plover (*Charadrius hiaticula*)	To maintain the favourable conservation condition of ringed plover in Killala Bay/Moy Estuary SPA
	A140 Golden plover (*Pluvialis apricaria*)	To maintain the favourable conservation condition of golden plover in Killala Bay/Moy Estuary SPA
	A141 Grey plover (*Pluvialis squatarola*)	To maintain the favourable conservation condition of grey plover in Killala Bay/Moy Estuary SPA
	A144 Sanderling (*Calidris alba*)	To maintain the favourable conservation condition of sanderling in Killala Bay/Moy Estuary SPA
	A149 Dunlin (*Calidris alpina*)	To maintain the favourable conservation condition of dunlin in Killala Bay/Moy Estuary SPA
	A157 Bar-tailed godwit (*Limosa lapponica*)	To maintain the favourable conservation condition of bar-tailed godwit in Killala Bay/Moy Estuary SPA
	A160 Curlew (*Numenius arquata*)	To maintain the favourable conservation condition of curlew in Killala Bay/Moy Estuary SPA
	A162 Redshank (*Tringa totanus*)	To maintain the favourable conservation condition of redshank in Killala Bay/Moy Estuary SPA
	A999 Wetland and waterbirds	To maintain the favourable conservation condition of wetland habitat in Killala Bay/Moy Estuary SPA as a resource for the regularly occurring migratory waterbirds that utilise it.
Lough Conn and Lough Cullin SPA (004228) (NPWS, 2022)	A061 Tufted duck (*Aythya fuligula*)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA
	A065 Common scoter (*Melanitta nigra*)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA
	A182 Common gull (*Larus canus*)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA

European Site	QI/SCI	Conservation Objective
	A395 Greenland white-fronted goose (*Anser albifrons flavirostris*)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA

6.3 Overview of Potential Impacts and Effects

This section predicts the potential effects of the Proposed Scheme on the QIs and SCIs of River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA. Potential effects are based on information regarding the QIs/SCIs and conservation objectives of the Sites and have been informed by a desk study and field surveys. The stated attributes and targets for each conservation objective were central to the impact assessment process.

Impact prediction is based on the Source-Pathway-Receptor (S-P-R) model. Where no pathway exists, there is no possibility for significant effects on any QI or SCI of the European Site in question. A summary of the potential significant effects and pathways between the Proposed Scheme and the QIs/SCIs of River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA is provided in **Table 6-4**.

Table 6-4 Possible source-pathway-receptor linkages between the Proposed Scheme and European Sites within the ZoI.

Source	Pathway	Receptor
Construction Phase		
Temporary or permanent loss of supporting habitat (e.g. for resting, foraging etc.) due to in-stream and bankside construction works on the River Moy/Moy Estuary and Brusna (Glenree) River	Land, hydrological	Receptors include otter, harbour seal, white-clawed crayfish, salmon, sea lamprey and brook lamprey associated with the River Moy SAC and Killala Bay/Moy Estuary SAC and SCI bird species associated with Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA.
Barriers to migratory or commuting species due to instream works on the River Moy and/or Moy estuary and tributaries. In-stream works in the River Moy/Moy Estuary could create a barrier to migratory or commuting species.	Hydrological	Receptors include otter, salmon and sea lamprey of the River Moy SAC and Killala Bay/Moy Estuary SAC.
Surface water run-off containing silt, sediments and/or other pollutants into nearby watercourses (River Moy, Moy Estuary, Tullyegan, Brusna, Bunree, Quignamanger) could affect the quality of aquatic/wetland habitats and species.	Hydrological, Land	Receptors include SCI waterbirds, otter, harbour seal, white-clawed crayfish, salmon, sea lamprey, brook lamprey, wetland habitat and QI habitat associated with River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA occurring adjacent to the Proposed Scheme. SCI bird species of Lough Conn and Lough Cullin SPA may also be affected
Uncontrolled releases of dust and/or other pollutants to air due to earthworks.	Air	Receptors include SCI birds associated with Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA and QI habitats of Killala Bay/Moy Estuary SAC.
Discharge to ground - runoff water containing silt, sediments and/or other pollutants into the local groundwater. Groundwater contamination could affect the quality of aquatic/wetland habitats and species.	Hydrogeological	Receptors include wetland habitat associated with Killala Bay/Moy Estuary SPA occurring adjacent to the Proposed Scheme. SCI waterbirds, otter, harbour seal, white-clawed crayfish, and QI fish species associated with River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA may also be indirectly affected by hydrogeological pathways.
Increased noise, vibrations or human presence as a result of construction activity	Air, Land	Receptors include SCI waterbirds, otter, white-clawed crayfish, harbour seal and QI fish species of the River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA.
Increased lighting in the vicinity of the Proposed Scheme as a result of construction activity	Air	Receptors include SCI waterbirds, otter, harbour seal, white-clawed crayfish and QI fish species of the River Moy

Source	Pathway	Receptor
		SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA.
Spread of IAPS. The spread of IAPS could affect supporting habitat adjacent to the Proposed Scheme or result in increased sedimentation of watercourses.	Land, hydrological	Receptors include otter, salmon, lamprey, white-clawed crayfish and SCI waterbirds associated with River Moy SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA.
Presence of machinery and other construction activities creating an increased mortality risk to QI/SCI species. Vegetation clearance and in-stream works present a mortality risk via direct contact with machinery and/or equipment. Open excavations also pose a mortality risk should entrapment occur.	Land, hydrological	Receptors include SCI waterbirds, otter, white-clawed crayfish, salmon, sea lamprey and brook lamprey associated with River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA.
Operational Phase		
Alterations to hydraulic character of River Moy and Brusna (Glenree), i.e., hydrology, water velocity, morphology as a result of new flood walls/embankments	Hydrological	Salmon, Sea lamprey, brook lamprey and white-clawed crayfish.
Habitat fragmentation as a result of bridge repair works at Rathkip/Shanaghy - Brusna (Glenree) River.	Hydrological	Receptors include Salmon and white-clawed crayfish. Sea and brook lamprey do not occur in the Brusna River.
The presence of personnel and machinery associated with channel maintenance may result in disturbance of QI/SCI species	Land, hydrological	Receptors include SCI waterbirds, otter, white-clawed crayfish, salmon, sea lamprey and brook lamprey associated with River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA.
Changes to water quality associated with new flood defences and new surface water drainage to the River Moy	Hydrological	Receptors include SCI waterbirds, otter, white-clawed crayfish, salmon, sea lamprey and brook lamprey associated with River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA.

6.4 Detailed Impact Predictions

6.4.1 Construction Phase Effects

6.4.1.1 Freshwater River Moy – Salmon and Lamprey

Table 6-5 Potential effects on salmon and lamprey within the freshwater section of the River Moy during the construction phase of the Proposed Scheme

Description of Potential Effect	Characterization of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
Ridgepool LHS (River Moy): Direct and/or Indirect Effects arising from instream works. Short term disturbance to sea lamprey habitats associated with temporary instream access route (Ballina Manor Hotel to Otter Apartments)	There is no sea lamprey spawning or nursery habitat within the direct footprint of the proposed temporary instream access ramp on the LHS bank in front of and upstream of the IFI Building to the "groyne" area. The impacted marginal areas are entirely unsuitable for sea lamprey spawning and there are no depositing silt areas for larval lamprey nursery within the proposed access ramp footprint (see details in **Appendix F: Ridgepool Instream Survey**). **Potential Lamprey Spawning Habitat (Ridgepool LHS):** On a precautionary basis, the outer edge of the proposed instream access ramp on the LHS in front of the old warehouse building is considered to comprise substrates with some limited potential to support sea lamprey spawning (though very sub-optimal), subject to the actual low flow wetted channel width during any particular spawning season. This precaution is based on the fact that dynamic, high-volume rivers such as the Moy will always be subject to natural fluvial processes that can subtly alter spatial distribution of substrates over time. In addition, sea lamprey themselves act as "river engineers" in the way they move substrates during nest building using their oral suckers (Dhamelincourt *et al*., 2020). The area in question is adjacent to Site RP2A on the LHS (out from corner of warehouse) (see **Appendix F**). A precautionary approach must be taken at this point (see **Section 7**: **Mitigation**) to avoid any potential for indirect negative effects on lamprey redds during the sea lamprey spawning season of May to July inclusive. There will be no instream construction works or bankside disturbance on the LHS of Ridgepool until August 1st of Y1 to accommodate IFI angling activity. This means that in Y1, the peak sea lamprey spawning season (May-July) is avoided. In Y2 the ramp and cofferdam area will be in-situ and no further instream works are required. Riverside works within the cofferdam using the access ramp will continue in front of Ballina Manor/apartments and the IFI Building because once the access ramp is in place, construction activity is then confined to the river margins with no additional intrusion into the Ridgepool. Sea lampreys that end up spawning in the Ridgepool will still have access to the existing spawning habitat in the low-flow wetted part of the mid-channel c.30 m downstream of the weir where there will be no direct instream construction works. **Lamprey Nursery Habitat (Ridgepool LHS):** Lamprey nursery habitat is present in one discrete area on the Ridge Pool LHS 40 m upstream of the Upper Bridge (Site RP5, see **Appendix F**) in front of Ballina Manor Hotel. This area is located downstream of the proposed access ramp footprint and is not subject to direct instream works. It is potentially susceptible to indirect effects	Potential **significant negative** short-term, reversible, though **unlikely** direct effects on *sea lamprey spawning habitat* locally in the Ridgepool in a discrete area adjacent RP2A on the outer margin of the temporary access ramp. This does not represent a significant effect at a catchment scale in terms of availability of lamprey spawning habitat but requires precautionary mitigation during the placement of the access ramp in the first August of the construction period. **Likely significant negative** short term localised indirect effects on *sea lamprey nursery habitat* locally in the Ridgepool in a discrete area downstream and adjacent to the temporary access ramp (Site RP5). This does not represent a significant effect at a catchment scale in terms of availability of lamprey nursery habitat but requires

Description of Potential Effect	Characterization of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
	relating to uncontrolled washout of construction materials (sediment, pollutants) from the construction work zone and/or loss of materials (gravel, fines) from the construction zone. The source of excessive fines is largely avoided because the access ramp will be comprised of rock bags (or similar, such as rock filled reno mattresses filled with washed rock) If excessive sediment did accidentally washout from the works area larval lamprey may abandon the area at RP5 and move downstream to below the N59 Lower Bridge where there is suitable alternative habitat for burrowing. Accidental spillage or leakage of potentially toxic pollutants (concrete, hydrocarbons) could cause direct mortality of small numbers of lamprey ammocoetes if concentrations are high enough, although that is unlikely to occur because of the contained works area and considerable dilution effect of the Moy in this location.	mitigation to prevent sediment/pollutant wash out.
Ridgepool LHS (River Moy): Direct and/or Indirect Effects arising from instream works. Short term disturbance to river margin habitats and salmonids associated with temporary instream access route (Ballina Manor to Otter Apartments)	The installation of the access ramp in front of the IFI Building and around the warehouse to the "groyne" area will cover benthic habitats along the LHS margin for 55 m, extending at most 7.5 m out into the channel (at the upstream corner of the warehouse) covering approximately 400 m^2 of the instream river margin. The habitats covered are described in **Appendix F**, sites RP1, RP2 and RP3 to as far as RP4. These marginal areas comprise mainly bryophyte vegetation with small amounts of common rooted macrophytes dominated by pondweeds (*Potamogeton* spp.) and *Ranunculus* spp. Shallow marginal areas at RP1 and RP3/RP4 typically dewater at low tide, representing ephemeral habitat value to fish. Small numbers of juvenile salmonids forage in the riffle on the shallow groyne area at low tide, but there is considerable alternative habitat availability locally for this function. The deeper glide adjacent to RP2 (c.40cm+ at 95 percentile of low tide/flow) forms a holding area for migrating salmonids with small amounts of instream plant cover (*Ranunculus* spp., *Potamogeton* spp.). This area is at the tail end of the more reliable, deeper holding pool towards the upstream end of the "groyne" which is not impacted by the access ramp. There are alternative holding habitats of good quality, locally within the Ridgepool and Cathedral pool available to migrating fish. **Instream Habitat Effects (Ridgepool LHS):** The affected area of the Ridgepool is already highly modified with concrete bank reinforcement and water levels affected by tides. The access ramp will cover the LHS river margin for 20 to 22 months, impinging on instream habitats that are of ephemeral value to salmonids and benthic invertebrates because of the tidal nature of the pool. The fluvial dynamics of the river margin area will return to near-original almost immediately following removal of the access ramp and cofferdams (which can be lifted out as the ramp is contained within rock bags or similar). There will be a ready supply of macroinvertebrate drift for recolonization at this point in the lower catchment. Microorganisms are likely to return to baseline density within 1-2 months, with periphyton returning to baseline biomass and productivity within 4-6 months (Niemi *et al.,* 1990), certainly within a year, i.e., seasonally dependent, noting that the works areas are proposed to be removed by end of July in Y2, meaning there is a reasonable summer period for recovery prior to winter onset. The lowland river reach is characterized by aquatic plant species that are well adapted to disturbance, being subject to highly variable flow and tide combinations. Commonly occurring species in this reach, e.g., *Potamogeton perfoliatus, Myriophyllum spicatum, Sparganium emersum* have the ability to re-grow from fragments that establish roots within a few weeks of deposition in the aquatic margin (Henriksen 2023, Barrat-	**Not Significant** but will result in short term moderate negative direct effects locally owing to placement of access ramp over ephemeral habitat of river margin for 22 months requiring mitigation measures to protect and reinstate benthic substrate upon completion of works.

Description of Potential Effect	Characterization of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
	Segretain, 2000). It can be expected that these ephemeral habitats will be recolonized by commonly occurring macrophytes by the second year after disturbance (Henry *et al*., 1996), although aquatic mosses may take longer to fully re-establish, noting that cover for fish in the affected reach is largely not provided by plants in the baseline scenario. Given the width of the river, and the relatively small instream works footprint, aquatic biota always has considerable habitat availability and migration pathways outside of the temporary work zone.	
Ridgepool LHS and RHS (River Moy): Fish entrapment in cofferdams	There is potential for localized mortality of any salmon that become trapped within a closed cofferdam work area on the groyne upstream of the IFI Building, if they are not rescued and relocated when the cofferdam is installed. Fish could also become trapped behind the cofferdam during unexpected flooding. The numbers of trapped fish would be expected to be low during initial cofferdam construction as they will tend to avoid disturbance related to sandbag cofferdam installation.	**Likely Significant negative** locally, owing to importance of Ridgepool to migrating salmonids.
River Moy and Moy Estuary LHS and RHS: Potential effects on fish migration	Ridgepool is the entry point to the freshwater River Moy for salmon and sea lampreys migrating from the Moy Estuary. Whilst there will be periods of temporary disturbance in relation to instream works these are confined to the extreme left and right banks, where habitat is ephemeral owing to tidal dewatering. The river is wide, comprising a diversity of fish holding and cover options for inward migrating fish. Fish migration pathways will at no point be obstructed during the construction works.	**Not significant and unlikely**
Ridgepool LHS (River Moy): Fisheries Enhancements Direct and/or Indirect Effects arising from instream works.	Reshaping of the upper corner of the existing “groyne” will require large instream boulders to be moved by long-reach machine prior to retreat from the cofferdam works area on the LHS. There are swift flows in the affected reach comprising boulder over bedrock with coarse interstitial sand as the dominant substrates with no fine sediment accumulations. Mobilisation of suspended solids will be minimal, limited to short distances downstream, resulting primarily in localized coarse sand redistribution, which occurs naturally in this area subject to discharge conditions. Some larger salmon may be disturbed locally, moving away to other holding areas for a short duration as the boulders are removed and replaced nearby, but without significant consequences in terms of Conservation Objectives. There is a remote potential for hydrocarbons (oils, hydraulic fluid) to enter the river and taint or otherwise adversely affect salmon and lampreys associated with long-reach plant necessary for the boulder removals, but only if machinery is not well maintained which is very unlikely.	**Not Significant.** Positive effects on fisheries holding areas in the Ridgepool
Ridgepool & Salmon Weir RHS (River Moy): Direct and/or Indirect Effects arising from instream works. Temporary to short term disturbance associated with instream works involving 4-5 No., 3-5 m wide x 50 m long sections of sandbag cofferdam for flood wall	There is no sea lamprey spawning habitat within the direct footprint of the proposed temporary instream works area (5 m band from Quay wall on Ridgepool Road). The impacted marginal areas comprise substates and or flows that are entirely unsuitable for sea lamprey spawning (see details in **Appendix F**). **Potential Sea Lamprey Spawning Habitat (Ridgepool RHS):** On a precautionary basis, the outer margin of the proposed instream cofferdam works area on the RHS adjacent to RP8-RP8A (Ridgepool Road) (see **Appendix F**) is considered to comprise substrates with some limited potential to support sea lamprey spawning (though very sub-optimal), subject to the actual low flow	Potential **significant negative,** though **unlikely** localized direct effects on *sea lamprey spawning habitat* in the Ridgepool in a discrete area on the outer margin of the cofferdam works zone (RP8-PP8A). This does not represent a significant effect

Description of Potential Effect	Characterization of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
repair/maintenance and construction works along Ridgepool Road.	wetted channel width during any particular spawning season. While the cofferdam footprints cover primarily ephemeral river margin habitat, lampreys that fail to ascend the weir may attempt to build redds in this part of the Ridgepool adjacent to proposed cofferdams in the vicinity of RP8 – RP8A, noting that (1) sea lamprey will select areas of suitable habitat in terms of flow and substrate and will also engineer the selected area using their oral suckers to shift stones and (2) Ridgepool is a sub-optimal "last resort" habitat for sea lampreys that fail to ascend the combined Salmon Weir and upstream rock outcrops earlier in the season. The following is noted - there will be no instream construction activity at the Ridgepool RHS during June and July of Y1 because of the IFI angling timing restriction. The timing restriction covers the peak sea lamprey spawning period (May-July) in Y1 and therefore avoids negative effects on this qualifying interest in Y1. Ridgepool RHS instream construction work will not commence in Y1 until August 1st at the earliest. At that time, works will commence to create the new angling access point at the Weir Building using the first of the cofferdam containment areas (large sandbags filled with small sandbags covering a reach of up to 50m). In Y2 there shall be a timing restriction on instream works on the Ridgepool RHS in the reach between Sites RP8 and RP8A (see site locations in **Appendix F**). Section 7.1 details the timing restrictions that will apply as mitigation. Construction activity, once the 50 m cofferdam sections are in place, will be confined to the RHS river margins, contained within the cofferdam with no additional lateral intrusion into the Ridgepool. Sea lampreys that fail to ascend Salmon Weir and end up spawning in the Ridgepool will still have access to existing potential spawning habitat in the low-flow wetted part of the mid-channel c.30 m downstream of the weir where no direct instream construction work will occur. **Potential Sea Lamprey Nursery Habitat (Ridgepool RHS):** There is one discrete patch of potential larval lamprey habitat on the RHS on Ridgepool Road upstream of the Upper Bridge (**Site RP11, Appendix F**). This area is potentially directly affected by the proposed 5 m instream works cofferdam. If possible, works on Quay walls at this point will be conducted from the road above, with no instream footprint. In the event this is not possible, any larval lampreys in the sediment beds would suffer mortality as a result of cofferdam placement and excavations. Mitigation (see **Section 7)** would be required to remove and relocate juvenile lamprey during construction. **Instream Habitat Effects (Ridgepool RHS):** The ephemeral river margin habitats temporarily disturbed during construction within cofferdams along Ridgepool Road are described in **Appendix F**, sites RP6, RP7 and RP8, RP8A, RP9, RP10, RP11. Marginal areas comprise mainly bedrock and a combination of embedded and loose cobble. The plant community is mainly bryophyte, filamentous green algae (*Cladophora* spp.) and occasional patches of macrophyte dominated by common pondweeds (*Potamogeton perfoliatus*) water milfoil (*Myriophyllum spicatum*) and *Ranunculus* spp. Shallow marginal areas along the Moy RHS (Ridgepool Road) typically dewater under low flow/low tide conditions, representing largely ephemeral habitat value to fish and invertebrates. The disturbance of successional 50 m reaches of marginal habitat over the construction phase will be followed by a period of relatively rapid recolonization by rooted macrophyte and filamentous algal species so long as suitable cobble substrates are reinstated. Commonly occurring macrophyte species in the reach are well adapted to disturbance and have	at a catchment scale in terms of availability of lamprey spawning habitat but requires precautionary mitigation in the form of timing restrictions to avoid indirect effects. **Likely significant negative** direct effects on *sea lamprey nursery habitat* locally in the Ridgepool RHS in a discrete area at **RP11**, upstream of the Upper Bridge. This does not represent a significant effect at a catchment scale in terms of availability of lamprey nursery habitat but requires precautionary mitigation during construction to avoid impact on juvenile lamprey.

Description of Potential Effect	Characterization of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
	the ability to re-grow from fragments that establish roots within a few weeks of deposition in the aquatic margin (Henriksen 2023, Barrat-Segretain, 2000). It can be expected that these ephemeral habitats will be recolonized with commonly occurring macrophytes by the second year after disturbance (Henry *et al*., 1996), although aquatic mosses may take longer to fully re-establish. Given the width of the river, and the relatively small instream works footprint, aquatic biota always has considerable habitat availability and migration pathways outside of the instream temporary work zones.	

6.4.1.2 Estuarine River Moy – Sea Lamprey

Table 6-6 Potential effects on sea lamprey within the estuarine section of the River Moy during the construction phase of the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
River Moy: Downstream Lower Bridge – N59 Crossing LHS: Direct Effects arising from instream works. Temporary disturbance to sea lamprey larval habitat associated with 3-5 m wide cofferdam installations and flood wall construction works adjacent to Bachelors Walk	The channel downstream of the Lower Bridge is sluggish with marginal silt deposits that support a diverse marginal aquatic vegetation and larval lamprey, including Annex II QI species sea lamprey (and possibly *Lampetra* spp.). A short section of sandbag cofferdam (120 m at most) and excavation work on the LHS adjacent to Bachelors Walk will result in direct effects comprising loss of a strip of emergent and submerged instream vegetation on the LHS bank as well as the riparian tall herb swamp on the bank. Dewatering and excavation of the cofferdam area will cause mortality of benthic macroinvertebrates and (in the absence of mitigation) some larval lamprey. Any fish that become trapped within the cofferdam and are not rescued will also likely suffer mortality. The numbers of trapped fish (other than lamprey) would be expected to be low as they will tend to avoid disturbance caused by cofferdam construction. Field results indicate numbers of larval lamprey affected will be low because marginal habitat along the first 120 m downstream of the Lower Bridge is confined by rock riprap and tends to partially or fully dewater at low tide / low flow. Further downstream (near the floating pontoon), the marginal habitat is more stable and more amenable to larval lamprey, but that reach is not directly affected by instream works and will act a suitable area for re-burrowing of disturbed ammocoetes. It can be expected that marginal instream habitats in this sluggish, tidal reach of the Moy will be recolonized by commonly occurring rooted macrophytes by the second year after disturbance (Henry *et al.,* 1996). The success of recolonization of the riparian tall herb swamp vegetation will be dependent upon bankside reinstatement prior to cofferdam removal.	**Likely significant negative** short term reversible localised effects on sea lamprey nursery habitat along the cofferdam reach on the LHS downstream of N59 Lower Bridge.

6.4.1.3 River Moy – General Indirect Effects on Aquatic QIs

Table 6-7 Potential general indirect effects on aquatic Qis of the River Moy during the construction phase of the Proposed Scheme

Description of Potential Effect	Characterization of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
River Moy: General Indirect Effects arising from instream works. Degradation of water quality and aquatic habitats arising from pollutant wash-out from temporary works areas along the River Moy margins through Ballina	Unexpected flooding that inundates the temporary works areas, including overtopping of sandbag cofferdams in the Ridgepool and downstream of the N59 Lower Bridge during the construction period could lead to uncontrolled washout of mainly suspended solids, but also hydrocarbons and cement resulting in negative effects on aquatic receptors locally and downstream on the River Moy. Potential exists for the temporary access ramp in the Ridgepool LHS to be eroded owing to swift and variable water levels on this part of the Moy, especially during winter. Loss of sediment and suspended solids from the access ramp surface would be transported into downstream habitats causing turbidity, and/or additional sedimentation in downstream habitats. The latter is not considered to be capable of causing likely significant effects downstream given that the downstream estuarine habitats are depositing by nature, but excess levels of sediment need to be avoided (see **Section 7: Mitigation**). Turbidity can affect behaviour of migrating fish (avoidance reactions), and whilst, in such a wide channel migrating fish can move away from a localized sediment plume these need to be avoided within this SAC channel (see **Section 7**: **Mitigation**).	**Likely Significant negative** in the absence of specific mitigations to control pollutant wash-out from temporary works areas
River Moy: General Indirect Effects arising from instream works. Degradation of water quality and aquatic habitats arising from pump out of ingress water from cofferdams	Indirect (downstream) effects related to untreated pump-out water from behind cofferdams are likely to occur if not well-managed. Pump-out water often contains highly concentrated suspended solids and may contain other pollutants (concrete, hydrocarbons). At worst, contaminated pump-out water may be toxic to fish (salmonids, lamprey, estuarine species) and aquatic macroinvertebrates causing localized mortality. High levels of continuous turbidity, if it occurred, may cause fish to abandon the area locally and can cause salmonids to temporarily delay passage upstream if turbidity was widespread for an extended period. On the latter, the volume of the Moy in Ballina means the zone of influence will be localized if such effects did occur. Noted also is that instream cofferdam works will occur August-May inclusive, which avoids the peak July migration period for salmonids on the Moy. Entrained sediment could settle in margins downstream with effects on larval lamprey habitat, noting that the effects further downstream would be less significant because of the naturally depositing nature of the lower River Moy and Estuary.	**Likely significant negative** short term reversible effects locally in relation to discharge of potentially toxic compounds and / or chronically elevated turbidity.
River Moy: General Indirect Effects arising from works over or near water. Degradation of water quality and aquatic habitats arising from out-of-channel flood wall repairs and construction, regrading of roads and footpaths, drainage features	Wash-out of pollutants (suspended solids, concrete, hydrocarbons) from bank-side construction areas to the River Moy, including bankside works on the Cathedral Pool reach, if not managed correctly are likely to degrade localized downstream habitats at least temporarily. At worst, such effects could include toxicity to or tainting of fish and macroinvertebrates, i.e., highly concentrated concrete and/or hydrocarbon wash-out. Ground excavations associated with river wall construction and localized road regrading can cause suspended solids wash out and turbidity locally, which is likely to cause fish to avoid area temporarily. The extent of indirect effects is limited to zones immediately downstream of works areas and will dissipate reasonably quickly given the volume of the River Moy in Ballina where such works occur.	**Likely significant negative** short term reversible effects locally in relation to discharge of potentially toxic compounds and / or chronically elevated turbidity.

6.4.1.4 Brusna (Glenree) River – Salmon

Table 6-8 Potential effects on salmon within the Brusna (Glenree) River during the construction phase of the Proposed Scheme

Description of Potential Effect	Characterization of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
Brusna (Glenree) River: Direct and Indirect Effects arising from instream works. Replacement of instream bed and bank protection at Rathkip/Shanaghy Bridge using sandbag cofferdams (left and right alternately)	Instream works will use alternate left and right cofferdams to flume water past 'dry' working areas on each bank, alternately. There is potential for direct mortality of salmon and trout within temporary cofferdams if not rescued and relocated prior to dewatering. Salmon migration can be temporarily severed or disrupted by instream works which can be managed by adherence to instream works timing restrictions (works allowed July 1st to September 30th). Short term loss of localised salmonid habitat (300 m^2 plus some additional area for temporary construction works) is confined to nursery water as spawning is not possible on the existing concrete/stone bed protection. Removal of the existing bed and bank protection will generate concrete spoil, fines and dust, which is alkaline and can taint fish and smother habitats locally if excessive. Cofferdam containment areas will be subject to constant water ingress. These areas will be ongoing sources of contaminated water (sediment and concrete washings) which will need to be pumped out to maintain dry working conditions. Such pump-out water is likely to be turbid as well as highly alkaline (old and new concrete washings) and potentially contaminated with hydrocarbons (polycyclic aromatic hydrocarbons (PAHs), oils). If discharged directly back to the river or the general environment in the absence of specialized treatment, there is potential for adverse effects on salmonids locally in the form tainting and toxicity to fish, and at worst instream plant and fish mortality. Sedimentation of downstream salmon and trout habitats could occur in the absence of pump-out water treatment. If unexpected flooding with out-of-bank flow occurred while construction materials, plant and machinery and associated fuels, oils and lubricants were within the river cofferdams there is a risk of pollutant loss (concrete, sediment, hydrocarbons) to the Brusna.	**Likely significant negative** temporary-to-short term effects locally
Brusna (Glenree) River: Indirect Effects arising from works in and near water. Degradation of water quality and aquatic habitats arising from out-of-channel flood wall and embankment construction	Wash-out of pollutants (mainly suspended solids, and to a lesser extent concrete and hydrocarbons) from bank-side construction areas to the nearby Brusna River, if not managed correctly, is likely to degrade localized downstream habitats, at least temporarily causing juvenile salmonids to avoid the area and potential localised sedimentation of spawning / nursery areas. Such effects could include toxicity to or tainting of fish and macroinvertebrate food sources for fish, i.e., highly concentrated concrete and/or hydrocarbon wash-out. Ground excavations associated with river wall and embankment construction are likely to cause temporary elevation in suspended solids instream, locally, until such time as exposed ground is revegetated. Locally elevated turbidity can adversely affect juvenile trout and salmon respiration and feeding and will likely cause fish to avoid the areas temporarily. In a worst-case scenario, newly formed embankments could wash out completely resulting in sedimentation of spawning and nursery beds that may decrease recruitment locally for at least one season, although it is noted that most of the spawning and nursery occurs further upstream in the	**Likely significant negative** temporary-to-short term effects locally.

Description of Potential Effect	Characterization of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
	Brusna catchment. The extent of localized indirect effect is primarily limited to zones in the first few hundred metres downstream of work areas and will dissipate reasonably quickly given the turbulent flow of the lower Brusna where such works are proposed.	

6.4.1.5 White clawed crayfish

Table 6-9 Potential Effects on White-Clawed Crayfish During the Construction Phase of the Proposed Scheme

Description of Potential Effect	Characterization of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
Direct effects arising from instream works: River Brusna and Tullyegan	Instream works will utilize water management to create "dry" working areas through the use of cofferdams in the case of the Brusna River at Rathkip/Shanaghy Bridge and dam and pump-over on Tullyegan stream. Surveys indicate that crayfish are not present in the affected reaches, but as a precaution, there is considered to be potential for direct mortality of crayfish if they were to emerge during the dewatering. Very small numbers, if any, are expected to be affected based on focused instream surveys for the species.	**Unlikely, but moderate-to significant negative** temporary-to-short term effects - localised only (not significant at catchment level)
Indirect effects associated with spread of crayfish plague. All watercourses	Any personnel, equipment and machinery (e.g., pumps) that come into contact with river or stream water must be assumed to have potential to pick up crayfish plague which can be transported (as waterborne fungal spores) to other sites within the catchment or to other catchments.	**Likely significant negative** owing to risk of spread of crayfish plague, noting that plague is already within the catchment.

6.4.1.6 Otter

Table 6-10 Potential Effects on Otter During the Construction Phase of the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Habitat Loss, Fragmentation and Disturbance The Proposed Scheme will result in a loss of bank side vegetation including woodland in a number of areas including	Bankside vegetation is an important habitat for otter and the presence of bankside vegetation, especially good quality, high density habitat is correlated with the presence of the species (Knol & Vugteveen, 2014; Lunnon & Reynolds, 1991). Habitat loss, fragmentation and disturbance during the construction phase of the Proposed Scheme has the potential to affect otters not only within the confines of the proposed works areas but also within the wider environment e.g. if	Potential **significant, adverse, permanent** effects on otter movement within the Proposed Scheme area and potentially throughout the wider

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
along the Brusna, the main channel of the River Moy and the Tullyegan. These habitats could be used by otter e.g. for commuting, foraging and resting sites etc. The vegetation is also likely to provide cover, particularly in areas where there are other existing sources of disturbance, to facilitate movement. Otters often use riverbanks for movement throughout their environment especially when moving upstream when they would have to swim against a strong flow of water (NEIA, 2011).	habitat removal/disturbance prevents the movement or dispersal of otter throughout the wider area. A total of twenty-eight trees are proposed to be removed along the banks of the River Brusna during the construction phase of the Proposed Scheme. Twenty-six of these trees are to be removed as they are decayed and/or dying, while a further two are to be removed to facilitate the Proposed Scheme flood relief measures. These trees are dispersed throughout both banks of the River Brusna within the proposed works areas and their removal will not result in the loss of tree cover along any protracted length of riverbank. The longest gap to be created by tree removal is 20 m which will occur due to the removal of three diseased trees on the left-hand bank of the Brusna. An additional 60 m of bankside mixed broadleaved woodland will also potentially be removed along the left-hand bank of the River Brusna towards the northern extent of works to facilitate the installation of a flood wall. The exact width of this disturbance and the number of trees to be removed in this area is unknown. Sixty-three trees are to be removed along the River Moy to facilitate works. The majority of these trees (40) are single trees planted within BL3 habitat and do not provide any function for otter. Of the remaining 23 trees, eleven are located within the tall herb swamp habitat adjacent to Bachelors Walk on the left-hand bank of the River Moy while 12 are located further downstream within riparian woodland habitat adjacent to the boat yard and old dairy site. There is the possibility that smaller scrubby trees will also need to be removed within this riparian habitat. Both of these two habitats (i.e. riparian woodland and tall herb swamp) are used by otter. Additionally, 230 m of treeline and hedgerow habitat will also be removed along both banks of the Tullyegan to facilitate the installation of flood walls while 330 m^2 of scrub and 240 m^2 of mixed broadleaved woodland will be removed to facilitate embankment creation. The effect of habitat loss, fragmentation and disturbance on otter is predicted to be permanent and irreversible, as in the majority of areas where woody riparian vegetation is to be removed, flood protection measures will be created in these spaces. Therefore, there is likely to be an adverse effect due to these works on otter as the erection of flood defence measures such as walls and embankments in place of woody riparian habitat has the potential to impede the movement of otter throughout the environment.	environment which may have implications for breeding success if populations become fragmented and unable to disperse through the wider environment to find a territory and/or mate.
Habitat Degradation – Spread of Invasive Species A number of different invasive species were recorded across the Proposed Scheme. The proposed works has the potential to spread these species within and outside the redline boundary resulting in a deterioration of habitats used by otter e.g. bankside habitat, or reduction in prey items due to sedimentation.	Similar to the removal of bankside vegetation the spread of invasive species can prevent the movement of otter throughout the wider landscape e.g. if IAPS create dense, impenetrable stands on riverbanks. IAPS also have the potential to have indirect effects on otter e.g. via erosion of riverbanks which can introduce sediments to a watercourse reducing water quality for prey items e.g. fish which may impact upon the foraging success of otter should prey abundance reduce. The impact of the spread of invasive species on otter during the construction phase of the Proposed Scheme is predicted to be of local spatial extent, limited to the immediate environs of where the invasive species has been introduced and immediately downstream of a sediment input event should bank erosion occur. However, the effect on the otter population could be	Potential **significant, adverse, permanent** effects on otter movement within the Proposed Scheme area and potentially throughout the wider environment which may have implications for breeding success if populations become fragmented and unable to disperse through the wider

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	further reaching should invasive species create a barrier to otter dispersal or reduce foraging success. This effect can be potentially permanent (i.e. >60 years) if management regimes are not implemented, however, it is considered reversible within this habitat once management regimes are implemented.	environment to find a territory and/or mate.
Habitat Degradation – Pollution Event: Chemical Spill, Sedimentation etc. The habitat for otters could deteriorate during the construction phase due to adverse changes in surface or groundwater quality.	Wash-out of pollutants (mainly suspended solids, and to a lesser extent concrete and hydrocarbons) from bank-side construction areas to nearby watercourses, if not managed correctly, is likely to degrade localized downstream habitats, at least temporarily, that are utilised by otter. Surface water runoff containing large amounts of silt or other pollutants could also migrate into the groundwater which can cause significant pollution of these groundwaters which have the potential make their way to nearby surface waters. A reduction in surface or groundwater quality may negatively influence prey items of otter (e.g. amphibians, fish etc.) therefore having an indirect impact on otter should prey abundance reduce. Exposure to a hydrocarbon spill can also reduce the waterproofing of an otter's fur, resulting in heat loss and hypothermia (Mason, 1989; Stoskopf *et al.,* 1997). The impact of habitat degradation due to a pollution event during the construction phase of the Proposed Scheme is predicted to be of local spatial extent, primarily limited to zones in the first few hundred meters downstream of work areas and will dissipate reasonably quickly given the flow and dilution effect of running waters. However, the effect on the otter population could be further reaching should a pollution event cause injury or a fatality via contact with a toxic substance (e.g. exposure to a hydrocarbon spill). Should a fatality or injury occur it has the potential to be felt across neighbouring otter territories should this fatality/injury affect breeding success e.g. should a pregnant or lactating female be injured/killed or if the fatality/injury of one otter reduces the breeding opportunities for other otter. This potential effect may be short- to medium-term in duration as population recovery may take this long. The effect is irreversible at the individual level should a fatality occur, with a knock-on impact on the overall population within the vicinity of the works.	Potential **significant, adverse, short- to medium-term** effects on otter populations within the Proposed Scheme area and potentially throughout the wider environment should breeding opportunities/success be impacted.
Habitat Degradation – Reduction in Foraging Resources and/or Abundance of Prey Items The quality of foraging resources for otter may deteriorate due to the Proposed Scheme e.g. due to a reduction in water quality or loss of prey habitat.	Wash-out of pollutants (mainly suspended solids, and to a lesser extent concrete and hydrocarbons) from bank-side construction areas to the nearby watercourses, if not managed correctly, is likely to degrade localized downstream habitats, at least temporarily, causing prey species to avoid the area. Such effects could include toxicity to or tainting of fish and other food sources for otter, e.g., due to highly concentrated concrete and/or hydrocarbon wash-out. Additionally, a number of other construction activities also have the potential to affect fish abundance (e.g. potential mortality due to cofferdam placement, direct loss of nursery habitat, sediment input, pollution event etc.) which can have a knock-on effect on foraging success of otter. The impact of habitat degradation - reduction in foraging resources and/or abundance in prey items during the construction phase of the Proposed Scheme is predicted to be of local spatial extent, primarily limited to zones in the first few hundred meters downstream of work areas. However, the effect on the otter population could be further reaching should a reduction in prey	Potential **significant, adverse, short- to medium-term** effects on otter populations within the Proposed Scheme area and potentially throughout the wider environment should breeding opportunities/success be impacted.

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	items significantly reduce foraging opportunities within a single otter's territory resulting in illness or fatality of that otter. Should a fatality occur it has the potential to be felt across neighbouring otter territories should this fatality affect breeding success e.g. should a pregnant or lactating female be killed or if the fatality of one otter reduces the breeding opportunities for other otter. This potential effect may be short- to medium-term in duration as population recovery may take this long. The effect is irreversible at the individual level should a fatality occur, with a knock-on impact on the overall population within the vicinity of the works.	
Loss of Breeding and Resting Sites. The Proposed Scheme will result in the direct removal of two otter couches along Clare Street adjacent to the River Moy while works are within 10 m of a holt and 80 m, 15 m and 3 m of three separate couches along the River Brusna.	A natal den is the small space occupied by a female otter when she gives birth and where the cubs stay for up to three months. They can be above- or below-ground structures (Liles, 2003). Couches are daytime resting places for otters (Northern Ireland Environment Agency, 2011). They are above ground structures and can be an uncovered nestlike structure or just a flattened area of vegetation. Couches are generally used on a short term, transient basis and otter can be very flexible in where they rest and sleep generally relying on a network of holts and couches across their territory (Lundy 2023). They are, however, more likely to show faithful year-to-year use of below-ground natal holts (Liles, 2003). Two otter resting spots (couches) were identified on the right-hand bank of the River Moy along Clare Street. A further three couches and a potential natal holt were identified along the banks of the River Brusna in close proximity to the proposed works areas. The two otter couches along Clare Street will be removed to facilitate the demolition of the current wall and installation of the new flood wall. The three couches identified along the Brusna are outside the proposed works areas and will not be removed. Two couches which are 15 m and 80 m from the proposed works areas are on the opposite bank of the Brusna from the proposed works areas while the third is on the same bank and 3 m from the proposed works. While these couches are not expected to be directly disturbed or destroyed by the proposed works it is considered likely that the works will impact their use by otter. The holt entrance is within 10 m of the proposed works area and given the location of this entrance it is very likely that the resting chambers in the holt itself are much closer to the proposed works area. Therefore, it is considered that the use of heavy machinery over the holt may cause the structure to collapse. The impact of the loss of potential resting sites (couches, holts) on otters during the construction phase of the Proposed Scheme is predicted to be confined to within 100 m of the proposed works area. The effect of the loss of a natal holt along the banks of the River Brusna, however, has the potential to be wider ranging and may result in a reduction of the otter population along the River Brusna should its destruction negatively affect breeding success. Two couches will be removed to facilitate works while a further three may be precluded from use due to the presence of construction machinery and/or personnel. Female otters with young are particularly sensitive to disturbance of their resting places, such as couches (NIEA, 2011). A female otter and cub were observed on camera using the holt along the River Brusna. Given that otter are solitary (with the exception of a mother and cub(s)) the three couches observed along this section of the River Brusna are also likely within the territory of this female otter. Should these couches become unavailable due to construction works, it may push the female (and her cubs) into	Potential **significant, adverse, short to medium-term** effects on otter breeding success within the Proposed Scheme area and potentially throughout the wider environment should this potential reduction in recruitment affect wider otter abundance.

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	bordering otter territory with the potential for aggression or hostile interactions which may result in injury or mortality. The duration of the potential effect of the loss of a breeding holt due to the construction phase of the Proposed Scheme is predicted to be short- to medium-term should this female otter not be able to breed for two seasons (Proposed Scheme works are proposed to occur for 18 months along the Brusna while GI works in this area may take up to a month).	
Disturbance/Displacement The Proposed Scheme has the potential to disturb foraging, commuting, resting or breeding otter during the construction phase e.g. noise disturbance from machinery, physical presence of humans during construction of features preventing foraging, commuting, lights lighting up areas that are normally dark etc.	Otter activity was observed across all proposed works areas including a live sighting adjacent to the Quignamanger proposed works area, a holt and couches along the River Brusna and couches along the River Moy. Otters have been shown to be sensitive to a number of different kinds of disturbance (presence of humans and machinery, sharp and sudden noise, lights etc.), sometimes up to 500 m away and will use dense cover or swim underwater to avoid the source of this disturbance (Jefferies, 1985). Disturbance, therefore, coupled with a lack or decrease in cover can have more significant ramifications on otter and could effectively reduce the area available for otter and consequently have an effect on population size (Jefferies, 1985). Work on or near a watercourse with heavy construction machinery can cause a large reduction in the use of the disturbed area, as observed by Weir (1984), where a large reduction in sprainting within the disturbed area was recorded during construction. Spraints were not observed regularly at this disturbed site again until two months after construction works were completed. Otters are primarily nocturnal and require dark spaces to travel through and forage, therefore, lighting can affect their ability to commute through their environment and feed. As a result, disturbance can increase the barrier effect on otter by preventing their smooth movement through-out their environment. Nonetheless, otter can become habituated to disturbance such as in urban situations (Jefferies, 1985) with well-known populations living and breeding in large urban locations, e.g. Cork city (Sleeman & Moore, 2005). It is therefore considered that any otter utilising the River Moy adjacent to Ballina town and along Quay Road/Quignamanger are habituated to the majority of the sources of disturbance likely to arise from the Proposed Scheme, such as the presence of machinery and personnel and lighting. Loud and sudden noises, however, such as those associated with a hydraulic breaker or a circular saw that are likely be used within this area are more likely to elicit a disturbance response (Jefferies, 1985). Otter residing in other areas where works are proposed (i.e. Brusna, Bunree and Tullyegan) are unlikely to be as habituated to human presence and disturbance given the degree of screening provided by the bankside habitats within each of these areas especially the Brusna and Tullyegan. Female otter has been shown to be more sensitive to disturbance compared to male otter (Green *et al.*, 1984) and are most sensitive when breeding (Jefferies, 1985). A female otter and cub were recorded using the holt along the Brusna, therefore, given the current baseline, works along the Brusna especially, have the potential to create the most significant effect on otter should disturbance result in an unfavourable breeding outcome. Works associated with the Proposed Scheme along the Brusna are expected to take 18 months, therefore, there is	Potential **significant, adverse, short to medium-term** effects on otter adjacent to the Proposed Scheme and the wider environment with the potential to affect breeding success for up to three seasons with associated potential to reduce recruitment and affect wider otter abundance.

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	potential for two breeding seasons to be affected during construction which may have implications for the wider otter population should this female not reproduce successfully for two years. Works within different locations are also expected to run at the same time with the potential for works to be undertaken at three or four proposed works areas in tandem. Should these works displace otter during the construction phase there is the potential that this may push otters into neighbouring territories with the potential for aggression or hostile interactions with the holder of that territory which may result in injury or mortality. Construction activities associated with the Proposed Scheme, therefore, have the potential to result in temporary to short-term (works at the various proposed works areas are proposed to last between 6 and 30 months for the Proposed Scheme and 4 to 6 months for the GI works) disturbance to otter as a result of construction noise, presence of machinery and personnel and artificial lighting (working hours are proposed to be 08:00-19:00 Monday-Friday, therefore lighting will be needed during certain times in the spring, autumn and winter months). This disturbance could affect the use of available habitat by otters for foraging and movement. Disturbance during periods of breeding or rearing can be particularly damaging and may jeopardise reproductive success. Such effects may last longer (i.e. up to medium-term) than the construction works time frame should breeding success be affected for three breeding seasons. Disturbance/displacement of otter during the construction phase of the Proposed Scheme has the potential to not only affect otters who are directly disturbed by the works but also otter of neighbouring territories should otter where works are occurring be displaced into these adjacent areas. This effect is considered to be reversible once construction works cease.	
Habitat Severance/Barrier Effect The presence of construction workers, machinery and equipment during the construction of flood walls, culverts and embankments in addition to the placement of cofferdams in the River Moy, River Brusna and River Tullyegan have the potential to cause a habitat severance/barrier effect upon the movement of otter upstream and downstream.	Habitat severance/barrier effect can reduce access to foraging areas and access to breeding opportunities should otter not be able to freely move throughout their territory and further afield. Furthermore, coastal otters need access to freshwater to wash salt from their fur (NIEA, 2011). Salt can interfere with oil secretions released by glands in the otter's skin which are used to repel water and retain an insulating layer of air within their fur. Therefore, barriers preventing access to freshwater can have a detrimental effect on the health of an otter. The impact of habitat severance/barrier effect on otters during the construction phase of the Proposed Scheme is predicted to be confined to within the redline boundary. The effect of habitat severance, however, can be felt further afield e.g. for otter from neighbouring territories who may have access to breeding opportunities restricted or for young otter who may not be able to disperse successfully throughout the environment to set up their own territories. The impact is considered to be short-term (1-7 years) in duration as the construction works will take place over a 3-year period, however, the effect may be medium-term should breeding success be jeopardised. Both impact and effect are considered reversible once works cease.	Potential **significant, adverse, short to medium-term** effects on otter adjacent to the Proposed Scheme and the wider environment with the potential to affect breeding success for up to three seasons with associated potential to reduce recruitment and affect wider otter abundance.
Mortality Risk Vegetation clearance, the movement of machinery associated with the Proposed	Otters that live in rivers and lakes tend to be completely nocturnal with activity peaks at dusk and dawn. Coastal or semi-marine otters, however, may be active throughout daylight hours, potentially due to a higher abundance of prey in these areas and a subsequent higher	Potential **significant, adverse, short to medium-term** effects on otter adjacent to the

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Scheme may cause accidental disturbance of resting or breeding areas of otter with the potential to cause mortality. Other potential sources of fatality include falling into uncovered deep excavations or encountering machinery while foraging/moving throughout the environment.	population density (Jefferies, 1985). A live otter was sighted during daylight hours in winter 2022/23 adjacent to Ballina Quay. Works for the Proposed Scheme will be undertaken between 08:00 and 19:00 over a three and a half-year period. Therefore, regardless of whether otter across the proposed works area is more inclined to be nocturnal or active during daylight hours, there is the potential for personnel and machinery to encounter otter, either while resting or when active. Collision with construction machinery could result in injury or fatalities to otter during the construction phase of the Proposed Scheme. Accidental deaths due to traffic collisions was one of the main threats to otter identified in recent Article 17 reporting (NPWS, 2019). Otter may also become trapped within deep, uncovered excavations. The effect of accidental killing or injury has the potential to be felt across neighbouring otter territories should a fatality or injury affect breeding success e.g. should a pregnant or lactating female be injured/killed or if the mortality/injury of one otter reduces the breeding opportunities for other otter. This potential effect may be short- to medium-term in duration as population recovery may take this long. The effect is irreversible at the individual level should a fatality occur, with a knock-on impact on the overall population within the vicinity of the works.	Proposed Scheme and the wider environment with the potential to affect breeding success for up to three seasons with associated potential to reduce recruitment and affect wider otter abundance.

6.4.1.7 Harbour Seal

Table 6-11 Potential effects on harbour seal during the construction phase of the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Habitat Loss, Fragmentation and Disturbance There are two records of a single harbour seal sighted in the vicinity of the Proposed Scheme in the main channel of the River Moy in the centre of Ballina town. Instream works along the main channel of the River Moy in the centre of Ballina town will result in the maximum temporary loss of 7,100 m^2 (6,600 m^2 along Ridgepool Road and opposite bank and 500 m^2 along Bachelors Walk) of foraging habitat for harbour seal.	The effect of habitat loss, fragmentation and disturbance on harbour seal during the construction phase of the Proposed Scheme is predicted to be confined to within the redline boundary as potential foraging area for harbour seal is reduced to facilitate works. This effect is predicted to be short-term in duration as works along Bachelors Walk are predicted to last for a maximum of 18 months while works along the Ridgepool are predicted to last for a maximum of 30 months. It is also considered to be reversible as this foraging area will become available once again once instream works cease.	Given the very low numbers of harbour seal observed utilising the main channel of the River Moy in the centre of Ballina town and the extensive areas of suitable alternative foraging habitat within Killala Bay/Moy Estuary and the north and west coasts, outside the redline boundary, these works are unlikely to cause significant impacts. This effect is therefore considered to be **not significant**.
Habitat Degradation	Wash-out of pollutants (mainly suspended solids, and to a lesser extent concrete and hydrocarbons) from bank-side construction areas to nearby watercourses, if not managed	Potential **significant, adverse, short- to medium-term** effects

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Pollution Event - Chemical Spill or Sedimentation The construction phase of the Proposed Scheme has the potential to degrade habitat used by a reduction in water quality due to a chemical spill or increased sedimentation.	correctly, is likely to degrade localized downstream habitats, at least temporarily, that are utilised by harbour seal. Surface water runoff containing large amounts of silt or other pollutants could also migrate into the groundwater which can cause significant pollution of these groundwaters which have the potential make their way to nearby surface waters. Contaminated surface water run-off or an accidental pollution event, of a sufficient magnitude during the construction phase of the Proposed Scheme, therefore, has the potential to affect water quality in Moy Estuary/Killala Bay as the Proposed Scheme site ultimately drains to this coastal waterbody. Harbour seals would be vulnerable to an accidental pollution incident either directly e.g., through direct contact with polluting chemicals, or indirectly by affecting the habitats and food supply on which they rely. The impact of habitat degradation due to a pollution event during the construction phase of the Proposed Scheme is predicted to be of local spatial extent, primarily limited to zones in the first few hundred meters downstream of work areas and will dissipate reasonably quickly given the flow and dilution effect of running waters. However, the effect on the harbour seal population could be further reaching should a pollution event cause injury or a fatality via contact with a toxic substance (e.g. exposure to a hydrocarbon spill). The effect is irreversible at the individual level should a fatality occur, with a knock-on impact on the overall population within the vicinity of the works.	on harbour seal populations within the Proposed Scheme area and potentially throughout the wider environment should breeding opportunities/success be impacted.
Habitat Degradation – Reduction in Foraging Resources and/or Abundance of Prey Items The quality of foraging resources for harbour seal may deteriorate due to the Proposed Scheme e.g. due to a reduction in water quality or loss of prey habitat	Wash-out of pollutants (mainly suspended solids, and to a lesser extent concrete and hydrocarbons) from bank-side construction areas to the nearby watercourses, if not managed correctly, is likely to degrade localized downstream habitats, at least temporarily, causing prey species to avoid the area. Such effects could include toxicity to or tainting of fish for harbour seal, e.g., due to highly concentrated concrete and/or hydrocarbon wash-out. Additionally, a number of other construction activities also have the potential to affect fish abundance (e.g. potential mortality due to cofferdam placement, direct loss of nursery habitat, sediment input, pollution event etc.) which can have a knock-on effect on foraging success of harbour seal. The impact of habitat degradation - reduction in foraging resources and/or abundance in prey items during the construction phase of the Proposed Scheme is predicted to be of local spatial extent, primarily limited to zones in the first few hundred meters downstream of work areas.	Given the very low numbers of harbour seal observed utilising the main channel of the River Moy in the centre of Ballina town and downstream at Quignamanger and the extensive areas of suitable alternative foraging habitat within Killala Bay/Moy Estuary and the north and west coasts, outside the redline boundary, these works are unlikely to cause significant impacts. This effect is therefore considered to be **not significant**
Disturbance/Displacement There is potential that the presence of construction machinery and personnel associated with instream and/or bankside works for the construction phase of the Proposed Scheme could result in temporary disturbance and displacement effects on harbour seals in the vicinity of the proposed works areas.	The presence of construction personnel, machinery and equipment, both instream and on the bankside during construction works has the potential to disturb and displace harbour seal who may be using the River Moy for foraging.	Given that both banks of the River Moy within the centre of Ballina town are within an urban area with an almost constant stream of traffic and pedestrians, it can be concluded that any seal utilising the river at this point are already habituated to the presence of humans and machinery. This, coupled with the

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
		extent of suitable alternative foraging habitat within Killala Bay/Moy Estuary and the north and west coasts, the proposed works have no potential to result in effects on harbour seal at any geographic scale. This effect is therefore considered to be **not significant.**

6.4.1.8 SCI Bird Species

Table 6-12 Potential Effects on SCI Bird Species During the Construction Phase of the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Habitat Loss, Fragmentation and Disturbance Instream works on the main channel of the River Moy in the centre of Ballina town will result in a temporary loss of estuarine foraging habitat for overwintering waterbirds.	As instream works are proposed, the habitat most likely to be used by SCI bird species that will be disturbed during the Proposed Scheme is estuary or river habitat which will be directly disturbed by the proposed works in the centre of Ballina town. Another habitat that will be affected by the Proposed Scheme that could potentially be used by SCI bird species is riparian woodland. Approximately 1,200 m^2 of this habitat is to be removed or disturbed during the proposed works along the main channel of the River Moy adjacent to the boatyard and the old dairies site. Common gull have been known to nest/roost in trees while bar-tail godwit can very rarely perch in trees. The effect of habitat loss, fragmentation and disturbance on SCI bird species during the construction phase of the Proposed Scheme is predicted to be within the redline boundary. This effect is predicted to be temporary and reversible in the case of estuarine habitat and permanent and irreversible in the case of riparian woodland.	Habitat loss, fragmentation and disturbance has the potential to affect four SCI species relevant to this NIS (i.e. those species recorded during surveys that are SCI of either Lough Conn and Lough Cullin SPA and/or Killala Bay/Moy Estuary SPA – redshank, curlew, common gull and bar-tailed godwit). Habitats likely to be used by these species (i.e. estuary/river habitat and riparian woodland) will be disturbed in the centre of Ballina town (i.e. over-wintering waterbird surveys Site 2). Taking peak number of SCI bird species observed at Site 2 (1 common gull and 2 redshank), three SCI birds could be affected by habitat removal/disturbance from the Proposed Scheme. Therefore, given the very low numbers of relevant SCI birds utilising the

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
		habitats to be lost, the small area of habitat to be lost and the extensive areas of these habitats present outside the redline boundary, these works are unlikely to cause significant impacts. This effect is therefore considered to be **not significant**.
Habitat Degradation - Air Pollution The construction phase of the Proposed Scheme has the potential to degrade the habitat used by overwintering waterbirds via changes in air quality associated with dust and pollution release.	Due to the location of foraging habitat for overwintering waterbirds adjacent to the Proposed Scheme, air pollution from construction activities may affect overwintering waterbirds in the vicinity of the works. The potential impacts on air quality from the construction phase of the Proposed Scheme that may affect overwintering waterbirds is primarily the generation of traffic emissions from material haulage and dust emissions from various construction/demolition works. Works along the River Moy, including the construction compounds, and those at Quignamanger are most likely to affect overwintering waterbirds via air pollution. The primary activities within these areas which have the potential to generate dust include the removal of existing walls to allow for construction of new flood walls, excavation and construction of culverts, remediation of existing quay walls and removal of footpaths. The most significant works with dust generation potential are those that involve demolition, excavations and filling. Pollution arising from the release of dust and vehicle emissions has the potential to directly affect SCI bird species. The respiratory system of avian species is more sensitive than that of humans which, therefore, renders them more susceptible to the negative effects of air pollution (Sanderfoot & Holloway, 2017). Avian responses to air pollution can include respiratory distress, elevated stress levels and impaired reproductive success. Furthermore, exposure to air pollution may reduce population density, species diversity and species richness in bird communities. Air pollutants such as carbon dioxide (CO_2), ozone (O_3), sulphur dioxide (SO_2) and nitrogen oxides (NOx), which originate from developments, can cause direct impacts to birds such as respiratory distress including irreversible lung damage (Liang *et al.,* 2020; Sanderfoot & Holloway, 2017). These pollutants can also cause indirect impacts due to habitat degradation. As per Transport Infrastructure Ireland (TII) guidance – Air Quality Assessment of Specified Infrastructure Projects (PE-ENV-01106) (TII, 2022), the construction stage traffic associated with the Proposed Scheme is not predicted to increase by sufficient quantities (i.e. annual average daily traffic (AADT) changes by 1,000 or more or heavy duty vehicle (AADT) changes by 200 or more) to elicit a significant impact on air quality. Therefore, no air quality effects from vehicle emissions are predicted from the Proposed Scheme on SCI bird species. Therefore, the greatest potential impact on air quality during the construction phase of the Proposed Scheme is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 350 m of a construction site, the majority of the deposition occurs within the first 50 m. The majority of the required works for the	The vast majority of relevant SCI bird species observations recorded during the 2022/23 survey for the Proposed Scheme along the Quignamanger site survey area (i.e. Site 1) were >125 m from the proposed works. A single redshank observation was within 50m of the proposed works area at Quignamanger. The three redshank and two common gull observations across all surveys from the River Moy survey area (i.e. Site 2) were within 50 m of the proposed works areas (**Figure 5-13, Figure 5-14, Figure 5-15**). Therefore, habitat degradation as a result of air pollution has the potential to affect very low abundances of relevant SCI bird species, which is 4 combined between Site 1 and Site 2) when taking the peak number of SCI species at Site 2 (i.e. 1 common gull and 2 redshank) and 1 redshank observation within 50m of the proposed works area at Site 1. Therefore, given the very low numbers of birds utilising the habitats within 50 m of the proposed works area, especially in the centre of Ballina town where the majority of SCI bird species records are <50 m from

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)

Proposed Scheme are over relatively small areas and will result in very localised emissions of dust. The activities along the River Moy and Quignamanger proposed works areas that have the potential to effect air quality for avian species via the generation of dust have been assessed following the Institute of Air Quality Management (IAQM) (2014) criteria under the headings of demolition, earthworks, construction and trackout.

The dust emission magnitude for the proposed demolition activities along the River Moy can be classified as small as per the IAQM criteria. The dust emission magnitude for the proposed earthwork activities along the River Moy can be classified as small as the total material moved (both excavations and infilling works) will be less than 20,000 tonnes. The construction activities can be categorised as small as the building volume involved will be less than 25,000 m^3. While the dust emission magnitude for the proposed trackout along the River Moy, estimated to be up to 2 outward HGV movements per hour on a typical working day can be classified as medium. The small dust emission magnitude for the demolition, construction and earthworks activities and medium magnitude for the trackout activities along the River Moy has been combined with the sensitivity of the area with respect to ecology (high sensitivity to dust soiling and ecological effects) to produce a medium risk associated with the demolition works, a low risk associated with earthwork activities, a low risk associated with construction works and a medium risk associated with trackout activities in relation to dust soiling and potential dust-related ecological effects.

With respect to the Quignamanger proposed works area, no demolition will occur, therefore all construction activities along the Quignamanger can be assessed under the IAQM (2014) headings of earthworks, construction and trackout. The dust emission magnitude for the proposed earthwork activities along the Quignamanger can be classified as small as the total material moved (both excavations and infilling works) will be less than 20,000 tonnes. The construction works can be classified as small as works include construction of culverts and new flood walls. While the dust emission magnitude for the proposed trackout along the Quignamanger proposed works area, estimated to be up to 2 outward HGV movements per hour on a typical working day, can be classified as medium. The small dust emission magnitude for the earthworks and construction activities and medium magnitude for the trackout activities has been combined with the sensitivity of the area (high sensitivity to ecological effects) to produce a low risk associated with earthwork and construction activities and a medium risk associated with trackout activities in relation to dust soiling and potential dust-related ecological effects. The potential effects on ecological receptors, including SCI bird species, of dust emissions across the River Moy and Quignamanger proposed works areas are summarised in the table below.

Potential Effects	Dust Emission Risk			
	Demolition	Earthworks	Construction	Trackout
River Moy	Medium	Low	Low	Medium
Quignamanger	N/A	Low	Low	Medium

the proposed works areas, the mobility of the species in question and the extensive areas of suitable foraging and roosting habitats present outside the likely air pollution range of the works, these works are unlikely to cause significant effects. This effect is therefore considered to be **not significant.**

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	The effect of habitat degradation caused by air pollution on overwintering waterbirds during the construction phase of the Proposed Scheme is predicted to be within and up to 50 m from the redline boundary. This effect is predicted to be short-term in duration as the construction works along the River Moy will take place over a maximum time period of 36 months while works on the Quignamanger are expected to last for 12 months. This effect is also considered to be reversible once works cease.	
Habitat Degradation: Pollution Event - Chemical Spill or Sedimentation The construction phase of the Proposed Scheme has the potential to degrade habitat used by a reduction in water quality due to a chemical spill or increased sedimentation.	Wash-out of pollutants (mainly suspended solids, and to a lesser extent concrete and hydrocarbons) from bank-side construction areas to nearby watercourses, if not managed correctly, is likely to degrade localized downstream habitats, at least temporarily, that are utilised by SCI bird species. Surface water runoff containing large amounts of silt or other pollutants could also migrate into the groundwater which can cause significant pollution of these groundwaters which have the potential make their way to nearby surface waters. Contaminated surface water run-off or an accidental pollution event, of a sufficient magnitude during the construction phase of the Proposed Scheme, therefore, has the potential to affect water quality in the River Moy and/or Moy Estuary/Killala Bay as the Proposed Scheme site ultimately drains to this waterbody. SCI birds would be vulnerable to an accidental pollution incident either directly e.g., through direct contact with polluting chemicals, or indirectly by affecting the habitats and food supply on which they rely. The impact of habitat degradation due to a pollution event during the construction phase of the Proposed Scheme is predicted to be of local spatial extent, primarily limited to zones in the first few hundred meters downstream of work areas and will dissipate reasonably quickly given the flow and dilution effect of running waters. However, the effect on SCI bird species' population could be further reaching should a pollution event cause injury or a fatality via contact with a toxic substance (e.g. exposure to a hydrocarbon spill). The effect is irreversible at the individual level should a fatality occur, with a knock-on impact on the overall population within the vicinity of the works.	A pollution event has the potential to affect up to 77 relevant SCI birds as this is the combined peak number of individuals observed at Site 1 Quignamanger where the majority of overwintering waterbirds were recorded. This number may also be greater should a pollution event reach birds foraging/roosting further downstream. Habitat degradation via a pollution even such as a chemical spill or sedimentation, therefore, has the potential to result in Potential **significant, adverse, temporary to short-term** effects on SCI bird species populations within the Proposed Scheme area and potentially throughout the wider environment should a toxic event occur, that could result in bird fatalities.
Habitat Degradation – Reduction in Foraging Resources and/or Abundance of Prey Items The quality of foraging resources for overwintering waterbirds may deteriorate due to the Proposed Scheme e.g., due to a reduction in water quality or loss of prey habitat	Wash-out of pollutants (mainly suspended solids, and to a lesser extent concrete and hydrocarbons) from bank-side construction areas to the nearby watercourses, if not managed correctly, is likely to degrade localized downstream habitats, at least temporarily, causing prey species to avoid the area. Such effects could include toxicity to or tainting of fish and other prey items such as invertebrates for SCI bird species, e.g., due to highly concentrated concrete and/or hydrocarbon wash-out. Additionally, a number of other construction activities also have the potential to affect fish abundance (e.g. potential mortality due to cofferdam placement, direct loss of nursery habitat, sediment input, pollution event etc.) which can have a knock-on effect on foraging success of SCI bird species.	Given the relatively low numbers of birds utilising the habitats adjacent to the proposed works area, the mobility of the species' in question, the extensive areas of suitable foraging habitats present outside the likely habitat degradation range of the works and the species' preference for other foraging areas outside the likely habitat degradation range of the works (see NPWS, 2013c) these works are unlikely to cause

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	The impact of habitat degradation - reduction in foraging resources and/or abundance in prey items during the construction phase of the Proposed Scheme is predicted to be of local spatial extent, primarily limited to zones in the first few hundred meters downstream of work areas.	significant effects. This effect is therefore considered to be **not significant.**
Disturbance/Displacement There is potential that noise and vibration associated with instream and/or bankside works for the construction phase of the Proposed Scheme could result in temporary disturbance and displacement effects on overwintering waterbirds in the vicinity of the proposed works areas.	In general, birds are able to see and hear better than humans and are thus, more sensitive to increased light and noise pollution. During construction, these stimuli (i.e., increased light and noise) could have an indirect impact on avian species. The Proposed Scheme will include construction works within and adjacent to waterbird habitat. These works have the potential to result in temporary disturbance activities (noise, personnel, artificial lighting) which could affect the use of available habitat by wintering waterbirds for foraging, roosting and movement. Disturbance of avifauna feeding within the Moy Estuary during construction works could cause them to temporarily abandon their habitat while such works are being undertaken. Such disturbance events can result from the increased noise and human activity levels associated with heavy machinery and the construction works. Disturbance to avifauna has two main effects 1) decreasing time available for foraging and 2) increasing energy expenditure as a result of fleeing the source of the disturbance (Riddington *et al*. 1996). Possible responses to disturbance include i) changing feeding site and/or diet, if alternatives are available, ii) increasing the amount of time spent foraging; iii) increasing intake or assimilation rate; and/or iv) increasing the level of night-time feeding (if disturbance is lower at night). If none of these options are available, waterbirds may incur an energy deficit and lose weight. Accordingly, disturbance can have a severe negative effect on waterbird species utilising the Moy estuary. Disturbance, in the general context, is defined in a 2009 Institute of Estuarine and Coastal Studies (IECS) report as discrete events that disrupt ecosystem, community or population structures or in some way alter resource levels i.e. food and space (Cutts *et al.,* 2009). It may also influence the survival of individual birds and reduce the function of the site either for roosting or feeding. The report states that disturbance varies in its magnitude, frequency, predictability, spatial distribution and duration and species vary greatly in their susceptibility to disturbance and this susceptibility is likely to vary with age, season, weather and the degree of previous exposure. The links between visual and audible stimuli are evident throughout the report and it is clear that noise by itself is not necessarily a cause for disturbance if not accompanied by a perceived visual threat. The 2009 IECS report refers to observations made during the construction of the South Humber Power Station, and it gives an illustrative overview of the effects of disturbance to waterbirds from different activities that may arise as a result of a construction project. Along the River Moy, during wall demolition with the use of a machine mounted breaker, noise levels are expected to reach 80-90 dB for short periods approximately 5 m from the noise source. This has the potential to disturb any bird utilising the River Moy in the centre of Ballina town. The majority of overwintering waterbirds observed during surveys for the Proposed Scheme were recorded along the mudflats on the left-hand bank of the River Moy approximately 150 m from the western extent of the Quignamanger proposed works area	This impact has the potential to affect approximately 80 SCI birds, which is the maximum number of individuals of relevant SCI species combined that were observed on any one date during surveys across both sites (i.e. Site 1 and Site 2). Given the low numbers of birds utilising the habitats adjacent to the proposed works area, especially in the centre of Ballina town (3 individual SCI birds) where the loudest activity (use of a mechanical breaker) is to take place, the potential habituation of waterbirds to disturbance and noise adjacent to the proposed works areas, the mobility of the species in question, the extensive areas of suitable foraging and roosting habitats present outside the likely disturbance range of the works, and the species' preference for other foraging areas outside the likely habitat degradation range of the works (see NPWS, 2013c) these works are unlikely to cause significant impacts. The minimum population of common gull recorded as a pair unit breeding at Lough Conn and Lough Cullin SPA was 40 (NPWS, 2020b). While the four common gull recorded on site during the winter 2022/2023 surveys exceeds the 1% population threshold for Lough

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	(**Figure 5-13**, **Figure 5-14** and **Figure 5-15**). Noise modelling predicts that the noise levels experienced at these mudflats to be 68 dB averaged over a ten-hour day, meaning there will be periods of both lower and higher noise levels during the day. This has the potential to disturb any bird utilising the estuary adjacent to the Quignamanger proposed works area. The distance at which a response due to habitat disturbance on overwintering waterbirds during the construction phase of the Proposed Scheme may be elicited is hard to determine given the range of waterbirds using the estuary and surrounding areas. Furthermore, it is unknown whether these species are already habituated to disturbance given the urban nature of the estuary adjacent to the proposed works areas and if so, to what extent. This effect of disturbance/displacement on overwintering waterbirds is predicted to be short-term in duration as the construction works along the River Moy will take place over a maximum time period of 36 months while works on the Quignamanger are expected to last for 12 months. This effect is also considered to be reversible once works cease.	Conn and Lough Cullin SPA (40 pair units NPWS, 2020b), the SPA is designated for breeding common gull. As such, any disturbance or displacement of wintering common gull onsite as a result of the Proposed Scheme would not have the potential to affect the conservation objectives of this SPA. This effect is therefore considered to be **not significant.**

6.4.1.9 QI Marine Habitats

Table 6-13 Potential effects on estuaries [1130] during the construction phase of the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Habitat Loss, Fragmentation and Disturbance Instream works will be required to facilitate construction activities along some sections of the River Moy to construct flood defences. Within estuary habitat, cofferdams will be erected to facilitate the construction of flood walls along Bachelors Walk between the Lower Bridge and Rope Walk Lane which will result in the loss of a maximum of 500 m^2 of estuary habitat. Cofferdam construction will be via the use of 1-tonne sandbags to manage water to allow access for construction activities. An additional 65 m^2 of estuary habitat falls within the redline boundary at Quignamanger.	The effect of habitat loss, fragmentation and disturbance on the estuaries [1130] during the construction phase of the Proposed Scheme is predicted to be confined to within the proposed works areas on the main channel of the River Moy at Bachelors Walk and at Quignamanger. This effect is predicted to be short-term in duration as the construction works at Bachelor's Walk will take place over a maximum duration of 18 months while those at Quignamanger are expected to take 12 months. It is also considered to be reversible given the nature of estuaries i.e. a receiving environment for sediments deriving from upstream processes once the works are ceased.	There will be minimal loss of estuary sediment during the construction phase of the Proposed Scheme. This coupled with the dynamic nature of estuaries and the overall small area of estuary to be impacted these works are unlikely to cause significant impacts. This effect is therefore considered to be **not significant**.
Habitat Degradation Works on the Quignamanger and the main channel of the Moy will take place within or adjacent to estuary habitat while all other works	Unexpected flooding that inundates the temporary works areas, including overtopping of sandbag cofferdams in the Ridgepool and downstream of the N59 Lower Bridge during the construction period could lead to uncontrolled washout of mainly suspended solids,	**Likely significant, negative** short term reversible effects locally in relation to discharge of potentially toxic compounds

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
areas will take place upstream of the Moy estuary. Therefore, the Proposed Scheme has the potential to cause the degradation of estuary habitat due to an accidental chemical or hydrocarbon spill during the construction phase such as from pollutant wash-out from temporary works areas along the River Moy margins through Ballina, from pump out of ingress water from cofferdams or from out-of-channel flood wall repairs and construction, regrading of roads, footpaths and drainage features.	but also hydrocarbons and cement resulting in negative effects on estuaries habitats locally and downstream within the Moy estuary. Wash-out of pollutants (suspended solids, concrete, hydrocarbons) from bank-side construction areas to the Moy estuary, if not managed correctly, are likely to degrade localized downstream habitats, at least temporarily. Ground excavations associated with river wall construction and localized road regrading can cause suspended solids wash out and turbidity locally. The extent of indirect effects is limited to zones immediately downstream of works areas and will dissipate reasonably quickly given the volume of the River Moy in Ballina where such works occur. Indirect (downstream) effects related to untreated pump-out water from behind cofferdams are likely to occur if not well-managed. Pump-out water often contains highly concentrated suspended solids and may contain other pollutants (concrete, hydrocarbons). Uncontrolled wash-out of pollutants (suspended solids, concrete, hydrocarbons) associated with suspended solids and pollutant wash out during culvert replacements and flood defense wall/embankment construction works on tributary streams can flow to the Moy estuary with negative effects on estuary habitat. The main risk is high concentrations of suspended solids which if discharged untreated to the tributary streams may cause localised reduction in water quality and subsequent habitat degradation. The Moy Estuary is depositing along the reach affected by the proposed works, and sedimentation if it did arise would potentially cause temporary slight negative reversible effects on benthic macroinvertebrates, slightly altering local diversity and abundance but with no significant consequences. At worst, cement and/or hydrocarbon spills from works areas could be transported into the Moy which can have toxic effects on benthic macroinvertebrates, including benthic fauna of QI habitat “estuaries”, however this is unlikely to occur from a well-managed construction site.	and/or chronically elevated turbidity.

Table 6-14 Potential effects on mudflats and sandflats not covered by seawater at low tide [1140] during the construction phase of the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Habitat Degradation Works on the culvert of the Quignamanger stream under Quay Road will occur	Wash-out of pollutants (suspended solids, concrete, hydrocarbons) from bank-side construction areas to the Moy estuary, if not managed correctly, are likely to degrade localized downstream habitats, at least temporarily. Ground excavations associated with	**Likely significant, negative** short term reversible effects locally in relation to discharge of

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
approximately 30 m upstream of mudflats and sandflats habitat. An accidental chemical (including cement) or hydrocarbon spillage during works on this culvert or works upstream on the Quignamanger during the construction phase has the potential to impact upon this habitat.	culvert construction can cause suspended solids wash out and turbidity locally. The extent of effects is limited to zones immediately downstream of works areas and will dissipate reasonably quickly given the volume of water in the Moy estuary where such works are proposed to occur. Uncontrolled wash-out of pollutants (suspended solids, concrete, hydrocarbons) associated with suspended solids and pollutant wash out during culvert replacements and flood defense wall construction works on the Quignamanger can flow to the Moy estuary with negative effects on mudflats and sandflats habitat. The main risk is high concentrations of suspended solids which if discharged untreated to the Quignamanger may cause localised reduction in water quality and subsequent habitat degradation. The Moy Estuary is sluggish and depositing in the confluence reach of the Quignamanger, and sedimentation, if it did arise, would potentially cause temporary slight negative reversible effects on benthic macroinvertebrates, slightly altering local diversity and abundance but with no significant consequences. At worst, cement and/or hydrocarbon spills from works areas could be transported into the Moy which can have toxic effects on benthic macroinvertebrates, including benthic fauna of QI habitat “sandflats and mudflats not covered by seawater at low tide”, however this is unlikely to occur from a well-managed construction site.	potentially toxic compounds and/or chronically elevated turbidity.

Table 6-15 Potential effects on Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] During the Construction Phase of the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Habitat Degradation Works on the culvert of the Quignamanger stream under Quay Road will occur approximately 1.6 km upstream of Atlantic salt meadow habitat. An accidental chemical (including cement) or hydrocarbon spillage during works on this culvert or works upstream on the Quignamanger during the construction phase has the potential to impact upon this habitat.	Wash-out of pollutants (suspended solids, concrete, hydrocarbons) from bank-side and tributary construction areas to the Moy estuary, if not managed correctly, may degrade localized downstream habitats, at least temporarily. Ground excavations associated with culvert construction can cause suspended solids wash out and turbidity locally. The extent of effects is limited to zones immediately downstream of works areas and will dissipate reasonably quickly given the volume of water in the Moy estuary where such works are proposed to occur. Uncontrolled wash-out of pollutants (suspended solids, concrete, hydrocarbons) associated with suspended solids and pollutant wash out during culvert replacements and flood defense wall construction works on the Quignamanger can flow to the Moy estuary with negative effects on Atlantic salt meadow habitat. The main risk is high concentrations of suspended solids which if discharged untreated to the Quignamanger may cause localised reduction in water quality and subsequent habitat degradation.	**Likely significant, negative** short term reversible effects locally in relation to discharge of potentially toxic compounds and/or chronically elevated turbidity.

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	The Moy Estuary is sluggish and depositing in the confluence reach of the Quignamanger, and sedimentation, if it did arise, would potentially cause temporary slight negative reversible effects on the botanical species composition. At worst, cement and/or hydrocarbon spills from works areas could be transported into the Moy which can have toxic effects on botanical species, including species of QI habitat "Atlantic salt meadows", however this is unlikely to occur from a well-managed construction site.	

6.4.2 Operational and Maintenance Phase Effects

6.4.2.1 Freshwater River Moy – Salmon and Lamprey

Table 6-16 Potential effects on salmon and lamprey within the freshwater section of the River Moy during the operational and maintenance phase of the Proposed Scheme

Description of Potential Effect (River Moy SAC)	Characterisation of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
River Moy: Hydromorphology. Potential hydraulic effects on instream habitats and biota	The freshwater River Moy (River Moy SAC) within Ballina (Ridgepool) is tidally influenced and modified by historical widening/deepening and constriction within existing flood defence walls. A wide variation of in-channel velocities influenced by tide and river discharge is the normal baseline for the Ballina reach. The refurbishment of existing walls and installation of relatively short sections of new flood wall will increase the overbank flow height by an average of 0.8 m (0.45 – 1.2 m) within Ballina. Hydraulic cross section modelling within the Ridgepool (**Appendix N**) shows that compared to the baseline hydraulic scenario, the Proposed Scheme would result in a very slight reduction of average cross section velocity during more common, smaller flood events (50% AEP). During more rare flood events (1% AEP), the Proposed Scheme will result in a very slight increase in average cross section velocity at one location about halfway along the Ridgepool, but a very slight decreases at cross sections at either end of the Ridgepool (see **Figure A9.8.4, Appendix N**). The velocities are peak average values (i.e., at low tide), and as such would naturally decrease at higher tide and be variable across the channel cross section (i.e., slacker water at shallow margins). These changes signify the worst-case scenario, i.e., low tide peak velocities, meaning that any changes to high tide velocities will be even less perceptible. The hydraulic model also shows imperceptible changes to mean cross section velocity and depth in the estuarine river reach downstream of the N59 Lower Bridge (Appendix 9.8, Figure A9.8.10). Such small changes to hydraulic conditions within a channel of enormously variable flow / tide combinations means that bed substrate mobilisation, transport and deposition patterns will not significantly alter over baseline conditions. Consequently, instream habitats will be subject to imperceptible, if any, physical modification in terms of: (1) sea lamprey spawning substrates in a discrete area of the Ridgepool (see **Appendix F**) and (2) two discrete patches of lamprey nursery habitat in the Ridgepool (see **Appendix F**) and, (3) river margin habitat downstream of the N59 Lower Bridge.	**Not Significant.** Long-term imperceptible to neutral effects in terms of instream habitats for fish, macroinvertebrates and plants.

Description of Potential Effect (River Moy SAC)	Characterisation of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
	The imperceptible net change to instream channel velocities means there will be no significant effects on upstream migration of salmon and sea lamprey under pre-scheme and design scenarios, especially considering that upstream fish movement through the estuary to river-entry often occurs during spates on the high tide, i.e., facilitated by favorable tidal conditions when water velocities are not at the modelled peaks. Reshaping of the existing "groyne" as part of fisheries enhancement will improve salmonid holding and migration habitat on the riverine (mid-channel) side adjacent to the "groyne" and slightly downstream on the LHS by improving flow and depth characteristics. This will have a net neutral to positive effect on instream holding habitat for fish locally.	
River Moy: Habitat disturbance related to future channel maintenance	The freshwater Moy (Ridgepool) is wide and generally swift and turbulent, thereby "self-cleaning" and not facilitating deposition of silt or woody debris. The requirement for ongoing channel maintenance is therefore low to non-existent. Any future discrete areas of channel maintenance would be subject to an AA Screening process and will be dealt with in a bespoke fashion based on requirement.	**Not significant.**
River Moy: Water Quality. Changes to water quality associated with flood defenses and new storm water drainage outfalls to the Moy	Flood walls will help prevent contamination arising from uncontrolled over-bank flows during extreme events, providing a positive effect on water quality supporting habitat quality for QI salmon and lampreys in the long-term for the freshwater River Moy. Upgraded storm water outfalls as described in the **Section 3** will be fitted with hydrocarbon interceptors. This is likely to reduce the level of waterborne contaminants reaching aquatic receptors in the River Moy but require regular maintenance to retain this function. The worst-case scenario (i.e., no maintenance) is assessed here.	**Not significant.** Positive to neutral long-term effects on the River Moy in and downstream of Ballina
River Moy: Water Quality. Changes to water quality associated with new surface water pumping stations to the Moy	Four new pumping stations will be installed as part of the Proposed Scheme to manage excess surface water during floods (refer to **Section 3** for details). The pumping stations will collect urban runoff and outfall directly to the River Moy. These will be fitted with hydrocarbon (HC) interceptors which will require regular maintenance to ensure proper function.	**Not significant** (likely positive effect if HC interceptors are maintained)

6.4.2.2 Estuarine River Moy – Sea Lamprey

Table 6-17 Potential effects on sea lamprey within the estuarine section of the River Moy during the operational and maintenance phase of the Proposed Scheme

Description of Potential Effect (Killala Bay/Moy Estuary SAC)	Characterisation of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
River Moy: Hydromorphology. Potential hydraulic effects on instream habitats and biota	The estuarine River Moy (Killala Bay/Moy Estuary SAC) within Ballina is a laminar glide that is heavily tidally influenced and modified by existing riprap reinforced banks and flood defence walls. A wide variation of in-channel velocities influenced by tide and river discharge is the normal baseline for the Ballina reach. The refurbishment of existing walls (Cathedral pool) and installation of relatively short sections of new flood wall (downstream of N59 Lower Bridge) will increase the overbank flow height by an average of 0.8 m (0.45 – 1.2 m) within Ballina. The hydraulic model shows imperceptible changes to average channel cross section velocity and depth in the estuarine river reach downstream of the N59 Lower Bridge (**Figure A9.8.10, Appendix N**). The estuarine reach of the Moy downstream of the Lower Bridge will therefore not be subject to fundamental changes in hydraulic character as a result of the flood relief works. Re-construction of the riprap and bankside berm areas downstream of the N59 Lower Bridge following the construction disturbance will reinstate the pre-existing channel morphology and will lead to sediment deposition characteristics that are similar to baseline and suitable for lamprey nursery. There are no predicted changes to bed substrate mobilisation, transport and deposition patterns compared to baseline conditions. Consequently, instream habitats will be subject to imperceptible (if any) physical modification in terms of known sea lamprey nursery habitats downstream of the N59 Lower Bridge. Channel velocities will remain unchanged in terms of upstream migration of QI sea lamprey under pre-scheme and design scenarios, especially considering that upstream fish movement through the estuary to river-entry often occurs during spates on the high tide, i.e., facilitated by favorable tidal conditions when water velocities are slackest.	**Not Significant.** Long-term imperceptible to neutral effects in terms of instream habitats for fish, macroinvertebrates and plants.
River Moy: Habitat disturbance related to future channel maintenance	The estuarine Moy is a naturally depositing, tidally influenced glide. The requirement for ongoing channel maintenance is low to non-existent. Any future discrete areas of channel maintenance would be subject to an AA Screening process and will be dealt with in a bespoke fashion based on requirement.	**Not significant.**

6.4.2.3 Brusna (Glenree) River – Salmon

Table 6-18 Potential effects on salmon within the Brusna (Glenree) River during the operational and maintenance phase of the Proposed Scheme

Description of Potential Effect (River Moy SAC)	Characterization of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
Brusna (Glenree): Hydromorphology. Severance of fish passage in relation to replacement of bed and bank protection at Rathkip/Shanaghy Bridge	The existing riverbed-protection below the bridge has eroded in the mid-channel forming a 'natural' low flow channel that has been colonized by aquatic mosses and has deposition of natural cobble, gravel and coarse sand. The morphology is such that fish migration will be facilitated during even the lowest flows. Flows are also turbulent owing to the existing concrete conglomerate structure of the bed protection which provides channel 'roughness' creating turbulent flows that provide cover to salmonids migrating through the reach. Replacement of this bed protection has potential to remove the low-flow channel and remove the turbulent flow / morphology which can disrupt or prevent fish passage (salmon, trout, eel) during low flows in the operational phase. This can be prevented by good design and engineering of the bed protection which is an important mitigation such that the low flow channel and bed 'roughness' elements are included in the design. In the absence of mitigation this effect has the potential to interfere with salmonid migration which would undermine river continuity and morphological quality.	**Likely significant negative** long-term effects in terms of hydromorphology and fish passage
Brusna (Glenree): Hydromorphology. Potential effects of hydraulic changes on instream habitats and fish as a result of new flood walls / embankment	To assist in assessment of potential impacts on the hydraulic environment of the Brusna River, baseline and post-scheme values for two hydraulic parameters were examined in detail, i.e., channel velocity (m/s) and Froude number (see **Appendix N** Figures A9.8.7 and A9.8.9). Modelled hydraulic changes were examined for nine (9 no.) river cross-sections spanning 545m upstream to 260 m downstream of Rathkip/Shanaghy Bridge. In summary, the examination of hydraulic changes pre- and post-works showed virtually no change in either mean cross section channel velocity or Froude number between baseline and post-scheme 50% AEP and 1% AEP scenario on the Brusna (Glenree) in relation to physical modifications in the reaches in the vicinity of Rathkip/Shanaghy Bridge. This is a channel that undergoes periods of elevated velocity and Froude number even at baseline owing to existing channelized morphology. Based on the post-scheme modelled hydraulic parameters, changes to sediment (bed-substrate) transport, deposition and settlement are predicted to not significantly alter over baseline conditions meaning any localized spawning and nursery habitats for salmon and trout will not be significantly affected. In terms of salmon upstream migration, channel velocities through the bridge structure and along the reach affected by set-back walls/embankment are not significantly altered in the 50%AEP and 1%AEP design scenarios. Water velocities in flood events are quite high (generally 1.8 to >2m/s) both at baseline and in the design scenario. Salmon will likely temporarily delay downstream of the bridge (at baseline and post-scheme) during higher discharges. Presence of the scour pool downstream of the bridge (which will not alter under the design) provides holding	**Not Significant,** imperceptible to neutral long-term effects in terms of salmonid habitats.

Description of Potential Effect (River Moy SAC)	Characterization of Potential Effect prior to mitigation	Significance of Effect (without mitigation)
	habitat for lay-overs. This means that temporary delays on the upward migration will not be any more frequent post scheme than under the baseline scenario. Fish will rapidly pass the structure once elevated velocities begin to recede.	
Brusna (Glenree): Hydromorphology. Potential habitat degradation arising from loss of riparian tree cover	The affected c.500 m reach comprises good salmonid habitats (spawning, nursery and holding), enhanced by dappled shade from southern bankside trees, providing beneficial ecosystem functions, i.e., fish cover, instream thermal regulation, suppression of ephemeral algal blooms that can lead to habitat changes and biological oxygen demand (BOD) pulses. Small numbers of trees will be removed on the LHS bank upstream of Rathkip/Shanaghy Bridge, removing a proportion of this beneficial function. There will also be losses of bankside trees on the RHS river corridor owing to set-back flood wall construction. Whilst there will still be considerable cover from both LHS and RHS banks, the loss of function provided by the existing tee cover may lead to increased ephemeral (filamentous green) algal growth with subsequent trophic effects as a result of dissolved oxygen fluctuations, plus loss of localized cover for fish from riparian vegetation.	**Likely significant negative** medium-term, reversible effect locally on salmon habitats within the SAC,
Brusna (Glenree): Habitat disturbance related to future channel maintenance	The river is generally swift and turbulent, thereby “self-cleaning” and not facilitating deposition of silt or woody debris. The requirement for ongoing channel maintenance is therefore low to non-existent. Any future discrete areas of channel maintenance would be subject to an AA Screening process and will be dealt with in a bespoke fashion based on requirement.	**Not significant.**

6.4.2.4 Otter

Table 6-19 Potential effects on otter during the operational and maintenance phase of the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Disturbance/Displacement The Proposed Scheme has the potential to disturb foraging, commuting, resting or breeding otter during the operational and maintenance phase from noise disturbance from machinery and physical presence of humans during the maintenance of features. Activities such as repairs, vegetation control, vermin control and back drainage improvements have the potential to disturb otter.	Given the nature of any maintenance works and the urban nature of the proposed works areas, the effect of disturbance/displacement on otters during the operational and maintenance phase of the Proposed Scheme is predicted to be confined to within 150 m of the redline boundary and to be brief i.e. lasting less than a day. Any effect is considered to be reversible and occasional as the maintenance works will take place quarterly, at most.	Given the urban nature of the Proposed Scheme area and the intermittent and minor nature of the operational and maintenance phase works, any disturbance/displacement effect on otter is unlikely to cause significant effects. This effect is therefore considered to be **not significant.**

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Habitat Degradation due to Changes in Water Quality The operational and maintenance phase of the Proposed Scheme has the potential to result in changes to water quality associated with the new flood defences, new storm water drainage outfalls and new surface water pumping station to the Moy.	Flood walls will help prevent contamination arising from uncontrolled over-bank flows during extreme events, providing a positive effect on water quality supporting habitat quality for otter in the long-term for the freshwater and estuarine River Moy. Upgraded storm water outfalls as described in the Section 3 will be fitted with hydrocarbon interceptors. This is likely to reduce the level of waterborne contaminants reaching otter and/or their prey items in the River Moy but require regular maintenance to retain this function. In addition, four new pumping stations will be installed as part of the Proposed Scheme to manage excess surface water during floods (refer to Section 3 for details). The pumping stations will collect urban runoff and outfall directly to the River Moy. These will be fitted with hydrocarbon (HC) interceptors which will require regular maintenance to ensure proper function. The worst-case scenario (i.e., no maintenance) is assessed here, which amounts to a neutral effect as surface water currently discharges uncontrolled in the absence of treatment.	**Not significant** (noting a likely positive effect with regular maintenance of HC interceptors)

6.4.2.5 Harbour Seal

Table 6-20 Potential effects on harbour seal during the operational and maintenance phase of the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Habitat Degradation due to Changes in Water Quality The operational and maintenance phase of the Proposed Scheme has the potential to result in changes to water quality associated with the new flood defences, new storm water drainage outfalls and new surface water pumping station to the Moy.	Flood walls will help prevent contamination arising from uncontrolled over-bank flows during extreme events, providing a positive effect on water quality supporting habitat quality for harbour seal in the long-term for the estuarine River Moy. Upgraded storm water outfalls as described in the Section 3 will be fitted with hydrocarbon interceptors. This is likely to reduce the level of waterborne contaminants reaching harbour seal and/or harbour seal prey items in the River Moy but require regular maintenance to retain this function. In addition, four new pumping stations will be installed as part of the Proposed Scheme to manage excess surface water during floods (refer to Section 3 for details). The pumping stations will collect urban runoff and outfall directly to the River Moy. These will be fitted with hydrocarbon (HC) interceptors which will require regular maintenance to ensure proper function. The worst-case scenario (i.e., no maintenance) is assessed here, which amounts to a neutral effect as surface water currently discharges uncontrolled in the absence of treatment.	**Not significant** (noting a likely positive effect with regular maintenance of HC interceptors)

6.4.2.6 SCI Bird Species

Table 6-21 Potential effects on SCI bird species during the operational and maintenance phase of the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Disturbance/Displacement The Proposed Scheme has the potential to disturb foraging, commuting or resting overwintering waterbirds during the operational and maintenance phase e.g., noise disturbance from machinery and physical presence of humans.	The schedule of operational and maintenance activated for the Moy and Quignamanger includes monthly, annual or bi-annual inspections of flood walls, pump stations, open spaces, storm water drains and diversion culverts, repairs of all these features as required, annual vegetation control and window cleaning of flood walls, replanting and landscaping as required of open spaces, quarterly petrol interceptor emptying and cleaning of stormwater drains and removal of trash and vegetation from diversion culverts.	Given the type of works to be carried out, the intermittent nature of the works, the urbanised area where these works are to be carried out, the mobility of the species' in question and likely habituation of these species to human presence, any impact upon waterbirds due to disturbance/displacement during the operational and maintenance phase of the Proposed Scheme is considered to be **not significant.**
Habitat Degradation due to Changes in Water Quality The operational and maintenance phase of the Proposed Scheme has the potential to result in changes to water quality associated with the new flood defences, new storm water drainage outfalls and new surface water pumping station to the Moy.	Flood walls will help prevent contamination arising from uncontrolled over-bank flows during extreme events, providing a positive effect on water quality supporting habitat quality for SCI birds in the long-term for the freshwater and estuarine River Moy. Upgraded storm water outfalls as described in the Section 3 will be fitted with hydrocarbon interceptors. This is likely to reduce the level of waterborne contaminants reaching SCI birds and/or their prey items in the River Moy but require regular maintenance to retain this function. In addition, four new pumping stations will be installed as part of the Proposed Scheme to manage excess surface water during floods (refer to Section 3 for details). The pumping stations will collect urban runoff and outfall directly to the River Moy. These will be fitted with hydrocarbon (HC) interceptors which will require regular maintenance to ensure proper function. The worst-case scenario (i.e., no maintenance) is assessed here, which amounts to a neutral effect as surface water currently discharges uncontrolled in the absence of treatment.	**Not significant** (noting a likely positive effect with regular maintenance of HC interceptors)

6.4.2.7 QI Marine Habitats

Table 6-22 Potential effects on Estuaries [1130] during the operational and maintenance phase of the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Habitat Degradation due to Changes in Water Quality The operational and maintenance phase of the Proposed Scheme has the potential to result in changes to water quality associated with the new flood defences, new storm water drainage outfalls and new surface water pumping station to the Moy which may impact upon downstream habitat.	A reduction in surface water quality may have a negative effect on estuary habitat and any organisms that reside within it e.g. invertebrates, bivalves etc. But this is unlikely to occur as the new flood walls will help prevent contamination arising from uncontrolled over-bank flows during extreme events, providing a positive effect on water quality in the long-term for the freshwater River Moy and further downstream to the tidal reaches. Upgraded storm water outfalls as described in the **Section 3** will be fitted with hydrocarbon interceptors. This is likely to reduce the level of waterborne contaminants reaching the Moy estuary but will require regular maintenance to retain this function. Four new pumping stations will be installed as part of the Proposed Scheme to manage excess surface water during floods (refer to **Section 3** for details). The pumping stations will collect urban runoff and outfall directly to the River Moy. This is opposed to the baseline scenario where uncontrolled flood waters discharge directly to the Moy. Hydrocarbon (HC) interceptors will be installed upstream of the pumps. If the hydrocarbon interceptors were not maintained, the new pumping stations represent no material change over the existing situation whereby uncontrolled urban flood water flows to the Moy in the absence of treatment.	**Not significant** (noting a likely positive effect with regular maintenance of HC interceptors)
Habitat degradation due to changes in hydromorphology Potential for hydraulic effects on estuary habitat and associated biota	Hydraulic analysis (water velocity, depth) (**Appendix L**) showed no significant changes to hydromorphology quality elements (morphological conditions, tidal regime) The proposed scheme therefore does not result in hydromorphological effects that could adversely affect QI Marine Habitats	**Not Significant.** Long-term imperceptible to neutral effects in terms of instream habitats.

Table 6-23 Potential effects on Mudflats and Sandflats not covered by seawater at low tide [1130] during the operational and maintenance phase of the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Habitat Degradation due to Changes in Water Quality The operational and maintenance phase of the Proposed Scheme has the potential to result in changes to water quality associated with the new flood defences, new storm water drainage outfalls and new surface water pumping station to the Moy	A reduction in surface water quality may have a negative effect on sandflat and mudflat habitat and any organisms that reside within it e.g., invertebrates, bivalves etc. But this is unlikely to occur as the new flood walls will help prevent contamination arising from uncontrolled over-bank flows during extreme events, providing a positive effect on water quality in the long-term for the freshwater River Moy and further downstream to the tidal reaches.	**Not significant** (noting a likely positive effect with regular maintenance of HC interceptors)

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
which may impact upon downstream sandflat and mudflat habitat.	Upgraded storm water outfalls as described in the **Section 3** will be fitted with hydrocarbon interceptors. This is likely to reduce the level of waterborne contaminants reaching the Moy estuary but will require regular maintenance to retain this function. Four new pumping stations will be installed as part of the Proposed Scheme to manage excess surface water during floods (refer to **Section 3** for details). The pumping stations will collect urban runoff and outfall directly to the River Moy. This is opposed to the baseline scenario where uncontrolled flood waters discharge directly to the Moy. Hydrocarbon interceptors will be installed upstream of the pumps. The worst-case scenario (i.e., no maintenance of HC interceptors) is assessed here, which amounts to a neutral effect as surface water currently discharges uncontrolled and in the absence of treatment.	

6.5 Potential In-combination Effects

As part of the screening for AA, in addition to the Proposed Scheme, other relevant projects and plans in the region must also be considered at this stage. The following sections outline the results of this assessment.

6.5.1 Methodology

Legislation, guidance and case law (**Section 2**) requires that in-combination effects with other plans or projects are considered. On this basis, a range of other plans and projects were considered in terms of their potential to have in-combination effects with the Proposed Scheme.

RPS undertook a desk study to source publicly available information on plans, projects and activities within the defined ZoI using internet searches, planning databases and other available sources to identify other plans, projects and activities falling within the ZoI, which may have the potential to give rise to in-combination effects with the Proposed Scheme.

A search was conducted of national, regional and local plans which were deemed relevant to the Proposed Scheme using relevant planning portals and datasets. This list is not exhaustive of all plans and programmes but instead focuses on plans which may result in an in-combination effect.

6.5.2 Plans

Plans considered relevant to this in-combination assessment were identified in the first instance by considering strategic plans relating to development planning at the national, regional and local levels. Any other strategic plans which outline specific activities that could act in-combination with the Proposed Scheme were identified. All relevant plans were assessed to identify specific activities which have the potential to act in-combination with the Proposed Scheme.

6.5.2.1 Project Ireland 2040: National Planning Framework

The National Planning Framework (NPF) (Department of Housing, Planning and Local Government (DHPLG), 2018b) is the Irish governments high-level strategic planning and development framework for the country out to the year 2040, so that as the population grows, that growth is sustainable (in economic, social and environmental terms). The National Policy Objective 59 in the NPF aims to: "*Enhance the conservation status and improve the management of protected areas and protected species by"*:

- Implementing relevant EU Directives to protect Ireland's environment and wildlife.
- Integrating policies and objectives for the protection and restoration of biodiversity in statutory development plans.
- Developing and utilising licensing and consent systems to facilitate sustainable activities within Natura 2000 sites.
- Continued research, survey programmes and monitoring of habitats and species.

The Environmental Impact Assessment Directive also requires that the direct and indirect significant effects of a project on biodiversity, with particular attention to species and habitats protected under the Birds and Habitats Directives are identified, described and assessed as part of the consent process.

Due to the implementation of these management measures within the NPF and the strategic, high-level nature of the NPF, the in-combination impacts from the NPF, and the Proposed Scheme are not predicted to result in any LSEs to any European Site(s).

6.5.2.2 National Development Plan 2021-2030

The National Development Plan (NDP) 2021-2030 (Department of Public Expenditure and Reform (DPER), 2021), which was subject to both Strategic Environmental Assessment (SEA) and AA, designates a number of National Strategic Outcomes and Priorities of the plan including Enhanced Regional Accessibility, Strengthened Rural Economies and Communities, Sustainable Mobility and Sustainable Management of Water and other Environmental Resources. It states "*As an integral part of the NDP Review, for the first time*

ever, an assessment has been undertaken of the impact that each of the Exchequer-funded measures contained in the NDP is likely to have on climate and environmental outcomes. When developing measures for inclusion in the NDP, Departments were asked to undertake a qualitative self-assessment of the impact each measure is likely to have on seven specified climate and environmental outcomes:

- *Climate Mitigation – the likely impact of the measure on greenhouse gas emissions*
- *Climate Adaptation – the contribution the measure will make to Ireland's climate resilience.*
- *Water Quality – any difference the measure may make to pollution levels in waterways.*
- *Air Quality – any difference the measure may make to air pollution levels.*
- *Waste & Circular Economy – what change in waste levels might be expected of the measure.*
- *Nature & Biodiversity – what impact the measure may have on biological diversity.*
- *Just Transition – will the measure contribute to employment that is compatible with Ireland's long-term climate and environmental objectives?*

……This encourages Departments to consider the wide climate and environmental impacts of all their spending plans and builds a base which can be built upon."

These Strategic Priorities carry the potential for in-combination impacts with the Proposed Scheme on a variety of potential receptors, through pathways of habitat fragmentation/destruction, increased disturbance, and surface/groundwater pollution. Such individual projects arising from these priorities will, however, be subject to their own AA requirements. The NDP 2021-2030 also sets biodiversity as a priority (i.e., Enhanced Amenity and Heritage – National Strategic outcome 7).

As biodiversity is a priority of the NDP the in-combination impacts from the NDP, and the Proposed Scheme are not predicted to result in any LSEs to any European Site(s).

6.5.2.3 Mayo County Development Plan 2022-2028

The current Mayo County Development Plan 2022-2028 sits beneath the National Development Plan and the Regional Spatial and Economic Strategy for the Northern and Western Region, as per planning hierarchy. This development plan, which is subject to SEA and AA, is the main planning framework within County Mayo, although the National Planning Framework and the subsequent Northern and Western Regional Assembly Regional Spatial and Economic Strategy (RSES) 2020-2032 provide additional guidance.

The Mayo County Development Plan 2022-2028 contains a considerable number of protective measures/objectives for the protection of the environment and specifically biodiversity, Natura 2000 sites, protected species and habitats and also non-designated sites. With the incorporation of protective policies for natural heritage and biodiversity, in-combination impacts from the Mayo County Development Plan 2022-2028 with the Proposed Scheme are not predicted to result in any likely significant effects on any European site(s).

6.5.2.4 Ballina Local Area Plan 2024-2030

The Ballina local area plan (LAP) sets out an overall strategy for the proper planning and sustainable development of Ballina in context of the Mayo County Development Plan 2022-28, the National Planning Framework, the Regional Spatial and Economic Strategy for the Northern and Western Region and the Mayo County Council Climate Change Adaption Strategy.

The Ballina LAP was screened for AA during its preparation at draft stage. This screening found that significant effects on European Sites, alone or in combination with other plans or projects, could not be screened out, and therefore, a Stage 2 NIS Natura Impact Statement was required. All NIS recommendations have been integrated into the Plan. The conclusion of the AA is that the Plan will not adversely affect the integrity of any European Site, in light of their conservation objectives. The plan also states that it is also an objective of the Council to "Ensure that any proposal for development within or adjacent to the River Moy SAC and Killala Bay and Moy Estuary SAC is located and designed to minimise its impact on the biodiversity, geological, water and landscape value of the SAC and where possible, to integrate these important attributes into all such development schemes."

The Ballina LAP places a priority and focus on enhancing and protecting the biodiversity, natural heritage and environment of the town and environs. There are a number of objectives within the plan to protect and enhance biodiversity with one of its main strategic aims to "To protect, conserve, enhance and sustain the natural environment of Ballina and promote climate adaption, placemaking and enhance biodiversity through promotion of green infrastructure for future generations."

As biodiversity is a priority of the Ballina LAP, the in-combination impacts from the LAP and the Proposed Scheme are not predicted to result in an LSEs to any European Site.

6.5.2.5 Water Action Plan 2024

The Water Framework Directive (WFD) provides a framework for the protection and improvement of rivers, lakes, marine and groundwaters in addition to water-dependent habitats. The aim of the WFD is to prevent any deterioration in the existing status of water quality, including the protection of good and high-water quality status where it exists. The Water Action Plan 2024 sets out a proposed framework for the protection and improvement of Ireland's water environment in line with WFD objectives.

There are binding obligations on all Irish local authorities, including Mayo County Council, to achieve at least good status of surface waters, under the terms of the EU Water Framework Directive 2000/60/EC. The implementation of the Water Action Plan 2024 seeks compliance with the environmental objectives set under the plan, which will be documented for each water body. This includes compliance with the European Communities (Surface Waters) Regulations S.I. No. 272 of 2009 (as amended). The implementation of the Water Action Plan 2024 and achievement or maintenance of environmental objectives which will be set for the receiving water bodies will have a positive impact on water dependent habitats and species within European sites.

The Water Action Plan 2024 is the third River Basin Management Plan for Ireland, and it outlines the measures the Irish government and other sectors are taking to improve water quality in Ireland's groundwater, rivers, lakes, estuarine and coastal waters and provide sustainable management of our water resources. It sets out a roadmap to restore Ireland's water bodies to the equivalent of 'good status' or better and to protect water from any further deterioration. The plan focuses on protecting and restoring water quality by preventing and reducing pollution, by restoring the natural ecosystem functions of rivers and by continuing to invest in water infrastructure.

The Water Action Plan 2024 outlines the approach that Ireland will take to protect waters. As the overall aim of the Water Action Plan is to protect and/or restore waters in Ireland, there are no predicted in-combination effects from the Water Action Plan with the Proposed Scheme on any European site(s).

6.5.2.6 Inland Fisheries Corporate Plan 2021 – 2025

The vision of IFIs Corporate Plan is "*to place the inland fisheries resource in the best sustainable position possible for the benefit of future generations*", while its mission is "*to protect, manage and conserve Ireland's inland fisheries and sea angling resources and to maximise their sustainability and natural biodiversity*". With this in mind, the plan has a number of objectives which include "*to sustainably develop and improve fish habitats*" and "*to protect, maintain and enhance Ireland's wild fish populations".*

Inland Fisheries Ireland's role is primarily concerned with the "*protection, management conservation, development and promotion of freshwater fisheries in Ireland including the fish species listed in the Habitats Directive*". As a result, no negative in-combination impacts with the Proposed Scheme are predicted on any European Site(s).

6.5.2.7 National Biodiversity Action Plan 2023-2030

The National Biodiversity Action Plan (NBAP) 2023-2030 is a framework for the conservation and protection of biodiversity in Ireland. It takes account of the wide range of policies, strategies, conventions, laws and targets at the global, EU and national level that influence our shared environment in order to scale up biodiversity action. It contains five main objectives:

- Adopt a whole-of-government, whole-of-society approach to biodiversity.
- Meet urgent conservation and restoration needs.

- Secure nature's contribution to people
- Enhance the evidence base for action on biodiversity.
- Strengthen Ireland's contribution to international biodiversity initiatives.

The NBAP's objectives will contribute to the conservation and restoration of biodiversity. As a result, no negative in-combination effects with the Proposed Scheme are predicted on any European Site(s).

6.5.2.8 Climate Action Plan 2023

Climate Action Plan (CAP) 2023 is the second annual update to Ireland's Climate Action Plan 2019. The plan is the first to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021. Under this act, Ireland's national climate objective requires the State to pursue and achieve, by no later than the end of the year 2050, the transition to a climate-resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy.

The CAP 2023 will build on the measures and technologies set out in previous CAPs, in addition to setting out specific actions required to achieve emissions targets over the coming years. This plan is cognisant of the link between climate change and biodiversity loss and underscores the need to safeguard biodiversity and ecosystems as a fundamental part of climate resilient development. With this in mind, no negative in-combination effects with the Proposed Scheme are predicted on any European Site(s).

6.5.2.9 Ballina Local Biodiversity Action Plan 2022

The Local Biodiversity Action Plan (LBAP) 2022 for Ballina provides advice and guidance to protect and promote biodiversity in the Ballina area. The aims of the Ballina LBAP 2022 are:

- To identify the available habitats in the town and find ways to enhance these in order to facilitate and encourage local biodiversity.
- To identify any sites that are particularly important, such as areas that have high numbers of species, areas where rare species are present or areas that can function as biodiversity corridors.
- To take into consideration any nationally or internationally protected sites within the town and its environs and to ensure that the biodiversity plan is compatible with their conservation objectives.
- To make recommendations for the management of habitats within the town and for future land-use planning
- To make proposals and suggestions for practical projects that can be carried out by local community groups such as Tidy Towns
- To set out opportunities for informing and educating both local people and visitors about the importance and intrinsic interest of local wildlife and biodiversity
- To explain how gardens and other private lands are important to local biodiversity and how these can be managed or enhanced to encourage wildlife.

Given these aims, including the inclusion of an aim that is cognisant of the conservation objectives of internationally protected sites, no negative in-combination effects with the Proposed Scheme are predicted on any European Site(s).

6.5.2.10 All-Ireland Pollinator Plan 2021-2025

The second *All-Ireland Pollinator Plan 2021-2025* was published by the National Biodiversity Data Centre and is a five-year road map that aims to help bees, other pollinating insects and our wider biodiversity. It is intended to be a plan of action to be carried out collectively by conservation organisations, national and local public bodies, farmers, gardeners, schools and colleges, businesses, and local community groups.

The plan emphasises the importance of pollinators and aims to bring about a landscape where pollinators can thrive and flourish into the future. Consequently, no negative in-combination effects with the Proposed Scheme are predicted on any European Site(s).

6.5.3 Projects

A search was conducted of planning applications (projects) within the vicinity of the Proposed Scheme, using Myplan[8], and the Department of Housing, Planning and Local Government EIA portal map viewer[9]. The search was limited to the five-year period preceding the date of issue of this report and excluded retention applications (i.e., typically local-scale residential or commercial developments where an impact has already occurred), incomplete, withdrawn, and refused applications. The relevant projects with potential for in-combination adverse effects on the integrity of European Sites, are detailed in **Table 6-24**.

Furthermore, a search of An Bord Pleanála's website[10] was undertaken to identify any relevant applications, including Strategic Infrastructure Development (SID), Strategic Housing Development (SHD) and Large-scale Residential Development (LRD) in the past three years or in close proximity to the Proposed Scheme.

Table 6-24 Planning search results.

Project Details	Applicant Name Development Address Brief Development Description	Comments
Planning Reference: 1859 **Decision Date:** 28/03/2019 **Decision:** Granted with conditions **Location relative to Proposed Scheme:** Approximately 1.15 km west, as the crow flies, from the River Moy proposed works area.	St. Muredach's Trust McDermott street, Ballina, Co. Mayo. New car park to St. Patrick's church, new vehicular entrance and exit to/from the car park at proposed new access road from Sli Ectra to proposed new secondary school, planning ref no. p17/561, new vehicular entrance and exit to/from the car park.	Mayo County Council concluded within the planner's report that NPWS Designations were not applicable for this development and therefore an AA Screening was not carried out.
Planning Reference: 18577 **Decision Date:** 09/04/2019 **Decision:** Granted with conditions **Location relative to Proposed Scheme**: Approximately 310 m, as the crow flies, from the River Moy proposed works area.	Cloonquay Ltd. Kevin Barry Street, Ballina, Co. Mayo Demolition of all existing buildings on site (1,240 m^2). Construction of a new two-storey medical centre (977 m^2) comprising of doctor's surgery (646 m^2), pharmacy (86 m^2), retail space (82 m^2) and office space (162 m^2). External illuminated signage, 42 No. carparking spaces and associated works including site lighting.	The site is potentially hydrologically connected with the River Moy SAC and Killala Bay/Moy Estuary SAC and SPA via the public storm water sewer. Surface water from the site will be controlled via trapped road gullies and an underground hydrocarbon interceptor. Foul water will be connected to the public foul sewer.
Planning Reference: 19119 **Decision Date:** 16/07/2019 **Decision:** Granted with conditions **Location relative to Proposed Scheme**: Approximately 3.5 km, upstream from the River Moy proposed works area.	John Craven Ardoughan, Ballina, Co. Mayo. Construct 49 no. dwelling houses, consisting of 13 no. detached dwellings and 36 no. semi-detached dwellings, with connection to public sewer and public water main, including all ancillary site works/services.	This site is hydrologically linked to the River Moy Estuary, however, as it lies >1.2 km upstream of the SAC, Mayo County Council concluded that it will not impact on the designated area and therefore was screened out of the requirement for AA Screening. Condition 10 of the planner's report states that the surface water system of the development is to be designed in accordance with SUDS and surface water attenuation shall be provided to restrict flows from the development to greenfield run off levels.
Planning Reference: 19185 **Decision Date:** 16/09/2019 **Decision:** Granted with conditions	Fiona Ruane Culleens, Rathroeen, Ballina Raising an area of land with construction waste approx. 19300 m^2	There are a number of land drains visible on aerial imagery directly adjacent to this site. A watercourse (EPA code: IE_WE_34MO21100)

[8] Available online at https://myplan.ie/. Accessed December 2023.
[9] Available online at https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1. Accessed December 2023.
[10] Available online at http://www.pleanala.ie/. Accessed December 2023.

Project Details	Applicant Name Development Address Brief Development Description	Comments
Location relative to Proposed Scheme: Approximately 3.5 km, as the crow flies, from the Quignamanger proposed works area.	to be filled no higher than 2 m to complete reclamation of field. Level and reseed fields together with all associated site works.	rises approximately 715 m (as the crow flies) from this development which is approximately 5.5km upstream from the River Moy. The lands in between this development and the watercourse contain numerous drainage ditches, therefore a hydrological connection to The River Moy SAC, Killala Bay/Moy Estuary SAC and Killala Bay/Moy Estuary SPA cannot be ruled out.
Planning Reference: 19209 **Decision Date**: 22/07/2019 **Decision**: Granted with conditions. **Location relative to Proposed Scheme**: Approximately 475 m, as the crow flies, from the Quignamanger proposed works area.	The Icehouse Ltd. Quignalecka, The Quay, Ballina Lay a 50 mm diameter waterpipe inside a trench in the riverbank for 100m along the rock armour of the northern wing, construct 2 no. deck extensions, place a prefab therapy pod on a new deck area, place a hot tub on new deck area. The Icehouse is a protected structure.	The proposed development is within the Killala Bay/Moy Estuary SAC. A Natura Impact Statement has been prepared which states that "*The impacts identified from this project were pollution of the river and a small loss (3 m^2) of habitat from the SAC. The habitat loss is not of any habitat for which the site is selected and is not deemed significant. Measures are in place which are designed to protect the river from pollution. Thus, with mitigation followed as described no significant impacts are expected.*"
Planning Reference: 19348 **Decision Date:** 18/10/2019 **Decision:** Granted with conditions **Location relative to Proposed Scheme:** Approximately 35 m west as, the crow flies, from the River Moy proposed works area.	Garballagh Developments Ltd. Ridgepool Road, Carrowcushlaun West, Ballina, Co. Mayo. Demolish existing builder's offices and yard and construct a two-story extension to Moy Ridge Nursing Home including all ancillary site works and services.	The site is potentially hydrologically connected with the River Moy SAC and Killala Bay/Moy Estuary SAC and SPA via the public storm water sewer and is <20 m from the River Moy SAC A Screening for Appropriate Assessment was undertaken as part of an F.I. Request for the proposed development which concluded "*following the application of the precautionary principle, no effects from the site development works were determined during the screening phase of Appropriate Assessment. This represents a Finding of No Significant Effects (FONSE)".*
Planning Reference: 19509 **Decision Date**: 27/08/2019 **Decision:** Granted with conditions **Location relative to Proposed Scheme**: Approximately 160 m, as the crow flies, from the River Moy main channel proposed works area.	St. Muredach's College Abbeyhalfquarter, Ballina, Co. Mayo Construction of the following: one multi use games area, footpaths and associated site works to the rear of the existing gymnasium and two adjustments to existing car park/hardstand area to the rear of the existing school.	This site is not hydrologically connected to any SAC or SPA or the Proposed Scheme. The planners report for the proposed development concluded "*having regard to the nature and scale of the proposed development and the nature of the receiving environment together with the proximity to the nearest European site, no appropriate assessment issues arise, and it is not considered that the proposed development would be likely to have a significant effect individually or in combination with other plans or projects on a European site*". This report also further states "*Having regard to the limited nature and scale of the proposed development and the absence of any direct connectivity to any sensitive location, there is no real likelihood of*

Project Details	Applicant Name Development Address Brief Development Description	Comments
		significant effects on the environment arising from the proposed development. The need for environmental impact assessment can, therefore, be excluded at preliminary examination and a screening determination is not required". Therefore, there is no potential for in-combination effects from this development and the Proposed Scheme.
Planning Reference: 19585 **Decision Date:** 06/04/2020 **Decision:** Granted with conditions **Location relative to Proposed Scheme:** Approximately 95 m, as the crow flies, from the River Moy main channel proposed works area.	Vincent Ruane Construction Ltd. Abbey Street, Ballina, Co. Mayo Demolition of three existing dwellings, construction of three new dwellings and all associated site works.	The grant of permission states that no surface water runoff from the site is to be discharged to the public road. All surface water generated by the development during and after construction shall be disposed of to a soak-pit or drain within the site boundaries. There shall also be no discharge of surface water to the foul sewer and only clean and uncontaminated surface water from the development shall be discharged to the surface water system.
Planning Reference: 19724 **Decision Date:** 21/02/2020 **Decision:** Granted with conditions **Location relative to Proposed Scheme:** Approximately 3.4 km, as the crow flies, from the Quignamanger proposed works areas.	Bob Sweeney Rosserk, Ballina, Co. Mayo Construct an indoor horse arena complete with stable block, horse handling area, domestic kitchen/canteen and toilet facilities (2,635.2 m^2), construction of a 4 bay machinery shed (252 m^2), construction of a 2 bay manure shed (99.2 m^2). Complete with domestic septic system, boundary treatment, parking and all ancillary site development works	The site is hydrologically connected with the Killala Bay/Moy Estuary SAC and SPA. An AA Screening report determined that a NIS was not required as no potential for significant effects upon any Natura 2000 site were identified to arise from the proposed development.
Planning Reference: 19884 **Decision Date**: 17/12/2019 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: Approximately 230 m, as the crow flies, from the River Moy main channel proposed works area.	Judge Bros Ltd. Construct three terraced, two-storey dwelling houses, connection to existing public services and for all associated site works.	The site is potentially hydrologically connected with the River Moy SAC and Killala Bay/Moy Estuary SAC and SPA via the public storm water sewer. The planners report states the following: "*NPWS Designations: Not applicable as an infill town site development which is c120 m northeast and the MCC are satisfied that the proposed development on zoned lands within the town boundary will not have any direct or indirect impact on the EU designated sites and therefore it has been screened out of the need for an Appropriate Assessment Screening Report*". The following is listed as a condition of grant of planning: "*5. Surface water shall be collected, and road gullies shall be provided in accordance with Section 3.19 of the "Recommendations for Site Development Works for Housing Areas" published by the Department of*

Project Details	Applicant Name Development Address Brief Development Description	Comments
		the Environment & Local Government. All gullies shall be fitted with suitable locking type covers or gratings. Surface water system shall be designed in accordance with S.U.D.S. and surface water attenuation shall be provided to restrict flows from development to greenfield run off levels. This figure is based on rainfall records and using formulae in "Institute of Hydrology Report No 124 and "Dublin Corporation Stormwater Management Policy for Developers." Developers shall submit calculations along with details of how this will be achieved to Mayo County Council for their written approval prior to commencement of development."
Planning Reference: 19943 **Decision Date:** 29/06/2020 **Decision:** Granted with conditions **Location relative to Proposed Scheme:** Approximately 675 m north of the Quignamanger proposed works area.	Seamus Kelly Farrangarode, Quay Road, Ballina, Co. Mayo Erect an agricultural shed (210 sqm) using the footprint of an existing paddock adjacent to existing farm buildings, for the storage of machinery & fodder and all ancillary site works	An AA Screening report determined that AA was not required as no potential for significant effects upon any Natura 2000 site were identified to arise from the proposed development. The AA Screening states, "*there would be no significant impacts, either directly or indirectly, on the identified Natura sites with respect to annexed habitat and/or annexed species either during construction or subsequent use of the proposed shed.*".
Planning Reference: 19964 **Decision Date**: 19/06/2020 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: Approximately 100 m as the crow flies, from the River Moy main channel proposed works area.	Pentico Contracting Ltd. Nally Street/Rope Walk Lane, Ballina, Co. Mayo Construct three houses consisting of one end of terrace two-storey over basement dwelling (177.75 m^2) and two, two-storey semi-detached houses (138.65 $m^{2)}$.	A Natura Impact Statement has been prepared which concludes that "*the main risk to the Killala Bay Moy Estuary from this development is a risk of pollution entering the river particularly during construction. Mitigation is proposed in respect of these impacts and no residual impacts are expected to remain. Therefore, this project is considered to be in line with the requirements of the Habitats Directive.*"
Planning Reference: 20223 **Decision Date**: 04/11/2020 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: Approximately 3.25 km upstream, from the River Moy proposed works area.	Mr. John Craven Importation of inert fill soils material for agricultural improvement purposes, including all other ancillary site work and services	An arterial drainage scheme (ADS) channel is located on the western boundary of this site which flows into the Killala Bay/Moy Estuary SAC and SPA in Ballina. Condition 2 of the final grant notice states "*No development shall be carried out on site until a waste facility permit or certificate of registration has been obtained from Mayo County Council under the Waste Management (Facility Permit & Registration) Regulations 2007 (S.I. No 821 of 2007) and Waste Management (Facility Permit & Registration)(amendment) Regulations 2008 (S.I. No 86 of 2008)*". Condition 8 of the final grant notice states "*prior to commencement of development the applicant shall submit proposals for the protection, including for the*

Project Details	Applicant Name Development Address Brief Development Description	Comments
		maintenance and access, of the ADS channel running across the western boundary of the site".
Planning Reference: 20316 **Decision Date**: 15/02/2021 **Decision**: Granted with conditions **Location relative to Proposed Scheme** Approximately 120 m west, as the crow flies, from the River Moy proposed works area.	Aldi Stores Ireland Ltd. Bury Street/Teeling Street, Ballina The demolition of 3 no. existing derelict buildings including the former Deanwood hotel and all associated structures (1,556.1 sqm) and the construction of a single storey discount food store (to include off licence use) including a welfare area, plant area, night storage area, warehouse area, freezer store, night chiller external plant area, loading area and ESB switch room, gross floor area of 1,803 sqm (net retail area 1.315 sqm) the development will be accessed from Bury Street and Teeling Street and will be served by 82 no. car parking spaces. The development includes for the erection of 2 no. free standing illuminated double-sided signs, 3 no. illuminated gable signs, 1 no. non-illuminated entrance sign and 1 no. non-illuminated "welcome" external wall sign. the proposed development also includes for upgrades to an existing laneway from Teeling Street and provision of a connection to car park, the provision of an ESB substation as well as all landscaping, boundary treatments and site development works a trolley bay, connection to existing services and all other ancillary works necessary to facilitate the proposed development.	A Natura Impact Statement has been prepared which states that "*With the implementation of mitigation measures (Site-setup, demolition mitigation and pollution controls) it can be objectively concluded that the proposed development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Sites'*.
Planning Reference: 20391 **Decision Date**: 08/03/2021 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: Approximately 75 m, as the crow flies, from the River Moy main channel proposed works area.	Vincent Ruane Construction Ltd. O'Rahilly Street, Ballina Demolition of existing three-storey building (398 m^2). Construction of new three-storey development comprising shop with ancillary area at ground floor with overall area (243 m^2), two apartments and ancillary area.	The site is potentially hydrologically connected with the River Moy SAC and Killala Bay/Moy Estuary SAC and SPA via public sewerage infrastructure. The planners report states the following: "*It is considered that the proposed development will not have any additional impact on the EU designated area and therefore an AA Screening report is not required in this instance and that the proposed development can be screened out of the requirement for any such assessment*."
Planning Reference: 20472 **Decision Date**: 07/09/2020 **Decision**: Granted with conditions **Location relative to Proposed Scheme:** Approximately 300 m as the crow flies, from the River Moy main channel proposed works area.	Philip Doyle of Valley Healthcare. Kevin Barry Street, Ballina, Co Mayo Primary Care Centre at former Courthouse Hotel.	The site is potentially hydrologically connected with the River Moy SAC and Killala Bay/Moy Estuary SAC and SPA via public sewerage infrastructure. The planners report states, under "planning considerations" that NPWS designations are "N/A"

Project Details	Applicant Name Development Address Brief Development Description	Comments
Planning Reference: 20584 **Decision Date**: 12/10/2020 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: Approximately 35 m west as, the crow flies, from the River Moy proposed works area.	Vincent Ruane Construction Ltd. Ridgepool Road, Carrowcushlaun West, Ballina, Co. Mayo Extension to existing MSLETB training centre. Construction of 195 sqm single storey training room to the rear of the existing building including extended site boundary and all ancillary site works and services. Permission is also sought to revise site layout permitted under p19/348 for Moy Ridge nursing home. This will consist of revising the permitted external layout and providing a revised external garden/amenity area to the rear of the premises	The site is potentially hydrologically connected with the River Moy SAC and Killala Bay/Moy Estuary SAC and SPA via public sewerage infrastructure in addition to being <20 m from the River Moy SAC. The planners report states the following: "*having regard to the nature and extent of the proposed development which is for an extension to the existing building on site and where under planning 19348 an appropriate assessment was submitted".* The schedule of conditions also states that "*the applicant shall provide drainage such that no surface water shall be discharged from the site onto the adjacent private or public road"*
Planning Reference: 20646 **Decision Date**: 08/03/2021 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: Approximately 625 m upstream from the Bunree/Behy road proposed works area.	Joseph Corcoran Ballyholan, Ballina, Co. Mayo Filling of land with inert soil and subsoil, approximate area of 12000sqm to an average depth of 1.2m. Level and reseed the site on completion of the fill. Carry out all ancillary site works.	An Appropriate Assessment Screening for the development states '*Appropriate Assessment is not required as there would be no significant impacts either directly or indirectly on the identified Natura site with respect to annexed habitat and / or annexed species either during filling or subsequent landscaping*.'
Planning Reference: 20683 **Decision Date**: 08/11/2022 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: <5 m, as the crow flies, from the River Moy proposed works area.	Ciun Healthcare Ltd. Construction of a two-storey residential care home building providing for 91 no. single ensuite bedrooms, communal area, kitchen, treatment rooms, internal secure landscaped garden, all other associated rooms and entrance signage.	A Natura Impact Statement has been prepared which states that "*a series of pollution-prevention measures will be implemented during the construction of the proposed development as outlined in the CEMP for the development. These measures will avoid or minimise the risk of significant negative impacts upon aquatic habitats and fauna within the SACs and SPAs*."
Planning Reference: 20702 **Decision Date**: 15/05/2021 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: Approximately 475 m south-west of the Quignamanger proposed works area.	The Ice House Quignalecka, The Quay, Ballina Construct a relaxation room at the lower spa-level along the riverbank, construct a connecting walkway to the deck granted under 19209, install door from spa corridor to walkway, extend deck by 47 sqm further to that granted under 19209, make changes to planning permission 19209 as follows: relocate therapy pod and increase the size from 11.25 sqm to 15.30 sqm, add a second hot tub and place both on a raised deck area, construct a timber pagoda over tubs, place rock armour under the deck and all ancillary site works	The proposed development is within the Killala Bay/Moy Estuary SAC. A Natura Impact Statement has been prepared which states that "*with mitigation followed as described no significant impacts are expected."*
Planning Reference: 21358 **Decision Date**: 09/12/2021 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: Approximately 100 m north	Thawside Ltd Bunree Industrial Estate, Abbeyhalfquarter, Ballina, Co. Mayo Construction of a new steel framed commercial unit measuring 3,323	The Planners report states 'Significant adverse impacts on habitats and species within this Natura site cannot be ruled out, as the planning authority requires more details on operation. Therefore, further assessment is

Project Details	Applicant Name Development Address Brief Development Description	Comments
of the site compound at Abbeyhalfquarter.	sq.m. together with associated on-site car parking and connection to public foul and stormwater sewer and all other associated site development works	required in relation to habitats. There is no record of an NIS with the scanned documents.
Planning Reference: 21693 **Decision Date:** 19/01/2022 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: Approximately 10 m as the crow flies, from the Bunree/Behy Road proposed works area.	Joseph Bourke Construct nine detached residential units including for a new estate entrance road entering from Quignalecka road, a new public footpath, site lighting, signage, associated car parking, landscape and all ancillary site works.	The site is likely to be hydrologically connected with the Killala Bay/Moy Estuary SAC and SPA via public sewerage infrastructure. Condition 16 of the grant of planning states "*surface water shall be collected, and road gullies shall be provided in accordance with section 3.19 of Recommendations for Site Development Works for Housing Areas (R.S.D.W.H.A.) by the Department of the Environment & Local Government (D.o.E.L.G.). All gullies shall be fitted with suitable locking type covers or gratings. Surface water system shall be designed in accordance with S.U.D.S. and surface water attenuation shall be provided to restrict flows from development to greenfield run off levels. This figure is based on rainfall records and using formulae in "Institute of Hydrology Report No 124 and "Dublin Corporation Stormwater Management Policy for Developers". Developers shall submit calculations along with details of how this will be achieved to the Planning Authority for their written approval prior to commencement of development*."
Planning Reference: 21793 **Decision Date:** 19/12/2022 **Decision:** Granted with conditions **Location relative to Proposed Scheme:** Approximately 2.2 km upstream from the River Moy proposed works area.	Thawside Ltd. Friars Court, Laghtadawannagh, Killala Road, Ballina Construct 54 No. Houses consisting of 15 No. 3 bed detached houses, 14 No. 4 bed semi-detached houses, 14 No. 3 bed semi-detached houses, 6 No. 3 bed terraced house and 5 No. two bed houses including all ancillary site works and connection to public services	Due to the presence of Japanese knotweed on this site and the proximity of the Knockanelo stream to the development, a Japanese knotweed management plan (JKMP) and a Natura Impact Statement (NIS) were submitted as part of this application. A number of mitigation measures were included in the NIS to prevent deterioration of watercourses from both the construction and operational phases of the development. The NIS concluded that there will be no significant impact on any Natura 2000 sites. The JKMP put in place measures to safeguard against the spread of Japanese knotweed.
Planning Reference: 2193 **Decision Date**: 07/06/2022 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: Approximately 1.8 km west, as the crow flies, of the Quignamanger proposed works area.	Lisglennon AD Ltd. An anaerobic digestion (AD) biogas facility and associated gas pipeline. Comprising: renewable energy project consisting of an AD biogas facility using locally sourced silage & slurry as feedstock to generate biogas for export to the national grid.	The project is hydrologically linked to the Killala Bay/Moy Estuary SAC and SPA and River Moy SAC. Furthermore, there is an intersection between a number of farm holdings that form part of the project with European Sites. A Natura Impact Statement has been prepared which states that: "*mitigation measures have been outlined above that will aim to eliminate the potential for the project to result in the emission*

Project Details	Applicant Name Development Address Brief Development Description	Comments
		of contaminated surface water runoff and its discharge downstream to these European Sites. The mitigation measures outlined to manage and treat surface water runoff are in line with best practice methods for managing surface water runoff at construction sites and during the operation phase of the project. These measures have undergone extensive and rigorous monitoring for their effectiveness at development sites where they have previously been applied to ensure adverse environmental impacts are avoided. The mitigation measures outlined for the appropriate land-spreading of digestate, and soil conditioner by-products are also in line with current nitrates regulations and the Good Agricultural Practices Regulations." The NIS concludes "*based upon the information provided in this NIS, it is the considered view of its the authors that it can be concluded by Mayo County Council that the project, alone or in-combination with other plans or projects, will not result in significant adverse effects to the integrity and conservation status of European Sites in view of their Conservation Objectives and on the basis of best scientific evidence and there is no reasonable scientific doubt as to that conclusion*."
Planning Reference: 21968 **Decision Date**: 27/06/2022 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: Approximately 4.6 km south, as the crow flies from Tullyegan proposed works area.	Conn Rangers Mount Falcon Community Development Construct an Astro-turf pitch with associated fencing, ball stop netting, flood lighting, carparking area, playground area together with all associated site works.	An AA Screening report determined that AA was not required as no potential for significant effects upon any Natura 2000 site were identified to arise from the proposed development. The AA Screening states "*There will be no loss, fragmentation, disruption or disturbance of the Natura sites or their annexed species either directly or indirectly, associated with the proposed project. No negative changes to surface water quality (microbiologically, chemically, physically or quantitatively) are possible given that there are no direct or indirect discharges to or abstraction from surface water either during construction or with subsequent use*".
Planning Reference: 22797 **Decision Date**: 14/12/2022 **Decision**: Granted with conditions **Location relative to Proposed Scheme**: Approximately 800 m, as the crow flies, from the River Moy proposed works area.	B.O.M of Scoil Iosa Demolition of the existing school buildings, all associated out buildings, structure, play shelters and the 2. no derelict ruins located on the site boundary. Construction of a new 2 storey primary school with a total floor area of 2,786 sqm incorporating 13 classrooms, sen base, GP hall and ancillary accommodation. Revised	The project is hydrologically linked to the Killala Bay/Moy Estuary SAC and SPA and River Moy SAC. A Natura Impact Statement has been prepared which concludes that: "*No habitats of conservation importance are to be directly impacted on by the development. Indirect impacts, in particular water pollution, are addressed in this report through*

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	access from McDermott Street to provide vehicular drop-off, set-down and parking provisions on sites, associated hard and soft play surfaces to include a sensory garden, hard and soft landscaping, boundary treatments, bin and fuel storage, associated surface water attenuation, foul and surface water drainage connections, site works and all other ancillary services. The site adjoins the Sisters of Mercy Convent and School, which are protected structures.	*mitigation. … The conclusion is that with mitigation in place, no negative impacts on the conservation status of the Natura 2000 network and its associated habitats and species are anticipated as a result of this development. This project is considered to be in line with the requirements of the Habitats Directive*."
Planning Reference: 22322 **Decision Date**: n/a **Decision**: Pending, further information requested. **Location relative to Proposed Scheme**: Approximately 800 m, as the crow flies, from River Moy proposed works area.	McGrath Group Properties Demolition of existing Cheshire Home building, 2 no. external storage sheds, adjoining apartment unit and detached dwelling house; construction of 76 no. residential units; connection to all services and all ancillary site development works.	An AA Screening report determined that AA was not required as no potential for significant effects upon any Natura 2000 site were identified to arise from the proposed development. The AA Screening concluded "*It is of the opinion of the author that an AA of the proposed development is not required as it can be excluded, on the basis of objective information provided in this report, that the proposed development, individually or in combination with other plans or projects, will not have a significant effect on any European sites*."
Planning Reference: 22531 **Decision Date**: n/a **Decision**: Pending. **Location relative to Proposed Scheme**: Approximately 1.75 km upstream from the River Moy proposed works area.	Shuttington Holdings ULC Kilmoremoy, Killala Road, Ballina Demolition of existing petrol filling station, convenience shop and ancillary site features, construction of a part two storey building (c.529 sqm) comprising of retail area with ancillary off-licence use, ancillary food offer counter, seating area, toilets, offices and ancillary storage and food preparation areas, construction of a new forecourt with pump islands and forecourt canopy, installation of 2 no. 40,000L and 1 no. 25,000L underground fuel storage tanks, associated pipework and above ground fill points, construction of ancillary single storey storage building (c. 55sqm), installation of freestanding advertising sign, construction of all ancillary site features including screened storage compound, signage, boundary treatments, drainage systems, landscaping, car parking and associated site works.	The project is hydrologically linked to the Killala Bay/Moy Estuary SAC and SPA and River Moy SAC. A Natura Impact Statement has been prepared as part of an F.I. request which states: "*there will be no direct impacts on the River Moy SAC and Killala Bay/Moy Estuary SAC or the Killala Bay/River Moy Estuary SPA as a result of the implementation of the proposed project*" and "*the primary consideration in terms of source-vector-pathways for indirect impacts relates to surface water and potential indirect impacts on hydrologically linked habitats and aquatic species*". The NIS concludes: "*It is the conclusion of this NIS, on the basis of the best scientific knowledge available, and with the implementation of the mitigation and restriction measures set out under Section 3.6, that the possibility of any adverse effects on the integrity of the European Sites considered in this NIS (having regard to their conservation objectives), or on the integrity of any other European Sites (having regard to their conservation objectives) arising from the proposed development, either alone or in combination with other plans or projects, can be excluded beyond reasonable scientific doubt*".

Project Details	Applicant Name Development Address Brief Development Description	Comments
Planning Reference: 2253 **Decision Date**: 23/03/2022 **Decision**: Granted with conditions. **Location relative to Proposed Scheme**: Immediately adjacent to Quignamanger proposed works area.	Ballina Rugby Football Club Heffernan Park, Creggs Road, Ballina Redevelopment and extension of existing carpark, to include improved gradients, public lighting and access to clubhouse facilities. To construct new retaining wall and associated works to facilitate carpark upgrade, to increase the width of exiting vehicular access gate onto public road and construct new gate piers, carry out all ancillary site works.	The proposed development is hydrologically linked to the Killala Bay/Moy Estuary SAC and SPA. The following is extracted from the planners report: "*Significant adverse impacts on habitats and species within these Natura 2000 sites can be ruled out due to; existing development on site, the nature of the proposed project and in conjunction with the ecological nature of the SAC/SPA, along with its associated conservation objectives/qualifying interests. Therefore, further assessment is not required in relation to habitats*."
Planning Reference: 211376 **Decision Date**: 18/11/2022 **Decision**: Granted with conditions. **Location relative to Proposed Scheme**: Approximately 725 m upstream from the Quignamanger proposed works area.	IDA Ireland Construction of a new access junction onto the N59 including the provision of road markings to facilitate a right turn ghost island junction, an internal access road of approx. 340 m length of 7.0 m wide carriageway, internal junctions, verges, footpaths, site services and all associated siteworks within the 8.66-hectare site.	The proposed development is hydrologically connected with the Killala Bay/Moy Estuary SAC. A Natura Impact Statement was prepared which found "*potential for indirect effects related to discharges to the Quignamanger stream which flows west into the Moy estuary".* Mitigation and avoidance measures to protect European sites are set out in the NIS, which concludes "*it can be objectively concluded that the proposed development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site*".
Planning Reference: 23172 **Decision Date**: 23/05/2023 **Decision**: Granted with conditions. **Location relative to Proposed Scheme**: Approximately 1.4 km north-west, as the crow flies, from the Quignamanger proposed works areas.	River Moy Search & Rescue Ballina CLG Belleek Wood Duck Pond & Quignalecka Stream, Belleek Wood, Belleek, Ballina Development consists of a series of proposed leaky dams, a proposed sediment settlement pond, reprofiling of the banks of the main amenity pond, aquatic planting in both ponds and temporary construction access tracks including the removal of several mature trees which are in decline to facilitate construction access	An EcIA and NIS were submitted with this application and include mitigation measures to control sediment loss and surface water run-off to ensure no impact occur upon European Sites.
Planning Reference: 23370 **Decision Date**: 23/08/2023 **Decision**: Granted with conditions. **Location relative to Proposed Scheme**: Approximately 625 m south of the Tullyegan proposed works area.	Circle K Ireland Energy Ltd. Circle K Service Station, Foxford Road, Ballina, Co. Mayo A 75.1 sqm extension to the side and rear of the existing service station retail building, bringing it to a total of 164.9sqm, internal modifications and additions including an area for the sale of alcohol for consumption off the premises (i.e. off-licence use) of 11.8sqm, which is ancillary to the primary retail use and results in an increase in net retail floor area of 30.3sqm (to bring it to a total of 69sqm), a deli area which will include the sale of hot and cold food for	An AA Screening report prepared for the project states that the development does not pose any risk of significant adverse effects on Natura 2000 sites, and that the development does not require progression to a Stage 2 AA (Natura Impact Statement).

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	consumption off the premises and staff facilities and customer toilets, the extension of forecourt fuel area incorporating an extended forecourt canopy and 1 no. additional fuel pump island, the provision of new car parking spaces, relocation of overground tanks, new signage, a new access exit arrangement and all other associated drainage and site development works	
Planning Reference: 2360261 **Decision Date**: 23/08/2023 **Decision**: Granted with conditions. **Location relative to Proposed Scheme**: Intersects the Proposed Scheme at the Bunree/Behy Road proposed works area.	Eirgrid PLC Townlands of Gorteen, Ardoughan, Kilemoremoy, Belleek, Ballina, Quignalecka, Quignashee, Ballyholan, Behy More, Corimla South, Carrownlabaun, Bunnyconnellan West, Rathreedaun, Drumsheen and Bunnyconnellan East, Co. Mayo. Uprate of the 110 kV circuit between Glenree 110kV Substation in the townland of Bunnyconnellan East, Co. Mayo and Moy 110kV Substation in the townland of Gorteen Co. Mayo.	The NIS submitted with the planning application stated that subject to the application of the mitigation measures outlined in the NIS, it can be concluded that there will be no adverse effects on the integrity of any European Site either alone or in-combination with other plans or projects.
Planning Reference: ABP 313724 **Case Type:** Electricity Development Application **Decision Date**:15/09/2023 **Decision**: Approved with conditions **Location relative to Proposed Scheme**: Approximately 700m and 1.4km, as the crow flies, from the Tullyegan and River Moy main channel proposed works areas respectively.	EirGrid Plc 'North Connacht Project' consisting of approximately 59 kilometres of underground cable between the existing Moy substation, near Ballina, Co. Mayo and the existing Tonroe substation, near Ballaghaderreen, Co. Roscommon	The proposed development is located within the River Moy SAC and is hydrologically connected to Killala Bay/Moy Estuary SAC/SPA. A NIS has been prepared for the proposed development which concludes: "*The mitigation measures detailed in Section 3. 5 of this NIS will ensure no adverse effects on the integrity of any European sites in light of the site's conservation objectives*
Planning Reference: N/A – not yet submitted. **Decision Date**: N/A **Decision**: N/A **Location relative to Proposed Scheme**: Overlaps with the redline boundary along Cregg's Road	Uisce Éireann Ballina and Lough Talt Water Supply Upgrade Project which will ensure a reliable and sustainable water supply for Ballina, Bonniconlon, Tubbercurry and surrounding areas as well as allowing for future social economic growth and development in the region.	This proposed project will intersect with the Killala Bay/Moy Estuary SAC and Killala Bay/Moy Estuary SPA. As such an AA Screening/NIS will be prepared as part of the planning process to ensure no adverse effects on the integrity of any European Site.

The Forestry Licence Viewer[11] indicates that there is numerous afforestation, forest roads, private clear-fell and thinning, Coillte clear-fell, Coillte thinning and reconstitution and underplanting licences either pending or approved in the River Moy catchment.

No relevant foreshore applications were identified that could result in an in-combination effect with the proposed development.

6.5.4 In-combination conclusion

Having regard for the above, there are multiple developments within the Ballina area, some of which have not been subject to Appropriate Assessment Screening, which are likely to be hydrologically linked to the River Moy SAC, Killala Bay/Moy Estuary SAC and Killala Bay/Moy Estuary SPA (for example via public

[11] https://forestry-maps.apps.rhos.agriculture.gov.ie/ [accessed 23/02/2023].

sewerage infrastructure). Urban run-off, as well as anthropogenic, agriculture and river hydromorphology pressures have been identified as significant pressures in parts of the River Moy and its tributaries in the Ballina area by the EPA[12]. Agriculture, domestic wastewater, and urban wastewater pressures have been identified as significant pressures in the Moy Estuary by the EPA. Two pressures listed for Killala Bay/Moy Estuary SAC and River Moy SAC with relevance to the current assessment are:

- Diffuse pollution to surface waters due to household sewage and waste waters
- Flooding and rising precipitations

With respect to these, the Proposed Scheme is expected to reduce intermittent uncontrolled flooding in the urban and wider Ballina area. This is likely to contribute to water quality improvement in the long term by reducing contamination of flood water and storm water with sewage/wastewater. This would likely result in long-term positive effects on aquatic habitats that support QI species otter, white-clawed crayfish, salmon, sea lamprey, brook lamprey and harbour seal, QI habitats and SCI bird species of the estuarine River Moy.

The examination of changes to instream hydraulic conditions as a result of the Proposed Scheme shows there will be no significant change to hydromorphology of the River Moy and Brusna (Glenree) River with respect to fisheries habitats (see **Section 6.4**). This means that bed substrate mobilisation, transport and deposition patterns will not significantly alter over baseline conditions. Consequently, instream habitats will be subject to imperceptible, if any, physical modification in terms of: (1) sea lamprey spawning substrates in a discrete area of the Ridgepool and discrete patches of lamprey nursery habitat in the Ridgepool and river margin habitat downstream of the N59 Lower Bridge. The Proposed Scheme, therefore, does not contribute to any potential in-combination pressure on river hydromorphology.

It is considered that in the absence of mitigation waterborne pollutant discharge (sediment, hydrocarbons, concrete) during the construction phase of the Proposed Scheme could combine with discharges from other localised construction projects, increasing concentrations (e.g., of suspended solids) intermittently. In a worst-case scenario temporary to short term, significant, negative in-combination effects on QI species (salmon, lamprey, otter, harbour seal, white-clawed crayfish), SCI bird species and marine QI habitat may result in the form of habitat sedimentation and adverse physical/physiological effects on QI/SCI species and/or their prey items.

There is potential for in-combination effects in conjunction with ongoing OPW Arterial Drainage Maintenance. Drainage works that involve physical removal of substrates (dredging) cause disturbance, mortality and localised decline in density of aquatic biota with recovery taking up to a number of years. In-combination effects on QI fish species may be significantly negative if such works occurred in channels at the same time as flood relief construction (especially instream works). In this respect, it is noted that the Lower River Moy and the Brusna (Glenree) River are swift and predominantly eroding in the areas where instream works are proposed and would not be subject to dredging as they are largely self-maintaining. Elevated suspended solids arising from the Proposed Scheme in the construction phase in combination with localised channel dredging may cause enhanced negative effects on aquatic biota related to sedimentation of salmon and lamprey spawning areas and adverse physical/physiological impacts on QI fish. Significant negative effects are possible, if dredging occurred at the same time as construction works on locally hydrologically connected OPW channels as follows:

- Moy – Lower C1 between Tullyegan C1/7 confluence and Brusna C1/5 confluence.
- Brusna (Glenree) – C1/5 between C1/5/5 confluence in townland of Behymore and River Moy confluence including no dredging in tributaries C1/5/1, C1/5/2, C1/5/3 and C1/5/4.
- Tullyegan – Lower C1/7 in townland of Commons.

Likely significant in-combination effects can be mitigated as set out in **Section 7**.

[12] https://gis.epa.ie/EPAMaps/Water

7 MITIGATION

7.1 Construction Phase Mitigation Measures

7.1.1 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.

7.1.2 Contractor's 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.

7.1.3 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 , 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 reporting 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.

7.1.4 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 NIS 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.
- In addition to the fencing of the Proposed Scheme boundary 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.
- 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.

7.1.5 Consultation with Inland Fisheries Ireland

It is normal practise that IFI be given an opportunity to review the detailed Construction Method Statement (CMS) post-planning, in advance of works commencing. In this regard, a detailed CMS for each area of instream and bankside works as part of the scheme shall be prepared by the contractor and submitted to IFI for final approval, noting that IFI have agreed in principle to all proposed works and have been consulted numerous times through the planning phase. Relevant staff in IFI Ballina must be consulted by the contractor prior to commencement of any instream works in each of the channels, providing an opportunity to refine the CMS in compliance with the Schedule of Environmental Commitments, updated subject to planning conditions. Any further requirements deemed necessary to comply shall become part of the CMS and be agreed with the IFI no less than 6 weeks in advance of construction works commencing.

Importantly, the contractor must hold consultation meetings with staff of IFI Ballina in advance of works commencing on the main channel of the Moy, particularly concerning the Ridgepool and Cathedral Pool stretches where there are:

1. Timing restrictions in recognition of their fisheries status (**Table 7-1**).
2. Fisheries enhancement measures to be incorporated in the Ridgepool while the access ramp is in place on the LHS between Ballina Manor Hotel and Otter's Lodge Apartments.

The initial consultation meeting with IFI must be held in the early stages of project scheduling so that angling timing restrictions can be adhered to by both parties, and so that IFI have full awareness of finalised details of the construction works schedule relating to individual elements of the Proposed Scheme.

Table 7-1: Timing Restrictions

Watercourse	Watercourse Reach and Type of Works	Timing restriction (work allowed)
River Moy	Instream work (Ridgepool LHS (in front of Ballina Manor /apartments and IFI Building) and Instream work (Ridgepool RHS at Ridgepool Road)	See bespoke timing restriction details set out in **Section 7.1.12**, below (Mitigation: Specific River Moy (Ridgepool) Measures).
River Moy	Out of bank works on Ridgepool and Salmon Weir, e.g., road and footpath resurfacing and out of channel finishing works (i.e., no instream incursion or footprint),	No timing restrictions with regards to fisheries habitat protection, but IFI require no disturbance to angling amenity of Ridgepool until August 1st of Year 1 of construction programme.
Moy Estuary	Instream works downstream of N59 Lower Bridge, both banks (Bachelor's Walk and Clare Street).	No timing restriction: work occurs in Transitional Water and does not affect salmonid spawning/nursery or sea lamprey spawning waters, but IFI require no disturbance to angling amenity of Cathedral pool beat until August 1st of Year 1 of construction programme.
Moy Estuary	Works over or near water (not encroaching instream) adjacent to Cathedral Pool and downstream of N59 Lower Bridge (Bachelor's Walk and Clare Street)	No timing restriction
Quignamanger	All instream works (culvert replacement, bed regrading)	May 1st to September 30th
Quignamanger	Works near water (flood wall construction along existing open section)	No timing restriction for works above water so long as there is no instream incursion
Bunree	All instream works for culvert replacement and installation	May 1st to September 30th
Brusna (Glenree)	All instream works relating to Rathkip/Shanaghy Bridge upgrade	July 1st to September 30th
Brusna (Glenree)	Works 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
Tullyegan	Works near water (set back embankment construction)	No timing restriction for works above water so long as there is no instream incursion

7.1.6 Pre-Construction Surveys

In advance of enabling works for the Proposed Scheme, the ECoW will complete preconstruction confirmatory surveys of selected ecological features whose distribution is dynamic over time, and which are known to have potential to occur within the ZoI of the Proposed Scheme works. These surveys will update the findings of the surveys completed to date (as set out in **Section 5.1.6** above). This will include:

- Pre-construction surveys by an experienced ecologist will be carried out for otter within all areas within 150 m of the Proposed Scheme. 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, for instance, otter surveys can be undertaken at any time of the year, however, timing surveys when riparian growth is not fully established or has died back or after a period of prolonged dry weather may be preferable as otter signs can be more easily spotted during these conditions. Otter surveys will be carried out in accordance with NRA guidance (NRA, 2008a, 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 be required.
- Pre-construction surveys by an experienced ecologist will be carried out for Third Schedule IAPS within the ZoI of the Proposed Scheme i.e. 100m from the redline boundary. These will be undertaken in a representative season(s) (i.e. spring and summer) to ensure accuracy. Invasive species will be carried out having regard to guidance of Transport Infrastructure Ireland (TII 2020a, TII 2020b).
- A season (i.e. October through March) of overwintering waterbird usage of the River Moy and River Moy Estuary adjacent to the Proposed Scheme shall be carried out prior to construction to ascertain if minimal usage of these areas 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 NIS 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.

7.1.7 Invasive Alien Plant Species Management

7.1.7.1 Terrestrial measures

A number of third schedule IAPS (Japanese knotweed, rhododendron, hybrid bluebell, Spanish bluebell and three-cornered leek) were recorded across the Proposed Scheme. The locations of which are outlined in **Appendix I** and **Appendix J.** The presence of non-native invasive species within the study area provides the potential for the spread of these species by the proposed works. These species are highly invasive and out-compete native flora to form single species stands. In the case of Japanese knotweed, its presence along watercourses is particularly significant, as contaminated soil or vegetative material washed from an infected area can result in the spread of this species downstream. Appropriate mitigation measures including management and control measures are required within the proposed works area where each of these species are encountered for the prevention of spread of these species.

The Local Authority shall appoint a suitably qualified contractor to deal with any Third Schedule Invasive Alien Plant Species within the proposed works areas prior to any works commencing. This specialist will prepare an Invasive Alien Species Management Plan (IASMP) that will be followed during the treatment of the IAS identified 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. 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).

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. Machinery shall be washed down on permeable material such as terram which will collect any IAPS fragments. This permeable material shall then be disposed of at a facility licenced to accept IAPS contaminated material. 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.

7.1.7.2 Aquatic Measures

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 will be employed 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. Personnel working instream will be made aware of potential for presence of aquatic invasive species (crayfish plague) and strict biosecurity measures will be applied, primarily using the Check/Clean/Dry protocol (Check Clean Dry - Invasives.ie).. 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. If drying is not possible, then the disinfection protocol as set out in Caffrey (2010) is to be followed. Biosecurity facilities shall be installed on-site prior to site works commencing within the site compound. Any personal protective equipment (PPE), footwear, 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 and disinfecting of footwear and other equipment prior to arrival on site and on leaving site. This will be in the form of a handheld spray pump filled with a suitable disinfectant (such as Virkon ® Aquatic) to thoroughly douse clean footwear and equipment before deployment to a different location. There shall be an area where brushing can be directed into a dedicated and contained area. Washdown water will not be allowed to enter surface water bodies. New machinery or equipment for instream works, e.g., pumps, shall be thoroughly cleaned and disinfected (including all those lines and tanks) as they arrive on site to prevent import of alien crayfish species or crayfish plague. Vehicles leaving the site will 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 will not be abstracted from the River Moy for cleaning. A sign-off sheet shall be maintained by the Contractor to confirm cleaning and disinfection.

7.1.8 Mitigation Measures for Noise and Vibration during Construction Activities

A range of measures will be implemented during construction works to mitigate the noise impacts where possible.

7.1.8.1 General Mitigation

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.
- 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 operations 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 permissible 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.

7.1.8.2 Rock Breaking and Consaws

Full acoustic screening of rock breakers and consaws, in the form of site hoarding or temporary noise barriers will be used to block line of site from rock breaking or consaw activities where noise sensitive locations 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.

7.1.9 Environmental Incidents and Accidents

7.1.9.1 Use of Concrete, Fuel, Oils or Chemicals (Accidental Spillage)

Construction activities and GI works 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.

These measures will ensure soil and groundwater, and adjacent watercourses remain free from pollution:

- 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.

The CEMP will include an emergency plan to deal with accidental spillages.

7.1.9.2 Damage to Flora and Fauna

- 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.
- Mitigation measures will be put in place to manage the incident.

7.1.10 Otter Specific Mitigation Measures

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase effects on otter:

- Pre-construction Surveys (**Section 7.1.6**) which will ensure the baseline is kept up to date with respect to otter activity across the Proposed Scheme.
- Invasive Alien Plant Species Measurements (**Section 7.1.7**) which will ensure that otter habitat is not degraded via the presence of IAPS.
- Mitigation Measures for Noise and Vibration (**Section 7.1.8**) which will ensure that disturbance of otter via noise and vibration is eliminated or kept to a minimum.
- Environmental Incidents and Accidents Measures (**Section 7.1.9**) which will ensure that otter and otter habitat is not affected by a pollution event.
- Water Protection Measure (**Section 7.1.12**) which will ensure that otter, otter habitat and otter prey species are not affected by a water pollution event.

In addition to the above mitigation measures, the following otter specific mitigation measures described in the following sections will be implemented:

- Derogation Licencing (**Section 7.1.10.1**)
- Measures for Dealing with Otter Holts (**Section 7.1.10.2**)
- Measures Regarding Loss and Disturbance of Otter Habitat (**Section 7.1.10.3**)
- Measures to Protect Against Mortality (**Section 7.1.10.4**)
- Watching Brief During Site Clearance (**Section 7.1.10.5**)
- Tall Herb Swamp Measures (**Section 7.1.10.6**)

7.1.10.1 Derogation Licensing

The current baseline indicates that derogation licencing will be needed for otter as a holt was observed within 10 m of the Proposed Scheme boundary along the River Brusna while two couches were observed within the proposed works area along Clare Street.

However, mindful of the mobile nature of otter, 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.

7.1.10.2 Mitigation Measures for Dealing with Otter Holts

No construction personnel or machinery will be used within 150 m of otter holts unless subject to the provisions of a derogation licence. The location of otter holts is to be confirmed during the pre-construction survey. During the pre-construction survey, otter holts located within the Proposed Scheme boundary or within 150 m of this boundary will be clearly identified to all personnel working in the vicinity of the holt. Temporary boundary tape fencing (or similar) can used at the discretion of the ECoW to identify such holts

subject to such measures themselves not impacting on the use of the holt. Neither blasting nor pile-driving will be undertaken within 150 m of active holt during the breeding season, unless subject to provisions of a derogation licence.

It is assumed that all active holts at the time of construction and within very close proximity to the Proposed Scheme boundary will need to be handled in accordance with a derogation licence. Currently, a single active holt has been identified within 10 m of the Proposed Scheme boundary at the Brusna proposed works area. Works along the Brusna, therefore, will need a derogation licence. The destruction of this holt is not anticipated due to the proposed works, however, given the close proximity to the proposed works area, the works are expected to temporarily impact upon the use of this holt by otter, but it will become available for use again once the works are finished.

In the event that holts 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, 2008b). The need for further licencing is to be determined by the ECoW during pre-construction surveys and if any holts 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 will be carried out under the supervision of an appropriately qualified ecologist under licence from the NPWS. The locations of such holts will be determined by the ECoW in liaison with the Contractor and the requirement of any derogation licence.

As works along the Brusna are likely to make the existing holt unfavourable for use by otter, two artificial holts will be created to provide alternative resting areas for otter while works are ongoing. These two holts are to be located along the left-hand bank of the River Brusna downstream of the Rathkip/Shanaghy bridge and will remain in place once works cease. The design of these holts is outlined in **Appendix O**.

7.1.10.3 Measures Regarding Loss and Disturbance of Otter Habitat

Two couches were recorded within tall herb swamp along Clare Street. Measures for the protection of tall herb swamp (**Section 7.1.10.6**) will ensure no large-scale loss of otter resting spots for a prolonged period of time along the main channel of the River Moy. Both couches will be removed during the proposed works, however, couches are generally transitory in nature, with otter using a number of these resting spots across their territory. Tall herb swamp is present for an approximate length of 285 m along Clare Street. Mitigation for this habitat stipulates that works within this area are to take place for a maximum length of working area along which can be undertaken in 1 working week, with works on additional areas not to commence until works on previous areas have been completed and tall herb swamp habitat reinstated. It is considered that this programme of works will allow sufficient area of tall herb swamp undisturbed at any one time for otter to use as couching spots and will not result in the total loss of this area for otter use.

Otter along the Brusna and Tullyegan are most likely to be active at night, therefore night-time (including dawn and dusk) works along these areas will be avoided. The baseline data also indicates that otter are very active along the main channel of the River Moy and a live otter was observed during daylight hours at Ballina Quay during surveys indicating that otter within this area are not necessarily most active at night. Accordingly, restricting work hours to daylight hours along this area (i.e. Quignamanger and River Moy) will not necessarily avoid otter activity. Nonetheless, 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 shall 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. Any compound areas which are to be light up during the night will also use directional lighting to avoid light-spill to adjacent watercourses.

Planting of trees will be undertaken for the Proposed Scheme to help minimise any effects of loss of riparian woodland due to the creation of flood defences. Planting will consist of the same species lost with trees sourced to be of Irish native provenance. This planting will provide woody riverbank cover in a number of areas where currently no or sparce cover exists, including on the section of the River Brusna where the holt was identified, providing additional privacy for otters utilising this holt. The areas where planting is to occur are identified in **Appendix A**.

7.1.10.4 Measures to Protect Against Mortality

A watching brief during vegetation clearance as detailed in **Section 7.1.10.5** will help protect against mortality of otter.

Any excavations greater in depth than 30 cm 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. This to prevent the entrapment of otter within the excavations and/or to enable their escape from the excavation.

7.1.10.5 Watching Brief during Site Clearance

All vegetation removal shall be monitored by the ECoW to ensure there is no disturbance of otter. If disturbance occurs, the ECoW will contact the NPWS.

Where dense vegetation or inaccessibility prevents adequate determination of the presence or absence of otter holts as part of the pre-construction surveys, these areas will require monitoring during vegetation clearance to ensure that any holts present will be found and treated appropriately.

7.1.10.6 Tall Herb Swamp Measures

Two otter couches were recorded within tall herb swamp along Clare Street. The measures set out below will ensure no large-scale loss of otter resting spots for a prolonged period of time along the main channel of the River Moy.

- In so much as possible, 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. Silt fencing (see **Section 7.1.12.2**) is also to be erected along this boundary to prevent any potential siltation of nearby watercourses.
- At any one time a maximum length of working area along Bachelors Walk and Clare Street which can be undertaken in 1 working week, is to be implemented. Works on additional areas will not commence until works on previous areas have been completed and tall herb swamp habitat reinstated (see next point).
- Where tall herb swamp habitat is to be disturbed by flood wall or culvert construction, turves are to be collected from the areas to be disturbed and stored on bog mats within adjacent working areas in a single layer i.e. no stacking of turves is to occur. The turves to be removed will be approximately 2m x 1m x 0.5m deep and will be collected with the use of a specially designed excavator bucket to lift and place the turves carefully on to bog mats so that they do not break up. The storing of turves on bog mats will facilitate their later removal and reinstatement without damaging the underlying habitat. Turves will be monitored during storage, and they will be watered when required to keep them moist. The depth of turves proposed is in line with practice elsewhere (Anderson, 2003), where in a wetland situation, the turf depth extracted for translocation was between 50 and 80 cm, depending on rooting depth. The deeper the turves, the greater likelihood of vegetation recovery. Turves will be stored for no more than 1 working week and measures will be implemented to ensure no erosion of tall herb swamp habitat or turves occurs while works are ongoing e.g. monitoring of weather forecasts to ensure works are avoided during periods of heavy rainfall, monitoring of tides to ensure habitat area does not flood while works are ongoing etc. The area where turves are to be taken and reinstated will not be traversed by machinery prior to or after works to ensure compaction does not occur to help facilitate recovery post reinstatement. Anderson (2003) recommends that all turf translocation should take place in the dormant season for terrestrial habitats, therefore, the best time for undertaking works where sections of tall herb swamp are to be disturbed is during the autumn or early winter. This timing ensures that soils will be at their field capacity with maximum cohesiveness without containing excess water which will facilitate habitat recovery after reinstatement.

- Ground protection mats shall be used at all areas of tall herb swamp where turve extraction is not necessary e.g. access routes for personnel (if required) to prevent compaction and erosion of this habitat.
- 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.

7.1.11 SCI Bird Species Specific Measures

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts to SCI bird species:

- Water Quality Protection Measures (**Section 7.1.12**) which will ensure that SCI bird species, SCI bird species habitat and SCI bird species prey items are not affected by a water pollution event.
- Environmental Incidents and Accidents Measures (**Section 7.1.9**) which will ensure that SCI bird species and SCI bird species habitat is not affected by a pollution event.
- Invasive Alien Plant Species Measures (**Section 7.1.7**) which will ensure that SCI bird species habitat is not degraded via the presence of IAPS.
- Noise and Vibration Measures (**Section 7.1.8**) which will ensure that disturbance of SCI bird species via noise and vibration is eliminated or kept to a minimum.

7.1.12 Water Quality Protection Measures

7.1.12.1 General Water Quality Protection

General mitigation measures and controls relevant to water are listed below:

- Limit suspended solids from entering watercourses by placing controls at all sources and pathways including, at a minimum, the following measures:
    - Placing silt fencing (see **Section 7.1.12.2**) between works areas and pathways to watercourses.
    - Passing sediment-laden runoff and dewatering effluent through settling tanks and silt bags before allowing discharge to watercourses. Discharges will not result in suspended sediment exceeding 25 mg/l in receiving waters and will be between 6 and 9 ph.
    - 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).
    - Stockpiling only allowed in designated areas.
    - 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 1 m 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 cementitious particles from entering watercourses by placing controls at all sources and pathways including, at a minimum, the following measures:
  - 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 from entering watercourses by placing controls at all sources and pathways including, at a minimum, the following measures:
  - 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 entering watercourses due to wall construction by:
  - Edge protection along the riverfront or a floating boom cordoning off an area of the river below the works to be implemented to prevent debris entering the river.
- Flood preparedness:
  - Checking water levels at Rahans gauge on a daily basis or twice daily during times of high flow when works are occurring in the vicinity of the River Moy.
  - Monitoring the tide forecast.
  - Developing an emergency response and evacuation procedure for all works areas including removal of potential contaminants and construction plant.
- Miscellaneous:
  - 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 stored and tankered away for treatment as needed.
- Construction sequencing to proceed from downstream to upstream on all watercourses.
- Customers to be notified in advance of watermain outages to allow time to prepare.

- Measures that have been incorporated into the design:
  - 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.
  - 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.
  - The bridge parapet to be installed on the Brusna will be prefabricated to reduce the risk of cementitious pollution on site.
  - 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).

7.1.12.2 Silt Fencing Specifications

- The bottom edge of the geotextile silt fence material must be installed to a 200mm embed below ground level.
- Stakes should be placed at the ends, on any bends, and at 2m intervals along the silt fence. Stakes need to be driven a minimum of 400mm to provide adequate support.
- The silt fence must have a tensioned wire backing - a minimum of 2 lines of wire run along the stakes. The top wire is used to clip the geotextile onto to hold it up and provide strength against trapped sediment.
- Silt fences need to be checked and maintained weekly at minimum, and always before any forecasted heavy rain event.

7.1.12.3 Embankment Settlement

Soft soils will be removed during the construction of embankment 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. 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. To prevent suspended sediment runoff a barrier method such as a sediment barrier or silt fence (see **Section 7.1.12.2**) will be placed on the river side of the embankment. This barrier/fence will not be removed until all soil is revegetated. Permanent cut-off ditches on the land side of the embankment will be used to prevent over land flow. Ensuring that a Construction Environmental Management Plan (CEMP) is in place will mitigate any risks associated with embankment construction activities, thus reducing these impacts to an Imperceptible level.

7.1.12.4 Infiltration of Surface Runoff

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 (TII, 2013). 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. Care will be taken in reworking this material to minimise the effects of weathering, dust generation, groundwater infiltration and generation of runoff. 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.

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.

Ensuring that a CEMP is in place will mitigate any risks associated with the removal of superficial deposits and/or bedrock, thus reducing these impacts to an imperceptible level.

7.1.12.5 Loss of Soil and Bedrock Reserves

Where possible the removal of topsoil will be avoided (except from where topsoil will be covered by 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/ 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 form part of the CEMP and will be developed further by the Contractor prior to the commencement of work. 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. The CEMP will provide appropriate measures for mitigating against ingress of groundwater during excavation works for foundations and trenches such as pumping out groundwater and/or rainfall with a sump pump. 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 in order to achieve acceptable settlement limits.

7.1.12.6 Impact to Aquifers (Loss of Aquifer and/or Increase of Aquifer Vulnerability)

The mitigation measures set out above under **Section 7.1.12.5** will mitigate against loss of aquifer and/or an increase in groundwater vulnerability.

7.1.12.7 Encountering Contamination

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 site 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.

7.1.12.8 In-Channel Works (Dewatering)

Where dewatering is required to facilitate culvert upgrades, works will be undertaken during low water 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.

The extent of dewatering from cofferdam areas is limited by using smaller sections (50m reaches in the Ridgepool RHS) and the volumes will be small and local in nature over a short timeframe in terms of groundwater and is therefore not expected to result in any significant impact on groundwater levels. Treatment of river ingress water to cofferdams is addressed in **Sections 7.1.12 to 7.1.14** (below). In order to mimic the naturally occurring substrates, river margin reinstatement measures prior to cofferdam removal are set out in **Section 7.1.13** and **Section 7.1.14.**

There will be no direct discharge of surface water from any element of the works without suitable attenuation and treatment of sediments. New culverts and culvert upgrades are required to be constructed in accordance with the requirements of the Office of Public Works (OPW) and IFI.

7.1.13 Specific River Moy (Ridgepool) Measures

Potentially Significant Impact Category Identified	Mitigation
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 timing restriction:** see details of bespoke timing restrictions set out in **Row 4** of this table regarding instream works in the vicinity of Ridgepool Points RP2A and RP8 to RP8A (see **Appendix F** for locations).
2. General water quality protection to protect aquatic habitats	• Adhere to water quality protection measures set out in Sections 7.7.10, above.
3. Access ramp construction LHS in front of Ballina Manor / apartments and IFI Building	• The LHS temporary access ramp will 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 similar (such as clean, rock filled reno-mattresses) - which will deliver the same function and effectiveness. Rock bags are a type of flexible rock gabion that can be placed on top of each other to form a base, which can 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 20-22 months, a robust, non-erodible solution such as this is required as the construction is within the SAC and adjacent to an iconic fisheries pool and angling amenity. • Use of Rockbags (or product of similar function and effectiveness in terms of being non-erodible) will also serve to protect the composition of underlying benthic substrates, such that when the access ramp is removed the overlying bags can be lifted without the need to excavate, leaving the underlying substate and benthic topography largely unaltered in terms of sediment size class and bed profile, which can then recolonise with algae and aquatic mosses similar to baseline conditions.
4. Protection of potential sea lamprey spawning habitat at Sites RP2A (LHS) and RP8-RP8A	• Although there are no potential lamprey spawning habitats directly affected by the temporary works areas in the Ridgepool (see **Appendix F**: **Ridgepool Instream Survey**), on a precautionary basis there are two discrete areas (Sites RP2A and RP8-RP8A, see locations in **Appendix F**) in proximity to the outer margins of the proposed

Potentially Significant Impact Category Identified	Mitigation
(RHS) (see Appendix F for locations)	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 F**). Water temperature must be taken by the ECoW to ensure it is below 15ºC. 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 15ºC, 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: (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

Potentially Significant Impact Category Identified	Mitigation
	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.
5. 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.
6. 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 F**) will be cordoned off marking the area as an exclusion zone. • A line of silt fencing (see **Section 7.1.12.2**) 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 Annex II larval lampreys (sea, brook) and the importance of protecting the RP5 area from disturbance.
7. 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 F**) 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

Potentially Significant Impact Category Identified	Mitigation
	so that lamprey ammocoetes can be collected and released. Juvenile lamprey will quickly re-burrow into suitable substrates once relocated (King, et al., 2008)
8. River margin reinstatement prior to cofferdam removal – Ridgepool RHS (Ridgepool Road) and LHS on "groyne" area adjacent to Otters Lodge Apartments	• If there are excavations to be carried out within the cofferdams, the top 30 cm of naturally occurring substrates will be scraped off and stockpiled for reinstatement before cofferdam removal. These substrates shall also be used to gauge the size of replacement substrate material for reinstatement works prior to cofferdam removal. Thus, reinstated substrates will be of the same size classes as the pre-existing condition and will facilitate sediment deposition patterns equal to baseline for regrowth of aquatic plants at the river margin. • Prior to removal of cofferdams on the RHS of the Ridgepool the river margin areas must be reinstated inside the cofferdam using a combination of the retained substrates (as above) and locally sourced, clean, calcareous substrates of cobble that is approved by IFI and that broadly mimic the naturally occurring substrates. IFI carry out other river improvement works in the catchment using locally sourced cobble/gravel materials and as such they are 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. • Prior to removal of cofferdams on the LHS of the Ridgepool on the "groyne", the area must also be reinstated inside the cofferdam using approved, locally sourced, clean, calcareous cobble and pebble that is approved by IFI and that broadly mimics the naturally occurring substrates. As 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 overseeing the above reinstatement measures for the River Moy channel margins within the Ridgepool in conjunction with IFI Ballina. • Reinstatement within the cofferdam shall 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. • Cofferdams shall be removed beginning downstream and working in an upstream direction beginning at low tide and working through to the high tide to slowly submerge the newly reinstated river margin areas. This is to avoid wash-out of newly reinstated substrates owing to strong river flows from the upstream end at low tide.
9. Management of ingress water (Cofferdams on the River Moy)	• On-site pumps must be present to dewater, as required, at cofferdam containment areas in order 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 to an appropriate standard 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 settlement/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).

7.1.14 Specific River Moy (Downstream of N59 Lower Bridge) Mitigation Measures

Potentially Significant Impact Category Identified	Mitigation
Timing Restrictions	• No timing restrictions on instream works as habitats are within the transitional water.
General water quality protection to protect aquatic habitats	• Adhere to water quality protection measures set out in **Section 7.1.12**, above.
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. • However, in the 120 m LHS reach downstream of the Lower Bridge adjacent Bachelors Walk cofferdams are likely to be required as the berm is narrow from where 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. • 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 rip-rap 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 secure line of silt fencing (see **Section 7.1.12.2**) 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 rip-rap 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 **Section 7.1.10.6**, to ensure that FS2 tall herb 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

Potentially Significant Impact Category Identified	Mitigation
	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 overseeing 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.

7.1.15 Specific Brusna (Glenree) Mitigation Measures

Potentially Significant Impact Category Identified	Mitigation
Timing Restrictions	• Instream works period is stipulated by IFI as July 1st to September 30th of any year. • Work near or over water within the SAC, e.g., embankment construction, is stipulated to occur May 1st to September 30th of any year.
General water quality protection to protect aquatic habitats	• Adhere to water quality protection measures set out in **Section 7.1.12**, above.
Sediment loss controls during embankment construction - Brusna (Glenree)	• There must be a line of well-secured silt fencing (see **Section 7.1.12.2**) 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 (see **Section 7.1.12.2**) 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 (see **Section 7.1.12**). 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

Potentially Significant Impact Category Identified	Mitigation
	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 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 work area along while also retaining fish passage throughout the works period. • Cofferdams can be constructed of small or large geotextile bags filled with clean sand. Larger bags must be filled with individual smaller sandbags to add an extra layer of protection. 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 Rathkip/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 (see **Section 7.1.12.2**) 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. A sample of the final discharge effluent will be taken by the ECoW to ensure suspended solids (SS) concentration does not exceed 25 mg/l. Additional settlement volume (extra tank in series) will be implemented in such case that the effluent exceeds 25 mg/l SS. These mitigations will be overseen by the ECoW.
Design Measures to be incorporated during construction	• Refer to **Section 7.2.2**, below, for design measures to be implemented during the construction phase that relate 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.

7.1.16 Specific Measures for White-clawed crayfish

Potentially Significant Impact Category Identified	Mitigation
General water quality protection to protect aquatic habitats and species	• Adhere to water quality protection measures set out in **Section 7.1.12**, above.
Instream works Rathkip/Shanaghy Bridge and Tullyegan Stream	• During initial water drawdown within the areas of water management (cofferdams on Brusna River and 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 to the channel upstream of the works area. This is a once off operation at each site (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. Similarly, the Brusna will be reinstated with appropriate clean, washed gravel and cobble, however that only applies upstream and downstream of the bed reinforcement reach (which is being replaced like-for like).

7.2 Operational and Maintenance Phase Mitigation Measures

7.2.1 General Operational and Maintenance Phase Mitigation Measures

OPW Guidance will be adhered to for periodic maintenance and/or repair of flood defences.

An Operation and Maintenance Manual (O&M Manual) will be developed for Mayo County Council with the input of an ecologist and will include an inspection and maintenance regime of all flood defence infrastructure. Maintenance activities may include structural repairs, culvert inspection and jetting, vegetation management, channel maintenance and pumping station maintenance.

To account for climate change, the Proposed Scheme has been designed to be adaptable to the High End Future Scenario (HEFS) standard of protection (SoP) climate change in a manner that will require further construction activity such as raising walls or extending embankments (RPS, 2023b). Environmental assessments will be completed before such activity is carried out.

General mitigation measures relevant to water protection are listed below:

- Flood preparedness.
  - Operational protocols to be included in the O&M Manual.
- Measures that have been incorporated into the design.
  - The proposed walls on the Brusna have been set back as far as possible to mitigate disconnection to the floodplain.
  - The hydrocarbon interceptors will be regularly maintained according to manufacturer's specifications to ensure their ongoing efficacy to mitigate against hydrocarbons entering the watercourse during pumping.
  - Scour and erosion protection measures have been incorporated on the Brusna and Bunree watercourses.

7.2.2 Specific Brusna (Glenree) Mitigation Measures

Potentially Significant Impact Category Identified	Mitigation
Riparian tree loss LHS between river and R294 road	• Notwithstanding that a reasonable amount of tree and shrub cover has been retained on the LHS by the proposed design, there has been (by design) and will be during construction, an overarching policy to retain as much tree and shrub cover as possible on the LHS floodplain between the river and the proposed flood wall along the R294 road. • Retain all marginal and bankside growth along the river in the reach where bankside tree loss is unavoidable. This includes any fringing emergent reeds and tall bankside herbs and grasses which offer cover to fish and thermal regulation to the river. • Notwithstanding that a reasonable amount of tree and shrub cover has been retained on the RHS by the proposed design, there will be an overarching policy to retain as much tree and shrub cover as possible on the RHS bank between the river and the proposed flood wall adjacent to Rathkip/Shanaghy Estate. Any riparian replanting shall be appropriate native tree/shrub species of Irish provenance in scattered aggregations, slightly set back from the channel, in areas where tree loss is unavoidable. • Strip planting along the corridor shall be avoided as this causes tunnelling and loss of instream productivity when it is too dense.
Fish passage – design and construction of scour protection at Rathkip/Shanaghy Bridge	• Bed scour protection will be designed with a low flow channel or mid-channel concave depression so that water depth will always be sufficient for fish passage. It must also be designed to ensure that the downstream invert level of the bed protection is drowned out at low flow so there is not a vertical drop, thus avoiding a migration barrier to fish. • The entire bed scour protection will include ‘roughness’ elements (mortared riprap, embedded stones, cobbles, blocks) to break up laminar flow and create turbulence that mimics natural conditions, providing cover for migrating and resident fish. Under no circumstances will the bed protection comprise laminar flow over a smooth, flat concrete bed surface. • The replacement bank scour protection shall be similar to existing with boulder riprap used upstream and downstream of the bridge abutments, as these provide a degree of flow diversity and bankside habitat for plants and macroinvertebrates.

8 MONITORING

8.1 Construction Phase

8.1.1 Daily Site Monitoring Procedure

The following daily environmental monitoring procedure will be carried out to ensure that environmental protection and management requirements are being implemented and are meeting their objectives:

8.1.1.1 General Procedures

- 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.
    - Electronic records to be kept of all checks and monitoring carried out and made available to MCC.
    - The ECoW will conduct toolbox talks for site staff to ensure they are informed about all water quality measures in the CEMP as well as the overall ecological sensitivity of the sites and their surrounds.
    - In the event that water pollution occurs, or the ECoW deems there to be a significant risk of pollution occurring, the ECoW will have the power to order all works to cease until mitigation or remediation is put in place.
    - Reporting of any failures of mitigation measures, pollution incidents, and occurrences of flooding.
    - Monitoring the condition of roads around the compound and works sites and order washing where build-up of mud becomes visible.

8.1.1.2 Weather Forecasts

- 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.

8.1.1.3 Visual Checks

- Underpinning the monitoring approach will be daily visual checks (twice-daily during wet weather conditions) 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.
- Notes will also be taken of any foul odours.

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. Triggers for ceasing works will be established in advance with the Contractor and ECoW. 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.

8.1.1.4 Weekly and Monthly Site Monitoring Procedures

In addition to the daily visual checks set out above, water sampling focused on suspended solids (total suspended solid, turbidity) will occur weekly and monthly and will be analysed in an accredited laboratory.

8.1.1.5 Water Sampling Schedule

- The ECoW will collect samples once weekly (e.g., every Tuesday) 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 fixed 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. Unscheduled samples may also be authorised by the ECoW to investigate sources of identified pollution.

8.1.2 Water Quality Sampling – Action Trigger Points

It is very difficult to set monitoring criteria for suspended solids for numerous reasons including:

- There are daily and seasonal variations in natural background levels, especially in tidally influence waters such as the lower River Moy.
- Impact of suspended solids on aquatic organisms depends upon both the concentration and the duration of exposure.
- The type of sediment (e.g., grain size) and the morphology of the river channel (e.g., eroding versus depositing systems) determines effects on habitats and biota.
- The wide variation in reported concentrations for onset of acute (sub-lethal and lethal) effects on aquatic biota.

Based on the literature (Kerr 1995, Newcombe and Jensen 1996), and given the extended construction period for the project, the following applies:

- The ECoW must tabulate the once weekly upstream and downstream suspended solids results for the River Moy and the Brusna (Glenree) River as these are the more sensitive receptors. The rolling average downstream (mixed) suspended solids concentration must not exceed 10 mg/l if the upstream concentration is ≤100 mg/l. Suspended solids concentration downstream must not exceed 5% of the upstream level if the upstream concentration is >100 mg/l (highly unlikely on either the Moy or the Brusna).
- If the emerging rolling average is exceeding these thresholds, then the ECoW will instruct additional efforts to be made to reduce suspended sediment sources and control pathways by strengthening the sediment control measures as set out in the CEMP and **Section 7** above. Works will also cease until excess sediment issues are resolved.
- 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.

8.1.3 Cofferdam Pump-out Water Management

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 25 mg/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). The suspended solids discharge limits may differ from the 25mg/l specified, only in agreement with IFI, in a circumstance where the guidelines alter or more evidence becomes available for suspended solids discharge limits to surface waters.

Ingress waters to cofferdam containment areas in relation to Brusna River instream works at Rathkip/Shanaghy Bridge can be pumped out and discharged via a silt bag ≥30m away from the watercourse. The pump-out point shall be a sump filled with clean, large gravel within the cofferdam area. The discharge point will be a vegetated area of land (which is available locally at the site) 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 discharge point will be visually monitored to ensure there is no escapement of highly turbid water, and regular samples will be taken from the outflow and tested for suspended solids concentrations. If turbid water is observed, the ECoW will have powers to stop works while mitigation measures are strengthened.

In the event that instream works do occur 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 250 mg/l suspended solids with pH in the range 6.0-9.0. The rationale for this is that (1) such a suspended solids concentration ought to be attainable relatively rapidly from bank-side settlement treatment train [discharge via settlement 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 1000 mg/l suspended solids for >1 day (Wilber and Clarke, 2001; Boelhert and Morgan 1985 cited Kerr 1995). The discharge effluent limit applied is 25% of this value and there is huge dilution in this part of the tidal 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 **Section 8.1.2** 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.

8.1.3.1 Biological Water Quality Monitoring

The EPA rated the River Brusna (RWB Glenree_030 EPA Code: IE_WE_34G010200) at good ecological status for the 2016-2021 2nd cycle River Basin Management Planning (RBMP): macroinvertebrates = good status, hydromorphology = high status, supporting physicochemical quality = good status. Sampling for the Proposed Scheme in 2023, as well as the EPA macroinvertebrate rating (2022) was Q4-5 (high status). 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 8-1.**

Pre-construction Q-value surveys will occur prior to the initial construction phase intervention within the seasonal window of May to September (inclusive).

Post-construction surveys will occur between May and September (inclusive) at least 3 months after works are completed (Y1), and again one year later (Y2). If works are completed at the end of September (as per timing restrictions, then the (Y1) survey shall occur in the following May, with the (Y2) survey occurring in May of the following year.

There is no possibility of upstream/downstream Q-value sampling on the Moy (i.e., tidal) nor on the highly modified small tributaries: Quignamanger, Bunree or Tullyegan. Hence Q-value monitoring on these streams is not applicable.

8.1.4 Noise and Vibration

Noise monitoring proposed for the Proposed Scheme is as follows:

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

8.1.5 Embankment Monitoring

The appointed contractor shall monitor settlement every two to three days using settlement plates during and after embankment construction at Rathkip/Shanaghy and along the Tullyegan Stream.

8.1.6 Excavations Monitoring

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.

8.1.7 Habitat Recovery Monitoring

The recovery of areas where tall herb swamp turves are removed and reinstated during the proposed works will be monitored at minimum weekly during the construction phase.

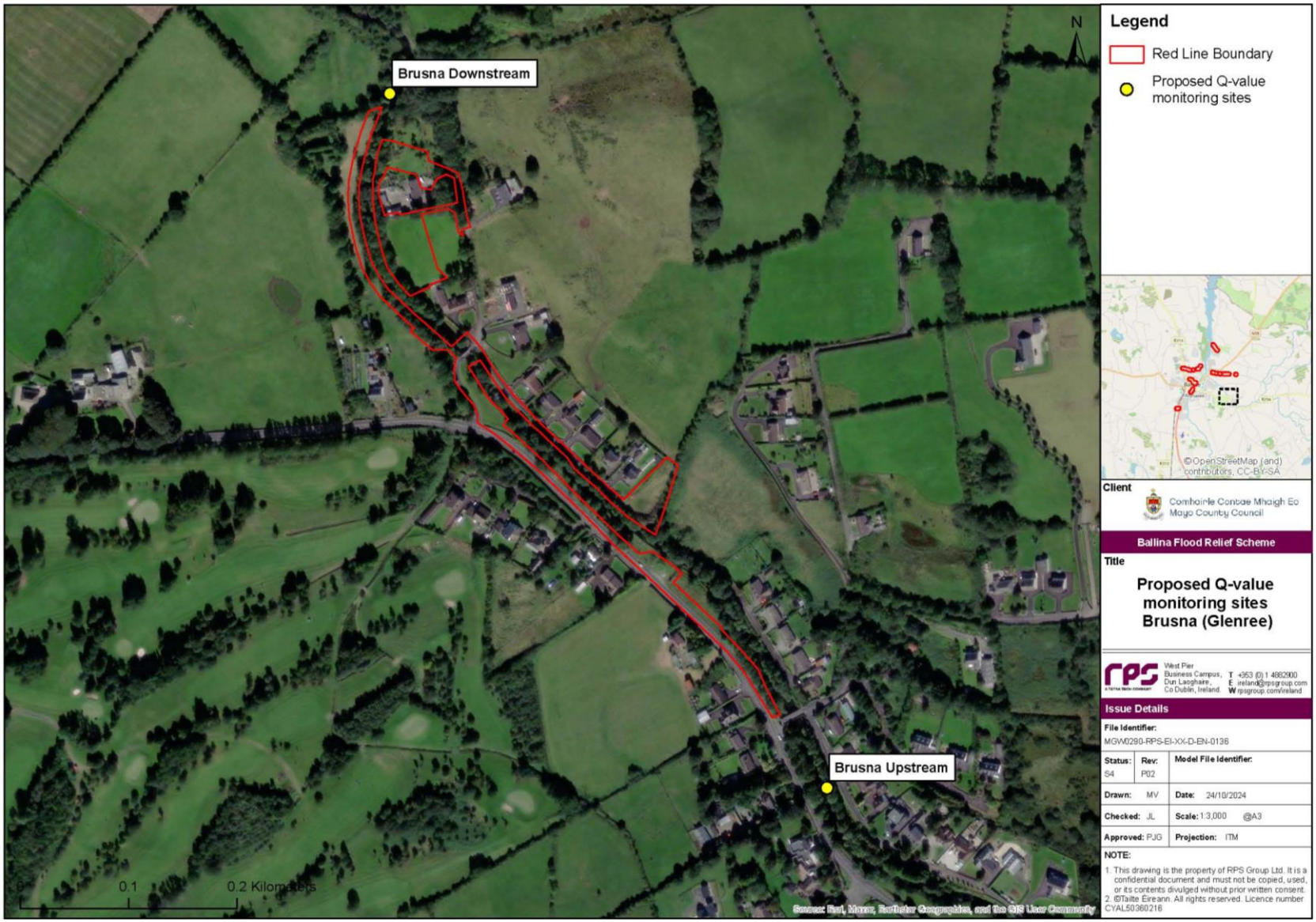

Figure 8-1 Proposed Q-value monitoring sites Brusna (Glenree)

8.2 Operational and Maintenance Phase

OPW Guidance will be adhered to for ongoing inspection and monitoring of flood defences and culverts.

It is expected that the OPW will continue to monitor flows in the River Moy at Rahans gauging station. Any unforeseen changes in extreme flow volumes or increased frequency can be risk assessed in the context of the scheme design.

It is expected that the EPA will continue to monitor water quality at the existing locations during the operational phase of the scheme as part of its WFD obligations.

The Operation and Maintenance (O&M) Manual will specify an inspection regime for all permanent elements of the scheme to ensure they remain in good working condition. This will include periodic structural inspections of flood defences, inspections and cleaning of culverts and flap valves, removal of debris from channels, and testing of pumping stations.

Operational protocols for preparing for and responding to flood events will also be detailed in the O&M Manual. Repairs and remediation works will be carried out on permanent scheme elements as needed.

Ongoing monitoring and treatment of invasive alien plant species across the Proposed Scheme area will be maintained for at least 5 years (in the case of Japanese knotweed) and at least 2 years for every other IAPS from the initiation of treatment or as long as is determined to be necessary to maintain control of these species.

The recovery of areas where tall herb swamp is disturbed during the proposed works will be monitored. This will be ongoing until such time as the habitat is considered to be fully recovered from disturbance.

9 RESIDUAL EFFECTS

With all measures and mitigations implemented in accordance with **Section 7**, relating to water quality protection measures during the construction phase and site-specific mitigations for relevant QI/SCI species and QI habitats, the Proposed Scheme will result in no adverse effects on the integrity of any European Site in the ZoI of the Proposed Scheme.

To aid the Competent Authority, **Sections 9.1** to **9.4**, below, set out the residual effects in relation to site-specific Conservation Objective targets and attributes for the relevant QI/SCI species and QI habitats of River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA.

9.1 River Moy SAC

Attribute	Measure	Target	Potential for the Proposed Scheme to affect the Conservation Objective
River Moy SAC			
[1095] Sea lamprey *Petromyzon marinus* Conservation Objective: To maintain the favourable conservation condition of Sea Lamprey in River Moy SAC, which is defined by the following list of attributes and targets:			
Distribution: extent of anadromy	Percentage of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	No change over baseline. The Proposed Scheme does not introduce any new barriers to sea lamprey migration through Ballina.
Population structure of juveniles	Number age/size groups	At least three age/size groups present	There will be temporary, slight, negative, reversible effects locally related to disturbance but no net change to population structure at catchment scale and no negative effect on CO target. Direct instream impacts during the construction phase impinge temporarily or short term on one discrete location: Ridgepool RHS immediately upstream of Upper Bridge (see Site RP11, **Appendix F**). Any disturbed individuals will be relocated according to prescribed mitigation with no adverse effects on the CO target.
Juvenile density in fine sediment	Juveniles/m^2	Mean catchment juvenile density at least 1/m^2	There will be temporary slight negative reversible effects locally related to disturbance but no significant net effect at catchment scale and no negative effect on CO target. Direct instream impacts during the construction phase impinge temporarily on one discrete location: Ridgepool RHS immediately upstream of Upper Bridge (see Site RP11, **Appendix F**). Any disturbed individuals will be relocated according to prescribed mitigation meaning a redistribution but no loss in density. There are no significant hydraulic or hydromorphological changes that would preclude recovery of marginal depositing silt habitat in the area between RP11 and the Upper Bridge meaning no adverse effects on the CO target.
Extent and distribution of spawning habitat	m^2 and occurrence	No decline in extent and distribution of spawning beds	**.** With mitigations in place that avoid placement of the access ramp and/or cofferdams at the river margin during sea lamprey spawning season (May-July (inclusive), there will be no decline in lamprey spawning area (m^2) or distribution of the spawning beds. That does not preclude that sea lamprey may slightly move the exact location of their spawning redd in Y2 compared to a season where there is no instream structure (access ramp or cofferdam), but the works do not preclude spawning in Ridgepool during either Y1 or Y2 as the footprint of the works and the tidal nature of the Ridgepool already dictates that spawning cannot occur in the ephemeral marginal habitats that dewater at low tide. No effect on the CO target from the Proposed Scheme with mitigations in place as prescribed.
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater),	More than 50% of sample sites positive	Catchment wide surveys (O'Connor, 2004) showed 24% of 75 Moy catchment sample sites were positive for sea lamprey, which falls short of the target. The construction phase impinges temporarily at one discrete area of mainly sub-optimal sea lamprey nursery habitat: Ridgepool RHS between RP11 and the

Attribute	Measure	Target	Potential for the Proposed Scheme to affect the Conservation Objective
	downstream of spawning areas		Upper Bridge (see **Appendix F**). With mitigations in place that include capture and release of juveniles, plus the fact that hydraulic and fluvial dynamics do not alter significantly in the operation phase, silt depositing habitats will recover post-works and the overall catchment juvenile habitat positivity rate will not be adversely affected compared to baseline.
[1096] Brook lamprey *Lampetra planeri* Conservation Objective: To maintain the favourable conservation condition of Brook Lamprey in River Moy SAC, which is defined by the following list of attributes and targets:			
Distribution	Percentage of river accessible	Access to all watercourses down to first order streams	No change over baseline. The proposed scheme does not introduce any new barriers to brook lamprey access.
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook lamprey present	Juvenile brook lamprey were not recorded on the lower Moy (in Ballina) (O'Connor, 2004). The Ridgepool is not considered brook lamprey spawning habitat, being tidally influenced and lacking in suitable substrates. There will be no change in population structure of juvenile brook lamprey with respect to works in the Ridgepool and no adverse effects on the overall CO target.
Juvenile density in fine sediment	Juveniles/m^2	Mean catchment juvenile density of brook lamprey at least 2/m^2	**.** The Ridgepool is not significant brook lamprey spawning habitat, being tidally influenced and lacking in suitable substrates. There will be no decline in brook lamprey juvenile density locally and no adverse effects on the CO target.
Extent and distribution of spawning habitat	m^2 and occurrence	No decline in extent and distribution of spawning beds	The Ridgepool is not significant brook lamprey spawning habitat, being tidally influenced and lacking in suitable substrates. There will be no decline in brook lamprey spawning habitat with respect to works in the Ridgepool and no adverse effect on the CO target.
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	. Catchment wide surveys (O'Connor, 2004) showed 60.3% of 75 Moy catchment sample sites were positive for *Lampetra* spp. (includes brook lamprey, which exceeds this target. *Lampetra* spp. were absent from the lower reaches of the Moy in Ballina, so the Proposed Scheme does not give rise to any change over baseline in terms of sample site positivity for brook lamprey.
[1106] Salmon *Salmo salar* Conservation Objective: To maintain the favourable conservation condition of Salmon in River Moy SAC, which is defined by the following list of attributes and targets:			
Distribution: extent of anadromy	Percentage of river accessible	100% of river channels down to second order accessible from estuary	No change over baseline. The Proposed Scheme does not introduce any new barriers to salmon migration through Ballina
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	No change over baseline. The Proposed Scheme does not impact on adult salmon returning numbers nor salmon spawning habitat which is primarily upstream of the Ridgepool on the Moy. There is no reason under the Proposed Scheme that CL will not continue to be exceeded.
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-side abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	No change over baseline. The Proposed Scheme does not impact on adult salmon returning numbers nor salmon spawning habitat. There is no reason under the Proposed Scheme that salmon fry catchment-wide abundance would not be maintained.
Out-migrating smolt abundance	Number	No significant decline	No change over baseline. The Proposed Scheme does not impact on downstream migrating smolts meaning there will be no decline in abundance of smolts reaching the sea.
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	No change over baseline. The Proposed Scheme does not impact on abundance of salmon reaching the spawning grounds nor on the spawning grounds themselves which are upstream of the Ridgepool, meaning the number and distribution of redds will not be affected.

Attribute	Measure	Target	Potential for the Proposed Scheme to affect the Conservation Objective
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q-value just upstream of Ballina (and upstream of the proposed scheme) is Q3-4 (2022 EPA data), which fails to meet the target. The reach affected by the Proposed Scheme does not impinge on the Q-rating, but if it did, scheme measures would (if anything) be likely to result in at least a slightly positive, long-term impact on water quality through and downstream of Ballina because of reduction in risk and frequency of flood waters overtopping walls and being contaminated within the urban drainage area. The Proposed Scheme does not result in changes to hydromorphology or water quality that would cause deterioration of the biological quality element (Macroinvertebrate Q-value). There is no cause for deterioration in water body status and the scheme does not jeopardise attainment of good status, hence compliant with WFD objectives.
[1335] Otter *Lutra lutra* Conservation Objective: To maintain the favourable conservation condition of Otter in River Moy SAC, which is defined by the following list of attributes and targets:			
Distribution	Percentage positive survey sites	No significant decline	No change over baseline. The Proposed Scheme has the potential to affect the distribution of otter across the proposed works areas via habitat loss and disturbance including the spread of invasive species, habitat degradation via a reduction in water quality directly affecting otter and/or prey items, loss of breeding and resting sites, disturbance/displacement or mortality during construction including creating a barrier effect due to the presence of construction machinery and/or personnel. However, with the implementation of the mitigation measures outlined in **Section 7.1.10,** there will be no significant decline in the distribution of otter across the SAC and otter distribution will not be affected compared to baseline.
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 1068.8 ha	The proposed works area along the Brusna has the potential to impact upon the extent of terrestrial habitat within the SAC used by otter. However, the design of the Proposed Scheme is such that minimal amount of bankside woody habitat will be removed to facilitate the creation of flood defences with defences being set back as far as practicable from the watercourse. Planting associated with the Proposed Scheme will aim to replace any woody vegetation lost during the construction phase and this planting will provide woody vegetation cover along a section of the Brusna where cover is very sparse. It is therefore considered that the extent of terrestrial habitat which can used by otter will not significantly decline compared to the baseline.
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 479.4 km	No change over baseline. The Proposed Scheme will not be altering or culverting any section of river within the SAC. Therefore, there will be no significant decline in the extent of freshwater (river) habitat within the SAC as a result of the Proposed Scheme.
Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 1248.2 ha	No change over baseline. The Proposed Scheme does not impact on any lake habitat therefore there will be no decline in the extent of freshwater (lake) habitat within the SAC.
Couching sites and holts	Number	No significant decline	The Proposed Scheme will result in the direct loss of two couches along Clare Street and has the potential to impact the use by otter of a further three couches along the River Brusna. Couches are generally ephemeral, and otter usually maintain a number of different couches across their territory. The Proposed Scheme will also temporarily impact the use of a single, potential natal holt along the River Brusna. This holt will not be destroyed due to the proposed works, however, the presence of personnel and machinery in close proximity to the holt may deter otters from using it while works are ongoing. With the implementation of the mitigation measures outlined in **Section 7.1.10,** there will be no significant decline of otter couching sites and holts across the SAC.

Attribute	Measure	Target	Potential for the Proposed Scheme to affect the Conservation Objective
Fish biomass available	Kilograms	No significant decline	No change over baseline. The Proposed Scheme has the potential to result in a loss of fish biomass e.g. via direct mortality, loss of redds, barriers to migration, reduction in water quality, loss of fisheries habitat etc. However, with the implementation of the stated mitigation measures, there will be no significant decline in fish biomass available.
Barriers to connectivity	Number	No significant increase	No change over baseline. The proposed scheme has the potential to create temporary barriers to connectivity during the construction phase, however, with the implementation of the stated mitigation measures, there will be no significant increase in barriers to connectivity for otter. The operational phase of the Proposed Scheme does not introduce any new barriers to connectivity for otter.
[1092] White-clawed Crayfish *Austropotamobius pallipes* Conservation Objective: To maintain the favourable conservation condition of White-clawed crayfish in River Moy SAC, which is defined by the following list of attributes and targets:			
Distribution	Occurrence	No reduction from Baseline, as on Map 7 of the Conservation Objectives	No change over baseline. The Proposed Scheme does not impact on crayfish distribution as defined in the Conservation Objectives, where it is recognised that crayfish do not occur in the Moy main channel and have never been recorded in the Brusna or Tullyegan tributaries.
Population structure: recruitment	Occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in all occupied tributaries	Crayfish primarily occur upstream of Foxford in the Moy and have never been recorded in the Moy, Brusna or Tullyegan. The Proposed Scheme does not impact on the crayfish positive tributaries as set out in the Conservation Objectives. If crayfish did emerge in the Tullyegan or Brusna during water draw-downs, they will be relocated outside of the working zone where there is abundant alternative habitat and no change with respect to this target, noting that crayfish presence is extremely unlikely in either of these streams , but were included on a precautionary basis.
Negative indicator species	Occurrence	No alien crayfish species	With all biosecurity measures employed, there will be no introduction of alien crayfish species
Disease	Occurrence	No instances of disease	Crayfish plague is already present in the distant upstream Moy catchment (upstream of Foxford). With mitigations in place around biosecurity (check/clean/dry and disinfection) there will be no transfer of crayfish plague within the catchment in association with the proposed construction works.
Water quality	EPA Q-value	At least Q3-4 at all sites sampled by the EPA	The proposed scheme does not involve chemical or physical changes that could alter the macroinvertebrate community in such a way that Q3-4 would not be obtained – this applies to the River Brusna which is currently at Q4-5 (2022 EPA data).
Habitat heterogeneity	Occurrence of positive habitat features	No decline in heterogeneity or habitat quality	With mitigation implemented in the area of channel reinstatement there will be no decline in habitat heterogeneity as relates to crayfish, noting that in any case crayfish are apparently absent from the Tullyegan and Brusna.

9.2 Killala Bay/Moy Estuary SAC

Attribute	Measure	Target	Potential for the Proposed Scheme to affect the Conservation Objective
Killala Bay/Moy Estuary SAC			
[1095] Sea Lamprey *Petromyzon marinus* Conservation Objectives: To maintain the favourable conservation condition of Sea Lamprey in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:			
Distribution: extent of anadromy	% of estuary accessible	No barriers for migratory life stages of lamprey moving from freshwater to marine habitats and vice versa	No change over baseline. The Proposed Scheme does not introduce any new barriers to sea lamprey migration through the estuary.

Attribute	Measure	Target	Potential for the Proposed Scheme to affect the Conservation Objective
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	There will be temporary slight negative reversible effects locally but no significant effect at catchment scale and no negative effect on CO target. Direct instream impacts during the construction phase impinge temporarily on 120 m of river margin adjacent to Bachelors Walk downstream of the N59 Lower Bridge. Any disturbed individuals will be relocated according to prescribed mitigation and the habitat will recover in the operational phase with no adverse effect on the CO target.
Juvenile density in fine sediment	Juveniles/m^2	Juvenile density at least 1/m^2	Direct instream impacts during the construction phase impinge temporarily on 120 m of river margin adjacent to Bachelors Walk downstream of the N59 Lower Bridge. Any disturbed individuals will be relocated according to prescribed mitigation. Sub-optimal silty depositing habitats will form equivalent habitat to baseline following the works. There are no significant hydraulic or hydromorphological changes that would preclude recovery of marginal depositing silt habitat in the area immediately upstream of the Upper Bridge meaning no adverse effect on the CO target.
[1130] Estuaries Conservation Objectives: To maintain the favourable conservation condition of Estuaries in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:			
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes	With mitigations implemented in the area of water quality protection (especially measures to prevent suspended solids loss) there are no direct or indirect processes or effects that could alter the permanent habitat area of Habitat 1130.
Community extent	Hectares	Maintain the extent of the *Zostera*-dominated community, subject to natural processes	The *Zostera* dominated community is located >6 km downstream of the proposed works at a minimum. With mitigations included in the area of water quality protection (especially measures to prevent suspended solids loss) there are no direct or indirect effects that could alter the extent of the *Zostera*-dominated community in the construction or operational phases.
Community structure: *Zostera* density	Shoots per m^2	Conserve the high quality of the *Zostera*-dominated community, subject to natural processes	The *Zostera* dominated community is located >6 km downstream of the proposed works at a minimum. With mitigations included in the area of water quality protection (especially measures to prevent suspended solids loss) there are no direct or indirect effects that could alter *Zostera* density and therefore affect the quality of the *Zostera*-dominated community in the construction or operational phases.
Community distribution	Hectares	Conserve the following community types in a natural condition: Muddy sand to fine sand dominated by *Hydrobia ulvae, Pygospio elegans* and *Tubificoides benedii* community complex; Estuarine muddy sand dominated by *Hediste diversicolor* and *Heterochaeta costata* community complex; and Fine sand dominated by *Nephtys cirrose* community complex.	There will be no significant continuous or ongoing disturbance of these communities. The estuarine muddy sand dominated by *Hediste diversicolor* and *Heterochaeta costata* community is not directly affected and with mitigations implemented in the area of water quality protection (especially measures to prevent suspended solids loss) there are no direct or indirect effects that could alter the natural condition, area or distribution of this estuarine community. The same applies to each of the other estuarine community types (not within the study area) in terms of absence of direct and indirect effects.

Attribute	Measure	Target	Potential for the Proposed Scheme to affect the Conservation Objective
[1140] Mudflats and sandflats not covered by seawater at low tide. Conservation Objective: To maintain the favourable conservation condition of mudflats and sandflats not covered by seawater at low tide in Killala Bay/Moy Estuary SAC, which is define by the following list of attributes and targets:			
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes	With mitigations implemented in the area of water quality protection (especially measures to prevent suspended solids loss) there are no direct or indirect processes or effects that could alter the permanent habitat area of Habitat 1140.
Community extent	Hectares	Maintain the extent of the *Zostera*-dominated community, subject to natural processes.	The *Zostera* dominated community is located >6 km downstream of the proposed works at a minimum. With mitigations included in the area of water quality protection (especially measures to prevent suspended solids loss) there are no direct or indirect effects that could alter the extent of this estuarine community in the construction or operational phases.
Community structure: *Zostera* density	Shoots per m^2	Conserve the high quality of the *Zostera*-dominated community, subject to natural processes	The *Zostera* dominated community is located >6 km downstream of the proposed works at a minimum. With mitigations included in the area of water quality protection (especially measures to prevent suspended solids loss) there are no direct or indirect effects that could alter *Zostera* density and therefore affect the quality of the *Zostera*-dominated community in the construction or operational phases.
Community distribution	Hectares	Conserve the following community types in a natural condition: Muddy sand to fine sand dominated by *Hydrobia ulvae, Pygospio elegans* and *Tubificoides benedii* community complex; Estuarine muddy sand dominated by *Hediste diversicolor* and *Heterochaeta costata* community complex; and Fine sand dominated by *Nephtys cirrose* community complex.	There will be no significant continuous or ongoing disturbance of these communities. The estuarine muddy sand dominated by *Hediste diversicolor* and *Heterochaeta costata* community is not directly affected and with mitigations implemented in the area of water quality protection (especially measures to prevent suspended solids loss) there are no direct or indirect effects that could alter the natural condition, distribution or extent of this estuarine community. The same applies to each of the other estuarine community types (not within the study area) in terms of absence of direct and indirect effects.
[1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Conservation Objective: To maintain the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:			
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.	With mitigations implemented in the area of water quality protection (especially measures to prevent suspended solid and other pollutant loss) there are no direct or indirect processes or effects that could alter the permanent habitat area of Habitat 1330.
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.	With mitigations implemented in the area of water quality protection (especially measures to prevent suspended solid and other pollutant loss) there are no direct or indirect processes or effects that could alter the permanent habitat area of Habitat 1330.
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	The Proposed Scheme will not result in any physical barriers that could impede the natural circulation of sediments and organic matter that would result in a change in the physical structure of Habitat 1330.
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure/allow to develop, subject to natural processes, including erosion and succession	The Proposed Scheme will not result in an alteration to any natural processes such as erosion and succession that allow creek and pan structures to develop within Habitat 1330. The Proposed Scheme, therefore, will not result in a reduction of the occurrence of creeks and pans within Habitat 1330.
Physical structure:	Hectares flooded; frequency	Maintain natural tidal regime	The Proposed Scheme will not result in any change to the tidal regime of the Moy estuary that could affect the number of hectares of Habitat 1330 flooded by the tides.

Attribute	Measure	Target	Potential for the Proposed Scheme to affect the Conservation Objective
flooding regime			
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	With mitigations implemented in the area of water quality protection (especially measures to prevent suspended solid and other pollutant loss) there are no direct or indirect processes or effects that could alter the zonation of vegetation within Habitat 1330.
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	With mitigations implemented in the area of water quality protection (especially measures to prevent suspended solid and other pollutant loss) there are no direct or indirect processes or effects that could alter the vegetation height within Habitat 1330.
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of the area outside of the creeks vegetated	With mitigations implemented in the area of water quality protection (especially measures to prevent suspended solid and other pollutant loss) there are no direct or indirect processes or effects that could alter the percentage vegetation cover within Habitat 1330.
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	With mitigations implemented in the area of water quality protection (especially measures to prevent suspended solid and other pollutant loss) there are no direct or indirect processes or effects that could alter the typical species and sub-communities within Habitat 1330.
Vegetation structure: negative indicator species – spartina anglica	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	*Spartina anglica* was not observed within or adjacent to the Proposed Scheme redline boundary. Therefore, the Proposed Scheme will not result in any expansion of *Spartina anglica* within Habitat 1330.
[1365] Harbour Seal *Phoca vitulina* Conservation Objective: To maintain the favourable conservation condition of Harbour Seal in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:			
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use	No change over baseline. The Proposed Scheme does not introduce any new barriers that would result in the restriction of access to suitable habitat by harbour seal.
Breeding behaviour	Breeding sites	Conserve the breeding sites in a natural condition	No change over baseline. The Proposed Scheme does not impact upon any harbour seal breeding sites and therefore, harbour seal breeding sites within the SAC will be conserved in a natural condition with no adverse effect on harbour seal breeding behaviour due to the Proposed Scheme.
Moulting behaviour	Moult haul-out sites	Conserve the moult haul-out sites in a natural condition	No change over baseline. The Proposed Scheme does not impact upon any harbour seal moult haul-out sites and therefore, harbour seal moult haul-out sites within the SAC will be conserved in a natural condition with no adverse effect on harbour seal moulting behaviour due to the Proposed Scheme.
Resting behaviour	Resting haul-out sites	Conserve the resting haul-out sites in a natural condition	. No change over baseline. The Proposed Scheme does not impact upon any harbour seal resting haul-out sites and therefore, harbour seal resting haul-out sites within the SAC will be conserved in a natural condition with no adverse effect on harbour seal resting behaviour due to the Proposed Scheme.
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour seal population at the site	No change over baseline. Harbour seal utilise the River Moy and Moy Estuary adjacent to the Proposed Scheme. The centre of Ballina is not considered a primary foraging ground for harbour seal within the SAC and any seal observed were most likely opportunistically pursuing migrating salmon. Furthermore, it is also considered that any harbour seal foraging within the centre of Ballina are habituated to the presence of humans and traffic. Given the low numbers of harbour seal likely using the River Moy and Moy Estuary adjacent to the Proposed Scheme works and

Attribute	Measure	Target	Potential for the Proposed Scheme to affect the Conservation Objective
			the extensive areas of suitable, alternative foraging habitat within Killala Bay/Moy Estuary and the north and west coasts outside the redline boundaries it is considered that the activities associated with the Proposed Scheme are not expected to occur at levels that will adversely affect the harbour seal population of the site.

9.3 Killala Bay/Moy Estuary SPA

Attribute	Measure	Target	Potential for the Proposed Scheme to Affect the Conservation Objective
Killala Bay/Moy Estuary SPA			
[A137] Ringed plover *Charadrius hiaticula* (wintering) Conservation Objective: To maintain the favourable conservation condition of Ringed Plover in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:			
Population trend	Percentage change	Long term population trend stable or increasing	No ringed plover were observed adjacent to the Proposed Scheme works areas during overwintering waterbird surveys undertaken for the Proposed Scheme. Additionally, no ringed plover were recorded from the three SPA subsites (0D448, 0D449, 0D450) adjacent to the Quignamanger proposed works area during either the 2010/11 Waterbird Survey Programme (i.e. a low-tide survey period) or the Irish Wetland Bird Survey (i.e. a rising tide or high tide survey) as outlined in the Conservation Objectives supporting document (NPWS, 2013c). A reduction in water quality is therefore considered the only potential impact arising from the Proposed Scheme with the possibility of affecting ringed plover that may be foraging or roosting downstream from the Proposed Scheme. However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the long-term population trend of ringed plover.
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by ringed plover, other than that occurring from natural patterns of variation	No ringed plover were observed adjacent to the Proposed Scheme works areas during overwintering waterbird surveys undertaken for the Proposed Scheme. Additionally, no ringed plover were recorded from the three SPA subsites (0D448, 0D449, 0D450) adjacent to the Quignamanger proposed works area during either the 2010/11 Waterbird Survey Programme (i.e. a low-tide survey period) or the Irish Wetland Bird Survey (i.e. a rising tide or high tide survey) as outlined in the Conservation Objectives supporting document (NPWS, 2013c). A reduction in water quality is therefore considered the only potential impact arising from the Proposed Scheme with the possibility of affecting ringed plover that may be foraging or roosting downstream from the Proposed Scheme. However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the range, timing or intensity of use of areas by ringed plover.
[A140] Golden plover *Pluvialis apricaria* (wintering) [Conservation Objective: To maintain the favourable conservation condition of Golden Plover in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:			
Population trend	Percentage change	Long term population trend stable or increasing	No golden plover were observed adjacent to the Proposed Scheme works areas during overwintering waterbird surveys undertaken for the Proposed Scheme. Additionally, no golden plover were recorded from the three SPA subsites (0D448, 0D449, 0D450) adjacent to

Attribute	Measure	Target	Potential for the Proposed Scheme to Affect the Conservation Objective
Killala Bay/Moy Estuary SPA			
			the Quignamanger proposed works area during either the 2010/11 Waterbird Survey Programme (i.e. a low-tide survey period) or the Irish Wetland Bird Survey (i.e. a rising tide or high tide survey) as outlined in the Conservation Objectives supporting document (NPWS, 2013c). A reduction in water quality is therefore considered the only potential impact arising from the Proposed Scheme with the possibility of affecting golden plover that may be foraging or roosting downstream from the Proposed Scheme. However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the long-term population trend of golden plover.
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by golden plover, other than that occurring from natural patterns of variation	No golden plover were observed adjacent to the Proposed Scheme works areas during overwintering waterbird surveys undertaken for the Proposed Scheme. Additionally, no golden plover were recorded from the three SPA subsites (0D448, 0D449, 0D450) adjacent to the Quignamanger proposed works area during either the 2010/11 Waterbird Survey Programme (i.e. a low-tide survey period) or the Irish Wetland Bird Survey (i.e. a rising tide or high tide survey) as outlined in the Conservation Objectives supporting document (NPWS, 2013c). A reduction in water quality is therefore considered the only potential impact arising from the Proposed Scheme with the possibility of affecting golden plover that may be foraging or roosting downstream from the Proposed Scheme. However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the range, timing or intensity of use of areas by golden plover.
[A141] Grey plover *Pluvialis squatarola* (wintering) Conservation Objective: To maintain the favourable conservation condition of Grey Plover in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:			
Population trend	Percentage change	Long term population trend stable or increasing	No grey plover were observed adjacent to the Proposed Scheme works areas during overwintering waterbird surveys undertaken for the Proposed Scheme. Additionally, no grey plover were recorded from the three SPA subsites (0D448, 0D449, 0D450) adjacent to the Quignamanger proposed works area during either the 2010/11 Waterbird Survey Programme (i.e. a low-tide survey period) or the Irish Wetland Bird Survey (i.e. a rising tide or high tide survey) as outlined in the Conservation Objectives supporting document (NPWS, 2013c). A reduction in water quality is therefore considered the only potential impact arising from the Proposed Scheme with the possibility of affecting grey plover that may be foraging or roosting downstream from the Proposed Scheme. However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the long-term population trend of grey plover.
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by grey plover, other than that occurring from natural patterns of variation	No grey plover were observed adjacent to the Proposed Scheme works areas during overwintering waterbird surveys undertaken for the Proposed Scheme. Additionally, no grey plover were recorded from the three SPA subsites (0D448, 0D449, 0D450) adjacent to the Quignamanger proposed works area during either the 2010/11 Waterbird Survey Programme (i.e. a low-tide survey period) or the Irish Wetland Bird Survey (i.e. a rising tide or high tide survey) as outlined in the

Attribute	Measure	Target	Potential for the Proposed Scheme to Affect the Conservation Objective
Killala Bay/Moy Estuary SPA			
			Conservation Objectives supporting document (NPWS, 2013c). A reduction in water quality is therefore considered the only potential impact arising from the Proposed Scheme with the possibility of affecting grey plover that may be foraging or roosting downstream from the Proposed Scheme. However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the range, timing or intensity of use of areas by grey plover.
[A144] Sanderling *Calidris alba* (wintering) Conservation Objective: To maintain the favourable conservation condition of Sanderling in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:			
Population trend	Percentage change	Long term population trend stable or increasing	No sanderling were observed adjacent to the Proposed Scheme works areas during overwintering waterbird surveys undertaken for the Proposed Scheme. Additionally, no sanderling were recorded from the three SPA subsites (0D448, 0D449, 0D450) adjacent to the Quignamanger proposed works area during either the 2010/11 Waterbird Survey Programme (i.e. a low-tide survey period) or the Irish Wetland Bird Survey (i.e. a rising tide or high tide survey) as outlined in the Conservation Objectives supporting document (NPWS, 2013c). A reduction in water quality is therefore considered the only potential impact arising from the Proposed Scheme with the possibility of affecting sanderling that may be foraging or roosting downstream from the Proposed Scheme. However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the long-term population trend of sanderling.
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by sanderling, other than that occurring from natural patterns of variation	No sanderling were observed adjacent to the Proposed Scheme works areas during overwintering waterbird surveys undertaken for the Proposed Scheme. Additionally, no sanderling were recorded from the three SPA subsites (0D448, 0D449, 0D450) adjacent to the Quignamanger proposed works area during either the 2010/11 Waterbird Survey Programme (i.e. a low-tide survey period) or the Irish Wetland Bird Survey (i.e. a rising tide or high tide survey) as outlined in the Conservation Objectives supporting document (NPWS, 2013c). A reduction in water quality is therefore considered the only potential impact arising from the Proposed Scheme with the possibility of affecting sanderling that may be foraging or roosting downstream from the Proposed Scheme. However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the range, timing or intensity of use of areas by sanderling.
[A149] Dunlin *Calidris alpina alpina* (wintering) Conservation Objective: To maintain the favourable conservation condition of Dunlin in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:			
Population trend	Percentage change	Long term population trend stable or increasing	None of the three SPA subsites which are adjacent to the Quignamanger proposed works area (Subsites 0D448, 0D449, 0D450) ranked as important high tide roosts for dunlin (NPWS, 2013c). Subsite 0D450, which is located directly downstream of the Quignamgner proposed works area was assessed as being of Moderate importance for dunlin at low tide during the 2010/11 Waterbird Survey Programme (NPWS, 2013c). No dunlin, however, were observed adjacent to the Proposed Scheme works areas during overwintering waterbird surveys conducted for the

Attribute	Measure	Target	Potential for the Proposed Scheme to Affect the Conservation Objective
Killala Bay/Moy Estuary SPA			
			Proposed Scheme. The site conservation condition of Dunlin within Killala Bay/Moy Estuary SPA is Highly Unfavourable with the site population trend decreasing by 58% over the 12 years from 1995/96 through to 2007/08. The long-term trend (1995/96 – 2019/20) for this species within Killala Bay is also categorised as a Large Decline (Kennedy *et al.,* 2022). It is likely that, as the decline in Dunlin across the site has continued, subsite 0D450 which was moderately important for dunlin in 2010/11 is currently not utilised by this species as numbers have reduced and alternative foraging sites further downstream are considered more favourable by the species. A reduction in water quality is therefore considered the only potential impact arising from the Proposed Scheme with the possibility of affecting dunlin that may be foraging or roosting downstream from the Proposed Scheme. However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the long-term population trend of dunlin.
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by dunlin, other than that occurring from natural patterns of variation	None of the three SPA subsite which are adjacent to the Quignamanger proposed works area (Subsites 0D448, 0D449, 0D450) ranked as important high tide roosts for dunlin (NPWS, 2013c). Subsite 0D450, which is located directly downstream of the Quignamanger proposed works area was assessed as begin of Moderate importance for dunlin at low tide during the 2010/11 Waterbird Survey Programme (NPWS, 2013c). No dunlin, however, were observed adjacent to the Proposed Scheme works areas during overwintering waterbird surveys conducted for the Proposed Scheme. The site conservation condition of Dunlin within Killala Bay/Moy Estuary SPA is Highly Unfavourable with the site population trend decreasing by 58% over the 12 years from 1995/96 through to 2007/08. The long-term trend (1995/96 – 2019/20) for this species within Killala Bay is also categorised as a Large Decline (Kennedy *et al.,* 2022). It is likely that, as the decline in Dunlin across the site has continued, subsite 0D450 which was moderately important for dunlin in 2010/11 is currently not utilised by this species as numbers have reduced and alternative foraging sites further downstream are considered more favourable by the species. A reduction in water quality is therefore considered the only potential impact arising from the Proposed Scheme with the possibility of affecting dunlin that may be foraging or roosting downstream from the Proposed Scheme. However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the range, timing or intensity of use of areas by dunlin.
[A157] Bar-tailed godwit *Limosa lapponica* (wintering) Conservation Objective: To maintain the favourable conservation condition of Bar-tailed Godwit in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:			
Population trend	Percentage change	Long term population trend stable or increasing	None of the three SPA subsites which are adjacent to the Quignamanger proposed works area (Subsites 0D448, 0D449, 0D450) ranked as important high tide roosts for bar-tailed godwit (NPWS, 2013c). Subsite 0D450, which is located directly downstream of the Quignamanger proposed works area was assessed as being of Low important for dunlin at low tide during the 2010/11 Waterbird Survey Programme (NPWS, 2013c). Nineteen bar-tailed godwit were observed adjacent to the Quignamanger proposed works area during the survey

Attribute	Measure	Target	Potential for the Proposed Scheme to Affect the Conservation Objective
Killala Bay/Moy Estuary SPA			
			visit in December 2022. These birds were seen foraging on the mudflats on the left-hand bank of the Moy estuary approximately 200 m from the western extent of the Quignamanger proposed works area at the edge of Ballina Quay. These 19 individuals are 5.7% of the SPA population. The site conservation condition of bar-tailed godwit within Killala Bay/Moy Estuary SPA is Intermediate (unfavourable) with the site population trend decreasing by 6.9% over the 12 years from 1995/96 through to 2007/08. The long-term trend (1995/96 – 2019/20) for this species within Killala Bay is also categorised as a Large Decline (Kennedy *et al.,* 2022). A reduction in water quality is considered the only potential impact arising from the Proposed Scheme with the possibility of affecting the population trend of bar-tailed godwit (e.g. via mortality due to contact with toxic substances; a reduction in prey items having a negative effect on survival etc.). However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the long term population trend of bar-tailed godwit.
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by bar-tailed godwit, other than that occurring from natural patterns of variation	Nineteen bar-tailed godwit were observed adjacent to the Quignamanger proposed works area during the survey visit in December 2022. These birds were seen foraging on the mudflats on the left-hand bank of the Moy estuary approximately 200 m from the western extent of the Quignamanger proposed works area at the edge of Ballina Quay. These 19 individuals are 5.7% of the SPA population. There is potential for individuals of this species to be affected by the proposed works e.g. via a change in water quality or via displacement as a result of noise emitted from the proposed works area. Mitigations will be implemented in the area of water quality protection to prevent direct and indirect effects resulting from a potential water pollution event from the Proposed Scheme. Additionally, given the small area of works that have the potential to elicit a disturbance response (i.e. the culvert upgrade under Quay Road and the open channel re-instatement at the northern end of Ballina Quay), the distance that bar-tailed godwit were observed from this works area and the relatively small numbers of bar-tailed godwit observed, it is considered that the Proposed Scheme will not affect the distribution of bar-tailed godwit by causing a significant decrease in the range, timing or intensity of use of areas by bar-tailed godwit.
[A160] Curlew *Numenius arquata* (wintering) Conservation Objective: To maintain the favourable conservation condition of Curlew in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:			
Population trend	Percentage change	Long term population trend stable or increasing	None of the three SPA subsites which are adjacent to the Quignamanger proposed works area (Subsites 0D448, 0D449, 0D450) ranked as important high tide roosts for curlew (NPWS, 2013c). Subsite 0D450, which is located directly downstream of the Quignamgner proposed works area was assessed as being of Low important for curlew at low tide during the 2010/11 Waterbird Survey Programme (NPWS, 2013c). A maximum of four curlew were observed at any one time utilising the survey area adjacent to the Quignamanger proposed works area during the over-wintering birds survey for the Proposed Scheme. This represents 0.74% of the SPA population. The site conservation condition of curlew within Killala Bay/Moy Estuary SPA is Unfavourable with the site population trend decreasing by 41.8% over the 12 years from 1995/96 through to 2007/08. The long-term trend

Attribute	Measure	Target	Potential for the Proposed Scheme to Affect the Conservation Objective
Killala Bay/Moy Estuary SPA			
			(1995/96 – 2019/20) for this species within Killala Bay is also categorised as a Large Decline (Kennedy *et al.,* 2022). A reduction in water quality is considered the only potential impact arising from the Proposed Scheme with the possibility of affecting the population trend of curlew (e.g. via mortality due to contact with toxic substances; a reduction in prey items having a negative effect on survival etc.). However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the long-term population trend of curlew.
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by curlew other than that occurring from natural patterns of variation	A maximum of four curlew were observed at any one time utilising the survey area adjacent to the Quignamanger proposed works area during the over-wintering birds survey for the Proposed Scheme. These birds were seen foraging on the mudflats on the left-hand bank of the Moy estuary with the closed individual approximately 150 m from the western extent of the Quignamanger proposed works area at the edge of Ballina Quay. There is potential for individuals of this species to be affected by the proposed works e.g. via a change in water quality or via displacement as a result of noise emitted from the proposed works area. Mitigations will be implemented in the area of water quality protection to prevent direct and indirect effects resulting from a potential water pollution event from the Proposed Scheme. Additionally, given the small area of works that have the potential to elicit a disturbance response (i.e. the culvert upgrade under Quay Road and the open channel re-instatement at the northern end of Ballina Quay), the distance that curlew were observed from this works area and the very small numbers of curlew observed, it is considered that the Proposed Scheme will not affect the distribution of curlew by causing a significant decrease in the range, timing or intensity of use of areas by curlew.
[A162] Redshank *Tringa totanus* (wintering) Conservation Objective: To maintain the favourable conservation condition of Redshank in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:			
Population trend	Percentage change	Long term population trend stable or increasing	None of the three SPA subsites which are adjacent to the Quignamanger proposed works area (Subsites 0D448, 0D449, 0D450) ranked as important high tide roosts for redshank (NPWS, 2013c). Subsite 0D450, which is located directly downstream of the Quignamgner proposed works area was assessed as being of High importance while subside 0D448 (which is located downstream of the Ice House) was assessed as being of Low importance for redshank at low tide during the 2010/11 Waterbird Survey Programme (NPWS, 2013c). A maximum of 50 redshank were observed at any one time utilising the survey area adjacent to the Quignamanger proposed works area during the over-wintering birds survey for the Proposed Scheme. Redshank were seen foraging on the mudflats on both the left-hand and right-hand banks of the Moy estuary between 50 and 500m from the western extent of the Quignamanger proposed works area at the edge of Ballina Quay. Some redshank were also observed flying over this survey area. These 50 individuals are 16.7% of the SPA population. A maximum of two redshank were observed at any one time utilising the survey area within the centre of Ballina town during the over-wintering birds survey for the Proposed Scheme. These redshank were observed flying over and foraging within the main channel of the River Moy in the centre of the town. The site conservation condition of redshank

Attribute	Measure	Target	Potential for the Proposed Scheme to Affect the Conservation Objective
Killala Bay/Moy Estuary SPA			
			within Killala Bay/Moy Estuary SPA is Favourable with the site population trend increasing by 3.4% over the 12 years from 1995/96 through to 2007/08. The long-term trend (1995/96 – 2019/20) for this species within Killala Bay is also categorised as a Moderate Decline (Kennedy *et al.,* 2022). A reduction in water quality is considered the only potential impact arising from the Proposed Scheme with the possibility of affecting the population trend of redshank (e.g. via mortality due to contact with toxic substances; a reduction in prey items having a negative effect on survival etc.). However, with mitigations implemented in the area of water quality protection there are no direct or indirect effects resulting from the Proposed Scheme that could alter the long-term population trend of bar-tailed godwit.
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by redshank, other than that occurring from natural patterns of variation	A maximum of 50 redshank were observed at any one time utilising the survey area adjacent to the Quignamanger proposed works area during the over-wintering birds survey for the Proposed Scheme. Redshank were seen foraging on the mudflats on both the left-hand and right-hand banks of the Moy estuary between 50 and 500m from the western extent of the Quignamanger proposed works area at the edge of Ballina Quay. Some redshank were also observed flying over this survey area. These 50 individuals are 16.7% of the SPA population. A maximum of two redshank were observed at any one time utilising the survey area within the centre of Ballina town during the over-wintering birds survey for the Proposed Scheme. These redshank were observed flying over and foraging within the main channel of the River Moy in the centre of the town. There is potential for individuals of this species to be affected by the proposed works e.g. via a change in water quality or via displacement as a result of noise emitted from the proposed works area via human presence. Mitigations will be implemented in the area of water quality protection to prevent direct and indirect effects resulting from a potential water pollution event from the Proposed Scheme. Additionally, given the small area of works that have the potential to elicit a disturbance response (i.e. the culvert upgrade under Quay Road and the open channel re-instatement at the northern end of Ballina Quay) the distance that the majority of redshank were observed from this works area (i.e. all but three observations were >125 m away) and the relatively short duration of this section of the works, it is considered that the Proposed Scheme will not affect the distribution of redshank by causing a significant decrease in the range, timing or intensity of use of areas by redshank.
[A999] Wetlands Conservation Objective: To maintain the favourable conservation condition of wetland habitat in Killala Bay/Moy Estuary SPA as a resource for the regularly occurring migratory waterbirds that utilise it. This is defined by the following attribute and target:			
Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 3204 hectares, other than that occurring from natural patterns of variation	**Not Significant**, neutral. With mitigations implemented in the area of water quality protection (especially measures to prevent suspended solids loss) there are no direct or indirect processes or effects that could alter the permanent habitat area of wetlands.

9.4 Lough Conn and Lough Cullin SPA

Lough Conn and Lough Cullin SPA
[A060] Tufted duck Aythya fuligula (wintering) [A065] Common scoter *Melanitta nigra* (breeding) [A182] Common gull *Larus canus* (breeding) [A395] Greenland white-fronted goose *Anser albifrons flavirostris* (wintering) Conservation Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

No attributes are listed within the Conservation Objective document for this SPA. However, it does state that "The favourable conservation status of a species is achieved when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats.
- The natural range of the species is neither being reduced not is likely to be reduced for the foreseeable future.
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

With the implementation of the mitigation measures outlined in **Section 7**, it is considered that there is no significant potential for the Proposed Scheme to affect the conservation objective of Lough Conn and Lough Cullin SPA.

10 CONCLUSION

It was found that in the absence of mitigation the Proposed Scheme could (worst case) result in adverse effects on integrity with respect to identified QI/SCI species and habitats of the following European Sites:

- River Moy SAC
- Killala Bay/Moy Estuary SAC
- Killala Bay/Moy Estuary SPA
- Lough Conn and Lough Cullin SPA

This NIS comprehensively demonstrates, based on best scientific knowledge available, that subject to implementation of bespoke mitigation measures and monitoring as detailed above, it can be objectively concluded that the Proposed Scheme on its own and in combination with other plans and projects will not adversely affect the integrity of these European Sites having regard to site-specific conservation objectives.

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Appendix A
Proposed Planting

Appendix B
Aquatic Ecology Survey Points

Aquatic Ecology Survey Points

Site	EPA name	Easting (ITM)	Northing (ITM)	Survey Date	Width (m)	Depth (m)	EPA Water Body Name and Code	WFD status 2016-2021	WFD Status method
M1	Moy 34 (T)*	524872	819015	22/07/2021	40.0	Tidal influence	Moy Estuary IE_WE_420_0300	Moderate	Monitored
M2	Moy 34 (T)*	524822	818973	22/07/2021	40.0	Tidal influence			
M3 & M4	Moy 34 (T)*	524760	818925	22/07/2021	40.0	Tidal influence			
M5 & M6	Moy 34 (T)*	524632	818794	22/07/2021	40.0	Tidal influence			
M11 / 12	Moy 34 (T)*	524593	818788	22/07/2021	40.0	Tidal influence			
M13	Moy 34 (T)*	524818	819027	22/07/2021	40.0	Tidal influence			
M14	Moy 34 (T)*	524902	819105	22/07/2021	40.0	Tidal influence			
M15	Moy 34 (T)*	524957	819157	22/07/2021	40.0	Tidal influence			
M7	River Moy 34	524551	818601	22/07/2021	40.0	Tidal influence	Moy_120 IE_WE_34M021100	Moderate	Monitored
M8	River Moy 34	524577	818655	22/07/2021	40.0	(Bank habitat)			
M9	River Moy 34	524615	818717	22/07/2021	40.0	Tidal influence			
M10	River Moy 34	524596	818679	22/07/2021	40.0	Tidal influence			
TE1	Tullyegan 34	522022	818506	11/07/2022	1.0	0.05	Tullyegan_010 IE_WE_34T830920	Moderate	Modelling
TE2	Tullyegan 34	522987	817601	11/07/2022	1.6	0.15			
TE3	Tullyegan 34	523545	817628	11/07/2022	2.0	0.2			
TE4	Tullyegan 34	523882	817645	11/07/2022	2.5	*NV*			
BN1	Bunree	527533	819947	11/07/2022	0.6	NV	Dooyeaghhny_or _Cloonloughan_010 IE_WE_34D310990	Good	Modelling
BN2	Bunree	527231	819583	11/07/2022	0.6	<0.05			
BN3	Bunree	526397	819552	11/07/2022	0.7	0.03			
BN4	Bunree	526114	819567	11/07/2022	N/A	N/A			
BN5	Bunree	525448	819704	11/07/2022	1.0	0.1			
QG1	Quignamanger	527040	820567	11/07/2022	1.0	0.02	Dooyeaghhny_or _Cloonloughan_010 IE_WE_34D310990	Good	Modelling
QG2	Quignamanger	526698	820613	11/07/2022	0.8	0.05			
QG3	Quignamanger	526397	820744	11/07/2022	N/A	N/A			
QG4	Quignamanger	526114	820830	11/07/2022	N/A	N/A			
QG5	Quignamanger	525742	821170	11/07/2022	1.5	0.15			

Site	EPA name	Easting (ITM)	Northing (ITM)	Survey Date	Width (m)	Depth (m)	EPA Water Body Name and Code	WFD status 2016-2021	WFD Status method
QG6	Quignamanger	575703	821181	11/07/2022	NV	NV			
BR1	Brusna/Glenree	526867	817939	12/07/2022	10	0.3	Glenree_030 IE_WE_34G010200	Good	Monitored
BR2	Brusna/Glenree	526714	818205	12/07/2022	10	0.3			
BR3	Brusna/Glenree	526543	818350	12/07/2022	10	0.5			
BR3a	Brusna/Glenree	526510	818408	11/09/2023	11	0.4			
BR4	Brusna/Glenree	526157	818911	12/07/2022	12	0.8			
BR5	Brusna/Glenree	526089	818950	12/07/2022	11	0.35			
BR6	Brusna/Glenree	525445	819439	12/07/2022	14	NV			
DH1	Downhill	526502	818309	12/07/2022	2	0.15			

** (T) = Transitional Water – technically within Moy Estuary, but very much within the freshwater zone of the lower River Moy*

Appendix C
Instream Habitat Descriptions

Instream Habitat Descriptions

Site	EPA name	Habitat Description (Field Target Note)	Fisheries Value	Biological Water Quality (Q-value)	WFD status
M1	Transitional Moy 34	Bankside vegetation on both sides of the river downstream of the "Lower Bridge" is quite 'natural' and largely undisturbed. Riparian habitat pertains to *FS2 Tall-herb swamp,* grading locally into *FS1*. Species include *Phalaris*, purple loosestrife, meadow sweet, *Potentilla anserina*, water figwort, as well as occasional angelica, marsh ragwort, marsh valerian, narrow leaved ribwort plantain, tufted vetch, hemlock water dropwort, several grasses, *Rumex* spp., rushes, with scattered stunted alder and willow present at intervals. At the river-side face of the bank and toward its base, *Eliocharis palustris*, *Caltha palustris*, *Myosotis* and *Mentha* frequently occurred, along with loose stands of *Sparganium erectum* at intervals. Instream, just below the bridge at the RHS, substrates comprise scattered angular cobbles over slightly silted medium and coarse sand. There were extensive rafts of *Potamogeton* x zizii and *P. perfoliatus* and occasional amounts of the submerged form of *Schoenoplectus lacustris*. The cobbles had *Cinclidotus* and *Fissidens* sp. Freshwater sponge was abundant under the Lower Bridge and immediately below.	Flow during sampling (low tide) was mod-slow at the margins and habitat is not suitable for salmonid spawning, although an important migration route. Lamprey ammocoetes (juveniles) present (likely sea lamprey) in some of the softer marginal sediments, both banks.	Sampled fauna under and on stones included *Bithynia*, zebra mussels, *Theodoxus*, abundant swan mussel shells, *Polycentropus* etc. *Calopteryx* sp. on the wing. Transitional Water - EPA rating of Moderate Status (2022)	Moderate
M2	Transitional Moy 34	Immediately upstream of the Lower Bridge, RHS side, a drain enters (clearly enriched/polluted in July 2021). RHS grassland above the hard quay wall is of lower ecological value compared to M1. The vertical quay wall itself is covered with *Cinclidotus* above with *Fontinalis antipyretica* below but also probably other smaller amounts of other mosses. Instream was occasional *Myriophyllum spicatum* and *Ranunculus spp.*, plus wispy FGA heavily covered in diatoms.	Important salmonid and lamprey migration route (no spawning, no lamprey nursery). Valuable recreational fishing area.	As for M1	Moderate
M3 & M4	Transitional Moy 34	Paired Boulder Deflectors on both sides of the river running upstream from the Lower Bridge as far as the Salmon Weir. Covered with *Cinclidotus* and FGA, with coarse sand between boulders. They are in place to cause pools to develop downstream thereby encouraging salmon to rest up on their inward migration allowing anglers a chance to catch them as well as affording anglers a fishing platform extending into the channel. The RHS has a sloping, engineered bank which has a band of *Vaucheria* and *Cinclidotus*. Backwaters between deflectors have *Ranunculus* and *P. x zizzi* and occasional *Fontinalis antipyretica.*	Important salmonid and lamprey migration route (no spawning, no lamprey nursery). Valuable recreational fishing area.	As for M1	Moderate
M5 & M6	Transitional Moy 34	Large RHS side boulder deflector: *Ranunculus* sp. landward, *Cinclidotus* and FGA on small cobble on main body of the deflector and with heavy FGA and *Cinclidotus* on the tip (channel end) of the deflector. Slack, more laminar flow occurs upstream of 'natural' rock weir.	Important salmonid and lamprey migration route (no spawning, no lamprey nursery). Valuable recreational fishing area.	As for M1	Moderate
M7 & M8	River Moy 34	RHS quay walls dominated by *Cinclidotus.* Instream very slack flow over FGA and moss-covered cobble (*Cinclidotus*). Ivy and bramble in places above along with alder and sycamore 'bushes', and clumps of *Sparganium erectum* and *Phalaris* below.	Important salmonid and lamprey migration route. Sea lamprey spawning and nursery (See Appendix 9.6 for lamprey habitat details). Valuable recreational fishing area.	EPA rating (2022) - 50m u/s Salmon Weir [34M021050] = Q3-4 (Moderate Status)	Moderate
M9	River Moy 34	RHS existing wall - *Myriophyllum spicatum* and *Ranunculus* sp. in shallow, marginal slack-flow areas. Also, large clumps of *P. x zizzi* closer to the bridge downstream and occasional *Fontinalis* and *Ranunculus* with a band of *Phalaris* close to the wall.	Important salmonid and lamprey migration route. Potential lamprey nursery habitat at margin near Upper Bridge (see Appendix 9.6 for details).	As for M7/8	Moderate

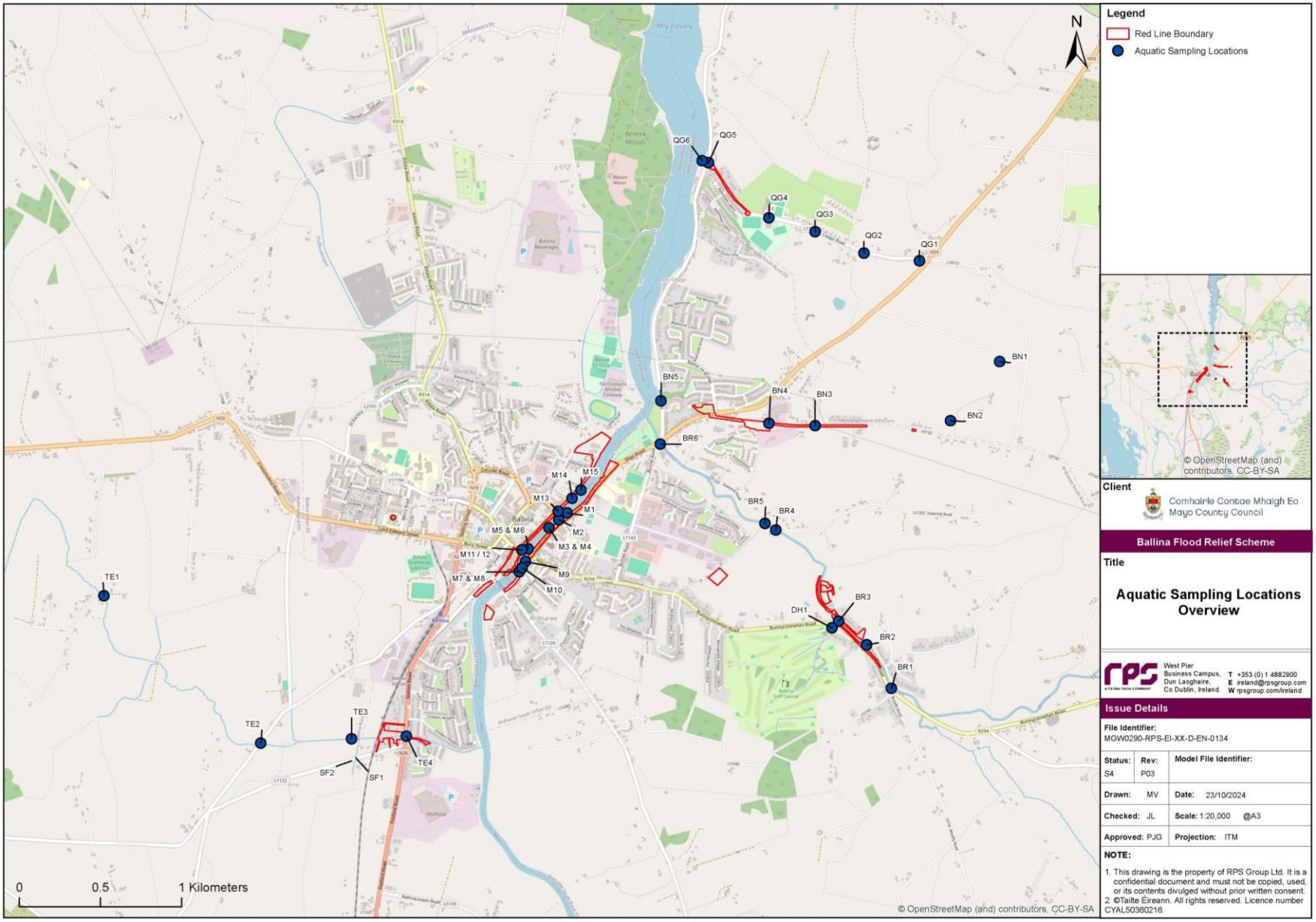
Site	EPA name	Habitat Description (Field Target Note)	Fisheries Value	Biological Water Quality (Q-value)	WFD status
			Valuable recreational fishing area.		
M10	River Moy 34	Heavy steel culvert flap - RHS wall (stormwater outlet). Slack pool/glide at outfall close to wall with bedrock, loose cobble and fine silt layer signifying slack flow.	~	As for M7/8	Moderate
M11 / 12	Transitional Moy 34	LHS of river below the "Upper Bridge". School of grey mullet observed in July 2022.	Important salmonid and lamprey migration route (no spawning, no lamprey nursery habitat). Valuable recreational fishing area.	As for M1	Moderate
M13	Transitional Moy 34	LHS side of the Lower Bridge - just upstream of Knockenelo Stream culvert confluence. Low boulder and cobble 'berm' protecting base of LHS bankside embankment, which is topped with *Phalaris*, purple loosestrife and meadow sweet, with a wide belt of P*otamogeton x zizzi* and *P. perfoliatus*. Well-developed plant community including buddleia on and just inside the roadside backing wall dominated by *Phalaris*, purple loostrife, marsh ragwort, meadow sweet, *Potentilla anserina, Ranunculus repens*, scattered water figwort, scattered *Iris pseudacorus*, occasional common valerian (*V. officinalis*) with *Eliocharis, Caltha* and *Myosotis, Mentha* further down the bank and a fringe of instream *Ranunculus* at the base of the bank.	Important salmonid and lamprey migration route. Lamprey ammocoetes present in slack margins (silt deposits).	As for M1	Moderate
M14	Transitional Moy 34	Instream: marginal 'belt' of *Ranunculus* stretching from the boulder base of the bank into the edge of the channel, with a wide belt of mixed *P. perfoliatus* and *P. x zizzi*. Some Fontinalis on boulders also, with *Eliocharis, Mentha*, occasional clumps of *Apium, O. crocata* and very occasional stands of *S. erectum*, v. occasional *Lycopodium*, Water plantain (*Alisma plantago-aquatica*) and Amphibious bistort.	Important salmonid and lamprey migration route. Lamprey ammocoetes present in slack margins (silt deposits).	As for M1	Moderate
M15	Transitional Moy 34	Floating dock - inner side had very slack water and FGA. Similar to M14 but *S. erectum* more common in slack flows. Small amounts of S. *emersum* and *S. erectum* present, *Elodea canadensis* and very occasional *Callitriche* spp.	Important salmonid and lamprey migration route. Lamprey ammocoetes present in slack margins (silt deposits).	As for M1	Moderate
TE1	Tullyegan 34	Small, drained stream within deepened field boundary ditch. Uniformly sloping banks overgrown with tall herb community of meadowsweet, watermint, water speedwell (*Veronica anagallis-aquatica*) figwort, bindweed, Great willowherb and grasses. Scarce instream plant community, with mainly marginal species including *S. erectum, Myosotis scorpiodes*, *Callitriche* spp. and both *Lemna minor* and *L. trisulca*. Shallow riffle-run over mainly coarse and fine gravel / pebble with occasional cobble. Heavy fine silt deposits at margins /slacks. Suitable for trout, brook lamprey spawning and nursery, although regular drainage and low summer flows, with a lack of deeper pools may militate against their presence. Eel and stickleback likely. 30-minute crayfish search conducted - no evidence of crayfish.	Trout and brook lamprey spawning / nursery potential throughout this stream although impaired water quality and apparently regular dredging would militate against this. Eel, stickleback likely.	Kick sample taken 12/07/2022 = Q3-4 - slightly towards the poor end of the moderate status band possibly owing to hydromorphology alterations and siltation	*Moderate
TE2	Tullyegan 34	Culverted beneath local road. Evidence of drainage downstream with drainage spoil deposited on RHS bank. Similar habitat to TE1 with greater proportion of cobble. Suitable trout nursery with pockets of trout and likely brook lamprey spawning habitat.	As for TE1	Infer Q3-4 from TE1 and TE3	*Moderate

Site	EPA name	Habitat Description (Field Target Note)	Fisheries Value	Biological Water Quality (Q-value)	WFD status
TE3	Tullyegan 34	Moderate sized stream with reasonable flow even in summer (possibly spring fed). Modified by recent drainage - deepened, widened, channelized. Steep, unstable clay banks. Cobble (40%) and pebble/gravel (50%) with silt (10%). Mainly uniform riffle/run. Long trailing *Cladophora* (35% cover) instream, indicative of nutrient enrichment. Slightly turbid during sampling. Trout nursery with potential pockets of spawning habitat, but generally low-quality salmonid habitat (not suited to salmon). Trout, stickleback, stoneloach, brook lamprey and eel are likely. 30-minute crayfish search conducted - no evidence of crayfish.	As for TE1	Kick sample Q3-4	*Moderate
TE4	Tullyegan 34	N26 crossing (upstream of Moy confluence). Highly modified through urban reach with high concrete flood defence walls and deepened / widened channel.	As for TE1	Infer Q3-4 from TE1 and TE3	*Moderate
BN1	Bunree	This upper reach of the Bunree is drained, forming a field boundary ditch. There was no visible flow (during summer) - mainly dry with occasional small pools. Deepened channel lined with damp soft sediments overgrown with *Equisetum fluviatile,* rushes, bramble and occasional trimmed willow, hawthorn and alder.	Low, if any fisheries value.		*Poor
BN2	Bunree	Deeply drained and realigned from this point downstream and along the L5132 road. Trickle flow over substrates of silty gravel and cobble. Not accessible for kick-sample.	Low, if any fisheries value.	Infer Q3 from BN3	*Poor
BN3	Bunree	The stream is realigned alongside the L5132 road and has modified banks that appeared recently herbicide sprayed. Slow riffle/run over fine gravel substrates with silty deposits at margins and slacks. 5% cover of FGA (*Spirogyra* spp.), clear, but very low volume.	Low potential for any fish presence owing to limited water volume and impaired water quality.	Kick sample taken 11/07/2022 = Q3	*Poor
BN4	Bunree	Extensively culverted from this point down to BN5. Stepped culvert entrance forms a fish passage barrier.	No fisheries value (culverted)	Infer Q3 from BN3	*Poor
BN5	Bunree	Lower Bunree Stream just upstream confluence of River Moy. Glide flow over embedded cobble substates with overlying soft sediment. Bank habitat appears to be a diverse reed swamp area with reed canary grass, meadowsweet, butterbur, figwort, marsh ragwort, *Rumex* spp., *Angelica* spp.	Low fisheries value, although fish may forage up from Moy main channel	Infer Q3 from BN3	*Poor
QG1	Quignamanger	Small woodland stream. Trickle flow, run glide over silty sediments with embedded calcareous gravel/cobble (10%) and abundant woody debris. Otter prints noted along stream margin. Trout and brook lamprey cannot be ruled out, but habitat is not ideal, and this site is upstream of culvert works. Stickleback present. 30-minute crayfish search conducted - no evidence of crayfish.	Stickleback, possibly eel if they can negotiate culverts	Q3 inferred from QG2	*Poor
QG2	Quignamanger	Calcareous concretions with patches of loose gravel/cobble attest to high alkalinity and likely spring fed nature of this stream. 15% cover of leafy liverwort (*Pellia epiphylla*). Stickleback present. The stream is culverted from 20m downstream of this point all the way to point QG5.	Stickleback: possibly eel if they can negotiate culverts. Calcareous concretions in any riffle /run sections mean that habitat is largely unsuitable for trout spawning	Kick sample taken 11/07/2022 = Q3 (low diversity, not ideal for sampling)	*Poor
QG3	Quignamanger	Stream culverted - road side channel for stormwater only	No fisheries value (culverted)	N/A	N/A
QG4	Quignamanger	Stream culverted - road side channel for stormwater only	No fisheries value (culverted)	N/A	N/A
QG5	Quignamanger	Short section of open channel upstream of Quay Road pipe/culvert and River Moy confluence. Stony substrates with calcareaos silty /sand deposits in slack flows, riffle-run habitat with small cascades that have tufa formation (calcareous deposition) on masses of filamentous green algae (*Vaucheria* spp.) and stony substrates. The channel is 1.5m in width (10cm depth at low flow), confined within vertical stone walls along the open reach between the active culvert flap valve and the Quay Road culvert. The	Low fisheries value, although fish may forage up from Moy main channel	Q3 inferred from QG2	*Poor

Site	EPA name	Habitat Description (Field Target Note)	Fisheries Value	Biological Water Quality (Q-value)	WFD status
		diversion culvert was inactive during low flows, meaning the channel was dry upstream of the outfall of the active culvert.			
QG6	Quignamanger	Tributary outfall is culverted under Quay Road first within a low box culvert, then merging into a 900mm pipe and conveyed out to the River Moy beneath the Quay. The piped outfall to the Moy is not visible at high tide.	Conduit for salmonids and eel into the lower reach of the Quignamanger	Q3 inferred from QG2	N/A
BR1	Brusna /Glenree	Same instream habitat as for BR2. LHS bank has low, set-back wall next to R294 road.	Good salmonid spawning/nursery habitat. Very little nursery habitat for brook lamprey	Q4-5 inferred from BR2	*High
BR2	Brusna /Glenree	Riffle-run over cobble / pebble/gravel with bryophyte community (*Schistidium, Chiloscyphus*) and *Hildenbrandia* common. Both banks have boulder old riprap, overgrown with broadleaved trees (alder, sycamore) on RHS and mainly tall herb, bramble and grasses on LHS. Excellent salmonid spawning/nursery habitat. 30-minute crayfish search conducted - no evidence of crayfish.	Good salmonid spawning/nursery habitat. Very little nursery habitat for brook lamprey	Kick-sample taken 11/09/2023 = Q4-5	*High
BR3	Brusna /Glenree	Similar habitat to BR2, but low weir causes slight impoundment. Narrow strip of tall herb on LHS backed by mowed field. Relatively natural hydromorpholgy in spite of proximity to urban area.	Good salmonid spawning/nursery / holding habitat. Very little nursery habitat for brook lamprey	Q4-5 inferred from BR2	*High
BR3a	Brusna /Glenree	River width 9-10m, depth 40cm (average). Eroding concrete/conglomerate bed protection extending 6m upstream and downstream of existing bridge faces. Fast-flowing riffle run extending from c.50m upstream of bridge to the downstream end of bed protection. Bed protection is eroded and broken at downstream end where there has formed a scour pool, which merges to a long glide for c.90m downstream before merging to riffle/run again. The bed protection had eroded mid-channel, forming a low flow channel with habitat similar to that merging from upstream: cobble (20%), pebble/gravel (60%), coarse sand (20%). Bryophyte community dominated by *Schistidium rivulare* (20% cover) with smaller amounts of *Fissidens* and *Chiloschyphus*. The bed protection area is not suitable for spawning but upstream comprises good spawning and nursery for salmonids. Downstream of bridge is a scour pool which forms excellent salmonid holding habitat.	Good salmonid spawning/nursery / holding habitat. No nursery habitat for brook lamprey (too swift).	Q4-5 inferred from BR2	*High
BR4	Brusna /Glenree	Glide/pool on bend in river with overhanging trees and marginal reed swamp. Good salmonid holding habitat.	Good salmonid spawning/nursery habitat. Very little nursery habitat for brook lamprey	Q4-5 inferred from BR2	*High
BR5	Brusna /Glenree	Footbridge over river. Similar habitat to BR2, but with finer substrates. Excellent salmonid spawning/ nursery habitat. 30-minute crayfish search conducted - no evidence of crayfish.	Good salmonid spawning/nursery habitat. Very little nursery habitat for brook lamprey	Q4-5 inferred from BR2	*High
BR6	Brusna /Glenree	Fast rapid/cascade over bedrock substrates. Almost certainly a migration barrier to sea/river lamprey, but salmon should have no problem passing. This series of cascades continues upstream for about 200m. Another, engineered, cascade/weir occurs about 250m upstream of the natural cascades.	Migration channel for salmon and eel. Lamprey nursery in this lower reach (sea lamprey and *Lampetra* spp.)	Q4-5 inferred from BR2	*High
DH1	Downhill	Deeply drained channel with stagnant, standing water supporting floating and emergent macrophytes (*Callitriche spp., P. natans; Apium nodiflorum; Alisma plantago aquaticum*). Culverted from R294 road down to Brusna confluence.	Possible stickleback and eel	Not suitable for kick-sample	N/A

**Note – 'WFD status' marked with asterisk are considered "representative", as they are the result of field sampling and not part of the formal EPA monitoring programme.*

Appendix D
Aquatic Ecology Survey Maps


N
Legend
Red Line Boundary
Aquatic Sampling Locations
QG6
QG5
QG4
QG3
QG2
QG1
BN1
BN2
BN3
BN4
BN5
BR6
BR5
BR4
BR3
BR2
BR1
DH1
M14
M15
M13
M1
M2
M5 & M6
M3 & M4
M11 / 12
M7 & M8
M9
M10
TE1
TE2
TE3
TE4
SF1
SF2
0
0.5
1 Kilometers
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Client
Comhairle Contae Mhaigh Eo
Mayo County Council
Ballina Flood Relief Scheme
Title
Aquatic Sampling Locations Overview
West Pier
Business Campus,
Dun Laoghaire,
Co Dublin, Ireland.
T +353 (0) 1 4882900
E ireland@rpsgroup.com
W rpsgroup.com/ireland
Issue Details
File Identifier:
MGW0290-RPS-EI-XX-D-EN-0134
Status: S4
Rev: P03
Model File Identifier:
Drawn: MV
Date: 23/10/2024
Checked: JL
Scale: 1:20,000 @A3
Approved: PJG
Projection: ITM
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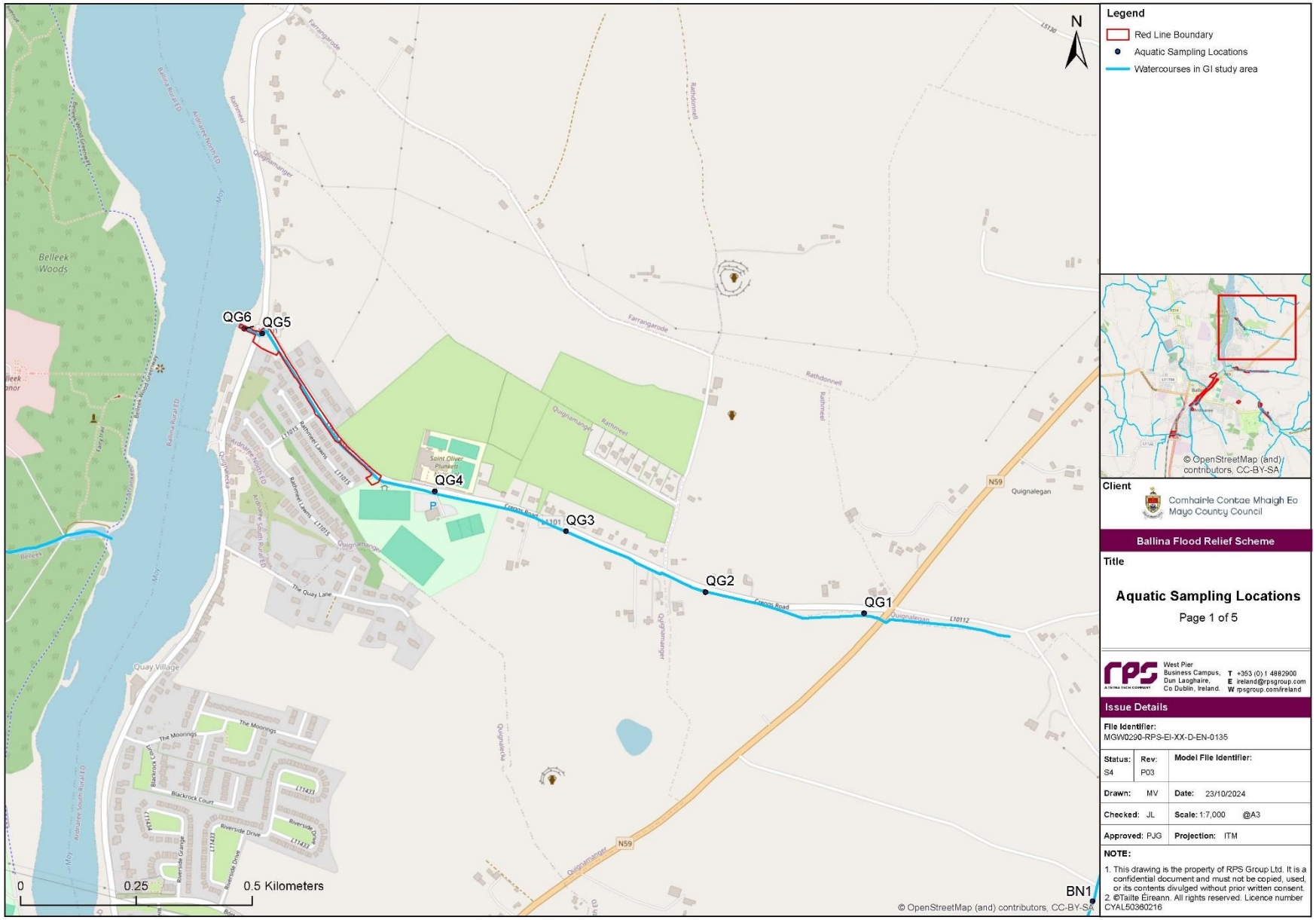
N
Legend
Red Line Boundary
Aquatic Sampling Locations
Watercourses in GI study area
QG6
QG5
QG4
QG3
QG2
QG1
BN1
Belleek Woods
Quay Village
N59
0
0.25
0.5 Kilometers
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Client
Comhairle Contae Mhaigh Eo
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Title
Aquatic Sampling Locations
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Co Dublin, Ireland.
T +353 (0) 1 4882900
E ireland@rpsgroup.com
W rpsgroup.com/ireland
Issue Details
File Identifier:
MGW0290-RPS-EI-XX-D-EN-0135
Status: S4
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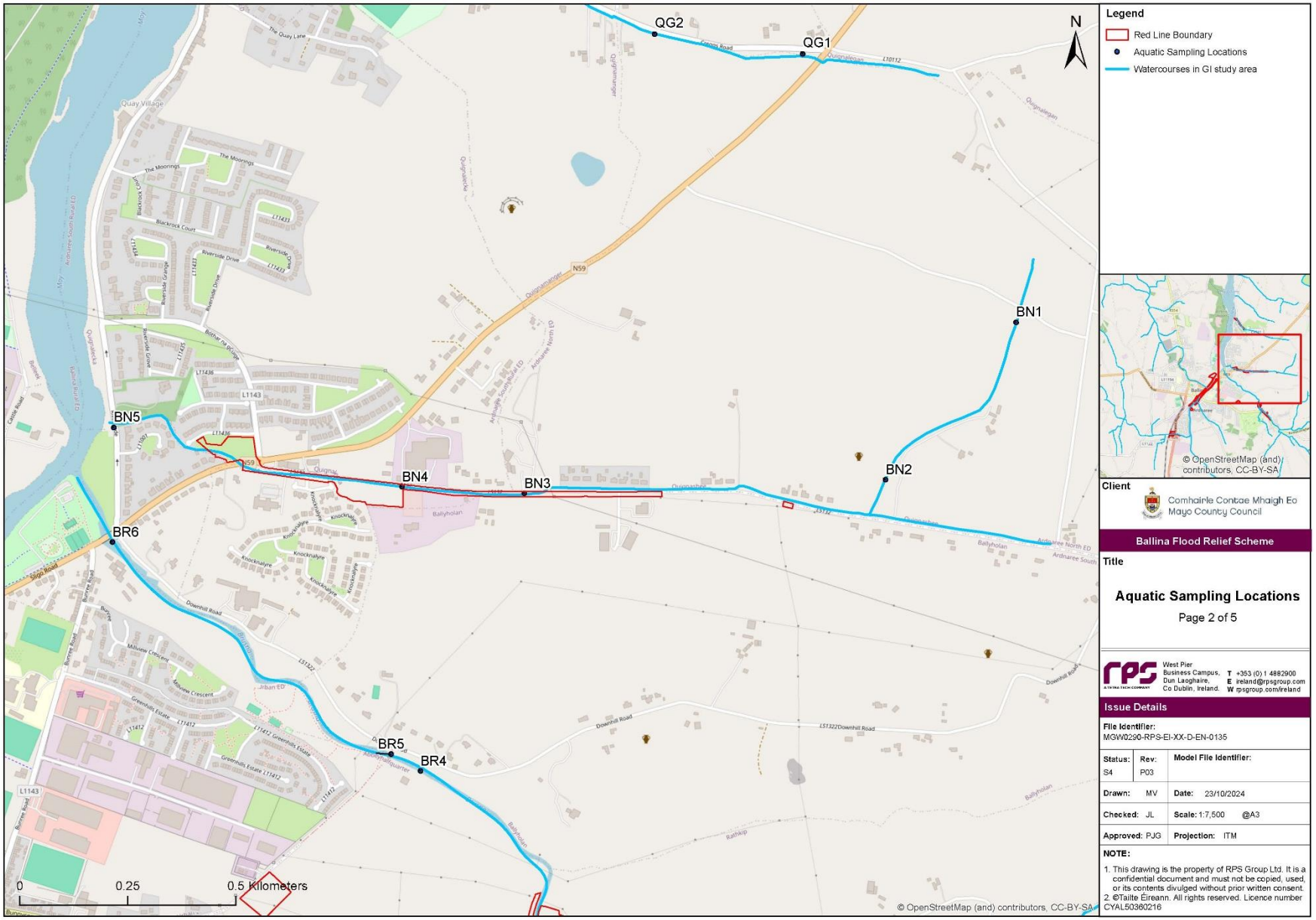
QG2
QG1
BN1
BN2
BN3
BN4
BN5
BR6
BR5
BR4
N
0
0.25
0.5 Kilometers
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Legend
Red Line Boundary
Aquatic Sampling Locations
Watercourses in GI study area
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T +353 (0) 1 4882900
E ireland@rpsgroup.com
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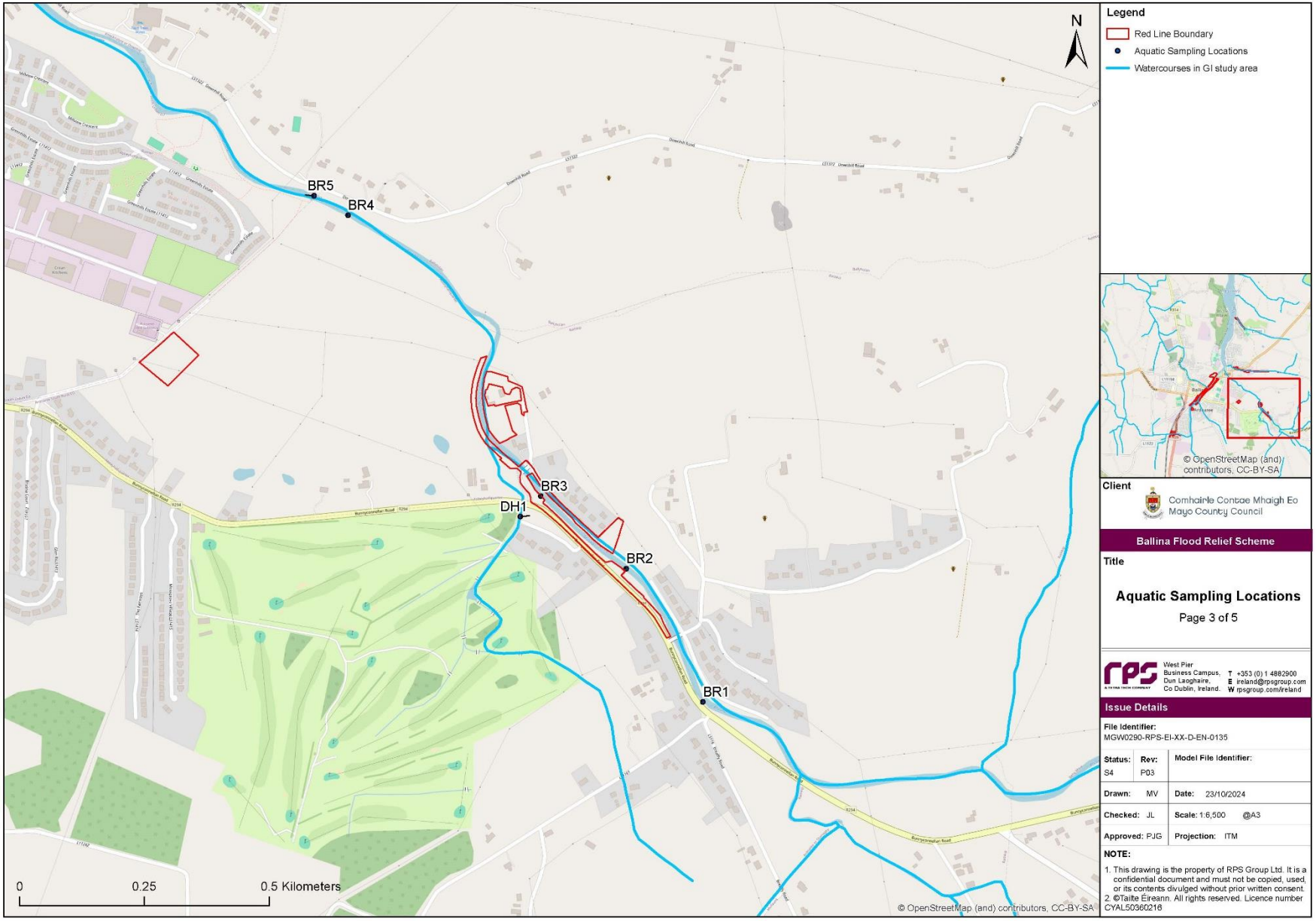
N
Legend
Red Line Boundary
Aquatic Sampling Locations
Watercourses in GI study area
BR5
BR4
BR3
DH1
BR2
BR1
0
0.25
0.5 Kilometers
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Co Dublin, Ireland.
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Date: 23/10/2024
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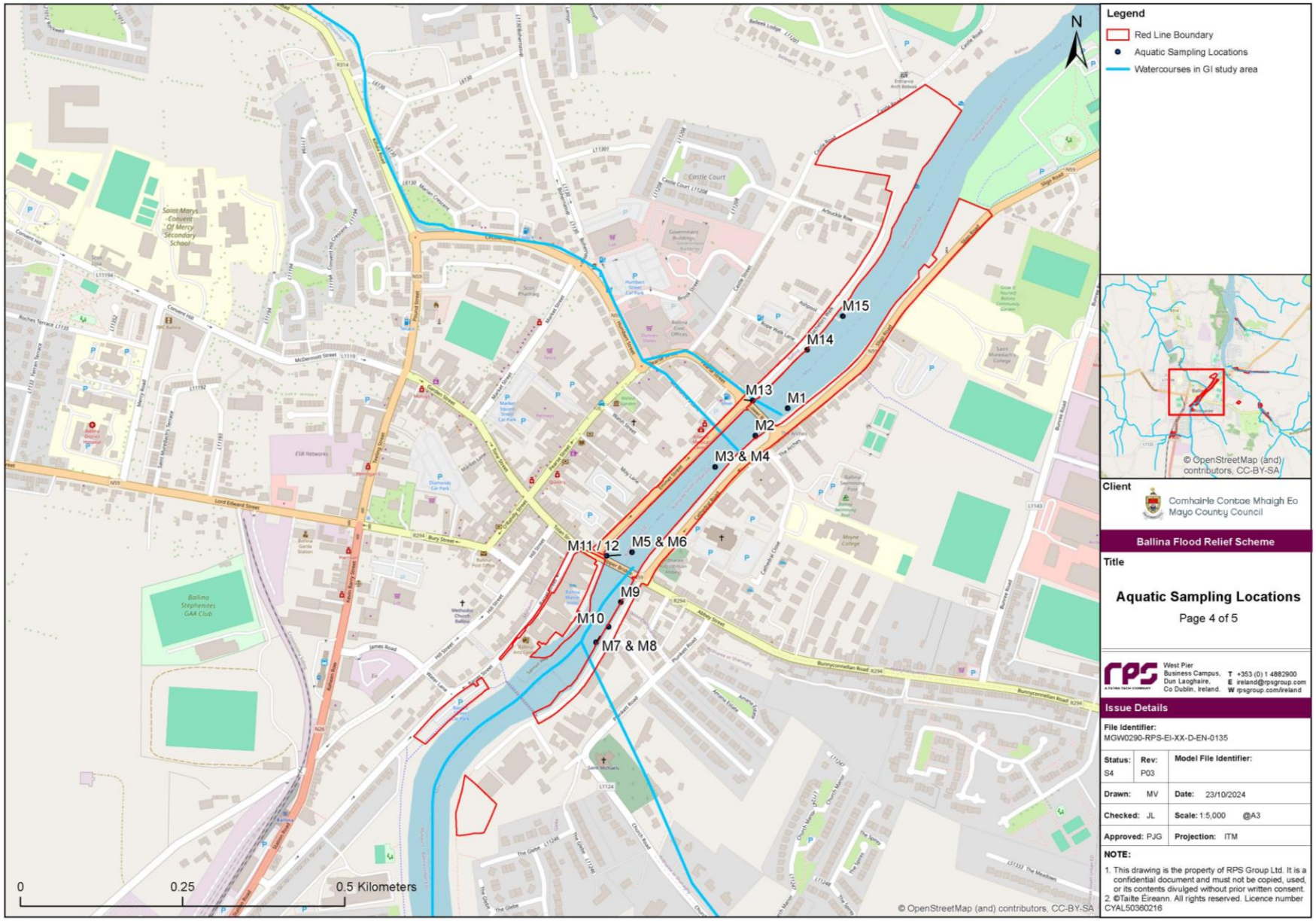
N
M15
M14
M13
M1
M2
M3 & M4
M11 / 12
M5 & M6
M9
M10
M7 & M8
0
0.25
0.5 Kilometers
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Legend
Red Line Boundary
Aquatic Sampling Locations
Watercourses in GI study area
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Business Campus,
Dun Laoghaire,
Co Dublin, Ireland.
T +353 (0) 1 4882900
E ireland@rpsgroup.com
W rpsgroup.com/ireland
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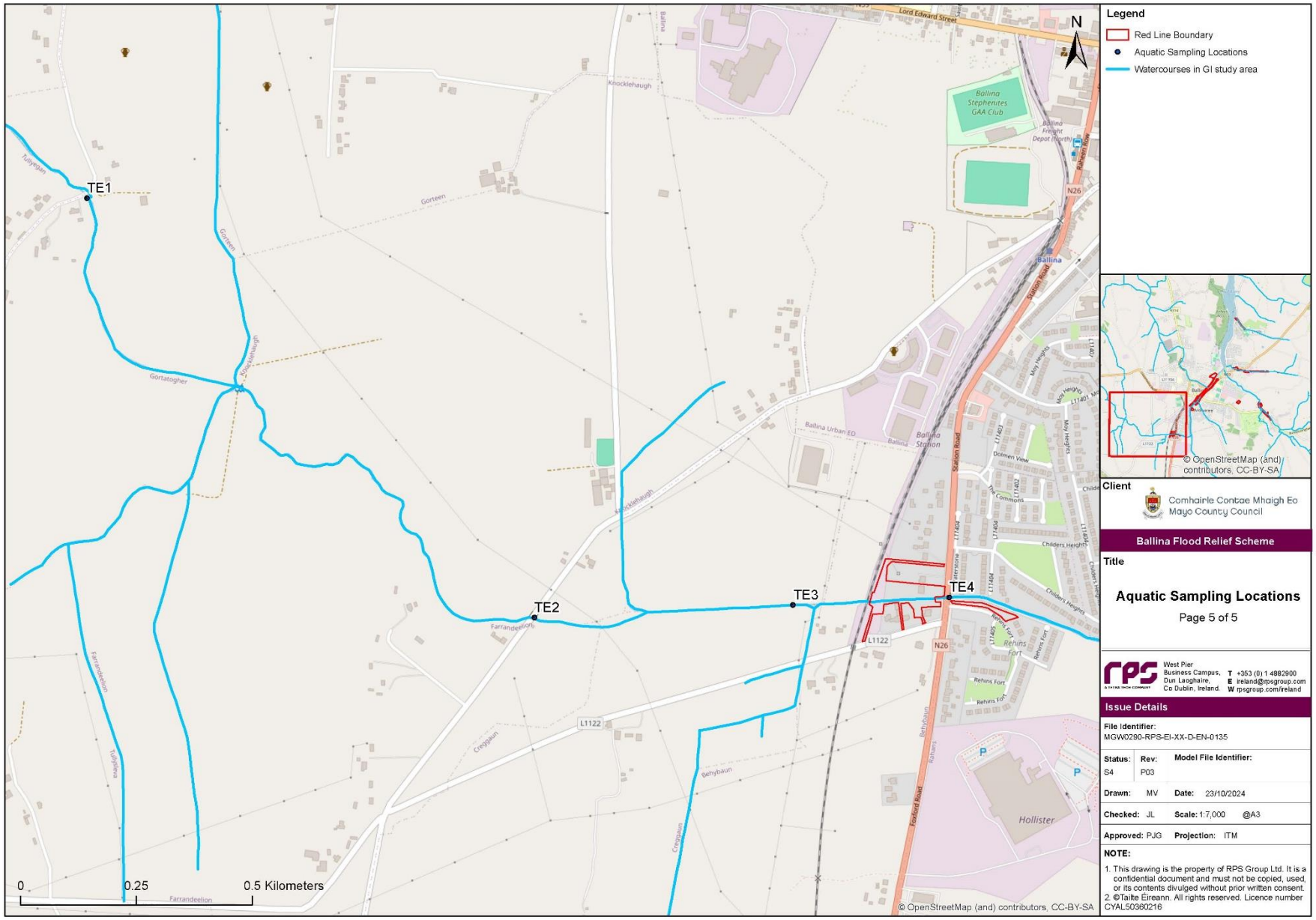
N
Legend
Red Line Boundary
Aquatic Sampling Locations
Watercourses in GI study area
TE1
TE2
TE3
TE4
0
0.25
0.5 Kilometers
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Appendix E
Aquatic Ecology Photographs

River Moy

Site M1 *FS1/Annex I habitat 6430* on RHS downstream of Lower Bridge + instream habitat (22 July 2021)

Site M2 Bankside and instream habitat at low tide (22 July 2021)

Sites M3/4 Cathedral Pool with boulder deflectors – salmon migration route / fishing area (22 July 2021)

Site M5/6 Cathedral Pool - Existing bank defences and instream habitat with deflectors (low tide) (22 July 2021)

Site M7/8 Ridge pool - views downstream and upstream towards Salmon Weir (22 July 2021)

Site M9/10 Existing River walls on Ridgepool RHS and non-return culvert flap (22 July 2021)

Sites M11/12 LHS view downstream and close up of instream habitat with dominant pondweed (22 July 2021)

Site M13 Knockenelo Stream northernmost culvert confluence, with LHS existing wall & view across to RHS (22 July 2021)

Site M14 LHS instream and bankside habitat (22 July 2021)

Site M15 Upstream / downstream views from floating dock (22 July 2021)

Site M15 Lamprey ammocoete with close-up of trunk myomeres (12 July 2022)

Brusna/Glenree River

BR1 – Brusna/Glenree, low wall with narrow, tree-lined riparian corridor along R294 road (12 July 2022)

BR2 – Brusna/Glenree, kick sample site, view upstream (12 July 2022)

BR3 – Brusna/Glenree, low weir view downstream. The reach may be subject to embankment (12 July 2022)

BR4 – Brusna/Glenree relatively rare glide/pool – salmonid holding habitat (12 July 2022)

BR5 – Brusna/Glenree, good salmonid spawning /nursery area upstream footbridge (12 July 2022)

BR6 – Brusna/Glenree, natural bedrock cascades upstream of N59 bridge (12 July 2022)

Tullyegan Stream

TE1 – Tullyegan, instream habitat (11 July 2022)

TE2 - Tullyegan, view downstream (11 July 2022)

TE3 – Tullyegan, instream habitat showing drained channel and *Cladophora* coverage (11 July 2022)

TE4 – Tullyegan, view downstream from N26 road bridge (11 July 2022)

Bunree Stream

BN1 – Bunree, upper reaches (11 July 2022)

BN2 – Bunree (11 July 2022)

BN3 – Bunree, parallel to Behy Road (11 July 2022)

BN5 – view downstream toward Moy confluence (11 July 2022)

Quignamanger Stream

QG1 – Quignamanger (11 July 2022)

QG2 – Quignamanger, view upstream (11 July 2022)

QG3 – Quignamanger, roadside stormwater swale (11 July 2022)

QG4 – Quignamanger, roadside stormwater swale (11 July 2022)

QG5 – Quignamanger, short section of open channel along Cregg Road before culvert under Quay (11 July 2022)

QG6 – Quignamanger, view of tidal River Moy downstream of piped outfall (11 July 2022)

K19 - Knockenelo upper (12 July 2022)

K20 – Knockenelo upper (12 July 2022)

Appendix F
Ridgepool Instream Survey

Appendix G
NBDC QI and SCI Records for G21 and G22

Common name	Scientific name	Year of last record	Designation	Grid Square
Bar-tailed Godwit	*Limosa lapponica*	2011	BOCCI – Red SCI Bird Species EU Bird's Directive – Annex I Wildlife Act	G22
Black-headed Gull	*Larus ridibundus*	2011	BoCCI – Amber SCI Bird Species	G21
Black-legged Kittiwake	*Rissa tridactyla*	2011	Bocci – Red SCI Bird Species Wildlife Act	G22
Black-throated Diver	*Gavia arctica*	2011	BOCCI – Amber EU Bird's Directive – Annex I SCI Bird Species Wildlife Act	G22
Brent Goose	*Branta bernicla*	2018	BoCCI – Amber SCI Bird Species Wildlife Act	G21, G22
Common Goldeneye	*Bucephala clangula*	2011	BOCCI – Red SCI Bird Species EU Bird's Directive – Annex II Wildlife Act	G21, G22
Common Greenshank	*Tringa nebularia*	2011	BOCCI – Green SCI Bird Species Wildlife Act	G22
Common Kingfisher	*Alcedo atthis*	2011	BOCCI – Amber SCI Bird Species EU Bird's Directive – Annex I Wildlife Act	G21, G22
Common Pochard	*Aythya ferina*	2011	BOCCI- Red SCI Bird Species EU Bird's Directive- Annex II, III Wildlife Act	G21
Common Redshank	*Tringa totanus*	2011	BOCCI – Red SCI Bird's Directive Wildlife Act	G21, G22
Common Scoter	*Melanitta nigra*	2011	BOCCI- Red EU Bird's Directive- Annex II, III SCI Bird Species Wildlife Acts	G21
Common Shelduck	*Tadorna tadorna*	2011	BOCCI – Amber SCI Bird Species Wildlife Act	G22
Dunlin	*Calidris alpina*	2011	BOCCI – Red SCI Bird Species EU Bird's Directive – Annex I Wildlife Act	G22
Eurasian Curlew	*Numenius arquata*	2019	EU Birds Directive - Annex II BoCCI – Red SCI Bird Species Wildlife Act	G21, G22
Eurasian Oystercatcher	*Haematopus ostralegus*	2018	BoCCI – Red SCI Bird Species Wildlife Act	G21, G22
Eurasian Teal	*Anas crecca*	2011	BOCCI - Amber SCI Bird Species EU Bird's Directive – Annex II, III Wildlife Act	G22
Eurasian Wigeon	*Anas penelope*	2011	BOCCI- Amber SCI Bird Species EU Bird's Directive – Annex II, III Wildlife Act	G21, G22
European Golden Plover	*Pluvialis apricaria*	2011	BOCCI – Red SCI Bird's Species	G21, G22

Common name	Scientific name	Year of last record	Designation	Grid Square
			EU Bird's Directive- Annex I, II, III Wildlife Act	
European Shag	*Phalacrocorax aristotelis*	2011	BOCCI- Amber SCI Bird Species Wildlife Act	G22
Gadwall	*Anas strepera*	2011	BOCCI- Amber SCI Bird Species Wildlife Acts	G21
Great Black-backed Gull	*Larus marinus*	2011	BOCCI- Amber SCI Bird's Species Wildlife Act	G21, G22
Cormorant	*Phalacrocorax carbo*	2011	BOCCI- Amber SCI Bird's Species Wildlife Act	G21, G22
Great Crested Grebe	*Podiceps cristatus*	2011	BOCCI- Amber SCI Bird Species Wildlife Acts	G21
Great Northern Diver	*Gavia immer*	2011	BOCCI – Amber SCI Bird Species EU Bird's Directive – Annex I Wildlife Act	G22
Grey Plover	*Pluvialis squatarol)*	2011	BOCCI- Red SCI Bird Species Wildlife Act	G22
Greylag Goose	*Anser anser*	2011	BOCCI – Amber SCI Bird Species EU Bird Directive- Annex II, III Invasive Species Wildlife Act	G22
Herring Gull	*Larus argentatus*	2011	BOCCI – Amber SCI Bird Species Wildlife Act	G22
Lesser Black-backed Gull	*Larus fuscus*	2011	BOCCI- Amber SCI Bird Species Wildlife Act	G22
Little Grebe	*Tachybaptus ruficollis*	2011	BOCCI- Amber SCI Bird Species Wildlife Acts	G21
Mallard	*Anas platyrhynchos*	2022	EU Birds Directive - Annex II, III BoCCI – Amber SCI Bird Species Wildlife Act	G21, G22
Merlin	*Falco columbarius*	2011	BOCCI- Amber SCI Bird Species EU Bird Directive- Annex I Wildlife Act	G22
Mew Gull	*Larus canus*	2011	BOCCI- Amber SCI Bird Species Wildlife Act	G21, G22
Northern Lapwing	*Vanellus vanellus*	2011	BOCCI- Red SCI Bird Species EU Bird's Directive- Annex II Wildlife Act	G21, G22
Peregrine Falcon	*Falco peregrinus*	2011	BOCCI- Green SCI Bird Species EU Birds Directive-Annex I Wildlife Act	G21, G22
Red Knot	*Calidris canutus*	2011	BOCCI- Red SCI Bird Species Wildlife Act	G22
Red-breasted Merganser	*Mergus serrator*	2011	BOCCI- Amber SCI Bird Species EU Bird Directive- Annex II	G21, G22

Common name	Scientific name	Year of last record	Designation	Grid Square
			Wildlife Act	
Red-throated Diver	*Gavia stellata*	2011	BOCCI- Amber SCI Bird Species EU Bird Directive- Annex I Wildlife Act	G22
Ringed Plover	*Charadrius hiaticula*	2011	BOCCI- Amber SCI Bird Species Wildlife Act	G22
Tufted Duck	*Aythya fuligula*	2011	BOCCI- Amber SCI Bird Species EU Bird Species- Annex II, III Wildlife Act	G21, G22
Whooper Swan	*Cygnus cygnus*	2011	BOCCI- Amber SCI Bird Species EU Bird Species- Annex I Wildlife Act	G21, G22
European otter	*Lutra lutra*	2017	EU Habitats Directive – Annex II, IV Wildlife Act	G22
Harbour seal	*Phoca vitulina*	2013	EU Habitats Directive – Annex II, V Wildlife Act	G21; G22
Common porpoise	*Phocoena phocoena*	2020	EU Habitats Directive – Annex II, IV Wildlife Act OSPAR	G22
Sea lamprey	*Petromyzon marinus*	2022	EU Habitats Directive – Annex II OSPAR	G21
Freshwater white-clawed crayfish	*Austropotamobius pallipes*	2016	EU Habitats Directive – Annex II, V Wildlife Acts	G22

Appendix H
IWeBS Data

Apx Table 1: BirdWatch Ireland database results for Killala Bay I-WeBS Site (Site Code 0D407)

Common Name	Scientific Name	Annex I Species	SCI Bird Species	Season of Last Record	Peak*	National (1%) Threshold^	International (1%) Threshold^	National Long-term Trend+	Long-term Trend for Killala Bay+
Mute swan	*Cygnus olor*	*N*	*N*	*2021/22*	*42*	*90*	*90*	Stable or increasing	Stable or increasing
Whooper swan	*Cygnus cygnus*	*Y*	*Y*	*2019/20*	*37*	*340*	*150*	No data	No data
Light-bellied brent goose	*Branta bernicla hrota*	*N*	*Y*	*2021/22*	*654*	*350*	*400*	Stable or increasing	Stable or increasing
Shelduck	*Tadorna tadorna*	*N*	*Y*	*2021/22*	*155*	*100*	*2,500*	Stable or increasing	Moderate decline
Wigeon	*Mareca penelope*	*N*	*Y*	*2021/22*	*348*	*560*	*140,000*	Intermediate decline	Moderate decline
Teal	*Anas crecca*	*N*	*Y*	*2021/22*	*259*	*360*	*5,000*	Stable or increasing	Stable or increasing
Mallard	*Anas platyrhynchos*	*N*	*Y*	*2021/22*	*98*	*280*	*53,000*	Intermediate decline	Moderate decline
Tufted duck	*Aythya fuligula*	*N*	*Y*	*2021/22*	*10*	*270*	*8,900*	No data	No data
Common scoter	*Melanitta nigra*	*N*	*Y*	*2021/22*	*502*	*110*	*7,500*	No data	No data
Red-breasted merganser	*Mergus serrator*	*N*	*Y*	*2021/22*	*48*	*25*	*860*	Intermediate decline	Moderate decline
Red-throated diver	*Gavia stellata*	*Y*	*Y*	*2021/22*	*7*	*20*	*3,000*	No data	No data
Great Northern diver	*Gavia immer*	*Y*	*Y*	*2021/22*	*25*	*20*	*50*	No data	No data
Little grebe	*Tachybaptus ruficollis*	*N*	*Y*	*2020/21*	*3*	*20*	*4,700*	Stable or increasing	Large decline
Great crested grebe	*Podiceps cristatus*	*N*	*Y*	*2019/20*	*1*	*30*	*6,300*	Intermediate decline	No data
Cormorant	*Phalacrocorax carbo*	*N*	*Y*	*2021/22*	*170*	*110*	*1,200*	Stable or increasing	Stable or increasing
Little egret	*Egretta garzetta*	*Y*	*N*	*2021/22*	*23*	*20*	*1,100*	Stable or increasing	Stable or increasing
Grey heron	*Ardea cinerea*	*N*	*Y*	*2021/22*	*36*	*25*	*5,000*	Stable or increasing	Moderate decline
Oystercatcher	*Haematopus ostralegus*	*N*	*Y*	*2021/22*	*394*	*610*	*8,200*	Stable or increasing	Large decline
Ringed plover	*Charadrius hiaticula*	*N*	*Y*	*2021/22*	*401*	*120*	*540*	Intermediate decline	Intermediate decline
Golden plover	*Pluvialis apricaria*	*Y*	*Y*	*2021/22*	*378*	*920*	*9,200*	Large decline	Large decline
Grey plover	*Pluvialis squatarola*	*N*	*Y*	*2021/22*	*52*	*30*	*2,000*	Large decline	Large decline
Lapwing	*Vanellus vanellus*	*N*	*Y*	*2021/22*	*329*	*850*	*72,300*	Large decline	Large decline
Knot	*Calidris canutus*	*N*	*Y*	*2021/22*	*500*	*160*	*5,300*	Intermediate decline	Large decline
Sanderling	*Calidris alba*	*N*	*Y*	*2021/22*	*214*	*85*	*2,000*	Stable or increasing	Stable or increasing
Dunlin	*Calidris alpina*	*N*	*Y*	*2021/22*	*731*	*460*	*13,300*	Large decline	Large decline
Black-tailed godwit	*Limosa limosa*	*N*	*Y*	*2021/22*	*18*	*200*	*1,100*	Stable or increasing	Moderate decline

Common Name	Scientific Name	Annex I Species	SCI Bird Species	Season of Last Record	Peak*	National (1%) Threshold^	International (1%) Threshold^	National Long-term Trend+	Long-term Trend for Killala Bay+
Bar-tailed godwit	*Limosa lapponica*	*Y*	*Y*	*2021/22*	*211*	*170*	*1,500*	Large decline	Large decline
Curlew	*Numenius arquata*	*N*	*Y*	*2021/22*	*544*	*350*	*7,600*	Large decline	Large decline
Redshank	*Tringa tetanus*	*N*	*Y*	*2021/22*	*375*	*240*	*760*	Moderate decline	Moderate decline
Greenshank	*Tringa nebularia*	*N*	*Y*	*2021/22*	*44*	*20*	*3,300*	Stable or increasing	Moderate decline
Turnstone	*Arenaria interpres*	*N*	*Y*	*2021/22*	*103*	*95*	*1,400*	Intermediate decline	Large decline

*Peak numbers for the previous 5 winters i.e. 2017/18 through 2021/22
Thresholds relate to site importance at both national and international level. A site is deemed to support numbers of international importance if it regularly supports 1% or more of the international threshold of one species or subspecies of waterbird. A site is deemed to support numbers of national importance if it regularly supports 1% or more of the all-Ireland estimate of a species. 1% threshold numbers follow those provided in Lewis *et al.* (2019)
+I-WeBS Trends Report 1994/95 – 2019/20 (Kennedy *et al*., 2022)

Apx Table 2: BirdWatch Ireland database results for the Mount Ready subsite (Subsite Code 0D412) within the Killala Bay I-WeBS site (Site Code 0D407)

Common Name	Scientific Name	Annex I Species	SCI Bird Species	Season of Last Record	Peak*	National (1%) Threshold^	International (1%) Threshold^	National Long-term Trend+	Long-term Trend for Killala Bay+
Mute Swan	*Cygnus olor*	N	N	*2021/22*	*32*	*90*	*100*	Stable or increasing	Stable or increasing
Light-bellied Brent Goose	*Branta bernicla hrota*	N	Y	*2020/21*	*110*	*350*	*400*	Stable or increasing	Stable or increasing
Shelduck	*Tadorna tadorna*	N	Y	*2020/21*	*9*	*100*	*2500*	Stable or increasing	Moderate decline
Wigeon	*Mareca penelope*	N	Y	*2021/22*	*201*	*560*	*14000*	Intermediate decline	Moderate decline
Teal	*Anas crecca*	N	Y	*2021/22*	*194*	*360*	*5000*	Stable or increasing	Stable or increasing
Mallard	*Anas platyrhynchos*	N	Y	*2021/22*	*54*	*280*	*53000*	Intermediate decline	Moderate decline
Red-breasted Merganser	*Mergus serrator*	N	Y	*2021/22*	*7*	*25*	*860*	Intermediate decline	Moderate decline
Great Northern Diver	*Gavia immer*	Y	Y	*2021/22*	*2*	*20*	*50*	No data	No data
Slavonian Grebe	*Podiceps auritus*	Y	Y	*2019/20*	*1*	-	-	No data	No data
Cormorant	*Phalacrocorax carbo*	N	Y	*2021/22*	*23*	*110*	*1200*	Stable or increasing	Stable or increasing
Little Egret	*Egretta garzetta*	Y	N	*2021/22*	*6*	*20*	*1100*	Stable or increasing	Stable or increasing
Grey Heron	*Ardea cinerea*	N	Y	*2021/22*	*12*	*25*	*5000*	Stable or increasing	Moderate decline
Moorhen	*Gallinula chloropus*	N	N	*2021/22*	*3*	-	-	No data	No data

Common Name	Scientific Name	Annex I Species	SCI Bird Species	Season of Last Record	Peak*	National (1%) Threshold^	International (1%) Threshold^	National Long-term Trend+	Long-term Trend for Killala Bay+
Oystercatcher	*Haematopus ostralegus*	N	Y	*2021/22*	*161*	*610*	*8200*	Stable or increasing	Large decline
Golden Plover	*Pluvialis apricaria*	Y	Y	*2020/21*	*58*	*920*	*9300*	Large decline	Large decline
Grey Plover	*Pluvialis squatarola*	N	Y	*2020/21*	*2*	*30*	*2000*	Large decline	Large decline
Lapwing	*Vanellus vanellus*	N	Y	*2021/22*	*115*	*850*	*72300*	Large decline	Large decline
Knot	*Calidris canutus*	N	Y	*2020/21*	*2*	*160*	*5300*	Intermediate decline	Large decline
Dunlin	*Calidris alpina*	N	Y	*2021/22*	*255*	*460*	*13300*	Large decline	Large decline
Snipe	*Gallinago gallinago*	N	N	*2021/22*	*5*	-	-	No data	No data
Black-tailed Godwit	*Limosa limosa*	N	Y	*2021/22*	*1*	*200*	*1100*	Stable or increasing	Moderate decline
Bar-tailed Godwit	*Limosa lapponica*	Y	Y	*2021/22*	*40*	*170*	*1500*	Large decline	Large decline
Curlew	*Numenius arquata*	N	Y	*2021/22*	*127*	*350*	*7600*	Large decline	Large decline
Redshank	*Tringa totanus*	N	Y	*2021/22*	*118*	*240*	*2400*	Moderate decline	Moderate decline
Greenshank	*Tringa nebularia*	N	Y	*2021/22*	*11*	*20*	*3300*	Stable or increasing	Moderate decline
Turnstone	*Arenaria interpres*	N	Y	*2021/22*	*8*	*95*	*1400*	Intermediate decline	Large decline
Black-headed Gull	*Chroicocephalus ridibundus*	N	Y	*2021/22*	*180*	-	-	No data	No data
Common Gull	*arus canus*	N	Y	*2021/22*	*123*	-	-	No data	No data
Lesser Black-backed Gull	*Larus fuscus*	N	Y	*2021/22*	*6*	-	-	No data	No data
Herring Gull	*Larus argentatus*	N	Y	*2021/22*	*70*	-	-	No data	No data
Great Black-backed Gull	*Larus marinus*	N	Y	*2021/22*	*13*	-	-	No data	No data
Unidentified wader	*Charadrii sp.*			*2020/21*	*36*	-	-	No data	No data

**Peak numbers for the previous 3 winters i.e. 2019/20 through 2021/22*
Thresholds relate to site importance at both national and international level. A site is deemed to support numbers of international importance if it regularly supports 1% or more of the international threshold of one species or subspecies of waterbird. A site is deemed to support numbers of national importance if it regularly supports 1% or more of the all-Ireland estimate of a species. 1% threshold numbers follow those provided in Lewis et al. (2019)
+I-WeBS Trends Report 1994/95 – 2019/20 (Kennedy et al., 2022)

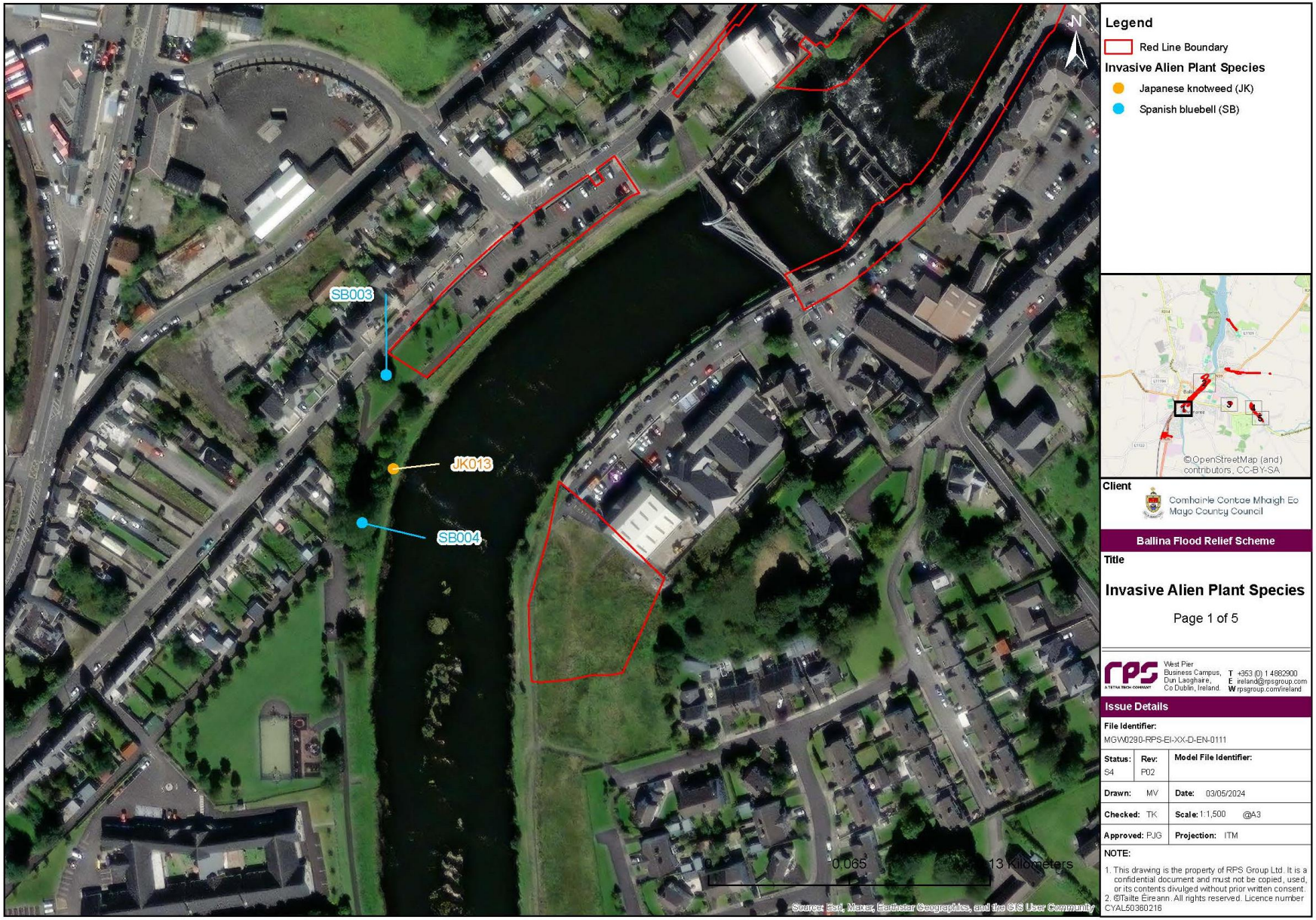
Appendix I
IAPS Results Tables

Code	Common Name	Scientific Name	Location (ITM X, Y)	Description
JK001	Japanese knotweed	*Reynoutria japonica*	525162, 819502	Potential JK on left-hand bank of River Moy. Observed from right-hand bank of Moy with binoculars.
JK002	Japanese knotweed	*Reynoutria japonica*	526510, 818342	Approximately 7x7m area of JK within depression/culvert in field. Central area of taller (>2m) JK with numerous smaller (<50cm) shoots surrounding it.
JK003	Japanese knotweed	*Reynoutria japonica*	524941, 819418	Approximately 10x3m area of previously treated knotweed with dead crowns visible. Regrowth of small shoots (<0.5m high) was visible, primarily on the periphery of the treated area.
JK004	Japanese knotweed	*Reynoutria japonica*	524963, 819420	Approximately 8x5m area of previously treated knotweed with dead crowns visible. Regrowth of small shoots (<0.5m high) was visible, primarily on the periphery of the treated area but some also in centre.
JK005	Japanese knotweed	*Reynoutria japonica*	525007, 819445	Large area (20x5m) of scattered small shoots (<1m high) on bank reaching up into woodland. The area was recently disturbed or knotweed infested material was spread across the area thus spreading the infestation.
JK006	Japanese knotweed	*Reynoutria japonica*	525105, 819442	Approximately 7x3m of relatively dense knotweed in riparian woodland on LHB of Moy. Average height approximately 1.5m
JK007	Japanese knotweed	*Reynoutria japonica*	525106, 819448	Approximately 2.5x1m infestation of 6 shoots at edge of riparian woodland.
JK008	Japanese knotweed	*Reynoutria japonica*	525111, 819466	Single shoot (<0.5m high) at corner of container. Likely recently disturbed/spread.
JK009	Japanese knotweed	*Reynoutria japonica*	525113, 819471	Two shoots (<0.5m high) behind container at edge of riparian woodland. Likely recently disturbed/spread.
JK010	Japanese knotweed	*Reynoutria japonica*	525103, 819498	Approximately 15x10m area with scattered knotweed. All shoots ≤1m high. Seems to have been recently disturbed and spread across the area.
JK011	Japanese knotweed	*Reynoutria japonica*	525086, 819501	One shoot approximately 75cm tall at edge of woodland
JK012	Japanese knotweed	*Reynoutria japonica*	525088, 819495	Five shoots scattered across an area of 5x2m. No shoots taller than 75cm. Seems to have been recently disturbed and spread across the area.
JK013	Japanese knotweed	*Reynoutria japonica*	524298, 818457	Approximately 10 shoots (<2m high) across an area of 3x0.5m on the LHB of the Moy.
RP001	Rhododendron	*Rhododendron ponticum*	526810, 818053	Small stand (approximately 3x2m) of rhododendron in roadside hedgerow.
SB001	Spanish bluebell	*Hyacinthoides hispanica*	526631, 818280	Approximately 16 clumps of bluebell in an area of 8x3m on the RHB of the Brusna between the fence and the river.
SB002	Spanish bluebell	*Hyacinthoides hispanica*	526487, 818365	Observed from a distance.
SB003	Spanish bluebell	*Hyacinthoides hispanica*	524295, 818502	Approximately 0.3x0.3m. At base of tree in amenity grassland.
SB004	Spanish bluebell	*Hyacinthoides hispanica*	524284, 818432	Approximately 0.5x0.5m infestation on embankment leading down to LH side of river.

Code	Common Name	Scientific Name	Location (ITM X, Y)	Description
HB001	Hybrid bluebell	*Hyacinthoides x massartiana*	526789, 818097	<0.3x0.3m in area. On the LHB of the Brusna under a number of ash trees.
HB002	Hybrid bluebell	*Hyacinthoides x massartiana*	526766, 818128	Ring of bluebells around an ash tree. Majority are native but there are a few hybrids in the mix.
HB003	Hybrid bluebell	*Hyacinthoides x massartiana*	526759, 818135	Scattered in approximately 3x3m area. Located on a grassy bank on the LHB of the Brusna.
HB004	Hybrid bluebell	*Hyacinthoides x massartiana*	526687, 818214	Approximately 4x1m area on the LHB of the Brusna
HB005	Hybrid bluebell	*Hyacinthoides x massartiana*	526627, 818259	Approximately 1x0.5m area on the LHB of the Brusna, halfway up the bank.
HB006	Hybrid bluebell	*Hyacinthoides x massartiana*	526618, 818261	Single clump on the LHB of the Brusna approximately 1.5m from the road edge.
HB007	Hybrid bluebell	*Hyacinthoides x massartiana*	526613, 818265	Two clumps covering approximately 1x0.5m area on the LHB of the Brusna about 1m from the roadside.
HB008	Hybrid bluebell	*Hyacinthoides x massartiana*	526585, 818302	Small number of hybrids in amongst native bluebells on the LHB of the Brusna.
HB009	Hybrid bluebell	*Hyacinthoides x massartiana*	526501, 818390	Four clumps covering approximately 5x1m area on the roadside near the barbwire fence.
HB010	Hybrid bluebell	*Hyacinthoides x massartiana*	526497, 818394	One clump on the LH side of the entrance into field.
HB011	Hybrid bluebell	*Hyacinthoides x massartiana*	526434, 818582	Observed from LHB of Brusna. Single clump on the RHB of Brusna.
HB012	Hybrid bluebell	*Hyacinthoides x massartiana*	526612, 818290	Single clump of approximately 0.3x0.5m on the RHB of the Brusna between the fence and the river.
HB013	Hybrid bluebell	*Hyacinthoides x massartiana*	526678, 818257	Numerous clumps scattered throughout an approximate area of 20x40m on embankment and flatter grassy area.
HB014	Hybrid bluebell	*Hyacinthoides x massartiana*	525719, 818597	Single clump of approximately 0.3x0.3m on the south-eastern side of the lane.
HB015	Hybrid bluebell	*Hyacinthoides x massartiana*	524968, 819194	Four flowerheads visible in amongst a group of three-cornered leek on the LHB of the River Moy.
HB016	Hybrid bluebell	*Hyacinthoides x massartiana*	524868, 818989	Approximately 0.3x0.3m in area. Adjacent to the Lower Bridge on the RHB of the River Moy
TCL001	Three-cornered leek	*Allium triquetrum*	526789, 818098	Approximately 1x0.5m in area. On the LHB of the Brusna in under a number of ash trees
TCL002	Three-cornered leek	*Allium triquetrum*	526769, 818125	Approximately 0.2x0.2m. LHB of the Brusna under an alder tree
TCL003	Three-cornered leek	*Allium triquetrum*	526757, 818146	Approximately 0.3x0.3m. LHB of the Brusna under a gorse bush
TCL004	Three-cornered leek	*Allium triquetrum*	526753, 818148	Three clumps under a sycamore tree and adjacent to snowberry on the LHB of the Brusna
TCL005	Three-cornered leek	*Allium triquetrum*	526446, 818629	Approximately 2x3m area within a number of clumps on the RHB of the Brusna. Observed from the LHB
TCL006	Three-cornered leek	*Allium triquetrum*	525088, 819502	Two clumps at the edge of woodland

Code	Common Name	Scientific Name	Location (ITM X, Y)	Description
TCL007	Three-cornered leek	*Allium triquetrum*	525100, 819495	Approximately 1x1m in area. On the bank at the edge of woodland
TCL008	Three-cornered leek	*Allium triquetrum*	525042, 819309	On the LHB of the River Moy. Observed using binoculars from the RHB
TCL009	Three-cornered leek	*Allium triquetrum*	525009, 819249	Approximately 1x0.5m. Adjacent to the wall at Bachelor's walk on the LHB of the River Moy.
TCL010	Three-cornered leek	*Allium triquetrum*	525001, 819237	Three clumps adjacent to the wall at Bachelor's walk on the LHB of the River Moy.
TCL011	Three-cornered leek	*Allium triquetrum*	524988, 819220	Large infestation (approx. 13x4m) under sycamore trees adjacent to the wall at Bachelor's Walk on the LHB of the River Moy
TCL012	Three-cornered leek	*Allium triquetrum*	524972, 819199	Extensive infestation (approx. 36x5m) under and around large willow trees adjacent to the wall at Bachelors Walk on the LHB of the River Moy. Starts at downstream end of pontoon.
TCL013	Three-cornered leek	*Allium triquetrum*	524950, 819171	Four clumps spanning approximately 4x2m adjacent to the wall on Bachelor's Walk on LHB of the River Moy. Adjacent to the pontoon.

Appendix J
IAPS Results Drawings


SB003
JK013
SB004
N
0
0.065
0.13 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Legend
Red Line Boundary
Invasive Alien Plant Species
Japanese knotweed (JK)
Spanish bluebell (SB)
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West Pier
Business Campus,
Dun Laoghaire,
Co Dublin, Ireland.
T +353 (0) 1 4882900
E ireland@rpsgroup.com
W rpsgroup.com/ireland
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File Identifier:
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Status: S4
Rev: P02
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Checked: TK
Scale: 1:1,500 @A3
Approved: PJG
Projection: ITM
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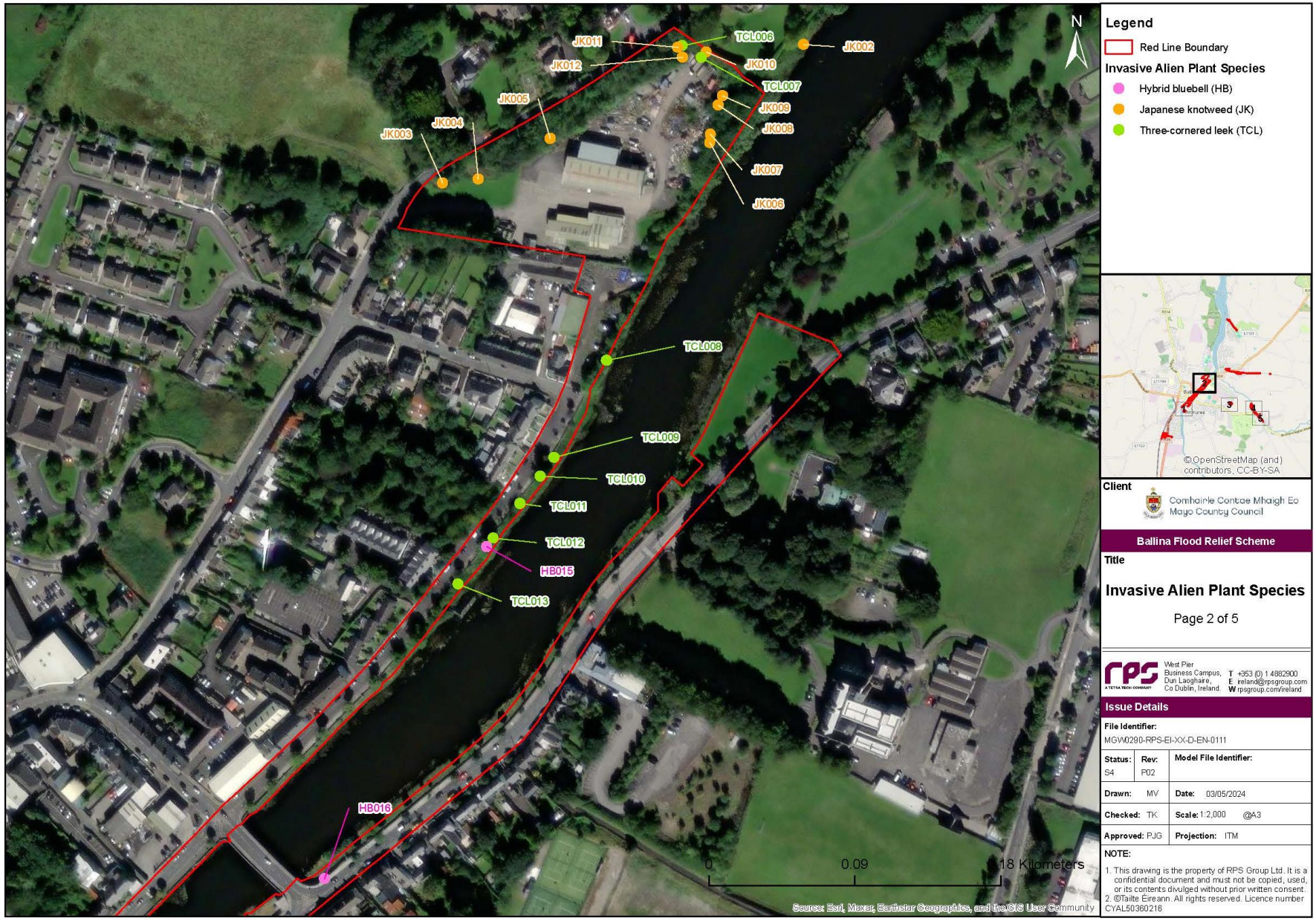
N
JK011
TCL006
JK002
JK012
JK010
TCL007
JK005
JK009
JK004
JK003
JK008
JK007
JK006
TCL008
TCL009
TCL010
TCL011
TCL012
HB015
TCL013
HB016
0
0.09
18 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Legend
Red Line Boundary
Invasive Alien Plant Species
Hybrid bluebell (HB)
Japanese knotweed (JK)
Three-cornered leek (TCL)
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West Pier
Business Campus,
Dun Laoghaire,
Co Dublin, Ireland.
T +353 (0) 1 4882900
E ireland@rpsgroup.com
W rpsgroup.com/ireland
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N
HB014
0
0.065
0.13 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Legend
Red Line Boundary
Invasive Alien Plant Species
Hybrid bluebell (HB)
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Dun Laoghaire,
Co Dublin, Ireland.
T +353 (0) 1 4882900
E ireland@rpsgroup.com
W rpsgroup.com/ireland
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N
TCL005
HB011
HB010
HB009
SB002
JK001
HB013
SB001
HB008
0
0.065
0.13 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Legend
Red Line Boundary
Invasive Alien Plant Species
Hybrid bluebell (HB)
Japanese knotweed (JK)
Spanish bluebell (SB)
Three-cornered leek (TCL)
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Business Campus,
Dun Laoghaire,
Co Dublin, Ireland.
T +353 (0) 1 4882900
E ireland@rpsgroup.com
W rpsgroup.com/ireland
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HB012
SB001
HB008
HB013
HB007
HB006
HB005
HB004
TCL004
TCL003
TCL002
HB003
HB002
TCL001
HB001
RP001
N
0.065
0.13 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Legend
Red Line Boundary
Invasive Alien Plant Species
Hybrid bluebell (HB)
Japanese knotweed (JK)
Rhododendron ponticum (RP)
Spanish bluebell (SB)
Three-cornered leek (TCL)
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T +353 (0) 1 4882900
E ireland@rpsgroup.com
W rpsgroup.com/ireland
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Appendix K
Otter Signs Tables

Apx Table 3: Signs of otter (and potential signs of otter) observed during surveys

Watercourse	Activity Signs	Species	X(ITM)	Y(ITM)	Description
Tullyegan	Mammal Trail & Slide	Otter	523697	817637	Mammal trail and slide up both right-hand and left-hand banks of the Tullyegan stream.
Tullyegan	Mammal Trail	Unknown	523713	817635	Numerous mammal trails through scrub on left-hand bank of the Tullyegan stream.
Tullyegan	Mammal Trail	Unknown	523724	817634	Mammal trail into scrub on left-hand bank of the Tullyegan stream.
Tullyegan	Mammal Trail	Unknown	523730	817632	Mammal trail along left-hand bank of the Tullyegan stream.
Tullyegan	Spraint	Otter	523709	817635	Otter spraint on top of rock in Tullyegan stream just downstream of railway bridge.
Tullyegan	Spraint	Otter	523713	817634	Otter spraint on top of rock in Tullyegan stream just downstream of railway bridge.
Glenree	Mammal Trail	Unknown	526767	818135	Potential mammal track into the river on the southern bank. Unknown source - potentially dog.
Glenree	Slide	Unknown	526665	818237	Potential otter slide into watercourse on the southern bank - a lot of public access, potential dog activity.
Glenree	Couch	Otter	526571	818323	Mammal trail on southwestern bank and a flattened grass area. Located at point in line with instream riffle.
Glenree	Slide	Otter	526515	818392	A distinctive mammal trail and flattened grass into watercourse on the southwestern bank near bridge.
Glenree	Mammal Trail	Unknown	526408	818708	Mammal trail into scrub on riverbank from western field.
Glenree	Couch	Otter	526441	818678	Potential couch located field side of fence in long grass, bordering the river.
Glenree	Couch	Otter	526429	818614	Potential couch located on western bank adjoining scrub along with 3No. Mammal trails.
Glenree	Slide	Otter	526424	818707	Slide into riverbank (western bank).
Glenree	Slide	Otter	526421	818580	Slide into riverbank (western bank).
Quays + Town	Couch	Otter	524974	819075	Possible couch.
Quays + Town	Slide	Otter	524917	819044	Slide into Watercourse.
Quays + Town	Couch	Otter	524860	818990	Possible couch.
Quays + Town	Slide	Otter	524838	819049	Distinctive slide and couch.
Quays + Town	Slide	Otter	524873	819085	Potential slide.
Quays + Town	Live sighting	Otter	525614	820906	Live otter sighting

Appendix L
Otter Signs Drawings


N
0
0.055
0.11 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Legend
Red Line Boundary
Activity
Couch
Trail
Slide
Live Sighting
Spraint
1
2
3
4
Ardnaree
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Otter Signs
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Business Campus,
Dun Laoghaire,
Co Dublin, Ireland.
T +353 (0) 1 4682900
E ireland@rpsgroup.com
W rpsgroup.com/ireland
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Legend
Red Line Boundary
Activity
Couch
Trail
Slide
Live Sighting
Spraint
N
0
0.095
0.19 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
3
2
4
1
Ardnaree
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Business Campus,
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T +353 (0) 1 4882900
E ireland@rpsgroup.com
W rpsgroup.com/ireland
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Ballina Flood Relief Scheme
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Page 3 of 4
West Pier
Business Campus,
Dun Laoghaire,
Co Dublin, Ireland.
T +353 (0) 1 4882900
E ireland@rpsgroup.com
W rpsgroup.com/ireland
Issue Details
File Identifier:
MGW0290-RPS-EI-XX-D-EN-0122
Status: S4
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Date: 23/10/2024
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Dun Laoghaire,
Co Dublin, Ireland.
T +353 (0) 1 4662900
E ireland@rpsgroup.com
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Appendix M
Identifying Relevant European Sites

M.1 Identifying Relevant European Sites

In order to determine the potential for LSE, it is necessary to identify the Zone of Influence (ZoI) of the Proposed Scheme and the European Sites therein. The ZoI of the Proposed Scheme is the geographical area over which it could affect the receiving environment in a way that could have LSEs directly or indirectly on European Site(s). The ZoI is established using the Source-Pathway-Receptor (S-P-R) model.

M.1.1 Source-Pathway-Receptor (S-P-R) Model

The likely effects of the Proposed Scheme on any European Site have been assessed using a S-P-R model where:

- A 'source' is defined as the individual element of the Proposed Scheme that has the potential to impact upon a European Site, its qualifying features and its conservation objectives.
- A 'pathway' is defined as the means or route by which a source can affect the ecological receptor.
- A 'receptor' is defined as the SCI of SPAs or the QI of SACs for which conservation objectives have been set for the European Sites being assessed, in addition to any relevant supporting habitat for species listed.

A S-P-R model is a standard tool used in environmental assessment. In order for an effect to be likely, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism results in no likelihood for the effect to occur. The S-P-R model was used to identify the European Sites, and their QIs/SCIs, to which the Proposed Scheme could be potentially linked.

M.1.1.1 Potential Sources

The sources of impact in this case are the activities required to undertake the Proposed Scheme. The sources of impact will arise from within the boundary of the Proposed Scheme area. It is from these impacts[13] that all ecological effects could arise.

There is potential for indirect effects to arise from sources within the site which could extend beyond the Proposed Scheme boundary (e.g., downstream effects on water quality, noise disturbance etc.), however the potential sources of significant effects are limited.

The range of impacts and effects that potentially arise as a result of the activities include:

Construction Phase of Proposed Scheme and GI Works

- Habitat loss, deterioration or fragmentation. This includes land take required to undertake the Proposed Scheme which encompasses the works area themselves, site compounds and storage areas (if required) and access routes.
- Accidental release of pollutants (e.g., suspended solids, silt, concrete, fuels, oils and lubricants) which could be released from the site (e.g., from machinery or during Proposed Scheme activities) into the surface water network. This could cause a consequent reduction in water quality in European Sites hydrologically linked via the surface water network during the works.
- Groundwater interference. Groundwater interference is deemed to involve changes in flow, yield and quality of the groundwater body arising from works which may extend into the water table in certain conditions.
- Air pollution from dust and vehicle emissions. Air pollution from Proposed Scheme activities may affect the sensitive habitats in the vicinity of the works. Dust or particles falling onto plants can physically smother the leaves affecting photosynthesis, respiration and transpiration.
- Disturbance of QI/SCI species from the Proposed Scheme. Sources of disturbance include the noise, vibration, dust and vehicle emissions associated with Proposed Scheme traffic and activities

[13] Definition of "impact" and "effect" as per CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater, Coastal and Marine.*

and the disturbance arising from the presence and activities of Proposed Scheme personnel. This includes barriers to migratory species due to instream works and potential mortality of QI species due to activities. These effects are likely to extend into areas beyond the Proposed Scheme boundary.

- Spread of Invasive species. The Proposed Scheme activities could lead to the dispersal of scheduled invasive species either via machinery, materials or clothing.

Operational and Maintenance Phase

- Alterations to hydraulic character of watercourses across the Proposed Scheme i.e., hydrology, water velocity, morphology as a result of new flood walls/embankments.
- Habitat fragmentation as a result of new instream structures.

M.1.1.2 Potential Pathways

The potential pathways for effects are summarised as follows:

- Hydrological: Downstream changes in surface water quality during works particularly with respect to accidental release of pollutants (e.g., suspended solids, silt, hydrocarbons from a fuel leak, waste material) into the surface water network and subsequently into the River Moy and/or its tributaries.
- Hydrogeological: Changes in groundwater quality during works particularly with respect to accidental spillages of materials (e.g., from a fuel leak, waste) during excavations which could migrate vertically to the underlying bedrock and laterally within the aquifer.
- Air/land: Indirect disturbance from noise or vibration on habitat upon which QI/SCI species or populations are dependent for part of their lifecycle both inside and outside the proposed works boundary, e.g., breeding, foraging or resting sites for certain bird species.
- Air: Indirect disturbance to QI species and habitats and/or SCI species from air pollution such as dust generation from construction activities or emissions from construction vehicles
- Land: Direct disturbance of QI/SCI species or populations because of their movement through or use of habitat within the site boundary for part of their lifecycle (e.g., the disturbance of foraging sites for certain SCI bird species).
- Hydrological/land: Direct disturbance of IAPS infestations during proposed works could lead to the dispersal of IAPS fragments via watercourses and/or via machinery, clothing or equipment with the capacity to establish new infestations.

M.1.1.3 Potential Receptors (European Sites)

The ZoI “rules” which have been developed specifically for the Proposed Scheme (see below) were applied with reference to available databases and mapping for the Natura 2000 network. As detailed above, the rules have been defined following a consideration of the potential sources of impact and defining the potential pathways of effects arising from these impacts upon the receptors. If no such pathway existed or the pathway did not extend sufficiently based on scientific analysis or professional judgement to impinge on the European Site (in whole or part) then no pathway for LSEs was considered to exist.

In order to inform Stage 1 – Screening Assessment, the following ZoI “rules” were used to identify any European Sites that the Proposed Scheme may impart LSEs upon:

3. Any European Sites within the boundary of the Proposed Scheme will be automatically considered with regard to potential for LSE. This is to take account of direct impacts and effects.
4. Any European Sites which lie within 200m straight-line measurement of the Proposed Scheme will be automatically considered with regard to potential for LSE. This is to account for:
    - The potential incursion of Proposed Scheme personnel, vehicles or materials beyond the proposed works areas during Proposed Scheme works.
    - The extent of potential dust-generating effects and pollution from vehicle emissions.

5. Any European Sites which lie within 50m of the Proposed Scheme will be considered with respect to any vibration disturbance effects with regard to potential for LSE on QI or SCI species during Proposed Scheme works.
6. Any European Sites which lie within 500m of the Proposed Scheme will be considered with respect to any noise disturbance effects with regard to potential for LSE on QI or SCI species during the Proposed Scheme Works.
7. Any European Sites within the catchment(s) of the Proposed Scheme which support QIs/SCIs which are sensitive to hydrological change (flow or quality) and are downstream of the proposed works area will be automatically considered with regard to potential for LSE.
8. Any European Sites with upstream hydrological connectivity to the Proposed Scheme will be considered with regard to potential for LSE if they support mobile aquatic QI/SCI species which could move through the proposed works area to/from the European Site as part of their lifecycle (e.g. Atlantic salmon) or aquatic species whose life cycle is dependent on mobile aquatic species (e.g. freshwater pearl mussel).
9. Any European Site which supports QI or SCI species which have been shown through survey to be present in ex-situ habitats within/adjacent to the proposed works area will be considered with regard to potential for LSE. This is particularly focussed on ornithological QIs and SCIs mindful of the proximity of the Proposed Scheme to Killala Bay and the Moy Estuary.
10. Any European Site which supports groundwater dependant ecosystems which is within the same groundwater body as the Proposed Scheme.

M.1.2 Likely Significant Effects Alone

Applying the ZoI "rules" defined above, S-P-R links between the Proposed Scheme and two SACs (Killala Bay/Moy Estuary SAC, River Moy SAC) and two SPAs (Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA) were identified. An analysis of the application of the ZoI "rules" is summarised in the table below. The Proposed Scheme has the potential to have direct, indirect and in combination effects on these European Sites.

Apx Table 4: Analysis of ZoI Rules for the Proposed Scheme.

European Site Name and Code	Distance from GI Study area	Connectivity
Killala Bay/Moy Estuary SAC (Site Code: 000458)	Within Proposed Scheme study area	Yes, due to application of ZoI rules **1, 2, 3, 4 and 5**
River Moy SAC (002298)	Within Proposed Scheme study area	Yes, due to application of ZoI rules **1, 2, 3, 4 and 5.**
Killala Bay/Moy Estuary SPA (004036)	Within Proposed Scheme study area	Yes, due to application of ZoI rules **1, 2, 3, 4, 5 and 7.**
Lough Conn and Lough Cullin SPA (004228)	Approximately 4.7km west, as the crow flies, from Ballina town centre	Yes, due to the application of ZoI rule **7**

Appendix N
Hydraulic Cross Section Data

Apx Table 8 and **Apx Table 9** refer to cross sectional velocity data for the Bunree, Moy, Quignamanger and Tullyegan. As a salmonid spawning/nursery river within the River Moy SAC, the Brusna (Glenree) River required greater scrutiny: **Apx Table 10** to **Apx Table 13** set out average cross section water velocities and Froude number comparing baseline and post-scheme under 50%AEP and 1%AEP for the Brusna (Glenree) reach affected by set-back walls and embankment.

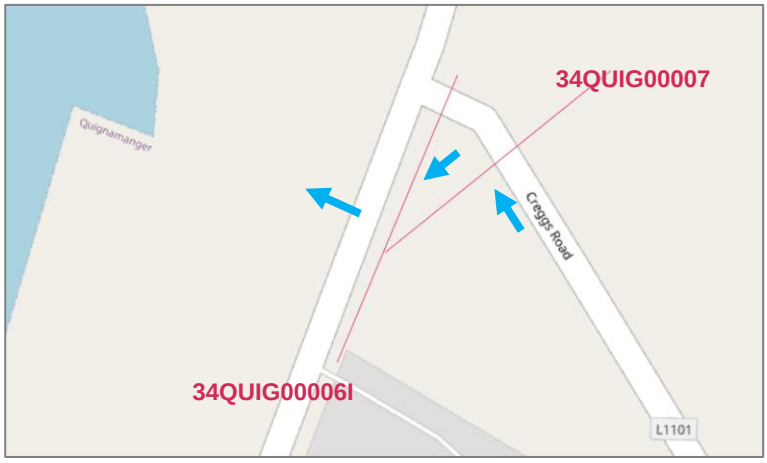
Apx Table 5: Pre- and Post-Scheme cross section velocity 50%AEP

Watercourse	Cross Section	Location	Baseline - 50% AEP Velocity (m/s)	Post Scheme - 50% AEP Velocity (m/s)	Difference
Bunree	34BNRE379	U/S (Moyvale Park)	0.456	1.404	0.948
	34BNRE357	D/S (Moyvale Park)	0.249	0.618	0.369
Moy	34MOYR00436	Ridge Pool (c.171m U/S Upper Bridge)	1.053	1.051	-0.002
	34MOYR00428	Ridge Pool (c.90m U/S Upper Bridge)	1.528	1.523	-0.005
	34MOYR00420	Ridge Pool (c.11m U/S Upper Bridge)	1.331	1.328	-0.003
Quignamanger	34QUIG00007	U/S (@ Cregg Rd culvert exit)	1.568	1.481	-0.087
	34QUIG00006I	D/S (@ Quay Rd culvert entry	0.375	0.842	0.467
Tullyegan	34TULN00063	U/S (near railway)	1.369	1.413	0.044
	34TULN00052	D/S (near N26)	0.724	1.018	0.294

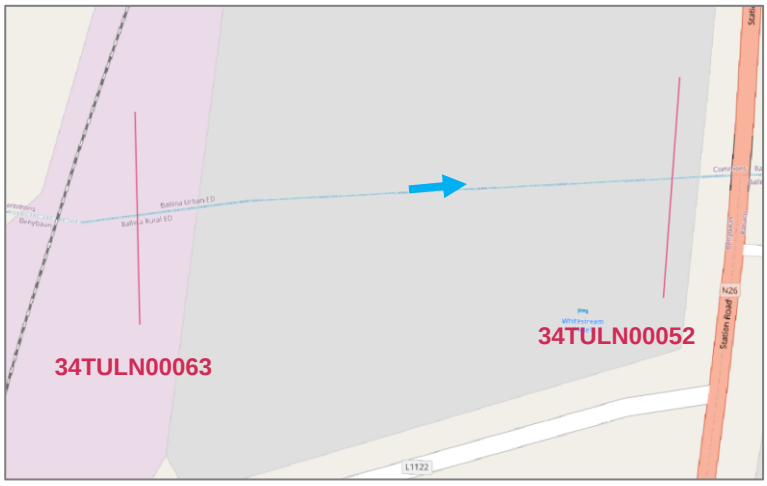
Apx Table 6: Pre- and Post-Scheme cross section velocity 1%AEP

Watercourse	Cross Section	Location	Baseline - 1% AEP Velocity (m/s)	Post Scheme - 1% AEP Velocity (m/s)	Difference
Bunree	34BNRE379	U/S (Moyvale Park)	0.486	3.099	2.613
	34BNRE357	D/S (Moyvale Park)	0.292	1.05	0.758
Moy	34MOYR00436	Ridge Pool (c.171m U/S Upper Bridge)	1.332	1.328	-0.004
	34MOYR00428	Ridge Pool (c.90m U/S Upper Bridge)	1.976	1.999	0.023
	34MOYR00420	Ridge Pool (c.11m U/S Upper Bridge)	1.715	1.705	-0.010
Quignamanger	34QUIG00007	U/S (@ Cregg Rd culvert exit)	1.599	2.029	0.43
	34QUIG00006I	D/S (@ Quay Rd culvert entry	0.379	1.121	0.742
Tullyegan	34TULN00063	U/S (near railway)	1.772	1.816	0.044
	34TULN00052	D/S (near N26)	0.98	1.217	0.237

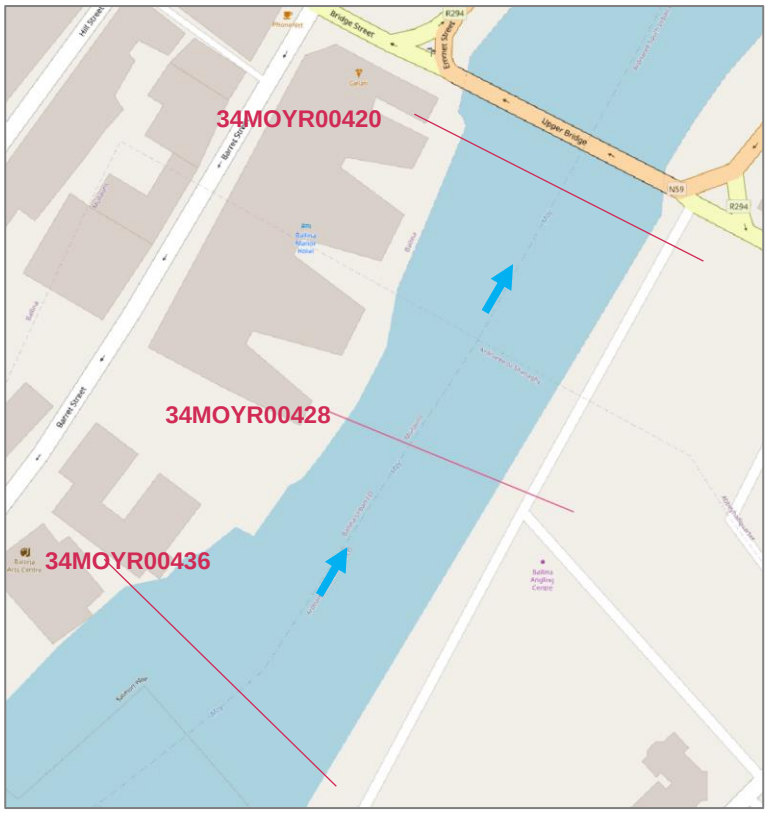
Apx Figure 1: Bunree Cross Sections – currently culverted near Moyvale Park but will be reinstated as open channel in the modelled reach under the Proposed Scheme.



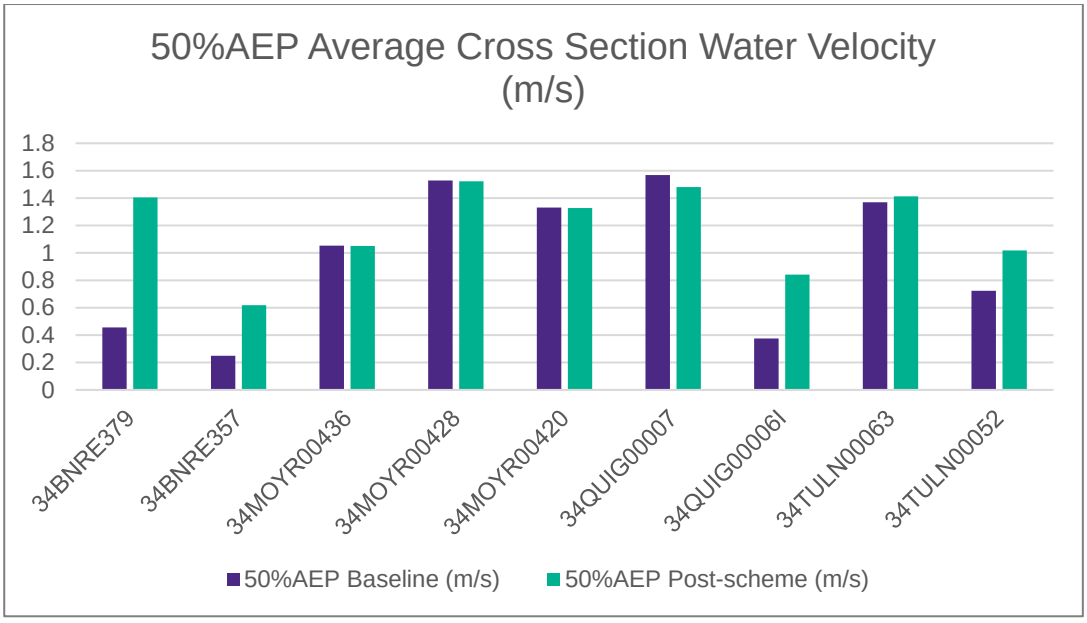
Apx Figure 2: Quignamanger Cross Sections



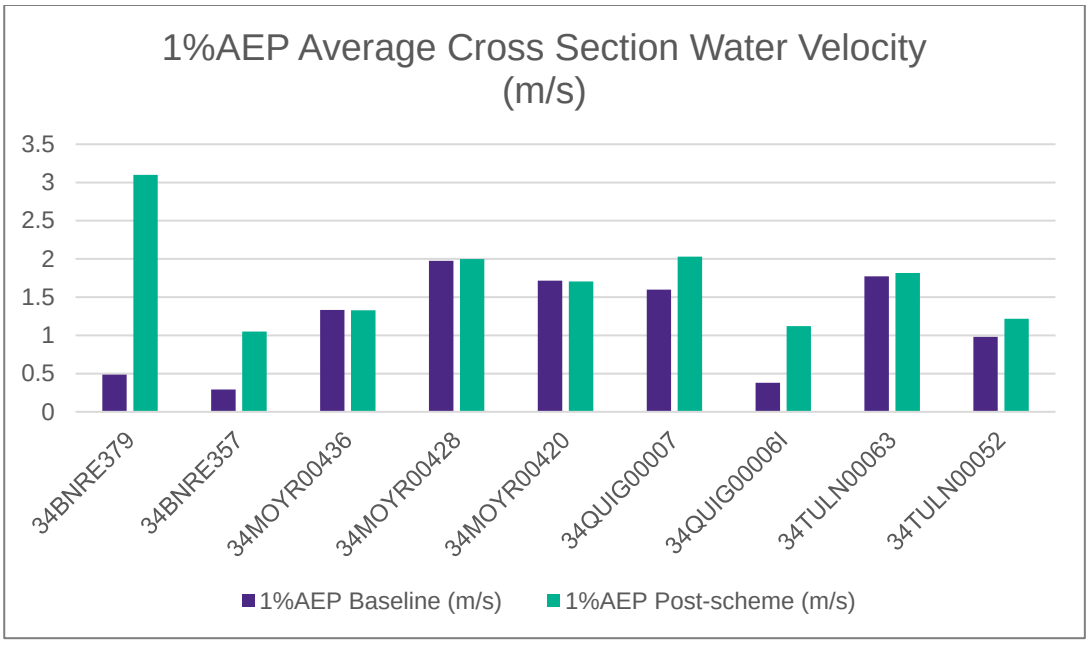
Apx Figure 3: Tullyegan Cross Sections – Upstream and downstream within proposed reach of flood walls/embankment



Apx Figure 4: River Moy Cross Sections – Ridge Pool Ballina

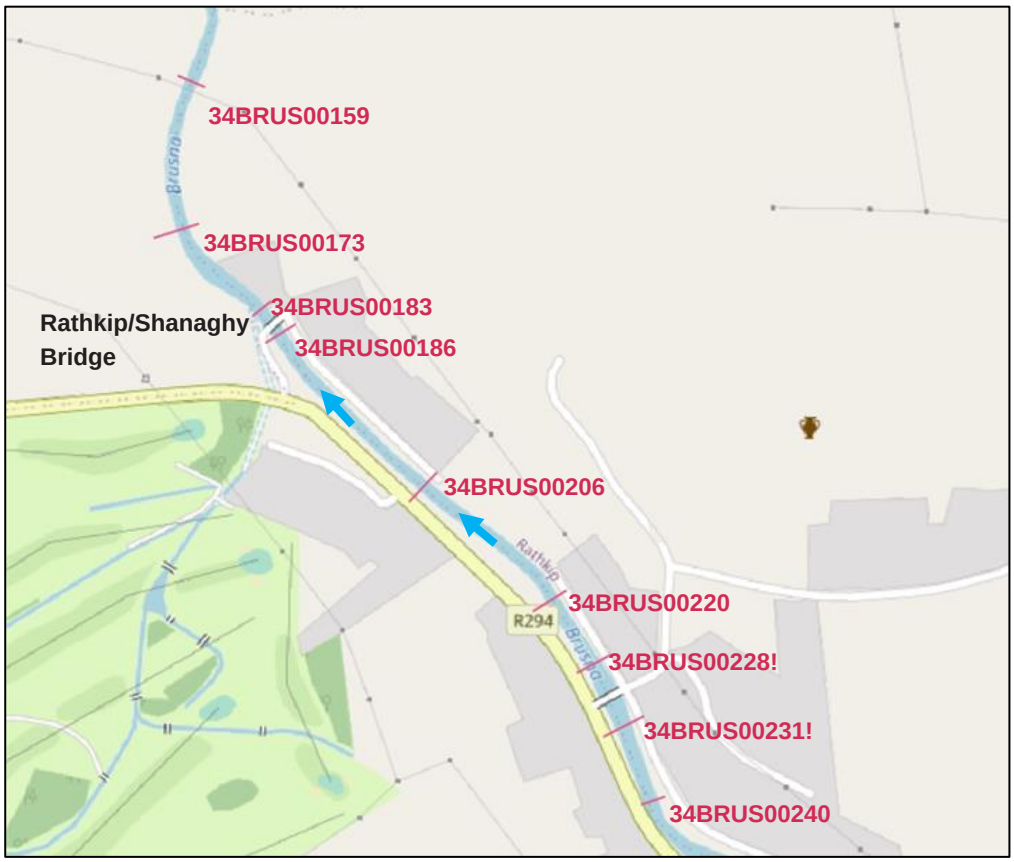


Apx Figure 5: Pre- and Post-Scheme cross section velocity 50%AEP



Apx Figure 6: Pre- and Post-Scheme cross section velocity 1%AEP

Detailed Examination of Brusna (Glenree) River Hydraulic Data



Apx Figure 7: Brusna (Glenree) Cross Sections – upstream/downstream Rathkip/Shanaghy Bridge

Apx Table 7: Brusna (Glenree) Pre- and Post-Scheme cross section velocity 50%AEP

Watercourse	Cross Section	Location	Baseline 50% AEP Velocity (m/s)	Post Scheme 50% AEP Velocity (m/s)	Difference
Brusna (Glenree)	34BRUS00159	260m DS Rathkip/Shanaghy Bridge	1.846	1.846	0
	34BRUS00173	~	1.866	1.865	-0.001
	34BRUS00183	Just DS Rathkip/Shanaghy Bridge	1.443	1.447	0.004
	34BRUS00186	Just US Rathkip/Shanaghy Bridge	1.853	1.922	0.069
	34BRUS00206	~	1.863	1.883	0.02
	34BRUS00220	~	1.8	1.818	0.018
	34BRUS00228!	~	1.947	1.958	0.011
	34BRUS00231!	~	1.717	1.749	0.032
	34BRUS00240	545m US Rathkip/Shanaghy Bridge	2.25	2.271	0.021

Apx Table 8: Brusna (Glenree) Pre- and Post-Scheme cross section velocity 1%AEP

Watercourse	Cross Section	Location	Baseline 1% AEP Velocity (m/s)	Post Scheme 1% AEP Velocity (m/s)	Difference
Brusna (Glenree)	34BRUS00159	260m DS Rathkip/Shanaghy Bridge	2.11	2.143	0.033
	34BRUS00173	~	2.298	2.324	0.026
	34BRUS00183	Just DS Rathkip/Shanaghy Bridge	1.829	2.045	0.216
	34BRUS00186	Just US Rathkip/Shanaghy Bridge	1.866	1.927	0.061
	34BRUS00206	~	1.909	1.932	0.023
	34BRUS00220	~	1.938	1.965	0.027
	34BRUS00228!	~	2.139	2.085	-0.054
	34BRUS00231!	~	2.015	1.972	-0.043
	34BRUS00240	545m US Rathkip/Shanaghy Bridge	2.454	2.426	-0.028

Apx Table 9: Brusna (Glenree) Pre- and Post-Scheme cross section Froude No. 50%AEP

Watercourse	Cross Section	Location	Baseline 50% AEP Froude no.	Post Scheme 50% AEP Froude no.	Difference
Brusna (Glenree)	34BRUS00159	260m DS Rathkip/Shanaghy Bridge	0.676	0.675	-0.001
	34BRUS00173	~	0.537	0.537	0
	34BRUS00183	Just DS Rathkip/Shanaghy Bridge	0.364	0.365	0.001

Watercourse	Cross Section	Location	Baseline 50% AEP Froude no.	Post Scheme 50% AEP Froude no.	Difference
	34BRUS00186	Just US Rathkip/ Shanaghy Bridge	0.54	0.564	0.024
	34BRUS00206	~	0.533	0.538	0.005
	34BRUS00220	~	0.514	0.518	0.004
	34BRUS00228!	~	0.615	0.616	0.001
	34BRUS00231!	~	0.492	0.505	0.013
	34BRUS00240	545m US Rathkip/Shanaghy Bridge	0.727	0.734	0.007

Apx Table 10: Brusna (Glenree) Pre- and Post-Scheme cross section Froude No. 1%AEP

Watercourse	Cross Section	Location	Baseline 1% AEP Froude no.	Post Scheme 1% AEP Froude no.	Difference
Brusna (Glenree)	34BRUS00159	260m DS Rathkip/Shanaghy Bridge	0.677	0.677	0
	34BRUS00173	~	0.672	0.678	0.006
	34BRUS00183	Just DS Rathkip/Shanaghy Bridge	0.429	0.468	0.039
	34BRUS00186	Just US Rathkip/Shanaghy Bridge	0.54	0.564	0.024
	34BRUS00206	~	0.548	0.555	0.007
	34BRUS00220	~	0.583	0.591	0.008
	34BRUS00228!	~	0.617	0.617	0
	34BRUS00231!	~	0.494	0.507	0.013
	34BRUS00240	545m US Rathkip/Shanaghy Bridge	0.729	0.736	0.007

To assist in assessment of potential impacts on the hydraulic environment of the Brusna (Glenree) River, baseline and post-scheme values for two hydraulic parameters were examined: channel velocity (m/s) and froude number. Modelled hydraulic changes were examined for nine (9 no.) river cross-sections spanning 545m upstream to 260m downstream of Rathkip/Shanaghy Bridge, numbered and mapped as shown in **Apx Figure 14** above.

Froude number is a dimensionless descriptor of the flow environment of a river calculated as a function of depth and velocity. It is a useful signifier of hydraulic habitat in relation to salmonid spawning and nursery habitat, being more versatile than river velocity or depth alone (Moir *et al*, 2002). Whilst larger fish tend to spawn in deeper, faster waters than smaller fish; the froude number within their selected spawning habitats has been found to be very similar. As an expression of depth-velocity character, it is thus comparable between different sized rivers and different sized fish. The relationship between mean depth / velocity and froude number for salmonids is set out in **Apx Figure 15** (reproduced from Moir et al. 2002), using amalgamated data from the literature (as listed).

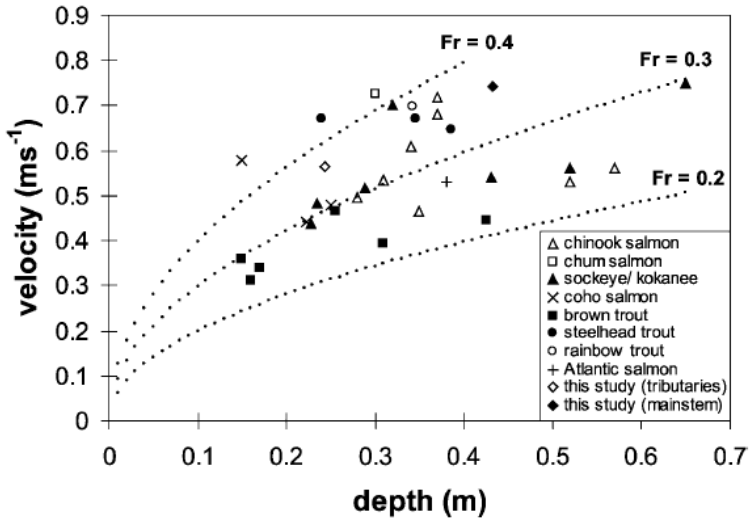


Fig. 8. Plot of mean depth and velocity-use data by spawning salmonids from the literature (Beland et al., 1982; Briggs, 1953; Burner, 1951; Delisle, 1962; Deverall et al., 1993; Grost et al., 1990; Hamilton and Remington, 1962; Hoopes, 1972; Kondolf, 1988; Mullner and Hubert, 1995; Orcutt et al., 1968; Parsons and Hubert, 1988; Sams and Pearson, 1963; Shirvell and Dungey, 1983; Smith, 1973; Swan, 1989; Witzel and MacCrimmon, 1982) and this study.

Apx Figure 8: Velocity, Depth and Froude Number Relationship (Moir et al. 2002)

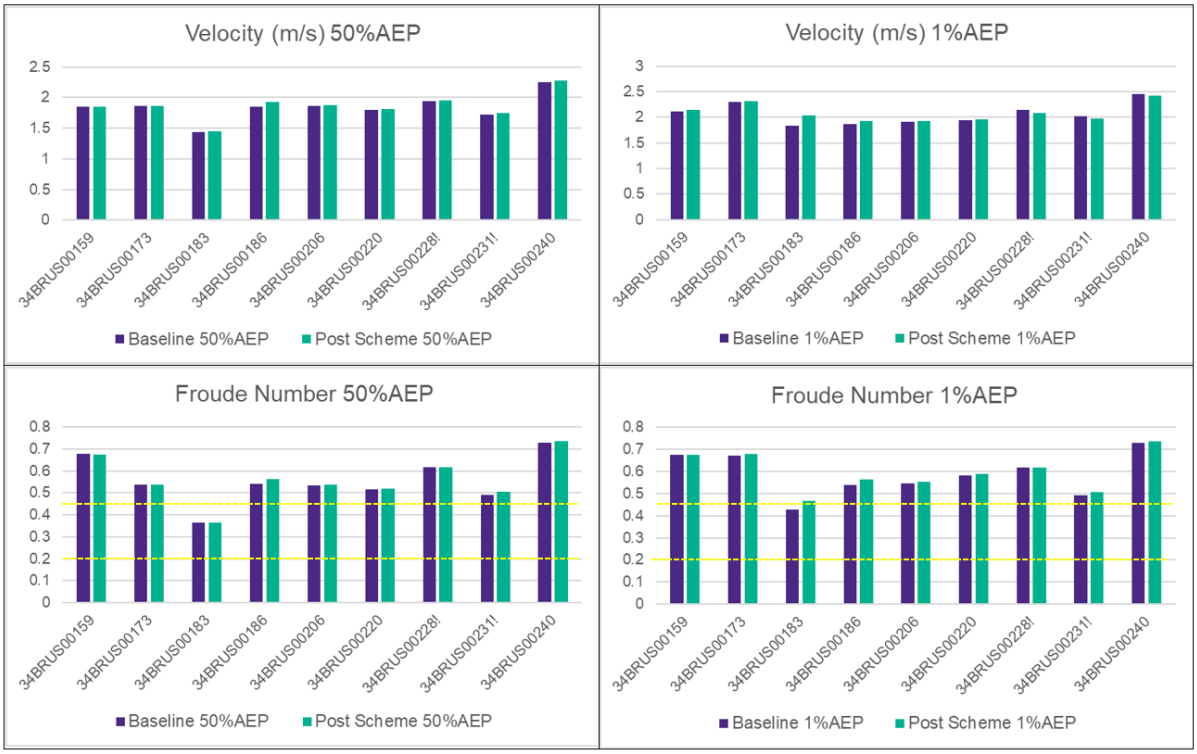
Moir et al (2002) demonstrated that salmon in Scottish mainstem and tributary streams spawn in a wide variety of depths (0.12 to 0.66m) and velocities (0.22 to 1.29 m/s), but that the froude number was very consistent with the optimal range being 0.3 to 0.44 (mean 0.38). For trout (*Salmo trutta*) the reported Froude number range is 0.2 to 0.3 (Fig. 9-3).

Armstrong et al (2003) reviewed published literature regarding habitat utilisation by Atlantic salmon and brown trout. Salmon were reported spawning in areas at average water velocities of 0.40 to 0.54 m/s, with nursery waters averaging 0.10 to 0.40 m/s (mean column velocity). Trout spawning was reported in mean water velocities of 0.39 to 0.47 m/s with nursery habitat having mean column velocities of 0 to 0.5 m/s. Spawning and nursery habitats of both species tend not to exceed mean column velocity of circa 1.0 m/s.

The Brusna (Glenree) River currently overtops the bank at 50%AEP, mainly just downstream of Rathkip/Shanaghy Bridge. This is the flood return period where changes over the baseline initiate under the scheme. Velocity and froude number were used to examine baseline and post-scheme changes for smaller, higher frequency (50%AEP) and larger, lower frequency (1%AEP) flood events as shown in **Apx Figure 16**, below.

Baseline and predicted water velocities are high at 50%AEP and 1%AEP along the examined channel reach, generally in excess of 1.5m/s which is sub-optimal for both spawning and nursery habitat (at elevated flows), though noting that bed velocity will be lower than mean column velocity. Important to this assessment is that there is very little change in cross section water velocities between baseline and post-scheme scenarios.

Froude numbers are also elevated along the channel reach, remaining virtually unchanged under baseline and post-scheme scenarios for both 50%AEP and 1%AEP events. Yellow dashed lines on Fig. A9.8.9 show the optimal Froude number band for salmonid spawning habitat (salmon and trout). This demonstrates the reach is sub-optimal in terms of froude number for both baseline and post-scheme scenarios, including during smaller, higher frequency events (50%AEP) that would be more likely to occur during the winter spawning months. The data shows the effect of the Proposed Scheme on hydraulic conditions as relate to quality of salmonid habitats is Not Significant.



Apx Figure 9: Brusna (Glenree) Cross Sections – channel velocity and Froude number comparisons

Examination of River Moy (Estuary) Downstream N59 Lower Bridge

The estuarine reach of the River Moy is examined below with reference to average cross section water velocity and depth pre- and post-scheme under 50%AEP and 1%AEP flood scenarios, as relates to potential hydromorphological changes specific to transitional water bodies. **Apx Figure 17** shows the cross-section locations. **Apx Table 14** to **Apx Table 17** show modelled hydraulic data. **Apx Figure 18** graphs the pre- and post-scheme changes, showing virtually no changes in velocity and depth.

Apx Table 11: Brusna (Glenree) Pre- and Post-Scheme cross section Froude No. 1%AEP

Cross Section	Location	Baseline - 50% AEP Velocity (m/s)	Post Scheme - 50% AEP Velocity (m/s)	Difference
34MOYR00385	15m d/s Lower Bridge	1.484	1.471	-0.013
34MOYR00376	100m d/s Lower Bridge	1.178	1.166	-0.012
34MOYR00367	200m d/s Lower Bridge	1.057	1.046	-0.011
34MOYR00356	300m d/s Lower Bridge	0.998	0.987	-0.011
34MOYR00347	400m d/s Lower Bridge	1.165	1.155	-0.01
34MOYR00336	500m d/s Lower Bridge	1.683	1.678	-0.005

Apx Table 12: Brusna (Glenree) Pre- and Post-Scheme cross section Froude No. 1%AEP

Cross Section	Location	Baseline - 50% AEP Depth (m)	Post Scheme - 50% AEP Depth (m)	Difference
34MOYR00385	15m d/s Lower Bridge	3.679	3.675	-0.004
34MOYR00376	100m d/s Lower Bridge	4	3.995	-0.005
34MOYR00367	200m d/s Lower Bridge	4.057	4.052	-0.005

Cross Section	Location	Baseline - 50% AEP Depth (m)	Post Scheme - 50% AEP Depth (m)	Difference
34MOYR00356	300m d/s Lower Bridge	4.543	4.536	-0.007
34MOYR00347	400m d/s Lower Bridge	4.442	4.436	-0.006
34MOYR00336	500m d/s Lower Bridge	3.325	3.32	-0.005

Apx Table 13: Brusna (Glenree) Pre- and Post-Scheme cross section Froude No. 1%AEP

Cross Section	Location	Baseline - 1% AEP Velocity (m/s)	Post Scheme - 1% AEP Velocity (m/s)	Difference
34MOYR00385	15m d/s Lower Bridge	1.968	1.959	-0.009
34MOYR00376	100m d/s Lower Bridge	1.595	1.589	-0.006
34MOYR00367	200m d/s Lower Bridge	1.438	1.441	0.003
34MOYR00356	300m d/s Lower Bridge	1.387	1.39	0.003
34MOYR00347	400m d/s Lower Bridge	1.533	1.531	-0.002
34MOYR00336	500m d/s Lower Bridge	2.161	2.155	-0.006

Apx Table 14: Brusna (Glenree) Pre- and Post-Scheme cross section Froude No. 1%AEP

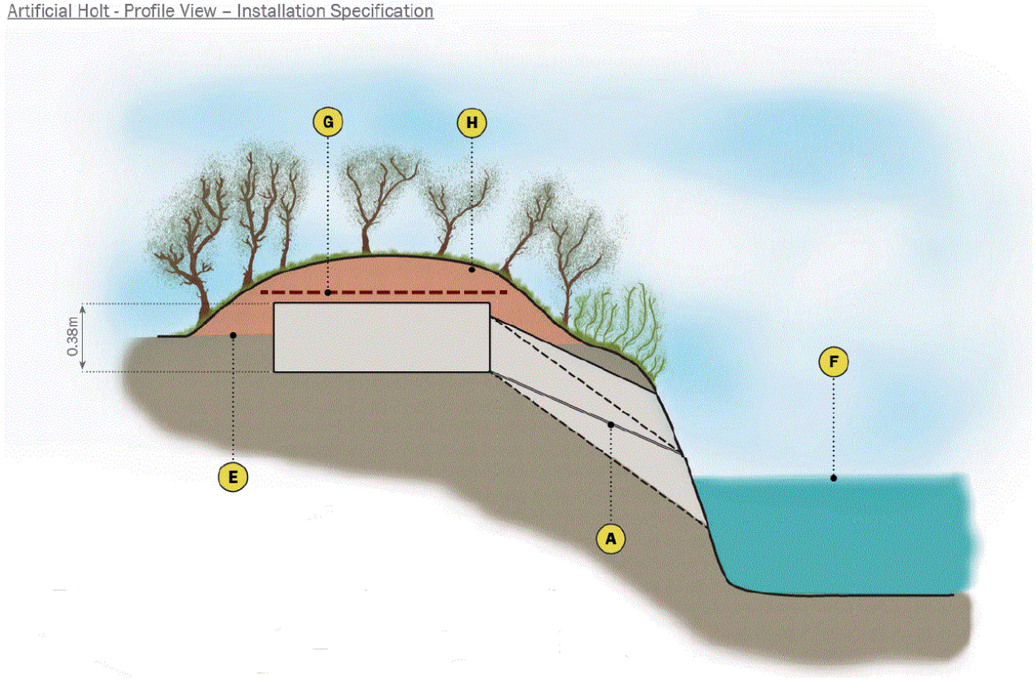
Cross Section	Location	Baseline - 1% AEP Depth (m)	Post Scheme - 1% AEP Depth (m)	Difference
34MOYR00385	15m d/s Lower Bridge	4.107	4.115	0.008
34MOYR00376	100m d/s Lower Bridge	4.42	4.425	0.005
34MOYR00367	200m d/s Lower Bridge	4.466	4.464	-0.002
34MOYR00356	300m d/s Lower Bridge	4.931	4.923	-0.008
34MOYR00347	400m d/s Lower Bridge	4.798	4.794	-0.004
34MOYR00336	500m d/s Lower Bridge	3.595	3.597	0.002

Apx Figure 10: River Moy (Estuary) Cross Sections – downstream N59 Lower Bridge

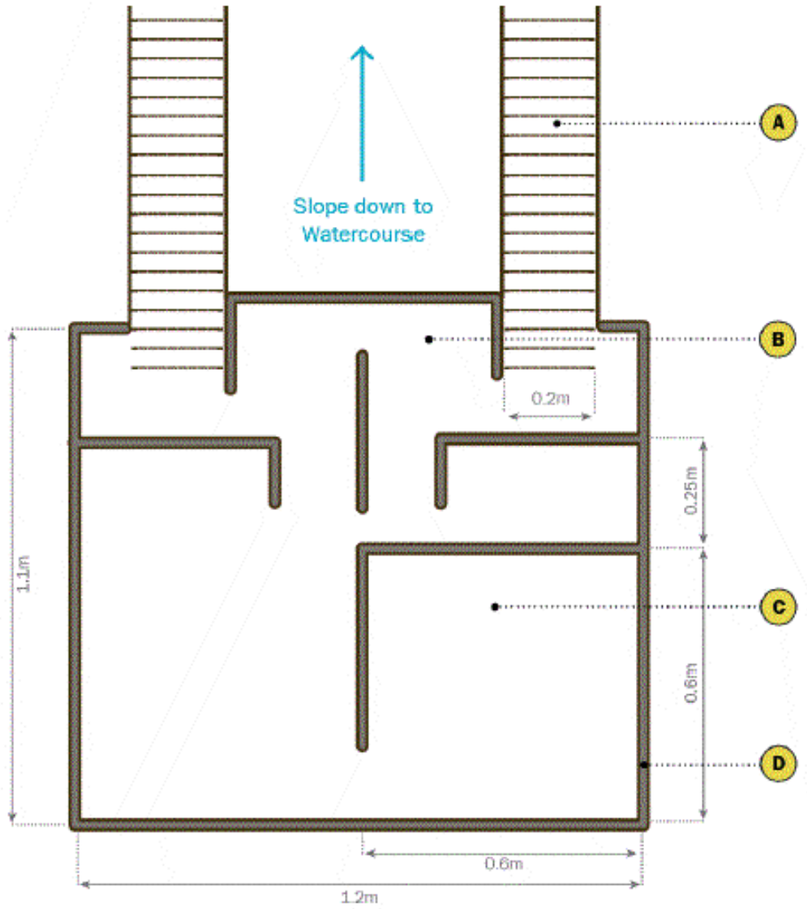
Apx Figure 11: River Moy (Estuary) Hydraulic Comparison – downstream N59 Lower Bridge

Appendix O
Otter Holt Design

Artificial Holt - Profile View – Installation Specification



Artificial Holt - Plan View – Construction Specifications



A	200mm Plastic Culvert Pipe used as access tunnels. One located above the mean water level for use during floods	F	Mean Water Level
B	Double right-angle turn at entrance to reduce light and drafts	G	Steel Reinforced Mesh to mark location of chamber when using C.A.T. scanner
C	600x600mm Internal Sub-chamber	H	Soil Cap with Scrub Planting
D	Constructed using 25mm Marine Ply-wood		
E	Existing Ground Level		

General Notes

(i) Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors from the use of these files, either by human error by the recipient, listing of the un-dimensioned measurements, compatibility with the recipients software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.

(ii) DO NOT SCALE, use figured dimensions only.

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(iv) Information including topographical survey, geotechnical investigation and utility detail used in the design have been provided by others.

(v) All Levels refer to Ordnance Survey Datum, Malin Head.

Rev	Date	Drn	Chk	Amendment / Issue	App
A1 C01	07/04/25	JB	KM	AUTHORISED & ACCEPTED FOR PLANNING	PJG
S4 P01	20/01/25	JB	KM	REVIEW & AUTHORISATION	PJG

Client: Comhairle Contae Mhaigh Eo Mayo County Council

OPW Oifig na nOibreacha Poiblí Office of Public Works

RPS MAKING COMPLEX EASY
Lyrr 2, IDA Business & Technology Park, Mervue, Galway
T +353 91 400200
W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

Project: **BALLINA FLOOD RELIEF SCHEME PLANNING APPLICATION**

Title: OTTER HOLT DESIGN

Model File Identifier: N/A

File Identifier: MGW0290-RPS-EI-XX-D-EN-0134

Created on	Sheets	
28/08/2023	01 OF 01	
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