BALLINA FLOOD RELIEF SCHEME

Constraints Study

MGW0290RP0002
Ballina Flood Relief Scheme
F01
25 February 2021

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
F01	Final	SM/KOD/EKL	PK	PJ	25/02/21

Approval for issue

PJG	25 February 2021

Prepared by:

RPS

Prepared for:

Mayo County Council

Áras an Chontae, The Mall, Castlebar,
Co. Mayo, F23 WF90

T +353 94 906 4000
E Info@mayo.ie

Contents

Tables

Figures

Appendices

GLOSSARY

Term	Meaning
Annex I habitat	Habitat types listed on Annex I of the EU Habitats Directive whose conservation requires the designation of Special Areas of Conservation.
Annex II species	Species listed on Annex II of the EU Habitats Directive whose conservation requires the designation of Special Areas of Conservation.
Annex IV species	Species listed on Annex IV of the EU Habitats Directive which are afforded strict protection under EU and national legislation.
Catchment	An area of land contributing to a river, lake or other waterbody
Designated sites	Sites which have special status as protected areas because of their natural and cultural importance.
Effect	The consequence of the impact on the environment
Effluent	Any liquid discharged from a source into the environment
European site	Collective term used in national legislation when referring to nature conservation sites protected under the Habitats or Birds Directives (i.e. SAC or SPA sites).
Impact	Changes to the environment resulting from the implementation of project.
Imperceptible Effect	An impact capable of measurement but without significant consequences.
Indirect Impact	Impacts on the environment, which are not a direct result of the project, often produced away from (the site) or as a result of a complex pathway.
Landscape Capacity	The capacity of a particular type of landscape to absorb change without unacceptable adverse effects on its character.
Landscape Character Area	Distinct types of landscape which are generic in character in that they may occur in different parts of the country, but wherever they are they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern.
Landscape Fabric	The physical pattern of elements and features such as vegetation, landform and land use that combine to create landscape character.
Landscape Quality (or Condition)	The quality or condition of the landscape based on judgements about the physical state of the landscape, and about its intactness, from visual, functional, and ecological perspectives.
Landscape Resource	The combination of elements that contribute to landscape context, character and value.
Landscape Value	The importance attached to a landscape (often as a basis for designation or recognition) that expresses national or local consensus because of its quality, cultural associations, scenic or aesthetic characteristics.
Magnitude	The size, extent and duration of an impact.
Mitigation Measures	Measures designed to avoid, reduce, remedy or offset impacts. These measures can mitigate impacts.
Moderate Effect	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Monitoring	The observation, measurement and evaluation of environmental data over a period of time, to assess the efficiency of control measures. This is typically a repetitive and continued process carried out during construction, operation or decommissioning of a project.

Not Significant Effect	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Operational phase	The period of time in which the proposed road is in use.
Pathway	The route by which an effect is conveyed between a source and a receptor.
Priority Annex I habitat	Annex I habitat types which are in danger of disappearance, and for which the European Community has particular responsibility in view of the proportion of their natural range which falls within the territory
Residual Impacts/Risks	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Sensitive Receptor	A receptor (e.g. physical or natural resource, special interest or viewer group) that will experience a significant impact.
Sensitivity	Vulnerability of a sensitive receptor to change.
Significant Effect	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Visual Amenity	The value of a particular area or view in terms of what is seen.
Visual Character	When a viewer experiences the visual environment, it is not observed as one aspect at a time, but rather as an integrated whole. The viewer's visual understanding of an area is based on the visual character of visible features and aspects and the relationships between them. The visual character is descriptive and not evaluative.
Visual Effect	A visual effect is a change to an existing view as a result of development or the loss of particular landscape elements or features already present in the view.
Visual Quality	Although the interpretation of viewers' experience can have preferential and subjective components, there is generally clear public agreement that the visual resources of certain landscapes have high visual quality. The visual quality of a landscape will reflect the physical state of individual features or elements.
Visual Resources	The visual resources of the landscape are the stimuli upon which actual visual experience is based. They are a combination of visual character and visual quality.

1 INTRODUCTION

1.1 Background

RPS Consulting Engineers have been commissioned by Mayo County Council to assist in the delivery of the Ballina Flood Relief Scheme (FRS), hereafter referred to as the proposed scheme. The objective of this project is the identification, design and submission (for planning consent) of a flood scheme, that is technically, socially, environmentally and economically acceptable, to alleviate the risk of flooding to the community of Ballina to a determined standard of protection, and to procure, manage and oversee the construction of that scheme.

The overall project is divided into five stages which are as follows:

- **Stage I:** Identification and Development of a Preferred Scheme
- **Stage II:** Planning process
- **Stage III:** Detailed Construction Design, Compilation of Work Packages and the Preparation of Tenders for Contracts
- **Stage IV:** Construction Supervision and Project Management Services
- **Stage V:** Handover of Works

1.2 Proposed Flood Relief Measures for River Moy

The proposed flood relief measures identified as part of the CFRAM study to be applied as part of the proposed scheme include the following;

- Constructing new quay walls with piled foundations at Bachelors Walk (1.2m high, 470m long) and in front of properties on Clare Street (0.6m high with 0.6m high railings, 340m long), to provide a 1.2m guarding height. The flood wall at Clare Street will continue north for a further 170m to tie into higher ground.
- In front of the St Muredach's Cathedral on the N59, the defence height will be 0.45m in height and have a length of 210 metres. Along Ridgepool Road the existing railings will be replaced with flood defence walls, in some points the existing walls will be raised with a total of 200m length of works in this area. In many of the gaps, walls will only need to be raised to 0.6m above ground level with 0.6m high railings (to provide a 1.2m guarding height). This will fit into the height of the existing river walls and maintain some visual connection. Constructing a flood defence embankment for the Knockanelo (or Sruffaunbrogue) River in Ballina at Killala Road (20m long rural clay embankment, 1m high, on Knockanelo River upstream).
- Provision of freeboard for all walls and raised riverbanks is in excess of 0.3m above the peak flood level. Two pumping stations (either new or upgraded existing) will be constructed to manage surface water and fluvial flooding behind the river walls, one on each bank of the River Moy.
- On the Knockanelo (or Sruffaunbrogue) River the inlets to the flood relief culvert and downstream culverts will be improved with some further works to the existing box culverts at Marian Crescent.
- Ongoing maintenance of the river walls, pumping stations and enhanced maintenance above the current arterial drainage maintenance programme for the full length of culverts on the Knockanelo through the town centre and the Flood Relief Culvert will be required.

These measures will be reviewed as part of Stage 1 for the project and a preferred schemed identified. **Figure 1-1, Figure 1-2** and **Figure 1-3** illustrate the preferred option from the CFRAM study.

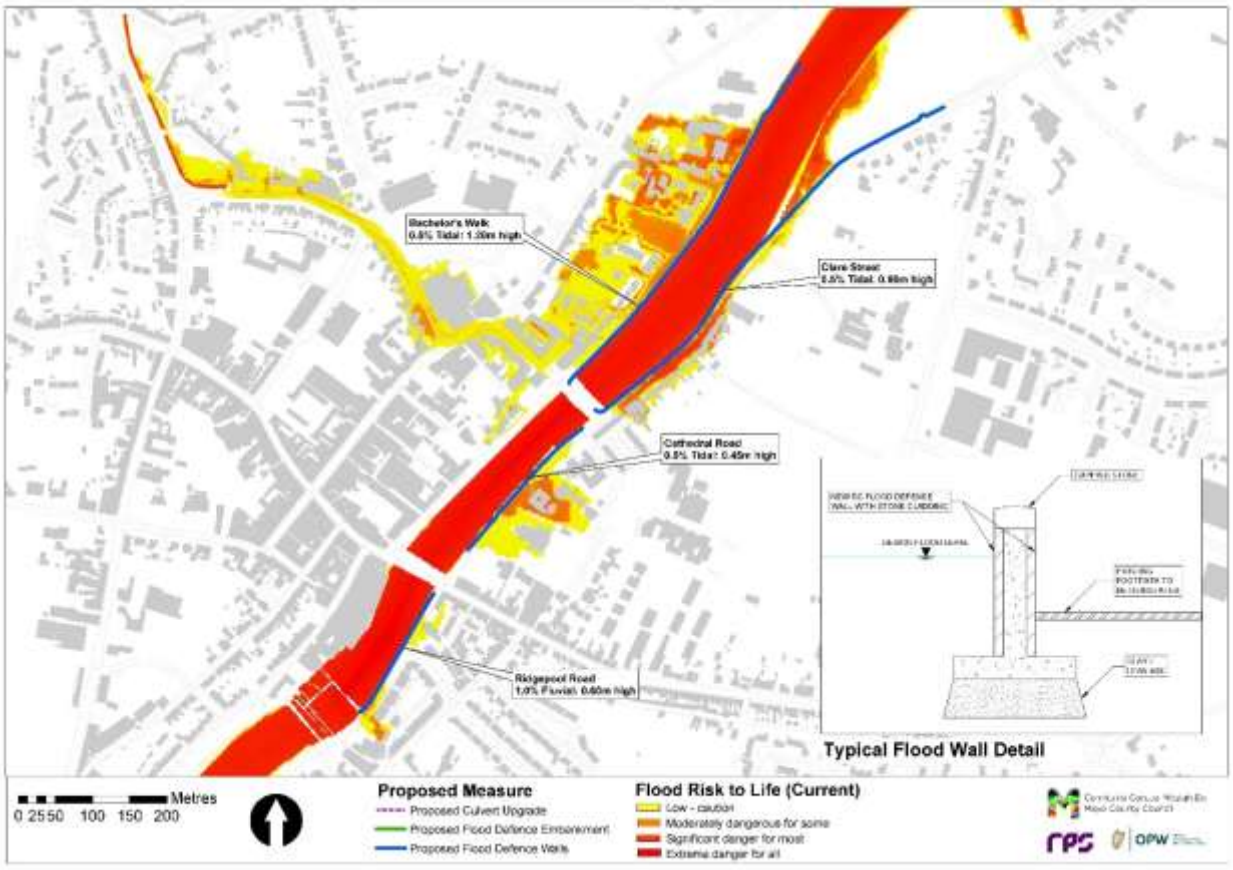


Figure 1-1: CFRAM Study Preferred Option – 1 of 3

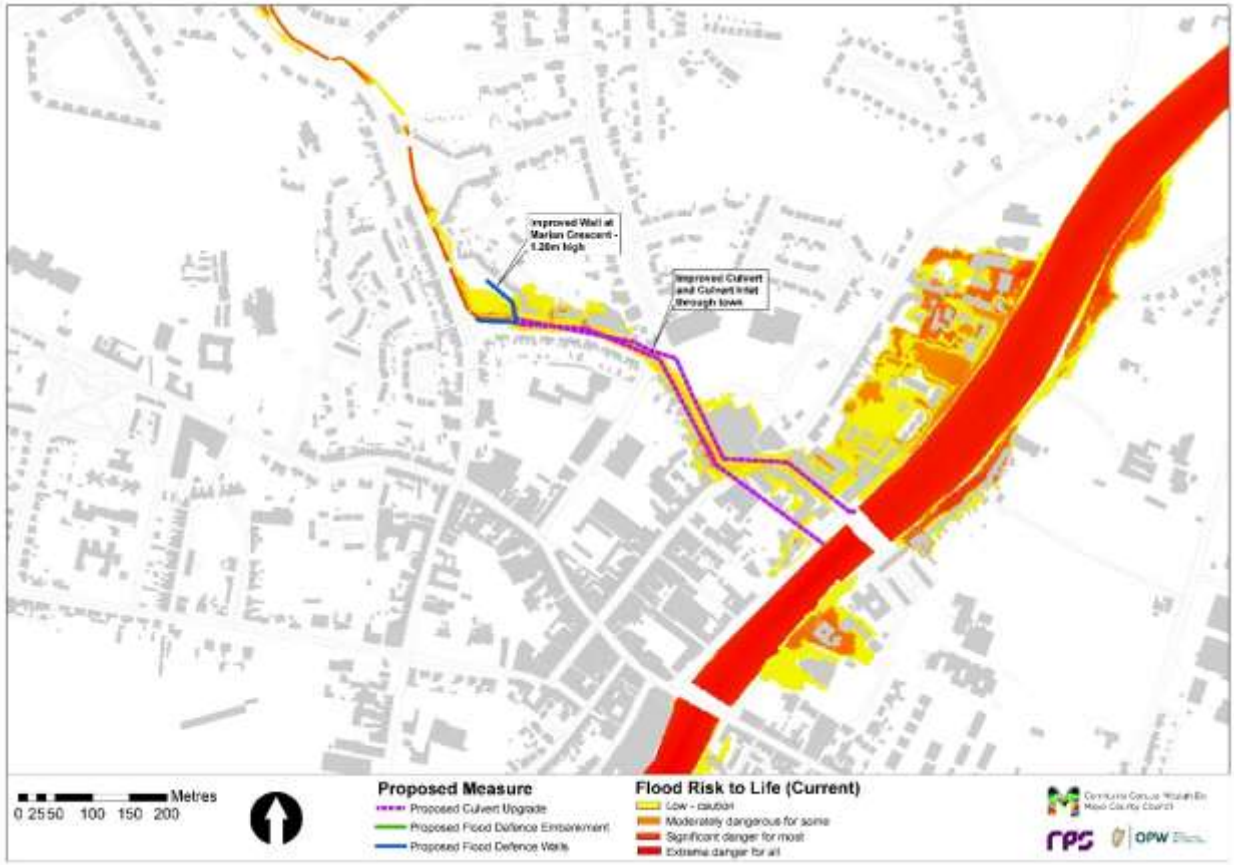


Figure 1-2: CFRAM Study Preferred Option – 2 of 3

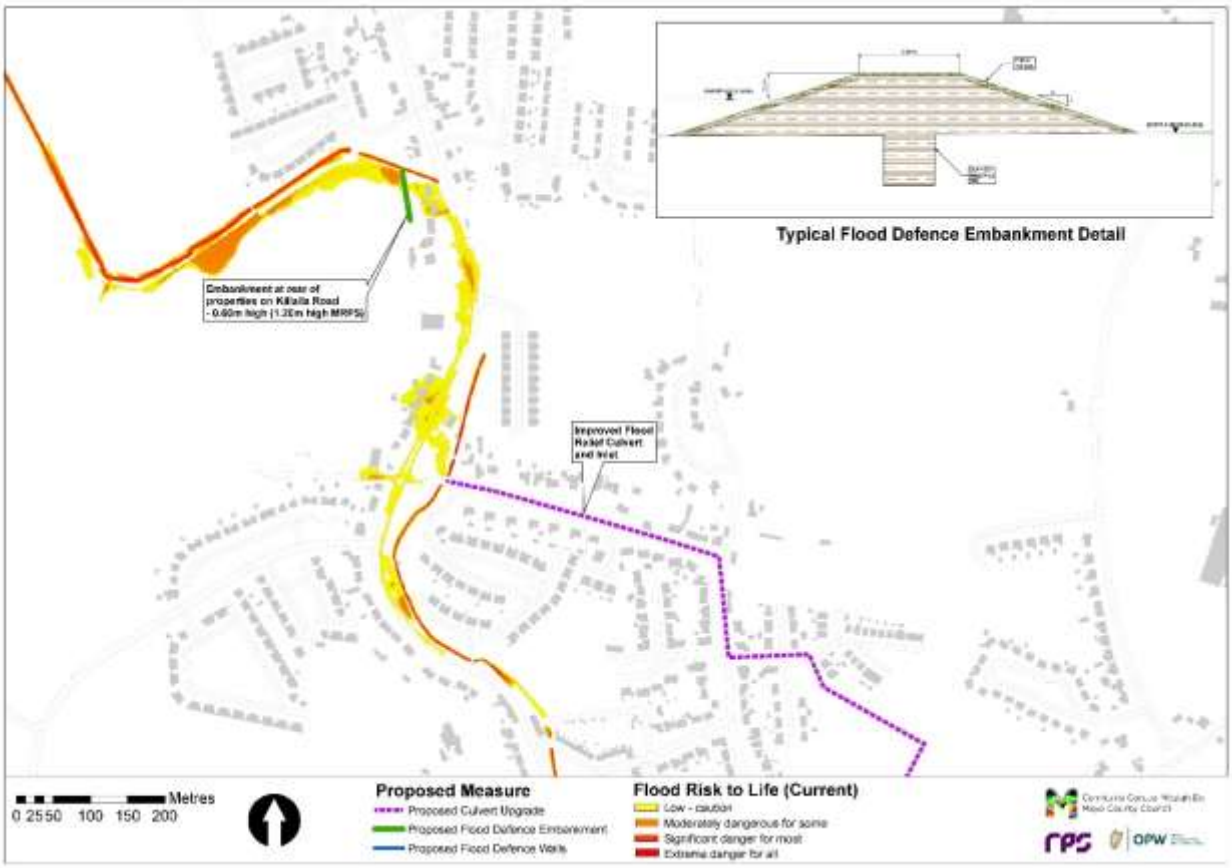


Figure 1-3: CFRAM Study Preferred Option – 3 of 3

2 SCOPE OF ENVIRONMENTAL CONSTRAINTS STUDY

The constraints study has been compiled with reference to the environmental factors provided in Article 3 of the EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU) as transposed into Irish legislation by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, S.I. No. 296 of 2018. The environmental factors identified in the EIA Directive and where they are assessed in this constraints study, in addition to other factors are as follows:

Constraints Study Section	Environmental topics as per the EIA Directive (2011/92/EU) as amended (2014/52 EU)	
Section 4 Population and Human Health	a)	Population and Human Health
Section 5 Biodiversity	b)	Biodiversity (with particular attention to species and habitats protected under the Habitats Directive and the Birds Directive)
Section 6 Land, Soils, Geology and Hydrogeology	c)	Land, Soils, Water, Air and Climate
Section 7 Water		
Section 8 Air, Climate and Noise		
Section 9 Material Assets: Agriculture	d)	Material Assets, Cultural Heritage and the Landscape
Section 10 Material Assets: Non-Agriculture		
Section 11 Cultural Heritage		
Section 12 Landscape		
Section 13 Other Constraints		
Section 14 Interaction between the Environmental Factors and Constraints Summary	The interaction between the factors referred to in points (a) to (d)	

The scope of this report is to identify and map environmental constraints within the scheme area and the study area of the proposed Ballina FRS based that may be impacted by the flood relief measures proposed for the scheme including the CFRAM proposed measures described in **Section 1.2** above. A description of what is contained within the study area and the scheme area are set out below:

Study Area

The Study Area is the area that contains the:

- Lengths of river channel/watercourse that have hydraulic influence on the area intended to benefit from, and be protected by, any feasible scheme;
- Full hydrological catchment areas draining to the downstream ends of those river channels/ watercourses; and
- Areas that require environmental assessments as part of the development of any such scheme.

Scheme Area

The Scheme Area is the area:

- within which physical works are proposed to be constructed, accessed and maintained as part of any feasible scheme;
- Areas that are intended to benefit from, and be protected by, any such scheme; and
- Lengths of river channel/watercourse upstream and downstream that are likely to be impacted hydraulically by such scheme.

The study area comprises the Moy and Killala Bay Water Framework Directive (WFD) Catchment (Catchment ID:34) and the scheme area largely contains Ballina. The scheme area is within which the proposed flood relief measures will be undertaken, see **Figure 2-1.**

2.1.1 Identifying and Mapping Constraints

Constraints are divided into three principal categories:

- Natural constraints (naturally occurring landscapes and features);
- Artificial constraints (forming part of the built environment); and
- External parameters (design standards, policy, procedural and legal issues).

This constraints study is comprised of a desktop study (which includes the review of various documentation, including mapping resources), site walkover, windshield surveys and consultation with key stakeholders. The available mapping for this scheme consisted of 1:50,000 Ordnance Survey Ireland (OSI) Discovery Series mapping and aerial photography which provides information on the physical features of the scheme area. A Geographic Information System (GIS) has been used to map and present the available data within the scheme areas. Additionally, a number of datasets from national agencies such as the National Parks and Wildlife Service (NPWS), Geological Survey Ireland (GSI) database and Environmental Protection Agency (EPA) have been utilised.

The constraints identified for the proposed scheme are described in **Sections 4** to **13.**

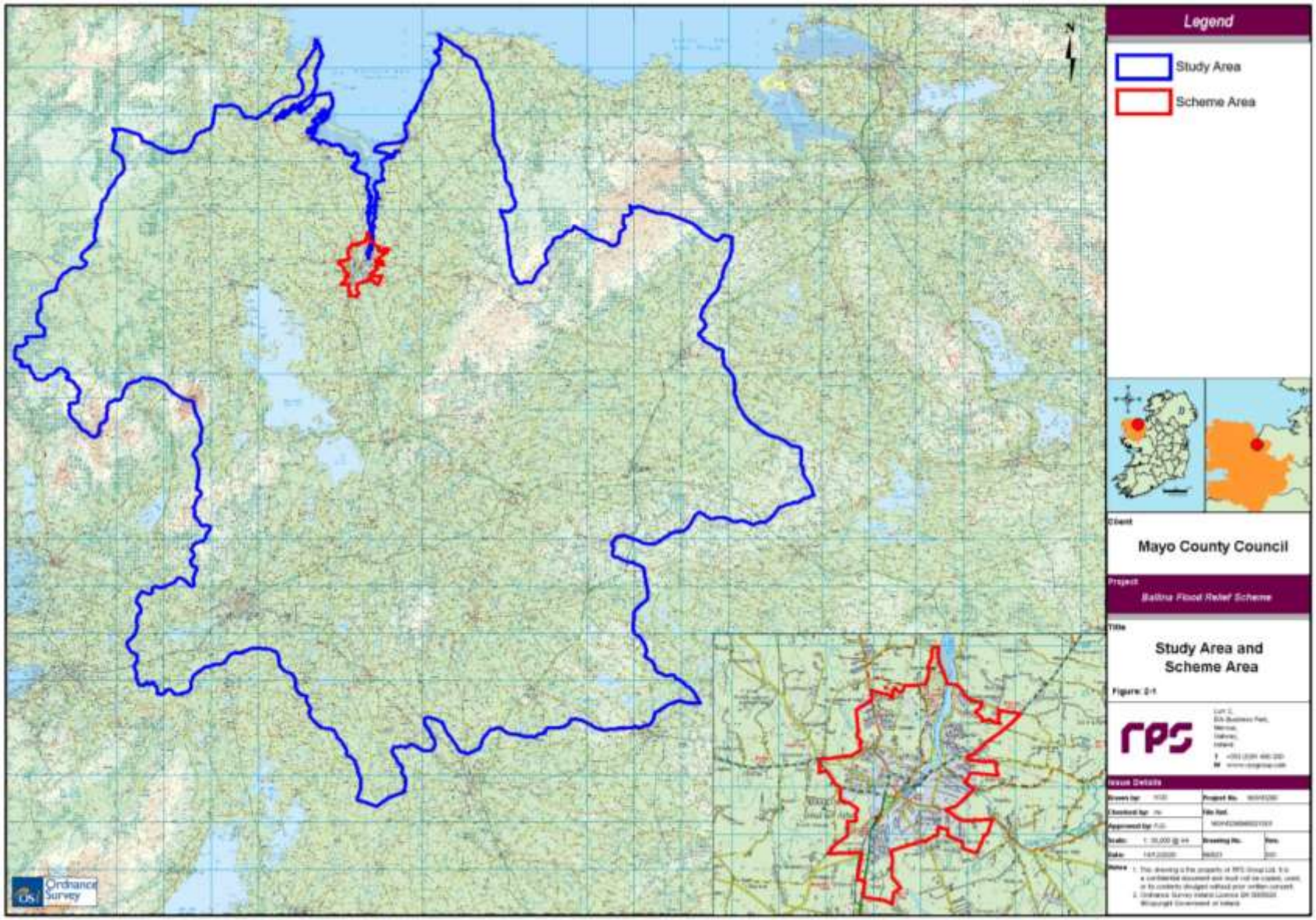


Figure 2-1: Ballina Flood Relief Scheme Study Area and Scheme Area

3 POTENTIAL ENVIRONMENTAL CONSTRAINTS

3.1 Purpose of Identifying Constraints

The purpose of identifying the constraints within the proposed scheme area and study area where potential as connectivity is identified, is to ensure the integration of environmental considerations into the selection and development of potential flood relief options. The environmental desktop assessment of constraints includes the following:

- A scope of the environmental disciplines to be assessed;
- Description of the receiving environment; and
- Identification of the constraints within the scheme area and study area as applicable.

A constraints analysis for each of the environmental disciplines addressed is presented in the following sections.

3.2 Legislative, Planning and Policy Constraints

Consideration of relevant policy and legal issues at EU, national, regional, county and local level may influence the progression of the proposed Flood Relief Scheme. This may influence future design and construction processes. It is prudent to consider issues at as early a stage as possible so as not to delay the timely completion of the project. On this basis a list of relevant legal, planning and policy related requirements relative to the proposed Flood Relief Scheme are set out in **Table 3-1.**

Table 3-1: Legislation, Planning and Policy Requirements with Potential to Influence the Proposed Ballina Flood Relief Scheme

Legislation/Plan/Policy	Content Relative to the Proposed Flood Relief Scheme
EU Level	
EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU)	• Environmental Impact Assessment (EIA) is a very significant instrument in the implementation of EU environmental policy. The EIA Directive 2011/92/EU as amended by Directive 2014/52/EU, on the assessment of the effects of certain public and private projects on the environment and is designed to ensure that projects likely to have significant effects on the environment are subject to a comprehensive assessment of environmental effects prior to development consent being given.
EU Flood Directive (2007/60/EC)	• Aim is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. • Establish a framework for the assessment and management of flood risks.
Water Framework Directive (2000/60/EC)	• Establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater.
Habitats Directive (92/43/EEC)	• All works during the development and operation of the project must aim to maintain/restore habitats and species of community interest within the scheme area. These habitats and species of community interest are identified as; Special Areas of Conservation (SACs), designated under the Habitats Directive and Special Protection Areas (SPAs), designated under the Birds Directive 2009/147/EC. The project will be screened for Appropriate Assessment in accordance with Article 6(3) of the Directive. • The habitats Directive contributes towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies.

Legislation/Plan/Policy	Content Relative to the Proposed Flood Relief Scheme
	• Measures taken pursuant to this Directive shall be designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest.
Birds Directive (2009/147/EC)	• All works during the development and operation of the project must aim to maintain/conserve wild bird species occurring in the scheme area.
National Level	
EC (Assessment and Management of Flood Risks) Regulations (SI 122 2010) as amended	• Transposes and gives effect to the EU Flood Directive 2007/60/EC into Irish legislation.
European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (as amended)	• Gives effect to the Habitats Directive (92/43/EEC) and the Birds Directive 2009/147/EC, as well as addressing transposition failures identified in CJEU judgments. • Regulation 42, enforces the requirement for all public authorities to conduct a screening for Appropriate Assessment and, if necessary, an Appropriate Assessment on any plan or project for which it receives an application for consent, or which the local authority itself wishes to undertake or adopt. This obligation derives from Article 6(3) of the Habitats Directive.
European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 as amended	• EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU) transposed into Irish legislation by S.I. No. 296 of 2018.
Planning and Development (P&D) Act 2000 (as amended)	• Requirements for an Environmental Impact Assessment are outlined under Section 172 of the P&D Act.
Planning and Development Regulations 2001 as amended	• The thresholds for prescribed classes of development requiring Environmental Impact Assessment are set out under the Planning and Development Regulations 2001 Schedule 5. The thresholds for flood relief works are provided under Schedule 5 Part II, Section 10(f)(ii) "*Canalisation and flood relief works, where the immediate contributing sub-catchment of the proposed scheme (i.e. the difference between the contributing catchments at the upper and lower extent of the works) would exceed 1,000 hectares or where more than 20 hectares of wetland would be affected or where the length of river channel on which works are proposed would be greater than 2 kilometres."*
Wildlife Act 1976 (as amended)	• The Wildlife Act, 1976 as amended, is the principal national legislation providing for the protection of wildlife and the control of some activities that may adversely affect wildlife. • The aims of the Wildlife Act is to provide for the protection and conservation of wild fauna and flora, to conserve a representative sample of important ecosystems, to provide for the development and protection of game resources and to regulate their exploitation, and to provide the services necessary to accomplish such aims.
Fisheries Acts 1959 to 2010	• Provides a wide range of measures to protect fish and the conservation of fish and other species of fauna and flora habitat; biodiversity of inland fisheries and ecosystems
European Communities (Quality of Salmonid Waters) Regulations 1988.	• All works during development and operation of the project must aim to conserve fish and other species of fauna and flora habitat; biodiversity of inland fisheries and ecosystems and protect spawning salmon and trout.
European Communities (Quality of Shellfish Waters) (Amendment) Regulations, 2009	• These regulations give effect to the Shellfish Water Directive 2006/113/EC. The purpose of these designations is to protect or improve the quality of the waters at the sites in question in order to support shellfish (bivalve and gastropod molluscs)

Legislation/Plan/Policy	Content Relative to the Proposed Flood Relief Scheme
	life and growth, thereby contributing to the high quality of shellfish products directly edible by man.
The National Monuments Acts 1930-2004. The Heritage Act 1995. Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999. Planning and Development Acts 2000 as amended	• All works during development and operation of the project must aim to ensure the satisfactory protection of archaeological remains, which are held to include all man-made structures and to protect and where possible preserve architectural heritage.
Ireland 2040 Our Plan National Planning Framework and National Development Plan 2018 – 2027	• Project Ireland 2040 is the governments overarching strategy for Ireland. The National Development Plan (NDP) and the National Planning Framework (NPF) combine to form Project Ireland 2040. The NPF sets the vision and strategy for the development of our country to 2040 and the National Development Plan (NDP) provides enabling investment to implement the strategy to 2027. The National Planning Framework is a long-term, 20 year strategy for the spatial development of Ireland that will promote a better quality of life for all, with sustainable economic growth and an environment of the highest quality as key underlying principles
Climate Action Plan 2019	• The Climate Action Plan 2019 is Ireland's all of Government Plan to tackle climate break down and achieve net zero greenhouse gas emissions by 2050. The full report contains 183 actions to ensure Ireland meets its targets.
Report of the Flood Policy Review Group, 2004	• National Policy on flooding: *'to minimise the national level of flood risk to people, businesses, infrastructure and the environment, through the identification and management of existing, and particularly potential future, flood risks in an integrated, proactive and catchment-based manner'* In determining if a flood relief scheme is to be implemented the regard must be had to the following broad criteria: (a) the scheme must be technically feasible; (b) the scheme must generally be cost beneficial (a cost benefit analysis is undertaken to determine the economic merits of the project); and (c) the scheme must also be environmentally compatible (an Environmental Impact Study is normally undertaken for each scheme and the scheme must satisfy the requirements of the EIS).
Planning System and Flood Risk Management – Guidelines for Local Authorities	The core objectives of the Guidelines are to: • Avoid inappropriate development in areas at risk of flooding; • Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off; • Ensure effective management of residual risks for development permitted in floodplains; • Avoid unnecessary restriction of national, regional or local economic and social growth; • Improve the understanding of flood risk among relevant stakeholders; • Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.
River Basin Management Plan for Ireland 2018 - 2021	• The River Basin Management Plan (RBMP) for Ireland (2018 – 2021), sets out the condition of Irish waters, and a summary of status for all monitored waters in the 2013 – 2015 period, including a description of the changes since 2007 – 2009. Nationally, both monitored river water bodies and lakes at high or good

Legislation/Plan/Policy	Content Relative to the Proposed Flood Relief Scheme
	ecological status, appear to have declined by 3% since 2007 – 2009; nevertheless, this figure does not reflect a significant number of improvements and dis-improvements across these waters since 2009. Provisional figures from the EPA suggest that approximately 900 river water bodies and lakes have either improved or dis-improved. In addition, the previously observed long term trend of decline in the number of high-status river sites has continued. • Chapter 5 of the RBMP presents results of the catchment characterisation process, which identifies the significant pressures on each water body that is At Risk of not meeting the environmental objectives of the WFD. Importantly, the assessment includes a review of trends over time to see if conditions were likely to remain stable, improve or deteriorate by 2021. This work was presented in the RBMP for 81% of water bodies nationally, which had been characterised at the time. 1,517 water bodies were classed At Risk out of a total of 4,775, or 32%. An assessment of significant environmental pressures found that agriculture was the most significant pressure in 729 river and lake water bodies that are At Risk. Urban waste water, hydromorphology and forestry were also significant pressures amongst others.
Arterial drainage Act 1945 (As amended)	• Arterial drainage act outlines legislation regarding arterial drainage works that are mainly used for improvement of agricultural land throughout Ireland.
Climate Change Sectoral Adaptation Plan for Flood Risk Management (2019 - 2024)	• This Plan considers the impacts of climate change on flooding and flood risk, as well as on flood risk management and identifies 21 adaptation actions needed to ensure effective and sustainable management of flood risk into the future. These actions include ongoing research and assessment of the potential impacts of climate change for flooding and flood risk, the consideration of these impacts in the development and implementation of ongoing and future flood risk management measures, and coordination with other sectors and local authorities as part of a whole of Government approach to sustainable and effective flood risk management. The objectives of the Plan are as follows:. – **Objective1:** Enhancing our knowledge and understanding of the potential impacts of climate change for flooding and flood risk management through research and assessment. – **Objective 2:** Adapting flood risk management practice to effectively manage the potential impact of climate change on future flood risk – **Objective 3:** Aligning adaptation to the impact of climate change on flood risk and flood risk management across sectors and wider Government policy
Climate Change and Low Carbon Development Act (2015)	• This act is for the purpose of pursuing the transition to a low carbon economy as well as for the establishment of the Climate Change Advisory Council.
National Adaptation Framework (2018)	• The National Adaptation Framework outlines a dual approach of the people and the government to tackle climate change adaptation in Ireland.
Regional Level	
Regional Planning Guidelines for the West 2010 – 2022	**Policy SPP11:** Development of catchment management strategies and design of flood management works will be informed by the Habitats Directive Assessment process and/or other relevant environmental assessment. **Objective SPO31:** To ensure that where flood alleviation works take place the natural heritage and landscape character of rivers, streams and watercourses are protected and enhanced to the greatest extent possible, and that there are no negative impacts on the Conservation Objectives of Natura 2000 sites through Habitats Directive Assessment.
Regional Spatial and Economic Strategy 2020-2032- Northern and Western Regional Assembly	**RPO 3.10** Ensure flood risk management informs development by avoiding inappropriate development in areas at risk of flooding and integrate sustainable water management solutions (such as SUDS, non-porous surfacing and green roofs) to create safe places.

Legislation/Plan/Policy	Content Relative to the Proposed Flood Relief Scheme
	Development plans should assess flood risk by implementing the recommendations of the Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014). **RPO 8.22** Prioritising investment to improve stormwater infrastructure to improve sustainable drainage and reduce the risk of flooding in the urban and rural environment.
River Basin Management Plan for the Western River Basin District in Ireland 2009 - 2015	River Basin Management Plan for the Western River Basin District in Ireland, issued in December 2009, sets out a number of objectives and measures for all water bodies in the Western Region.
County Level	
Proposed Mayo County Development Plan 2021-2027	Mayo County Development Plan review process was paused until after the Regional Spatial & Economic Strategy was published.
Mayo County Development Plan (2014- 2020)	Objective WQ-01: It is an objective of the Council to implement the Western River Basin District Management Plan "Water Matters" 2009-2015 to ensure the protection, restoration and sustainable use of all waters in the County, including rivers, lakes, ground water, coastal and transitional waters, and to restrict development likely to lead to deterioration in water quality or quantity.
Strategic Flood Risk Assessment to the Mayo County Development Plan 2014-2020	This document outlines the types of flooding and the flood risk of different locations throughout Mayo. The Preliminary Flood Risk Assessment (PRFA) for the Western CFRAM study has identified 11 Areas for Further Assessment (AFAs) in County Mayo, one of which is Ballina town.
County Mayo Biodiversity Action Plan 2010-2015	Objective 1 Action 1 Develop a biodiversity awareness-raising campaign. Produce interpretive material as part of the campaign. Focus on the following: • General awareness of biodiversity and Mayo's rich natural heritage; • The importance of riparian and aquatic habitats for wildlife, water quality and flood control; and • The impact of climate change on biodiversity.
Moy Water Management Unit Action Plan	This document outlines the pressures and risks associated with the waterbodies within the Moy Water Management Unit and the selected action programme.
County Mayo Local Authorities Draft Noise Action Plan 2013-2018	This action plan addresses environmental noise from major roads with more than three million vehicles per annum. The purpose of this Action Plan is to endeavour to manage the existing noise environment and protect the future noise environment within the action planning area.
Mayo County Council's Climate Change Adaptation Strategy 2019-2024	This document outlines the proposed Adaptation Strategy that Mayo County Council will implement to manage the existing or anticipated risks and impacts associated with climate change.
Local Level	
Ballina and Environs Development Plan (2009-2015)	It is a policy of the Ballina Town Council and Mayo County Council to reduce the impact of riverbank flood protection and drainage works.

3.3 Stakeholder Consultation and Constraints

In July 2020, a number of the key stakeholders to the project were identified and contacted in writing to inform them that the proposed scheme was being undertaken. The stakeholders were each invited to contribute observations and comments on environmental elements of the project regarding the proposed scheme.

Table 3-2 lists the stakeholders contacted as part of this stage in the project. All constraints, observations and comments received from these stakeholders are being considered as part of the environmental assessment of the proposed scheme. A copy of the letter is provided in **Appendix A**.

Table 3-2: Stakeholders Consulted during Environmental Constraints Study

Stakeholders	Responses Received	Summary
Department of Agriculture, Food, and the Marine		No response at this time
Department of the Environment, Climate and Communications[1]		No response at this time
Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media[2]	24/07/2020 & 14/12/2020	DAU acknowledged receipt of correspondence (24/07/2020). Comments on Nature Conservation and Archaeology were received on the 14/12/20. **Nature Conservation** • The proposed flood relief scheme is within or potentially directly or indirectly affecting a number of Natura 2000 sites, namely the River Moy SAC, the Killala Bay/Moy Estuary SAC and the Killala Bay/Moy Estuary SPA. • The nature and extent of direct footprint and all construction phase impacts, including disturbance impacts, should be fully explored in ecological assessments. • Any potential for change to hydrological conditions, and the impact of this on riverine and riparian habitats, should be clearly identified and considered. • Any watercourse or wetland impacted on should be surveyed for the presence of protected species and species listed on Annexes II and IV of the Habitats Directive, or Annex I of the Birds Directive, including Otters (*Lutra lutra*), Salmon (*Salmo salar*), Lamprey species and Kingfishers (*Alcedo atthis*). • One of the main threats identified in the Threat Response Plan for Otter is habitat destruction. A 10m riparian buffer on both banks of a waterway is considered to comprise Otter habitat, therefore impact within this zone should be considered. • IFI should be consulted regarding fish species and note publication "*Planning for watercourses in the urban environment*" • Hard infrastructure proposed as part of the scheme, such as pilings and embankments, will need full consideration in ecological assessments. It is important that the full range of construction works (the detailed construction designs) are described and assessed within the environmental assessments. • For this purpose, complete project details including outline construction management plans (CMPs) need to be provided. **Underwater Archaeology** • It is recommended that the services of a Project Archaeologist(s) is engaged to oversee and advise on all aspects of the scheme from design, through inception to completion, suitably qualified archaeologist, with coastal, riverine, lacustrine and underwater experience, to carry out a

[1] Department name changed 29th September 2020 from Department of Communications, Climate Action & Environment
[2] Department name changed 30th September 2020 from Department of Culture, Heritage and the Gaeltacht

Stakeholders	Responses Received	Summary
		detailed assessment of all proposed works within the Proposed Flood Relief Study areas • The Record of Monuments and Places (RMP) for archaeological sites are to be found within the areas for the FRS. • Refer to the Department's published policy *Framework and Principles for the Protection of the Archaeological Heritage* (Dúchas The Heritage Service). • The Wreck Inventory of Ireland Database lists a number of wrecks for the River Moy, which are subject to statutory protection under section 3 of the 1987 National Monuments (Amendment) Act. Given the location of the proposed FRS it is possible that underwater archaeology may be impacted by any potential works that impact the riverbed or adjacent areas. • Dredged material from previous dredging in the Moy dumped on the adjacent riverbanks may hold previously undiscovered archaeological material. • Coastal zones, sub-tidal zones, rivers and streams. These may contain known and previously unknown underwater archaeological heritage. • Mayo County Council should seek to protect the terrestrial and underwater archaeological heritage from direct damage or indirect impact through ill-considered design and take into account the advice and recommendations of The Heritage & Planning Division and the Underwater Archaeology Unit in the National Monuments Service. • Any proposed works either above or below ground or above or below water, within the vicinity of a site of known archaeological interest shall not be detrimental to the character of the archaeological site or its setting. • If the works result in a change in water levels near or adjacent to recorded monuments or wrecks, which may be water logged, there may be an indirect resultant deterioration of water logged archaeological material and this should be addressed. • The archaeological assessment to include: – National Monuments in the ownership or care of the State or Local Authority – Archaeological and Architectural monuments/sites in the Record of Monuments and Places – Monuments in the Register of Historic Monuments – Zones of Archaeological Potential in Historic Towns – Detail both the terrestrial and underwater archaeological heritage of the area including Underwater Archaeological Heritage, including Historic Wrecks – Previously unknown and unrecorded archaeological sites (including subsurface elements with no visible surface remains and potential sites underwater in rivers, lakes or the sea, that can include wharves, jetties, quays, piers, fish traps, anchorages, bridges, fording points, rockcut steps or sea caves) – Potential sites located in the vicinity of large complexes of site or monuments – Present or former wetlands, unenclosed land, rivers or lakes, or the inter-tidal zone – The Wreck Inventory of Ireland Database, Ports and Harbours Archive, Topographical Files of the National Museum shall be consulted as will relevant historical and local sources.
Department of Public Expenditure and Reform		No response at this time
Department of Housing, Local Government and Heritage[3]		No response at this time

[3] Department name changed 2nd October 2020 from Department of Housing Planning and Local Government

Stakeholders	Responses Received	Summary
Department of Transport, Tourism and Sport		No response at this time
Department of Defence		No response at this time
Department of Enterprise, Trade and Employment		No response at this time
Environment Department		No response at this time
Heritage Department		No response at this time
Planning Department	28/09/2020	General response received
Mayo National Road Design Office		No response at this time
Climate Action Regional Office		No response at this time
Office of Public Works Head Office		No response at this time
An Taisce		No response at this time
Ballina Chamber of Commerce		No response at this time
Birdwatch Ireland		No response at this time
BT Ireland		No response at this time
Bus Eireann		No response at this time
Coillte	28/09/2020	Belleek Coillte site could be impacted if water levels were to rise at this site as a result of this scheme. Team to confirm. Team have confirmed that this is highly unlikely and hydrological and hydraulic modelling will confirm this in time.
Eir		No response at this time, however, can be seen in Three response below.
Enet		No response at this time
ESB		No response at this time, however, can be seen in Three response below.
Fáilte Ireland	04/08/2020 and 30/09/2020	Consider impact of Scheme on Tourism and tourism amenities, infrastructure must be considered in light of natural processes and the potential long-term impacts on the heritage value, and indeed the tourism value of the area. Keep informed of project progression. Use Fáilte Ireland Guidance on any project that may impact tourism.
Gas Networks Ireland	13/07/2020	Gas networks present within scheme area
Geological Survey of Ireland	23/07/2020	There are no County Geological Sites (CGS); in the vicinity of the proposed scheme. Regionally important aquifer - karstified underlies area of scheme, groundwater vulnerability is variable. The GSI recommend the use of the groundwater viewer to identify areas of high to extreme vulnerability. Aggregate Potential can be seen via the Aggregate potential map viewer, use this to ensure that natural resources used in the scheme are from properly licensed facilities. GSI recommend that geohazards and flooding be taken into account when developing areas where these risks are prevalent. GSI request of the project goes ahead that a report with all SI works data be shared with them.
Inland Fisheries Ireland	29/07/2020	Strong emphasis given to natural flood management techniques. An assessment of the impact of the existing drainage schemes should be carried out to enhance natural flood management. Access to the Moy must remain in place for anglers as the Moy is a popular salmon angling spot. In-stream works should be avoided where necessary. Invasive Species must not be spread as a result of works of the project. If invasive species are found within the site an invasive species management plan should be produced and followed. Due to the River Moy being a migratory route for salmon, sea trout, eels and lamprey - any impacts on hydrology on fish passage as a result of the flood scheme should be assessed. Follow “Requirements for the Protection of Fisheries Habitat during Construction and Development work.” Ensure that the impact the scheme may have on a riparian zone is adequately assessed as many important species of invertebrate, essential to optimal salmonid production rely on this habitat.

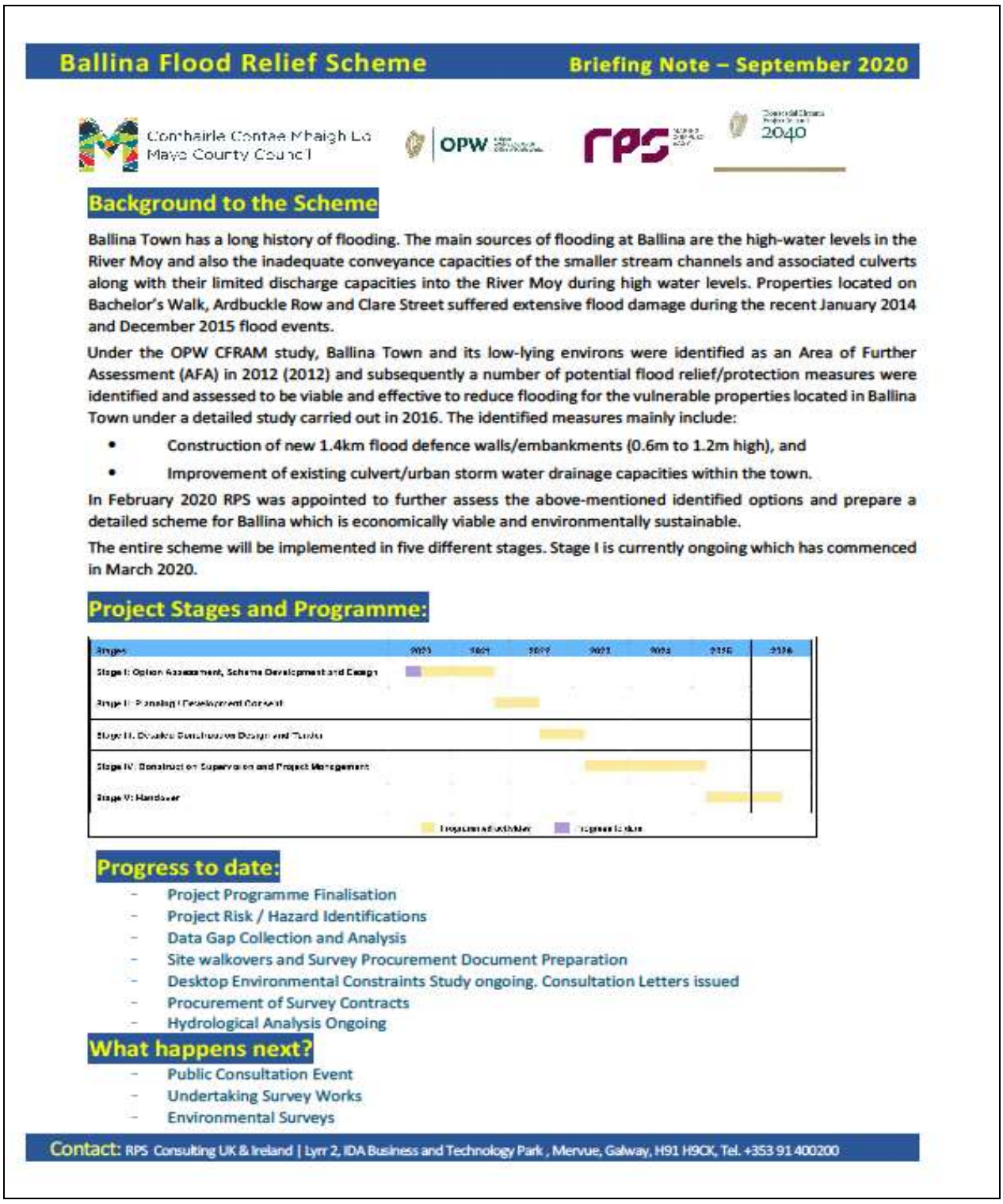
Stakeholders	Responses Received	Summary
Irish Farmers Association (IFA) Galway & Mayo Office		No response at this time
Irish Rail	22/07/2020	Railway in Ballina is situated some distance from the River Moy (≥160m) and is somewhat elevated from the areas that are a high flood risk alongside the river. Irish Rail are to be consulted again when more details on the proposed scheme are available
Irish Water	21/09/2020	Correspondence address updated.
Local Authority Waters and Communities Office		No response at this time
Mayo Local Enterprise Office	10/07/2020	No feedback
National Monument Service		No response at this time
National Museum of Ireland		No response at this time
Northern & Western Regional Assembly		No response at this time
Public Lighting		No response at this time
Road Safety Authority	01/10/2020	General response received
Royal Irish Academy; Committee for Historical Studies		No response at this time
Siro	10/07/2020	No network in area
Teagasc		No response at this time
The Arts Council		No response at this time
The Heritage Council		No response at this time
Three	10/07/2020	Requested GIS files that have been sent. Received notification that there are no Three Ireland Sites that could be affected, however, there is an ESB mast that also hosts Eir and Vodafone services within the scheme area.
TII	22/07/2020	TII Response - not in position to respond at this time
Virgin Media	02/10/2020	Existing Virgin Media underground services adjacent to and in the above location. A Virgin Media Plant Protection Officer would need be present during the work. Virgin Media have sent an AutoCad layout of the services network.
Vodafone		No response at this time, however, can be seen in Three response above.
Mayo County Council - Sanitary & Water Section		No response at this time
Ballina Angling Club		Undeliverable at multiple emails
Moy Boat Club		No response at this time
Bord Gáis		No response at this time
Bord na Mona	23/10/2020	Interest due to ongoing windfarm development at Oweninny Bog, a section of the haul route passes through the scheme area. Information to alterations to levels or structures within the scheme area could cumulatively impact this project.
River Moy Trust	16/07/2020	No feedback to the project at this time.
Irish Creamery Milk Suppliers Association (ICMSA)		No response at this time
Irish Environmental Network		No response at this time
Landscape Alliance Ireland		No response at this time
Marine Institute		No response at this time
Sustainable Water Network Ireland (SWAN)	16/07/2020	No feedback
The National Water Forum (An Forám Uisce)	11/08/2020 and 12/08/2020	No feedback
Water Policy Advisory Committee	01/10/2020	No feedback
Met Eireann	22/09/2020	No feedback

Stakeholders	Responses Received	Summary
St.Muredach's Cathedral		No response at this time
Bishop of Killala		No response at this time
Ballina Development Community Group		No response at this time
Councillor Mark Duffy		No response at this time

Additional meetings will be held with some of the stakeholders from the list above to discuss specific aspects of the project.

Project newsletters are being created over the lifespan of the project and can be found at the following website: https://www.floodinfo.ie/frs/en/ballina/news/

Also, a presentation to Mayo County Councillors was held on the 16th of September 2020 and further presentations will also be made at various stages as the project progresses. The briefing note distributed to the Mayo County Councillors is shown in **Figure 3-1** below.



Ballina Flood Relief Scheme — Briefing Note – September 2020

Comhairle Contae Mhaigh Eo
Mayo County Council

OPW

RPS

2040

Background to the Scheme

Ballina Town has a long history of flooding. The main sources of flooding at Ballina are the high-water levels in the River Moy and also the inadequate conveyance capacities of the smaller stream channels and associated culverts along with their limited discharge capacities into the River Moy during high water levels. Properties located on Bachelor's Walk, Ardbuckle Row and Clare Street suffered extensive flood damage during the recent January 2014 and December 2015 flood events.

Under the OPW CFRAM study, Ballina Town and its low-lying environs were identified as an Area of Further Assessment (AFA) in 2012 (2012) and subsequently a number of potential flood relief/protection measures were identified and assessed to be viable and effective to reduce flooding for the vulnerable properties located in Ballina Town under a detailed study carried out in 2016. The identified measures mainly include:

- Construction of new 1.4km flood defence walls/embankments (0.6m to 1.2m high), and
- Improvement of existing culvert/urban storm water drainage capacities within the town.

In February 2020 RPS was appointed to further assess the above-mentioned identified options and prepare a detailed scheme for Ballina which is economically viable and environmentally sustainable.

The entire scheme will be implemented in five different stages. Stage I is currently ongoing which has commenced in March 2020.

Project Stages and Programme:

Progress to date:

- Project Programme Finalisation
- Project Risk / Hazard Identifications
- Data Gap Collection and Analysis
- Site walkovers and Survey Procurement Document Preparation
- Desktop Environmental Constraints Study ongoing. Consultation Letters issued
- Procurement of Survey Contracts
- Hydrological Analysis Ongoing

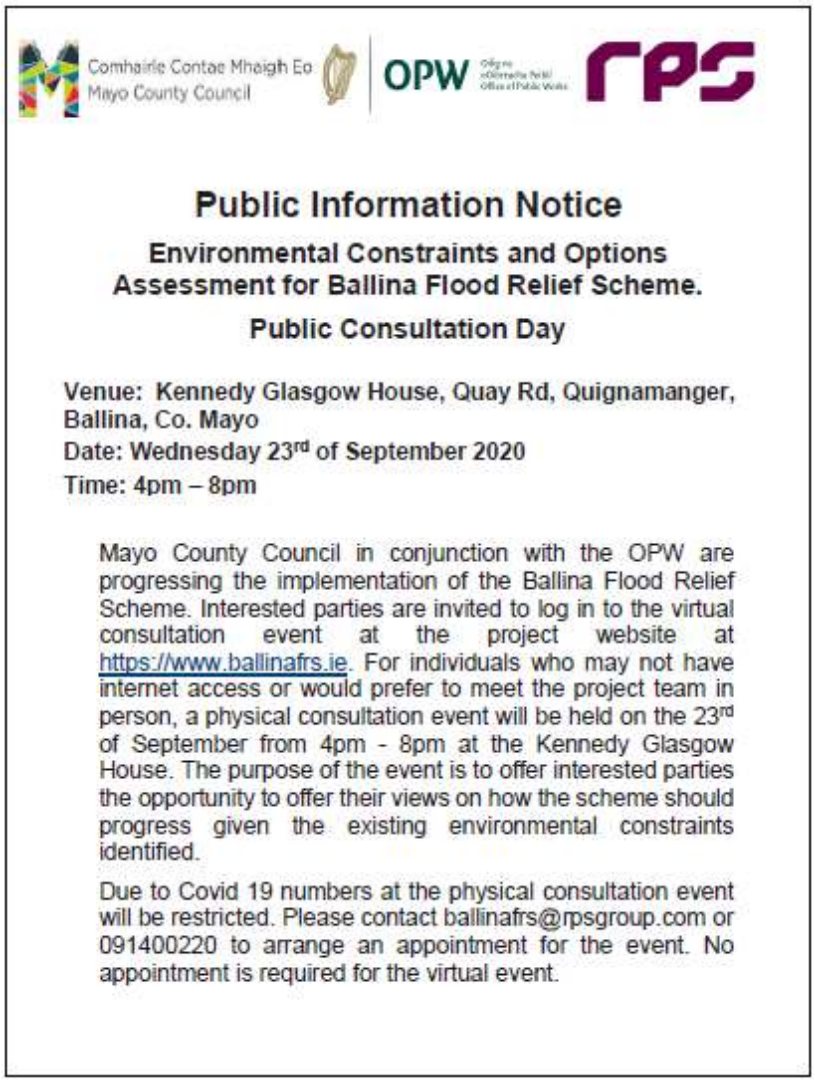
What happens next?

- Public Consultation Event
- Undertaking Survey Works
- Environmental Surveys

Contact: RPS Consulting UK & Ireland | Lyrr 2, IDA Business and Technology Park , Mervue, Galway, H91 H9OX, Tel. +353 91 400200

Figure 3-1: Notice issued to Councillors Public Consultation

Public consultation days will be held at various stages of the project. The first public consultation day was held on the 23rd of September 2020 from 4pm-8pm in the Kennedy Glasgow House, Quignamanger, Ballina, Co. Mayo. The event was advertised in the Western People, the principal paper for the locality in the week leading up to the consultation, from the 14th to the 20th. A copy of the consultation notice has been included in **Figure 3-2** below.



Comhairle Contae Mhaigh Eo
Mayo County Council

OPW

rps

Public Information Notice

Environmental Constraints and Options Assessment for Ballina Flood Relief Scheme.

Public Consultation Day

Venue: Kennedy Glasgow House, Quay Rd, Quignamanger, Ballina, Co. Mayo

Date: Wednesday 23rd of September 2020

Time: 4pm – 8pm

Mayo County Council in conjunction with the OPW are progressing the implementation of the Ballina Flood Relief Scheme. Interested parties are invited to log in to the virtual consultation event at the project website at https://www.ballinafrs.ie. For individuals who may not have internet access or would prefer to meet the project team in person, a physical consultation event will be held on the 23rd of September from 4pm - 8pm at the Kennedy Glasgow House. The purpose of the event is to offer interested parties the opportunity to offer their views on how the scheme should progress given the existing environmental constraints identified.

Due to Covid 19 numbers at the physical consultation event will be restricted. Please contact ballinafrs@rpsgroup.com or 091400220 to arrange an appointment for the event. No appointment is required for the virtual event.

Figure 3-2: Public Information Notice 23rd September 2020

The format of the event was centred around the presentation of information boards which displayed the watercourses, designated sites, archaeological and architectural sites within the scheme area and the preferred options following the CFRAMs study previously undertaken.

Attendees were requested to fill out an attendance log and were invited to fill out a comments sheet setting out their views and concerns regarding the project. A Covid-19 contact tracing log of attendees was also taken in accordance with Government guidelines. Responses from these forms have been consolidated and can be found in **Appendix D.**

A total of 16 people attended the Public Consultation Day and to date four comments forms have been received via the website and one via a phone call. A summary of the comments received are as follows;

- Need to ensure the project is adapted to climate change and ensure there is no impact on the local salmon population and their food sources.
- Consider reuse of the existing stone wall as cladding on any new wall.
- The project team should make sure to use the information that locals have provided in the past.
- Concerns were expressed over the timeline of the project being too long and asking for remediation works to be completed on the existing wall along Bachelor's Walk in the meantime as water is coming through the wall during high tides.

- It was noted that the Pier at Ballina house is an obstruction to water flow, around the headland (across from the Bunree inlet) there is a dock that also causes restriction to the flow of water, Bushes along both banks of the river need to be cut bank between the town and the Bunree River inlet.

Overall comments were positive that the scheme is moving forward and the main area of concern is the timeline of the project being too lengthy and the lack of new information.

4 POPULATION AND HUMAN HEALTH

4.1 Introduction

This section identifies the constraints of the proposed scheme in relation to population and human health considerations. A desktop study was conducted which included a review Mayo County Development Plan 2014-2020[4], Ballina and Environs Development Plan (2009-2015)[5], a review of aerial photography, Ordnance Survey and Discovery Series mapping to identify the potential constraints.

4.2 Population Profile and Settlement Patterns

The Mayo County Development Plan 2014-2020 classifies Ballina as part of the Castlebar and Ballina linked hub. As a joint Hub, Ballina is projected to grow strongly under the National Spatial Strategy and it has demonstrated this strong growth from 2011-2016 with an increase in the Town's population. Ballina can be subdivided into three key areas: Ballina Urban (the core of the town), Ballina Inner Rural (the area directly around the core of the town where significant population has begun to grow and expand) and the Rural Area where a number of estates have begun to appear and where the town has begun to stretch out beyond the town. The town supports a number of high-profile industries. Census 2016 population figures[6] indicate a population of 10,171 within the overarching settlement of Ballina, compared to a population of 11,086 in 2011. The area covered by the census boundary for Ballina is significantly different between the years 2011 and 2016. In 2016 the boundary area is smaller and this corresponds to the population decrease. In Mayo overall, the 2016 Census results indicated that the Mayo population had decreased by 131 people from 2011 to 2016, see **Table 4-1**.

Table 4-1: Population of Ballina Electoral Division

Census 2016	Mayo County 2016	Settlement of Ballina 2016	Census 2011	Mayo County 2011	Settlement of Ballina 2011
Population	130, 507	10,171	Population	130,638	11,086
Male	65,047	4,946	Male	65,420	5,463
Female	65,460	5,225	Female	65,218	5,623
Ireland's Seasonally Adjusted Annual Average Standardised Unemployment Rate (CSO, June 2017)	6.3%		Ireland's Seasonally Adjusted Annual Average Standardised Unemployment Rate (CSO, June 2017)	14.6%	

The scheme area is predominantly composed of residential and commercial buildings. As identified in the CFRAM study 151 residential buildings are at risk of flooding during the design flood event (1% Fluvial and 0.5% Tidal), 24 business properties are at risk and one highly vulnerable property is at risk. It is possible that the number of affected properties will increase or decrease upon the completion of updated Hydrological and Hydraulic Modelling for the scheme. Consideration of future climate change scenarios will likely increase the number of properties at risk.

[4] http://www.mayococo.ie/en/Planning/MayoCountyDevelopmentPlan2014-2020/Document1,29000,en.pdf

[5] http://www.mayococo.ie/en/Planning/DevelopmentPlansLocalAreaPlansandStrategies/TownCouncilandEnvironsDevelopmentPlans/Ballna/Document1,28976,en.pdf

[6] CSO SAP Maps (http://census.cso.ie/sapmap/) (Accessed on 29/04/20)

There are five areas of flooding in the town centre as follows:

- The right bank of the River Moy between the Salmon Weir and the Upper Bridge;
- On the right bank between the Upper and Lower Bridges, with the cathedral and tourist information office at risk;
- Downstream of the Lower Bridge on the right bank there is flooding of Clare Street;
- On the left bank around Bachelors Walk, Arbuckle Row, Rope Walk, Moy Court and Ashpool; and
- On the left bank adjacent to the Salmon weir.

Historical flood events are discussed in greater detail in **Section 7.2.6** and the locations of historical flood events are shown in **Figure 7-3.**

4.3 Properties

The property types within the scheme area were identified through the An Post Geodirectory[7] database. Residential development is concentrated throughout all sections of the scheme area with clusters of Commercial properties, mainly concentrated in the town. There is a total of 5,280 properties within the scheme area, see **Figure 4-1**: below. 4,562 of these properties are Residential, 469 are Commercial, 140 properties as being listed both Commercial and Residential and 109 property uses are Unknown.

[7] https://www.geodirectory.ie/

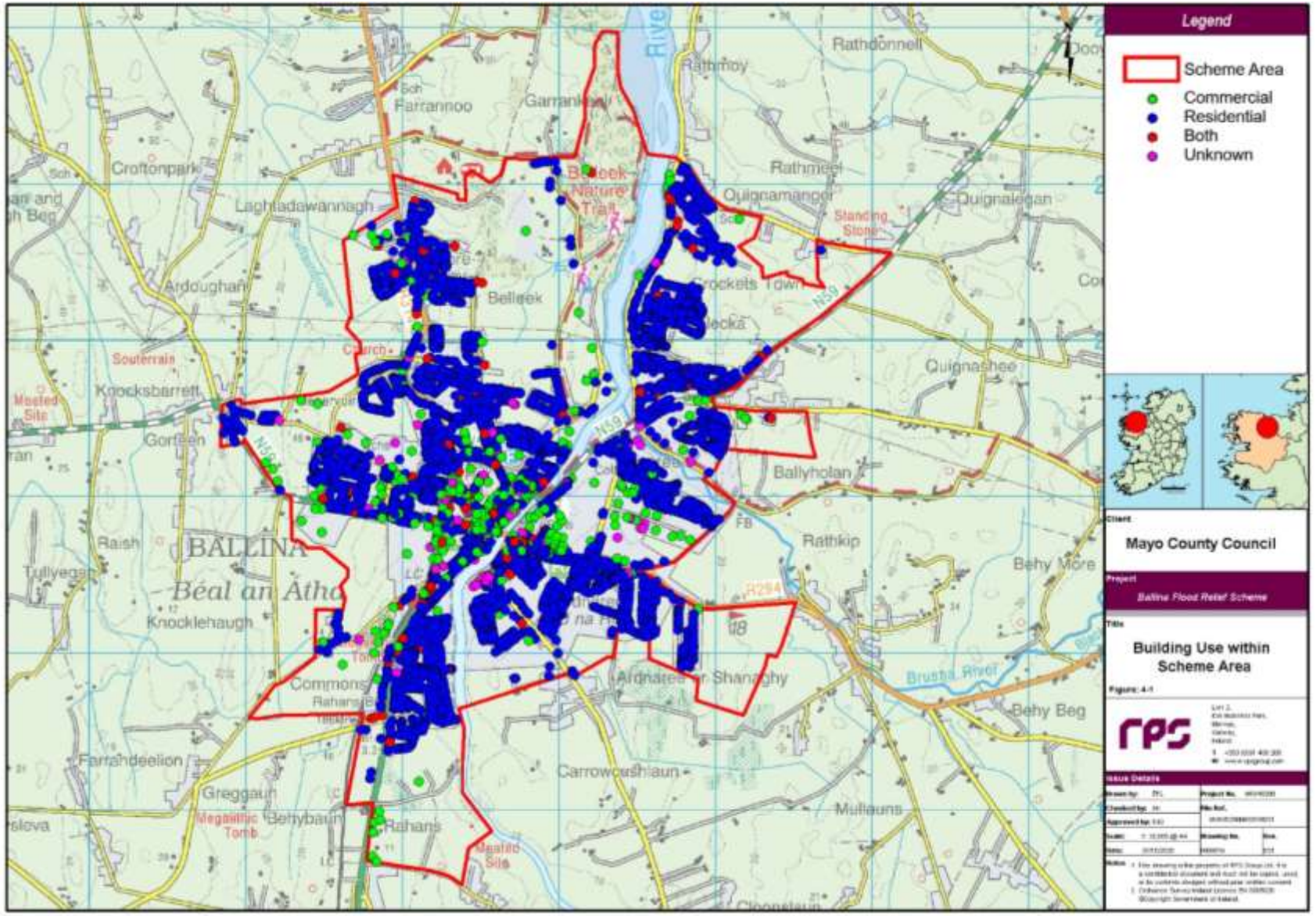


Figure 4-1: Property Use within Scheme Area (Property information from Geodirectory)

4.4 Land use and zoning

4.4.1 Land Use Zoning

The landuse zoning within the scheme area is provided in **Figure 4-2** and the zoning proximal to the River Moy is provided in **Figure 4-3.** It is not expected that there will be any changes to land use zoning within the scheme area, due to the largely residential and commercial town centre of Ballina, with industrial areas in the outskirts of the town.

Of note however is the Recreational/Leisure zoned lands adjacent to the River Moy. Future FRS proposals should be cognisant of these lands to ensure access to these areas is maintained.

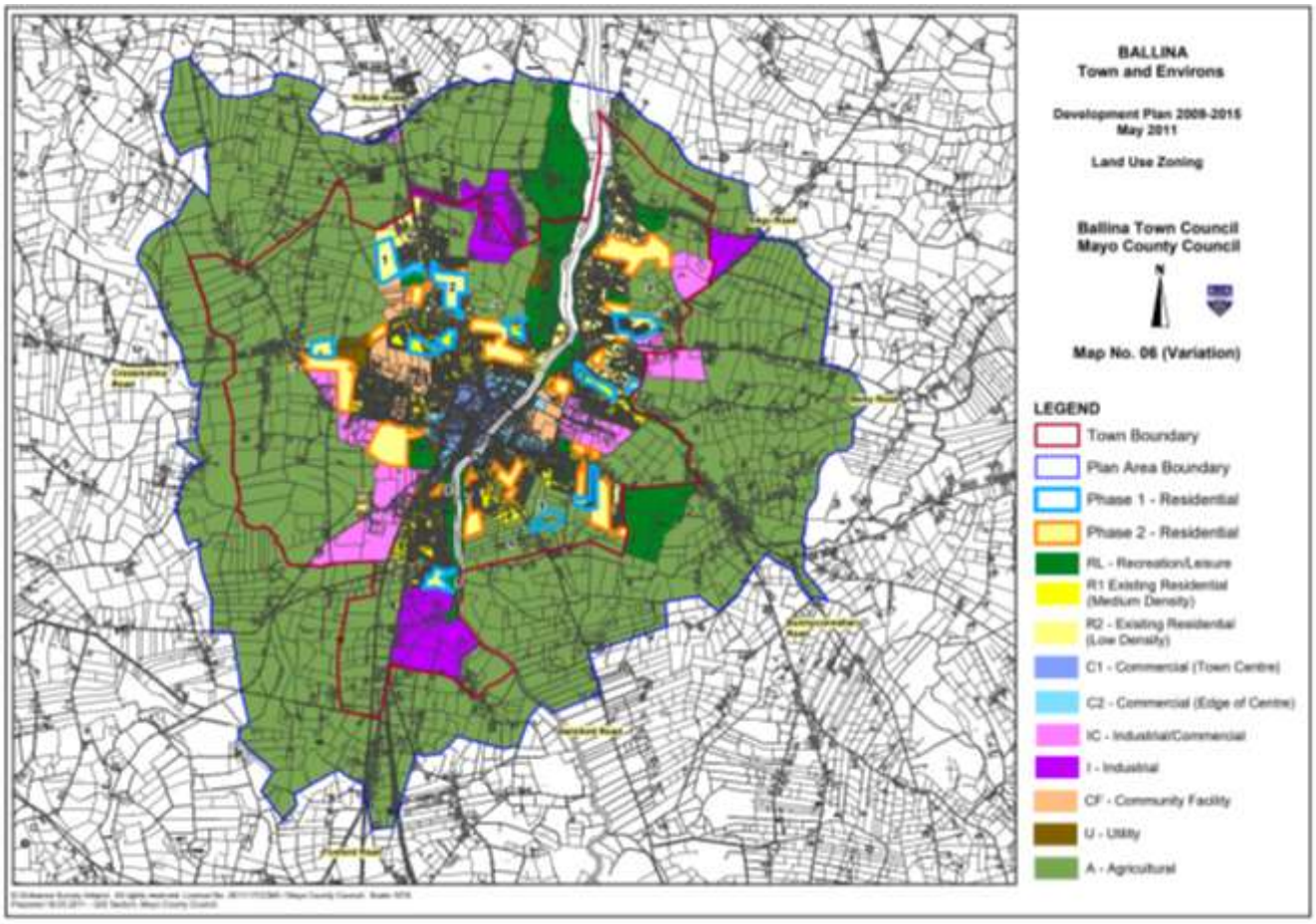


Figure 4-2: Land Use Zoning in Ballina[8]

[8] https://www.mayo.ie/getmedia/1311e768-cc9a-4d33-8496-60101e6c32d1/2-Document2,28976,en.pdf accessed: 23/11/2020

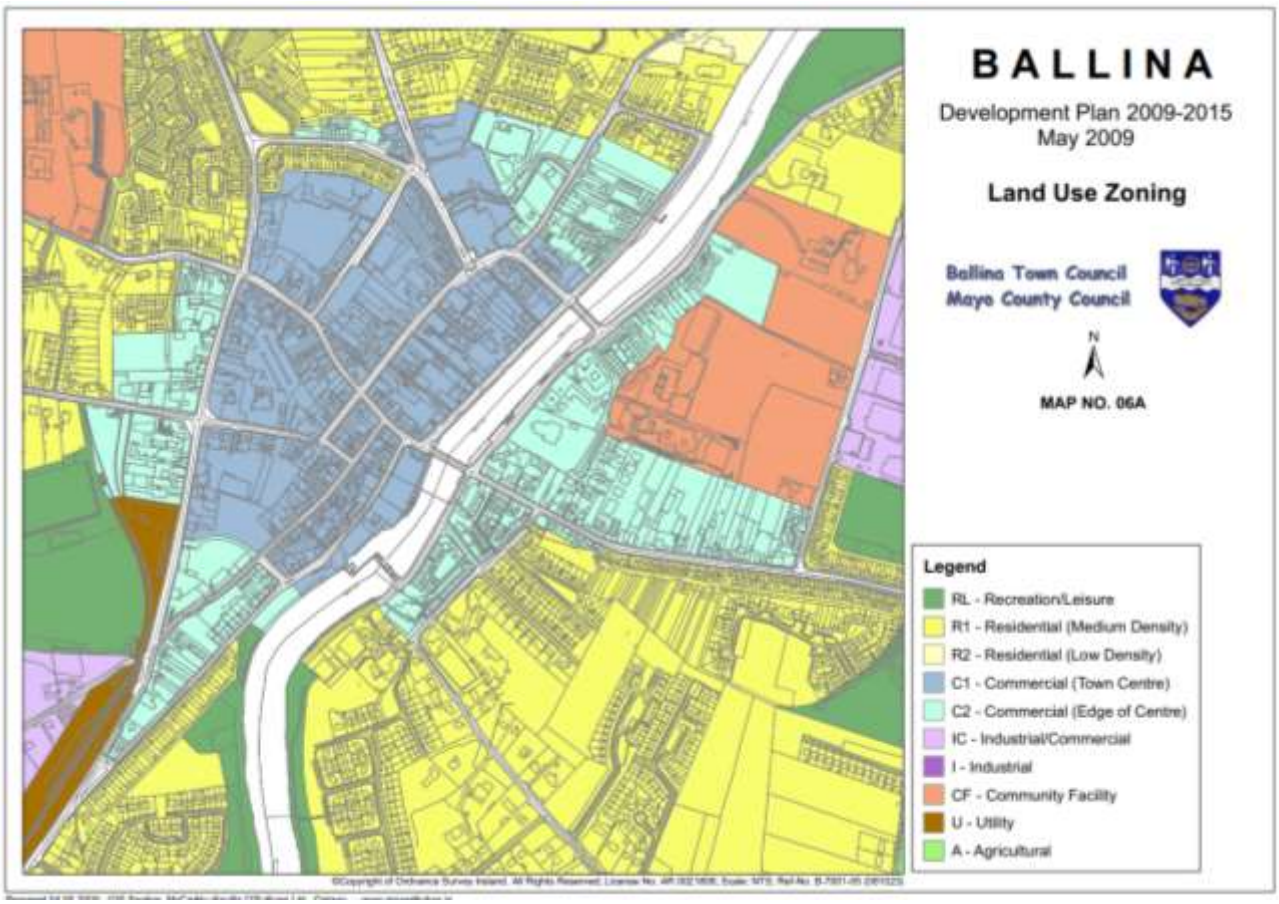


Figure 4-3: Land Use Zoning in Ballina Town centre [9]

4.4.2 Land Cover

The scheme area is characterised by a variety of landcover types which were extracted from the CORINE 2018 dataset. The landcover for the scheme area is dominated by discontinuous urban fabric (CORINE 2018 Code: 112). Agricultural areas (231) are present in patches along the boundary of the scheme area. The centre of the scheme area consists of continuous urban fabric (111), the south east of the scheme area intersects an area of sport and leisure facilities (142), from the north to the centre of the scheme area there is a section of watercourse (522) and the north west of the scheme area intersects an area of mixed forest (313). The CORINE 2018 landcover map for the scheme area is provided in **Figure 4-4.**

[9] https://www.mayo.ie/getmedia/27ce23f3-e79f-4560-a58c-9cc4de394400/3-Document3,28976,en.pdf accessed: 23/11/2020

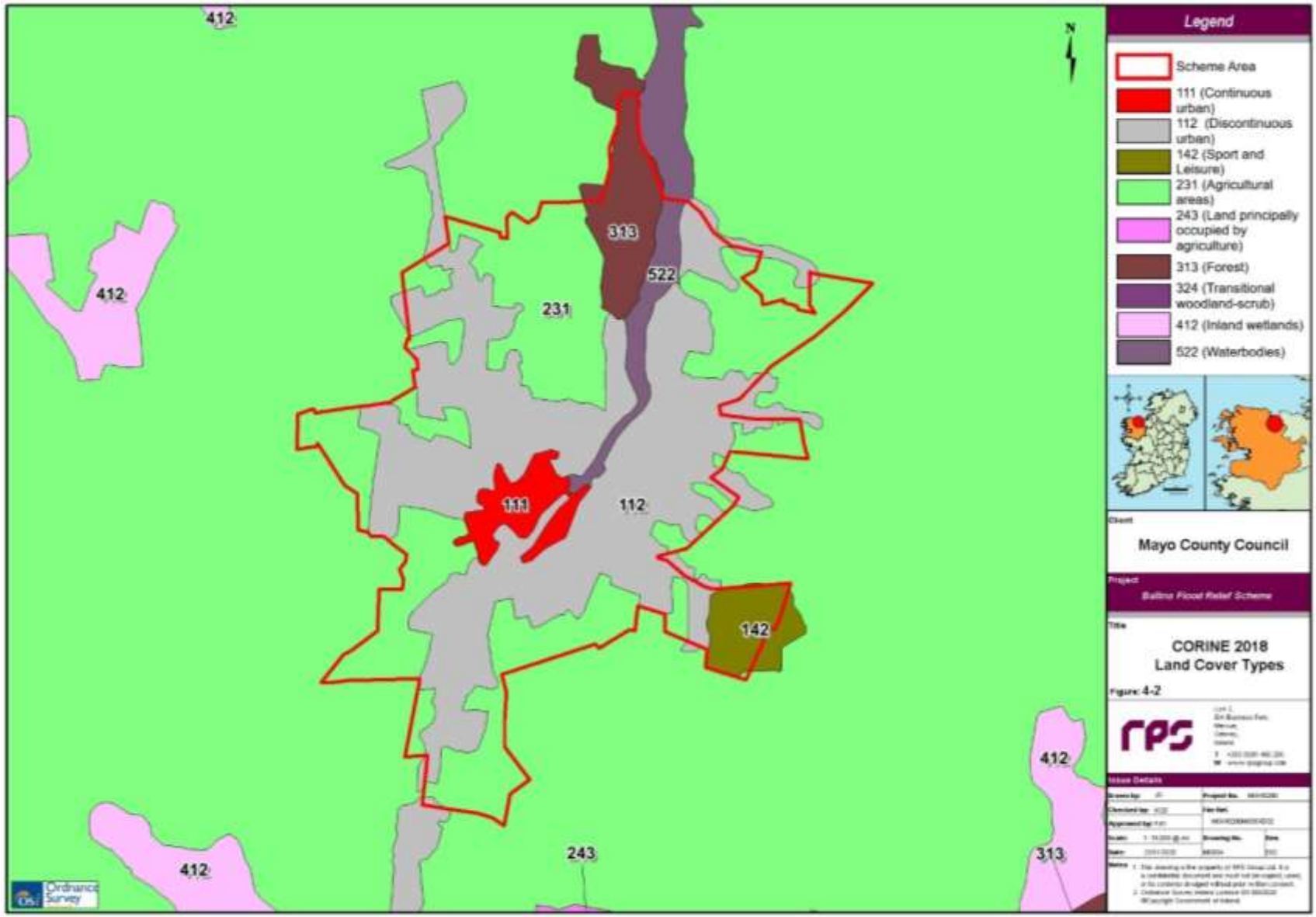


Figure 4-4: CORINE 2018 Land Cover Types

4.5 Tourism and Recreation Activities

The scheme area, notably the River Moy, is popular for recreational activities. Ballina itself is a renowned area for recreational fishing. The Ballina area is reputedly known as one of the most successful Salmon fisheries in Europe. The Moy Fishery is just over 2½ km in length and catches of over 5,000 Salmon have been recorded for one season. There is an extremely productive beat known as the Ridge Pool within the Moy Fishery[10].

Stand up paddle boarding and canoeing are also popular recreational activities in Ballina with a local triathlon club also popular amongst sports people.

It is an objective of Mayo County Council is to improve and encourage tourism in the Ballina area. The Ballina Town and Environs Development Plan (2009-2015) outlines the following policy on tourism within the town:

There are four policies listed in the plan. These include the following:

- It is the policy of the Ballina Town Council and Mayo County Council to support the development of tourism in Ballina and, in particular to develop the role of Ballina as a gateway to the amenities and tourist attractions of northern County Mayo and of western County Sligo;
- It is the policy of the Councils to protect and to develop the fishery on the River Moy, to protect the river from pollution or other interference that could compromise that fishery;
- It is the policy of the Council to work with other statutory, voluntary bodies and commercial interests in the town with a role to play in the tourist sector or developing the capacity of the town to grow its tourist market and develop Ballina as a tourist location. The Council shall seek to develop a working group on tourism involving a wide range of interests so as to develop a local action plan on tourism for the town; and
- It is the Councils' policy to use the powers available to it to promote and encourage the development of tourism in the area and to ensure that the value of the tourist industry and the wealth of underdeveloped attractions in the area bring about the maximum benefit for the town while developing sustainable tourist activities.

There are eight objectives relating to tourism also listed in the plan. These include the following;

- TM1 To protect and develop the Moy Fishery and to facilitate its development as an angling, amenity and tourist resource;
- TM2 To encourage the development of tourist related products at The Quay/Crocketstown;
- TM3 To facilitate the development of tourist facilities and tourist attractions within the town, particularly the development of all-weather attractions;
- TM4 To develop the role of Ballina as a gateway to the tourist attractions of the surrounding hinterland;
- TM5 It is an objective of the Councils to co-operate with statutory and voluntary tourism organisations in securing sustainable tourist developments within the town;
- TM6 It is an objective of the Councils to use their powers to promote Ballina as a tourist centre;
- TM7 To encourage a high quality of new development and maintenance of the existing built environment to make the town more visually attractive to visitors; and
- TM8 To improve signage in and around the town to assist the tourist market in the town.

Ballina is well located to act as gateway to the wild and scenic coastal routes and it also has the potential to become a commercial centre and a heritage town.

[10] https://fishinginireland.info/salmon/northwest/river_moy_system/moy_fishery/

4.6 Human Health

The Mayo County Development Plan 2014-2020 outlines the following objective on health and community facilities within the county:

- HH-01: It is an objective of the Council to support the provision of improved health services on suitably zoned lands in the Linked Hub, Key Towns and in Other Towns and Villages, on lands in the town centres or immediately adjacent to town centres (based on the sequential approach) which are serviced (water service, footpaths, lighting etc.).

The Ballina Town and Environs Development Plan (2009-2015) outlines the following policy on health and community facilities within the town;

- To seek the provision of the best possible quality of health infrastructure within the town.

Ballina's main health facility is St. Joseph's, located on Lord Edward Street. This includes a district hospital, outpatient's clinic, training centre, psychiatric care and ambulance base. While these health facilities are within the scheme area, they are not identified in CFRAMS mapping as being affected by flood events at any of the three flood event probabilities (1 in 10yr, 1 in 100yr, 1 in 1000yr).

The area profile for County Mayo based on the Census 2016 results indicated that 86.2% of the total people in Co. Mayo stated they were in very good or good health. In Co. Mayo 1.7% said they were in bad or very bad health.

The Ballina FRS will not result in any risk to health, it will ensure future protection of properties and therefore improve quality of life to those regularly impacted by the current flood events.

4.6.1 Built Environment

There are nine primary schools, three civic buildings, three post primary schools, a fire station and two playgrounds within the scheme area. Facilities, in close proximity to the River Moy are Ballina community centre, Ballina sports centre and Sean Duffy community centre.

4.6.2 Noise and Vibration

Noise is recognised as affecting health and wellbeing. Exposure to noise is recognised as being both an environmental pressure to wildlife as well as human beings and can affect human health and general well-being by causing stress, anxiety and disruption of activities such as sleep.

The National Road's Authority's document *Guidelines for the Treatment of Noise and Vibration in National Road Projects* outlines recommended steps in the process of constraints assessment. These guidelines have been followed for this assessment. Noise and vibration are discussed in more detail in **Section 8 Air, Climate and Noise.**

The residential properties in proximity to the proposed scheme are identified as noise sensitive receptors is detailed below:

- Residential receptors 151no.
- Amenity Areas, public facilities, public spaces etc 13no.

Geodirectory property types were selected using the above criteria largely due to the residential element (i.e. other building types such as Commercial and Unknown have been excluded as they are not deemed to be noise sensitive). Amenity areas and public facilities have also been included as additional receptors where they do not appear in Geodirectory data, including Ballina Youthreach, Ballina Library, Moyne College, Sonas Nursing Home Riverview, Riverside Nursing Home, St Augustine's Community Nursing Unit, Ballina District Hospital, Calvary Church Ballina, St. Muredach's Catholic Cathedral, Ballina Methodist Church, and public parks including Belleek Woods, Tom Ruane Park and the River Moy riverside walks.

4.6.3 Air Quality

Air pollution is also recognised as a significant public health burden in terms of illness and premature death associated with air pollution generally. Continued use of solid fossil fuels for domestic usage and

the increasing vehicle fleet leading to emissions of particulate matter and nitrous oxides are significant issues. It should be noted that the National Clean Air Strategy is currently being prepared by Department of the Environment, Climate and Communications, with the intention of developing the necessary policies and measures to comply with new and emerging EU legislation, in addition to supporting climate change mitigation.

The constraints of the project on air quality within the scheme area is discussed in this section. The TII guidance document, '*Guidance for the treatment of Air Quality* during *the Planning and Construction of National Road Schemes'* (NRA 2011) has been followed in this process and discussed in greater detail in **Section 8.**

The EPA releases an annual report titled '*Air quality in Ireland*'. The most recent revision of the report provides a synopsis of air quality in the country during 2019. The report was published in May 2020. The air quality for the scheme area is classified as "*Good*".

The EPA has published a national map of radon risk[11] potential, classified on a 10km grid square basis. The FRS scheme area falls within a grid square which is classed as having an estimated >20% of homes exceed the reference level of 200 becquerel per cubic metre (Bq/m3).

4.7 Summary of Population and Human Health Constraints

The population and human health constraints in the region, such as the mainland uses within the scheme area, the population or employment rates, will not for the most part be affected by the proposed flood relief works. Socio-economic and community facilities have been identified in the scheme area. Consideration of the locations of these facilities will be taken into account as part of the development of flood relief options.

Properties represent a constraint which should, where practicable, be avoided during the development of design and scheduling of works. Residential houses generally represent a considerable constraint and avoidance of residential properties, where possible, is generally considered best. Commercial properties also represent a considerable constraint and in most cases are best avoided. However, extensive properties may be able to absorb a degree of land take and ultimately benefit from the improved flood relief infrastructure.

It is not expected that there will be any changes to land use zoning within the scheme area, due to the largely residential and commercial town centre of Ballina. However, future FRS proposals should be cognisant of the Recreational/ Leisure zoned lands adjacent to the River Moy to ensure access to these areas is maintained. Access to the River for recreational activities and anglers will all need to be maintained

There is potential for air and noise impacts during the construction stage, refer to **Section 8**.

As the proposed scheme will take place adjacent to watercourses, such as the River Moy and numerous drainage channels, in the absence of best practice construction measures there is potential for impacts to water quality to occur. Overall, the proposed scheme will have a positive impact by protecting properties and the health and well-being of the population of Ballina as it will reduce significant negative impacts resulting from severe flooding events within the town.

[11] https://www.epa.ie/radiation/radonmap/ (Accessed on 30/04/20)

5 BIODIVERSITY

5.1 Introduction

This section provides an overview of the ecological (including terrestrial and aquatic) constraints within the scheme area. The overall aim was to identify areas of ecological significance within the scheme area which may form a constraint to the design and construction of the flood relief scheme.

5.2 Methodology

The methodology comprised a detailed desk study assessment, walkover surveys and consultation with key stakeholders (including the NPWS, IFI, Birdwatch Ireland etc.). These elements are used to identify, describe and map areas of known or potential ecological value. The material sources consulted as part of the desk study are as follows:

- A review of the National Parks & Wildlife Service (NPWS) natural heritage database for designated areas of ecological interest and sites of nature conservation importance within and adjacent to the scheme area (https://www.npws.ie/protected-sites);
- A review of the NPWS rare and threatened species database for records of species of conservation interest within the scheme area;
- Literature review to identify and collate relevant published information on both ecological aspects of the scheme area and relevant ecological studies conducted in other areas, including the following:
  - New Atlas of the British and Irish Flora (CD-ROM);
  - The National Biodiversity Data Centre (NBDC) database (http://maps.biodiversityireland.ie), consulted for records of rare, protected and invasive species for Irish National Grid 10km square, accessed online July 2020;
  - Boundaries for catchments with confirmed or potential Freshwater Pearl Mussel (FPM) *Margaritifera* populations in GIS format available online from the NPWS;
  - Bat Conservation Ireland's website (http://www.batconservationireland.org);
  - Irish Butterflies website (http://www.irishbutterflies.com);
  - Water Framework Directive website (www.wfdireland.ie);
  - 'The Angler's Guide to Game Fishing in the Western Region' Western Regional Fisheries Board, 2003;
  - Botanical Society of Britain & Ireland Distribution Database accessed online May 2020 (https://database.bsbi.org/);
  - GeoHive online mapping (http://map.geohive.ie/mapviewer.html);
  - Department of Housing, Planning, Community and Local Government – online land-use mapping www.myplan.ie/en/index.html;
  - 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;
  - Information on ranges of mobile Qualifying Interest (QI) populations in Volume 1 of NPWS' Status of EU Protected Habitats and Species in Ireland (NPWS, 2019a), and associated digital shapefiles obtained from the NPWS Research Branch;
  - Environmental Protection Agency – water bodies and water quality (www.epa.ie);
  - Environmental Protection Agency Catchments resource (https://www.catchments.ie/maps/);
  - Geological Survey of Ireland – geology, soils and hydrogeology (www.gsi.ie);
  - WFD website (www.wfdireland.ie);
  - Inland Fisheries Ireland (www.fisheriesireland.ie)and (http://wfdfish.ie/);
  - BirdWatch Ireland (https://birdwatchireland.ie/)

- Colhoun K. & Cummins, S. 2013 Birds of Conservation Concern in Ireland 2014-19. Irish Birds 9:523-544
- Any local surveys of flora, fauna and habitat available using the Heritage Councils mapping website (https://heritagemaps.ie/WebApps/HeritageMaps/index.html);
- River Basin Management Plan 2018 – 2021 - https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_full_reportweb.pdf;
- Review of Ordnance Survey maps and of orthophotography.

A review of orthophotography resources of the scheme area was also carried out. The objective of this review was to identify areas of low ecological value, such as urban areas and areas under arable cultivation or under intensive pasture. Conversely, the review of aerial photographs was also used to identify areas of potentially high ecological value such as woodlands and wetlands. Belleek Wood/Park is located within the north west of the scheme area and is of high ecological value. Any sites of potential ecological significance were validated during site walkovers.

5.3 Existing Environment and Key Constraints

5.3.1 Designated Sites of Conservation Importance

The site synopses produced by NPWS are a source of information used when investigating important habitats or species likely to be found within areas that have been officially designated because of their conservation importance.

The main types of designation are:

- Special Area of Conservation (SAC);
- Special Protection Area (SPA);
- Natural Heritage Area (NHA); and
- Proposed Natural Heritage Area (pNHA).

In Ireland, the Natura 2000 network of European sites comprises Special Areas of Conservation (SACs, including candidate SACs), and Special Protection Areas (SPAs, including proposed SPAs). SACs are selected for conservation under the Habitats Directive 92/43/EEC and include habitats listed on Annex I (including priority types which are in danger of disappearance) and Annex II listed species. SPAs are selected for the conservation under the EU Birds Directive 2009/147/EC protecting birds listed on Annex I and other regularly occurring migratory birds and their habitats. The EU Habitats Directive and EU Birds Directive are both transposed into Irish Law through the European Communities (Birds and Natural Habitats) Regulations 2011 (Statutory Instrument No. 477/2011 (2011, as amended).

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) comprise nationally protected sites. NHAs are protected under the Wildlife Amendment Act 2000 (as amended), many of which overlap with European Sites. The pNHAs were published on a non-statutory basis in 1995, but have not since been statutorily proposed or designated, however they do have some protection under schemes such as Rural Environment Protection Scheme (REPS), Agri-Environmental Options Scheme (AEOS) and County Development Plans and Licensing Authorities.

5.3.1.1 Zone of Influence

Determination of the project's Zone of Influence (ZoI) was achieved by assessing the project's requirements and deliverables against the ecological receptors within the project footprint, in addition to ecological receptors that could be connected to and subsequently impacted by the project through abiotic and biotic vectors.

Connectivity is identified via the potential source-pathway-receptor model which identifies the potential impact pathways such as land, air, hydrological, hydrogeological pathways etc. which may support direct or indirect connectivity of the proposed scheme to sensitive receptors including designated sites and / or their qualifying features as a result of the proposed scheme.

The ZoI of the proposed scheme on mobile species (e.g. birds, mammals, and fish), and static species and habitats (e.g. saltmarshes, woodlands, and flora) is considered differently. The range of mobile

species varies considerably, from several metres (e.g. in the case of whorl snails *Vertigo* spp.), to hundreds of kilometres (in the case of migratory wetland birds). Whilst static species and habitats are generally considered to have ZoIs within close proximity of the proposed development, they can be significantly affected at considerable distances from an effect source; for example, where an aquatic habitat or plant is located many kilometres downstream from a pollution source.

Due to the location of European sites within the scheme area, air pollution from construction 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. The potential distance for significant vegetation effects from the source on major construction sites is 25m and 10m from minor construction sites[12]. The principal pollutants of concern which originate from construction plant and machinery are the nitrogen oxides (NOx), in terms of impact on sensitive ecosystems. Nitrogen oxides (NOx) may have a positive or negative impact by acting as a fertiliser or a phytotoxicant. Effects are mainly on vegetation growth, photosynthesis, and nitrogen assimilation/metabolism. Due to the largely urban scheme area, construction sites will be limited in size and the amount of plant and machinery that can be used at any one time will be limited. Therefore, potential impacts from air pollution will be to sensitive ecological receptors within 200m (NRA, 2011) of the works.

Hydrological linkages between the scheme area and protected sites can occur over significant distances; however, any effect will be site specific depending on the receiving water environment, nature of the linkage and consequent nature of the potential impact. In this case the ZoI identified extends to the Moy and Killala Bay Water Framework Directive (WFD) Catchment (Catchment ID:34), and sensitive receptors downstream in transitional waters and marine environment including the Moy Estuary and Killala Bay.

Hydrogeological linkages between a proposed scheme area and European sites (and their QIs/SCIs) are highly variable based on the characteristics of the groundwater body, construction methodologies, operational practices, and the presence of groundwater dependant habitats and species. As a precautionary measure, a reasonable worst-case ZoI for water pollution from the scheme area in this instance is considered to comprise the entirety of each groundwater body the scheme area and study area overlies.

5.3.2 Designated Sites of Within the ZoI

Connectivity between the designated sites and the scheme area has been reviewed (refer to **Table B-1** in **Appendix B**).

A total of 12 European sites and 24 NHA/pNHA sites lie within the ZoI of the proposed scheme, see **Figure 5-1** and **Figure 5-2.** There are no Nature Reserves within the scheme area. Killala Bay/Moy Estuary Ramsar site (No. 843) is located downstream of the scheme area in Killala Bay.

There is one Nature Reserve located within the ZoI, this is the Owenboy Nature Reserve, this area is utilised by Greenland White-fronted Geese and housing a rare species of moss.

[12] NRA's '*Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*' (2011)

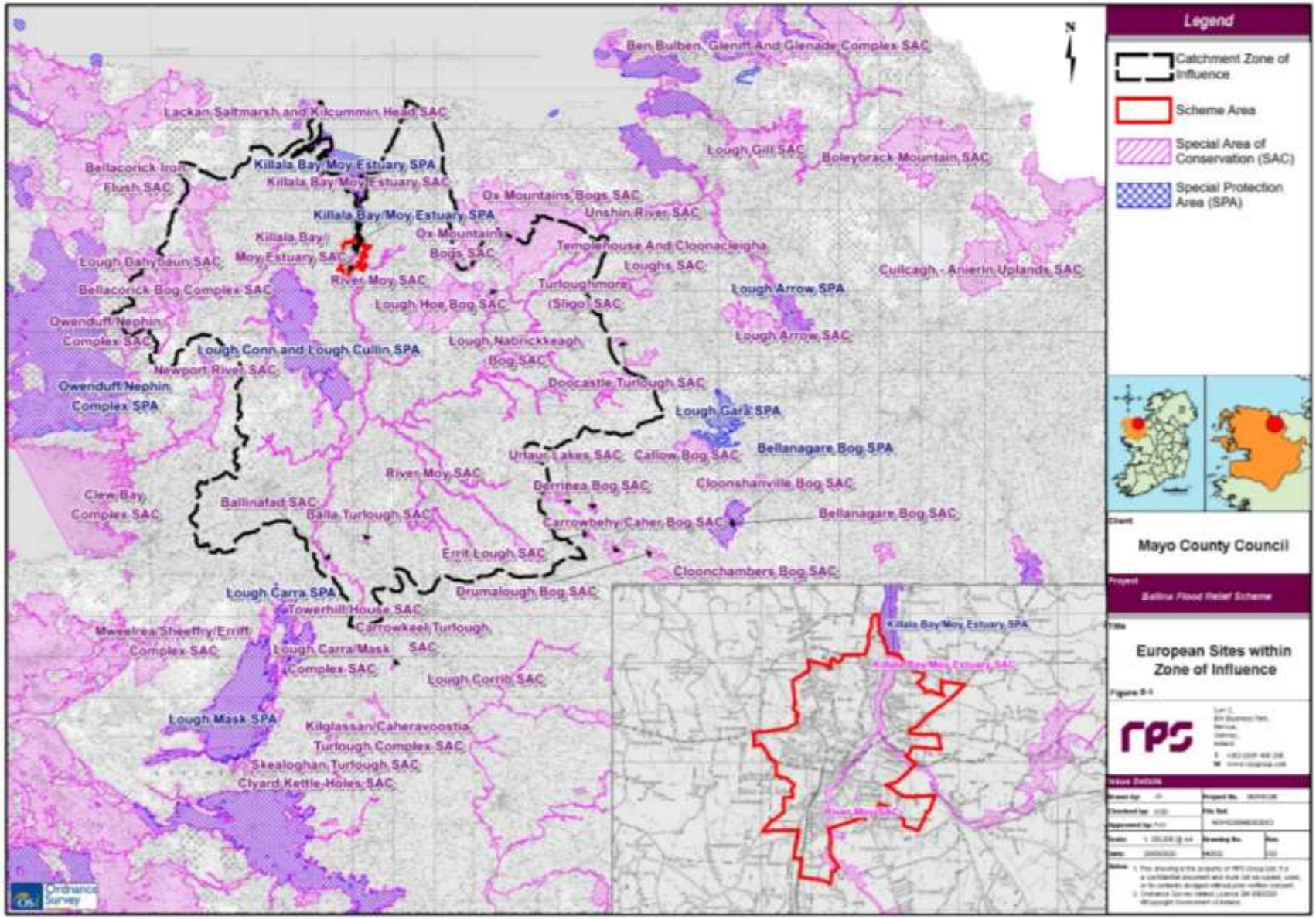


Figure 5-1: European Designated Sites (SACs and SPAs) within the ZoI

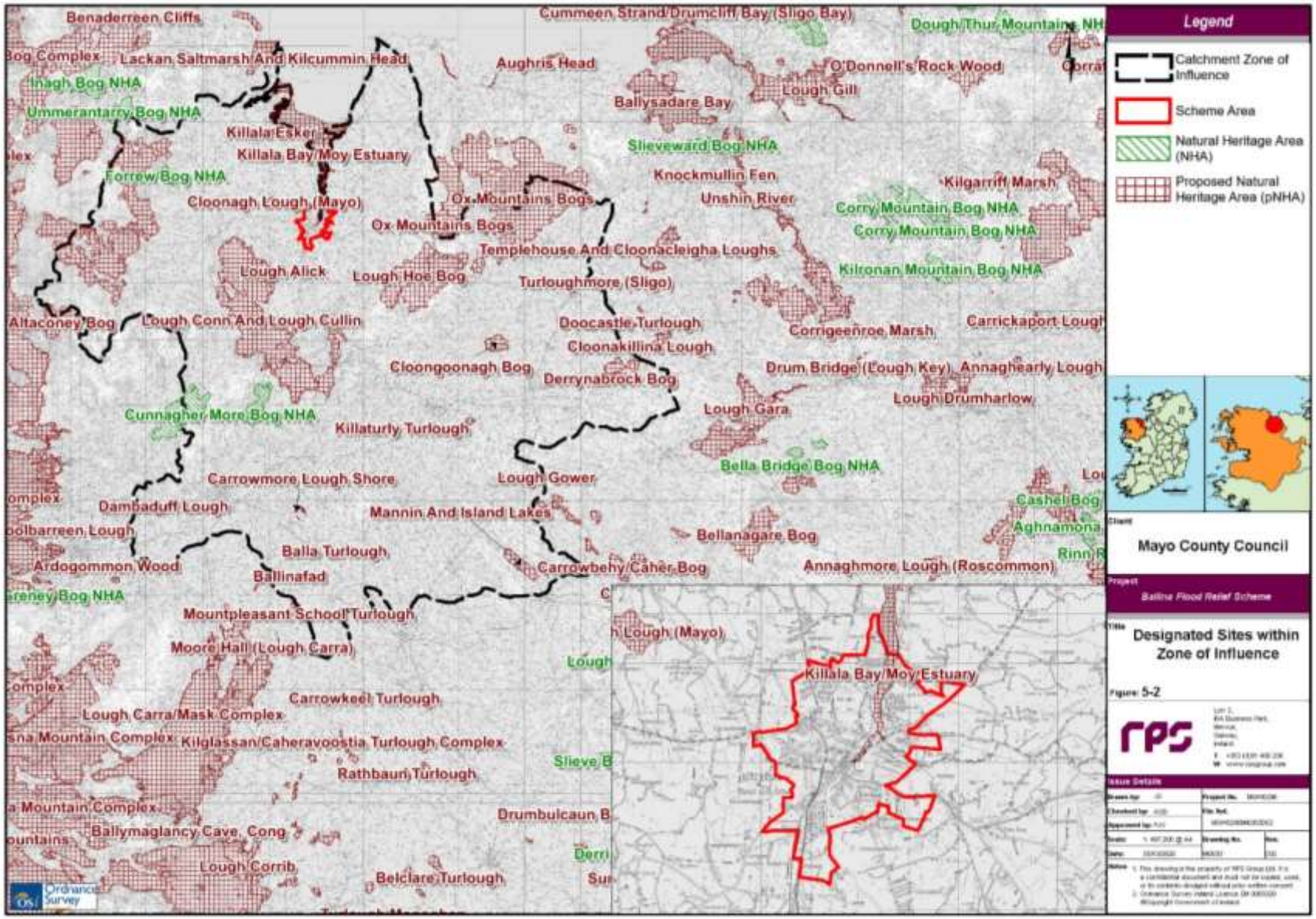


Figure 5-2: Designated National Sites (NHA and pNHA) within the ZoI

5.3.3 Protected Flora

The principal source of information regarding the distribution of flora in Ireland is the New Atlas of the British & Irish Flora (Preston *et al*., 2002). The data included in this atlas is from the 1987-1999 atlas survey as well as the National Biodiversity Data Centre. This atlas shows data for vascular plants in individual hectads (10 km by 10 km squares). The records for the grid squares G21 and G22 were consulted and a search was carried out to investigate if any rare or protected plant species had been recorded in the square, during the 1987-1999 atlas survey (and previous surveys) carried out by the Botanical Society of the British Isles (BSBI). The search included the vascular plants listed in Annex II of the EU Habitats Directive, Flora Protection Order (FPO) of 2015 and the Irish Red Data Book (IRDB). The results were also compared with species listed in the Site Synopses for the designated sites in the area and records for these hectads from the NPWS Rare and Protected Species database. The records of protected flora are provided in **Appendix B.**

FPO species such as Opposite-leaved Pondweed *(Groenlandia densa*) is a perennial herb of shallow, clear, base-rich water which may grow in lakes and rivers but is more frequent in smaller waters such as streams, canals, ditches and ponds. Therefore, it may be found in the smaller watercourses and tributaries of the River Moy within the scheme area. Rare and protected flora are a potential constraint to the project. Potential impacts to these species where they are found within the scheme area through field surveys or where there is potential to support these species will be assessed in the biodiversity impact assessments for the project.

5.3.4 Habitats

Preliminary site walkover surveys were conducted on the 4th June 2020, and aerial photography was examined in order to identify areas of particular ecological interest. Using the preliminary site walkover surveys and analysis of aerial imagery, habitats were classified according to the Guidelines set out in *'A Guide to Habitats in Ireland*' (Fossitt, 2000) which classifies habitats based on the vegetation present and management history. The classification is a standard system for identifying, describing and classifying wildlife habitats in Ireland. The habitats found within the scheme area and their potential correspondence with Annex I habitats have also been identified.

The habitats were recorded within the scheme area or identified from aerial imagery and preliminary walk over surveys are detailed in **Table 5-1**.

Table 5-1: Habitat Types Present within the Scheme Area

Fossitt Habitat Code	Habitat Type
GA1	Improved agricultural grassland
GA2	Amenity grassland (improved)
GS4	Wet grassland
WD2	Mixed broadleaved/conifer woodland
WS1	Scrub
WL1	Hedgerows
WL2	Treelines
FW2	Depositing/lowland rivers
FW4	Drainage ditches
ED3	Recolonising bare ground
BL1	Stone walls and other stonework
BL2	Earth banks
BL3	Buildings and artificial surfaces

The scheme area encompasses Ballina town which is predominately composed of buildings and artificial surfaces (BL3). Ballina town is primarily surrounded by improved agricultural grassland (GA1) and field boundaries consist of hedgerows (WL1), treelines (WL2) and ditches (FW4). The River Moy which is a depositing lowland river (FW2) runs through the centre of the scheme area with areas of wet grassland (GS4) along the banks. Belleek Wood (WD2) is a mixed woodland with conifer trees such as Norway

spruce, Scots pine, silver fir together with beech, oak and ash. The woodland is home to red squirrel, which were reintroduced into the woodlands in 2007. Locations of identified habitats are shown **in Figure 5-3.**

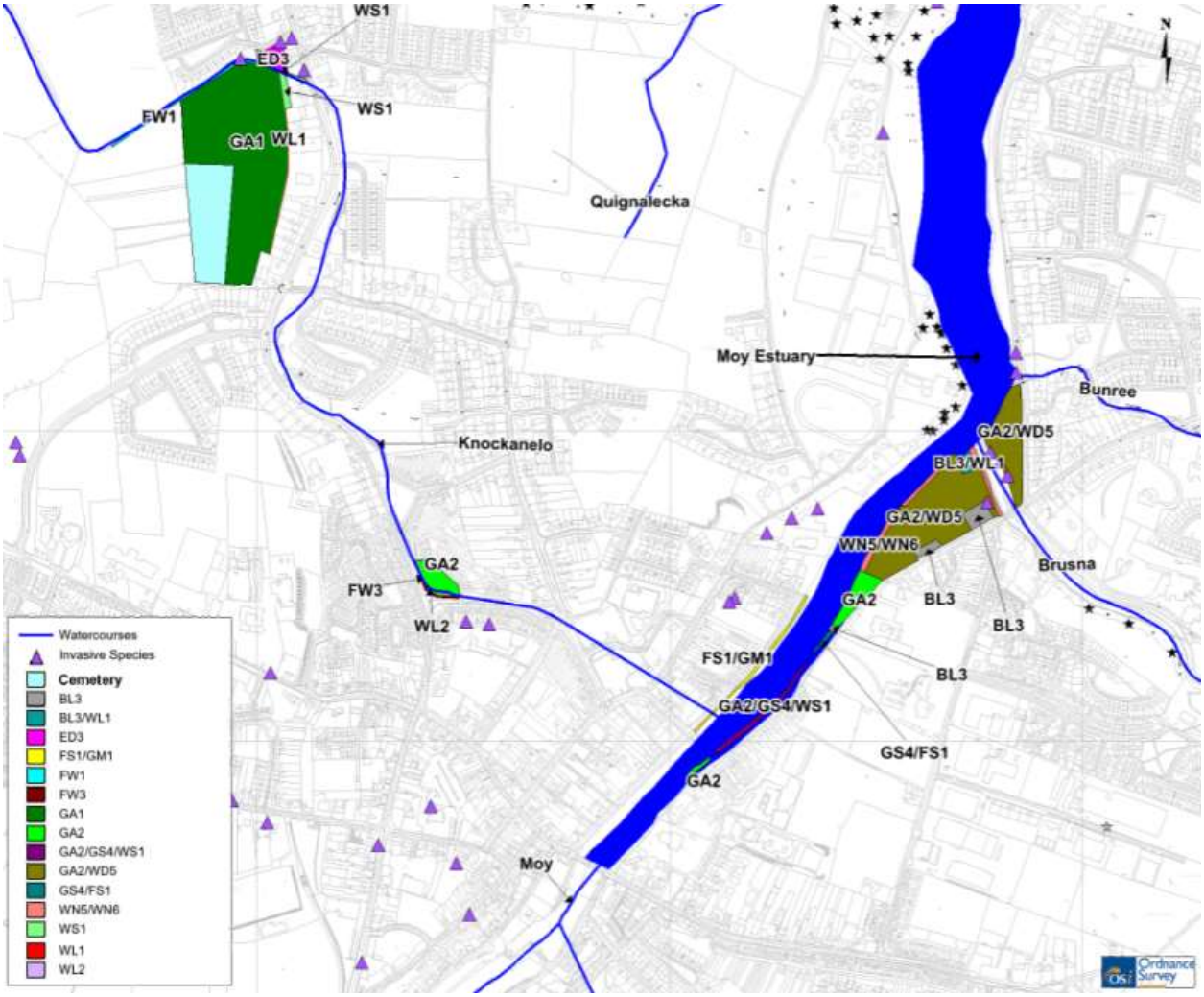


Figure 5-3 Identified Habitats

5.3.5 Invasive species

A search of National Biodiversity Data Centre (NBDC) online database was conducted for records of invasive species listed on the Third Schedule to the EC Birds and Natural Habitats Regulations 2011, as amended. Under Regulation 49(2) of the 2011 Regulations, it is an offence to plant, disperse, allow or cause to disperse, spread or otherwise cause to grow in any place, any plant included in Part 1 of the Third Schedule without a licence from the Minister for Arts, Heritage and the Gaeltacht.

Invasive species recorded on NBDC for grid squares G21 and G22 are displayed in **Table 5-2** below and provided in full in **Appendix B**. Invasive species were recorded within the scheme area on the site walkover survey and are shown in **Table 5-3** below. The records

Table 5-2: Invasive Species records from NBDC

Common Name	Scientific Name	Grid Square	Designation
Japanese Knotweed	*Fallopia japonica*	G21, G22	High Impact Invasive Species, Regulation S.I. 477
Traveller's-joy	*Clematis vitalba*	G21, G22	Medium Impact Invasive Species
Wall Cotoneaster	*Cotoneaster horizontalis*	G21, G22	Medium Impact Invasive Species
Winter Heliotrope	*Petasites fragrans*	G21, G22	Medium Impact Invasive Species

Butterfly-bush	*Buddleja davidii*	G21, G22	Medium Impact Invasive Species
Canadian Waterweed	*Elodea cardensis*	G21	High Impact Invasive Species, Regulation S.I. 477
Cherry Laurel	*Prunus laurocerasus*	G21, G22	High Impact Invasive Species
Sycamore	*Acer pseudoplatanus*	G21, G22	Medium Impact Invasive Species
Giant Hogweed	*Heracleum mantegazzianum*	G22	High Impact Invasive Species, Regulation S.I. 477
Himalayan Knotweed	*Persicaria Wallichii*	G22	Medium Impact Invasive Species, Regulation S.I. 477
Rhododendron	*Rhododendron ponticum*	G22	High Impact Invasive Species, Regulation S.I. 477
Three-cornered Garlic	*Allium triquetrum*	G22	Medium Impact Invasive Species, Regulation S.I. 477
Virginia-creeper	*Parthenocissus quinquefolia*	G22	Medium Impact Invasive Species

Table 5-3: Invasive Species recorded within the Scheme Area

Common Name	Scientific Name	Grid References (ITM)	Grid Square	Location
Giant Hogweed	*Heracleum mantegazzianum*	525088 819224	G21	Between Howley Street and the River Moy – opposite St Muredachs College
Buddleja	*Buddleja davidii*	524949.18, 819152.45 524949.18, 819152.45 524949.18, 819152.45 524949.18, 819152.45	G21	Growing on the quay walls downstream of Lower Bridge on both sides of the River Moy and at Upper Bridge on both banks of the River
Japanese Knotweed	*Fallopia japonica*	525375 819430	G21	Between the N59 and Tom Ruane Park
Japanese Knotweed	*Fallopia japonica*	525424 819507	G21	On the banks of the Brusna River, downstream of the N59 bridge
Winter Heliotrope	*Petasites pyrenaicus*	525518 819364	G21	On the banks of the Brusna River, upstream of the N59 bridge
Himalayan Knotweed	*Persicaria Wallichii*	525508 819511	G21	Adjacent to N59
Japanese Knotweed	*Fallopia japonica*	525691 819253	G21	On the banks of the Brusna River, upstream of the N59 bridge

5.3.6 Fauna

5.3.6.1 Legislation

Species which are afforded statutory protection, whether under International, European or National legislation, are considered in detail in this section. Relevant legislation is as follows:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and Directive 2009/147/EC (codified version of Directive (79/409/EEC) as amended) (Birds Directive) – transposed into Irish law as European Communities (Birds and Natural Habitats) Regulations 2011 and 2013 (SI 477/2011 and 499/2013), and
- Wildlife Act 1976 and Wildlife (Amendment) Act 2000, as amended.

5.3.6.2 EU Habitats Directive (as transposed)

Species protected under the EU Habitats Directive can be separated into three categories: Annex II of the directive lists species that require protection of their habitats, for which SACs are designated, while Annex IV of the directive lists species which are afforded strict protection, wherever they occur in the country (inside or outside of SACs), and Annex V species whose taking from the wild can be restricted by European law.

5.3.6.3 EU Birds Directive (as transposed)

The EU Birds Directive 2009/147/EC requires member states to identify and classify SPAs for rare or vulnerable species listed in Annex I of the Directive, as well as for all regularly occurring migratory species, paying particular attention to the protection of wetlands of international importance (Article 4).

5.3.6.4 Irish Wildlife Act

Under the Wildlife Act 1976 (as amended), species listed under the Fifth Schedule are afforded statutory protection and are therefore subject to the provisions of Section 23, which make it an offence to:

- Kill, injure or take any wild animal listed;
- Damage or destroy, or obstruct access to, any structure or place which any wild animal uses for shelter or protection;
- Damage or destroy anything which conceals or protects any such structure; or
- Disturb any such animal while it is occupying a structure or place which it uses for shelter or protection.

There is a requirement that any proposed development assesses the likelihood of impacting on such species. Surveys will be undertaken to identify those species listed under Schedule 5 of the Wildlife Act 1976 (as amended). All surveys will meet with standard recommended methodologies.

5.3.7 Fauna in the Scheme Area

5.3.7.1 Mammals

A search of National Biodiversity Data Centre (NBDC) online database was conducted for records of Annex II species protected under the EU Habitats Directive and other species protected under the Wildlife Act 1976 (as amended.) The following species were recorded within the grid square G21 and/or G22 from the NBDC and have potential to be found within the scheme area.

- Minke Whale (*Balaenoptera acutorostrata),* Common Dolphin *(Delphinus delphis*), Risso's Dolphin *(Grampus griseus),* and Humpback Whale *(Megaptera novaeangliae)* are protected under Annex IV of the EU Habitats Directive and the Wildlife Acts. Common Porpoise *(Phocoena phocoena)* is protected under Annex II, Annex IV of the EU Habitats Directive, Wildlife Acts and OSPAR. These are marine species and direct impacts are unlikely, however there is potential for indirect impacts from water pollution of the aquatic environment from the proposed scheme.
- Grey Seal *(Halichoerus grypus)* and Harbour Seal *(Phoca vitulina)* are protected under both Annex II and Annex V of the EU Habitats Directive and Wildlife Acts, Harbour Seal are a QI of Killala Bay/ Moy Estuary SAC. The species haul out, breeding and moult sites are further out in the estuary, therefore direct impacts are unlikely, however there is potential for indirect impacts from water pollution of the aquatic environment from the proposed scheme.
- European Otter *(Lutra lutra)* is protected under both Annex II and Annex IV of the EU Habitats Directive and Wildlife Acts, Pine Marten *(Martes martes*) is protected under Annex V of the EU Habitats Directive and Wildlife Acts. Otter are a QI of the River Moy SAC and are widespread throughout the Moy catchment. The 10m terrestrial buffer along lake shorelines and along river banks identified as critical for otters (NPWS, 2007), therefore there is potential for direct and indirect impacts to otter arising from the proposed scheme.
- A number of bat species were also recorded in the scheme area including Daubenton's Bat (*Myotis daubentonii*), Natterer's Bat (*Myotis nattereri*), Lesser Noctule (*Nyctalus leisleri),* Pipistrelle (*Pipistrellus pipistrellus sensu lato)*, Brown Long-eared Bat (*Plecotus auritus*) and Soprano Pipistrelle (*Pipistrellus pygmaeus*). All bat species are protected under the Wildlife Act 1976 as amended and under Annex IV of the EU Habitats Directive and may be found foraging along the banks of the River Moy and roosting in proximal buildings, bridges, quay walls and mature trees.
- Eurasian Red Squirrel (*Sciurus vulgaris*), Badger (*Meles meles*) and Common Frog (*Rana temporaria*) are protected under the Wildlife Act 1976 (as amended). These species can be found in Belleek Wood.

5.3.7.2 Birds

All bird species are protected under the Wildlife Act 1976 (as amended). Some bird species are afforded protected status under the Birds Directive. BirdWatch Ireland and the RSPB Northern Ireland have produced a list of Birds of Conservation Concern in Ireland (BoCCI). A number of bird species are also categorised as Red or Amber listed Birds of Conservation Concern.

There were a number of bird species recorded for grid square G21 and/or grid square G22 on the NBDC, see **Appendix B**. Recorded Bird Species listed on Annex I of the Birds Directive 2009/147/EC including Kingfisher, Snowy Owl, Dunlin, Hen Harrier, Corn-Crake, Whooper Swan, Little Egret, Merlin, Peregrine Falcon, Black-throated Diver, Great Northern Diver, Red-throated Diver, Bar-tailed Godwit, Golden Plover, Red-billed Chough, Common Tern, Arctic Tern, Sandwich Tern and Little Tern.

A number of these species are noted in the site synopsis for Killala Bay/ Moy Estuary SPA downstream and Ringed Plover, Golden Plover, Grey Plover, Sanderling, Dunlin, Bar-tailed Godwit, Curlew and Redshank are listed as the SCI species of the SPA.

These species will be critical receptors to the proposed scheme where they are found within the scheme area through field surveys or where there is habitat potential to support these species. Potential impacts to these species will be assessed in the AA reporting and biodiversity impact assessments for the project.

There are numerous records of Kingfishers within the study are, who are commonly found along streams, canals and rivers. They breed in tunnels dug in vertical banks along streams and rivers. There is potential for this species to occur along River Moy and tributaries, however it is unclear at this time whether the banks of the River Moy within the scheme area provides suitable nesting habitat.

5.3.7.3 Aquatic species

White-clawed Crayfish (*Austropotamobius pallipes*), Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), Salmon (*Salmo salar*) and Otter (*Lutra lutra*) are listed as the QI species for the River Moy SAC and Sea Lamprey (*Petromyzon marinus*) is also a QI of Killala Bay/ Moy Estuary SAC.

The Freshwater white clawed crayfish is protected under the Wildlife Act and Annex II and Annex V of the EU Habitats Directive, salmon (*Salmo salar*) is protected under Annex II and Annex V of the EU Habitats Directive, OSPAR and is red listed as vulnerable and all Lamprey species are protected under Annex II of the EU Habitats Directive. These species have potential to be located within the River Moy and its tributaries.

The River Moy is a Designated Salmonid Waters under S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations 1988. The designation covers the River Moy and many of its tributaries and terminates at Upper Bridge in Ballina. The River Moy and some of its larger tributaries provide excellent spring Salmon and grilse fishing. Sea trout are also abundant in the River Moy.

The Freshwater Pearl Mussel (FPM) (*Margaritifera margaritifera)* is protected under Annex II and V of the Habitats Directive and is legally protected in Ireland under Schedule 1 of the Wildlife Act 1976 as amended. There has been a considerable decline in species distribution and numbers of FPM in Ireland and across the EU. In Ireland, the Article 17 Report (2019) produced by NPWS indicates that the conservation status for FPM is “bad” and declining, with few locations with recruiting populations showing near-adequate replenishment.

A total of 27 populations that have been designated within 19 SACs. In 2009, legislation was enacted to support the achievement of favourable conservation status for FPMs, European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (S.I. 296 of 2009) and the NPWS developed 27 FPM Sub-basin Management Plans under these regulations.

There are no FPM SAC catchment or sub-basins within the scheme area or study area, however, three *Margaritifera* Sensitive Catchments are within the study area including the Moy - Deel, the Moy and the Moy – Tobergal catchments. These *Margaritifera* Sensitive Catchments are classified as a “*Catchment of other extant populations*” (NPWS, 2017b).

Freshwater pearl mussel was recorded within the G21 grid square, within the Moy-Deel *Margaritifera* sensitive catchments upstream in the River Moy catchment, therefore no direct impacts to this species are expected, however an assessment of potential indirect impacts will be conducted later on the in the impact assessment process. **Figure 5-4** depicts the *Margaritifera* sensitive areas located within the catchment which include the.

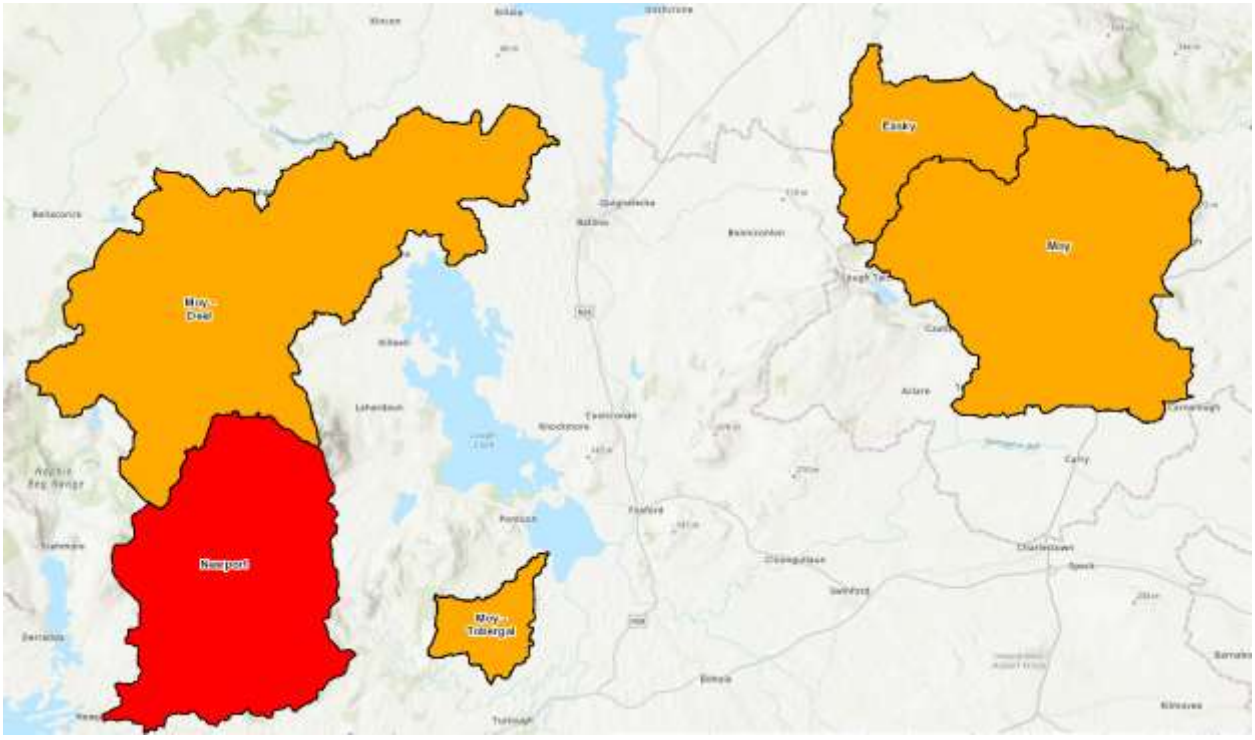


Figure 5-4: *Margaritifera* Sensitive Areas[13] within study area.

Aquatic species will be critical receptors to the proposed scheme. Potential impacts to these species will be assessed in the AA reporting and biodiversity impact assessments for the project.

5.3.7.4 Invertebrates

Narrow-mouthed Whorl Snail (*Vertigo angustior*) is a QI species of the Killala Bay/ Moy Estuary SAC, downstream of the proposed scheme. Impacts to this species are unlikely, however this will be assessed further as the scheme progresses.

5.3.7.5 Bats

Bat Conservation Ireland were contacted for existing records of bat species within 10km grid square G21 and G22. This information showed that six of the ten known Irish bat species have been observed within grid square G21 and G22. These are common pipistrelle *(Pipistrellus pipistrellus sensu lato)* and soprano pipistrelle *(Pipistrellus pygmaeus)*, Leisler's (*Nyctalus leisleri)*, brown long-eared (*Plecotus auritus)*, Daubenton's (*Myotis daubentonii)* and Natterer's (*Myotis Nattereri).* The roosts and bat activity recorded within the grid squares G21 and G22 are provided in **Appendix B.**

13 http://www.arcgis.com/home/webmap/viewer.html?url=https%3A%2F%2Fwebservices.npws.ie%2Farcgis%2Frest%2Fservices%2FNPWS%2FMargaritiferaSensitiveAreas%2FMapServer&source=sd accessed 22/11/2020 (Note The Newport and Easky Margaritifera Sensitive Areas are outsiude the study area)

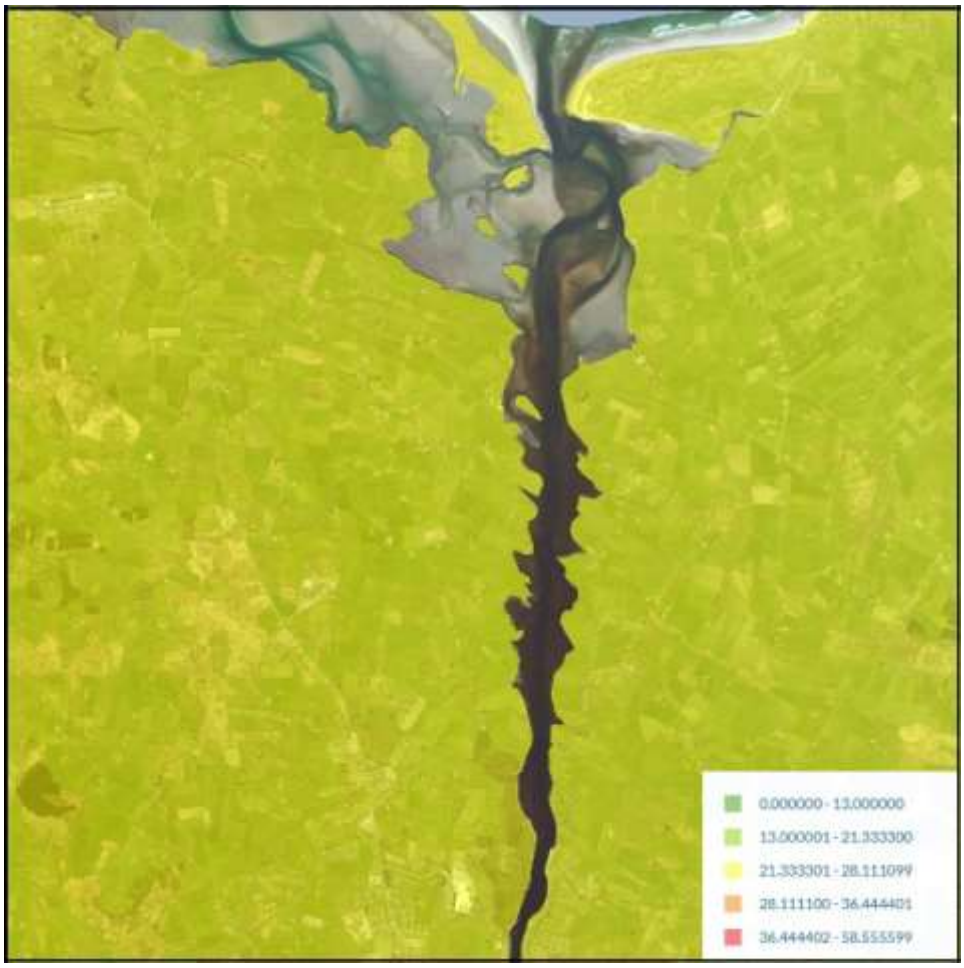


Figure 5-5: Bat Habitat Suitability Index for G22[14]

[14] Map from: https://maps.biodiversityireland.ie/Map

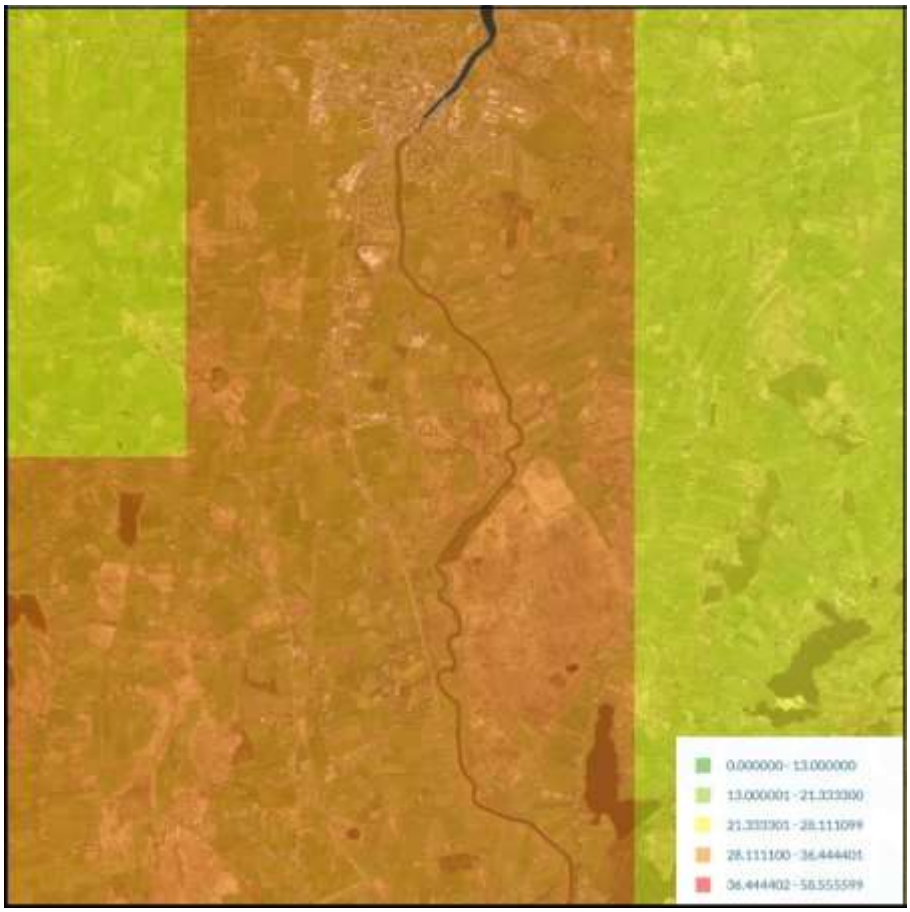


Figure 5-6: Bat Habitat Suitability Index for G21[15]

All Irish bat species are protected under the Wildlife Act (1976) as amended and the Habitats Directive 92/43/EEC, as transposed, seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. Lesser Horseshoe vats (*Rhinolophus hipposideros)* are listed under Annex II of the Habitats Directive and all bat species are listed in Annex IV.

The five-point scale bat habitat suitability index[16] available from NBDC online mapping was utilised to assess the importance of the scheme area for bat species. This index ranges from 0 to 100 with 0 being least favourable and 100 most favourable for bats.[17] The habitat suitability rating for bats is 31.67 in the south of the scheme area and 27.22 in the north of the scheme area. The scheme area is of moderate suitability for bat species. The bat habitat suitability for grid square G22 and G21 is shown in **Figure 5-5**and **Figure 5-6** respectively.

There may be potential impacts to foraging and commuting habitat in relation to bat species, the extent of these impacts will be examined through further survey and assessment.

5.4 Summary of Key Biodiversity Constraints

The proximity of European sites is a significant constraint to the proposed scheme. The Moy Estuary is located to the north of the scheme area and is designated as part of the Killala Bay/ Moy Estuary SAC/ pNHA and Killala Bay/Moy Estuary SPA. The River Moy flows through the scheme area and is designated as part of River Moy SAC. There is indirect hydrological connectivity between Lackan Saltmarsh and Kilcummin Head SAC/ pNHA and the scheme area via Moy Estuary, Killala Bay and Lackan Bay, 15.85km downstream of the scheme area.

[15] Map from: https://maps.biodiversityireland.ie/Map
[16] Lundy, M.G., Aughney, T., Montgomery, W.I., & Roche, N., (2011) Landscape conservation for Irish bats & species specific roosting characteristics. Bat Conservation Ireland.
[17] http://maps.biodiversityireland.ie/metadata/Landscape_Conservation_for_Irish_Bats_metadata(v.3).pdf

There is potential for hydrogeological connectivity between the scheme area and Bellacorick Bog Complex SAC/pNHA, Lough Conn and Lough Cullin SPA, Cloonagh Lough (Mayo) pNHA, Lough Conn and Lough Cullin pNHA and Lough Alick pNHA as they all intersect Ballina groundwater body.

Air pollution from construction activities may affect the sensitive habitats in the vicinity of the works. Due to the largely urban scheme area, construction sites will be limited in size and the amount of plant and machinery that can be used will be limited. Therefore, potential impacts from air pollution will be to sensitive ecological receptors within 200m[18] of the works, which includes Killala Bay/ Moy Estuary SAC/ pNHA and the River Moy SAC.

In addition to the habitats and species protected under designated sites, there are numerous records for rare and protected species which will require further assessments for habitats and protected flora species, Wildlife Act species or species listed Annex II/IV/V of the EU Habitats Directive, as well as protected bird species under the Birds Directive and important bird assemblages that are likely to be found within the scheme area.

All designated sites and other features of ecological interest should be considered in full when identifying suitable options for the flood relief scheme. Avoidance of all designated sites and important ecological features should be prioritised where possible. In the event where works located within or in proximity to designated sites and ecological features appropriate mitigation measures should be implemented to avoid or minimise disturbance.

Non-native invasive species listed on the Third Schedule to the EC Birds and Natural Habitats Regulations 2011, as amended were recorded within the scheme area. Further surveys will be required to inform the design and identify potential interactions with the infected sites. A management plan will need to be prepared to ensure compliance with Regulation 49 of the 2011 Regulations.

When designing the scheme it will be necessary to ensure that movement of species between identified ecological sites are not impaired by the provision of the Flood Relief Scheme (i.e. fish, mammal, invertebrates etc.).

Water quality impacts to receiving waters such as the River Moy has the potential to significantly impact protected species/habitats which may be present.

Where works within important waterbodies cannot be avoided; the timing of works and best site practice should be incorporated into the physical design and construction of the Flood Relief Scheme to minimise pollution risk and alteration of hydrology.

The NPWS and IFI should be consulted when determining viable options for flood relief at further stages of scheme development and appropriate mitigation should be determined.

The following requirements of the IFI should be considered in the design of the proposed scheme:

- Strong emphasis given to natural flood management techniques.
- An assessment of the impact of the existing drainage schemes should be carried out to enhance natural flood management.
- Access to the Moy must remain in place for anglers as the Moy is a popular salmon angling spot.
- In-stream works should be avoided where necessary.
- Invasive Species must not be spread as a result of works of the project. If invasive species are found within the site an invasive species management plan should be produced and followed.
- Due to the River Moy being a migratory route for salmon, sea trout, eels and lamprey - any impacts on hydrology on fish passage as a result of the flood scheme should be assessed.
- Follow "*Requirements for the Protection of Fisheries Habitat during Construction and Development work*."
- Ensure that the impact the scheme may have on a riparian zone is adequately assessed as many important species of invertebrate, essential to optimal salmonid production rely on this habitat.

[18] Guidance for the treatment of Air Quality during the Planning and Construction of National Road Schemes' (NRA 2011)

6 LAND, SOILS, GEOLOGY AND HYDROGEOLOGY

6.1 Methodology

A detailed desktop assessment was undertaken to identify areas of constraint in relation to land, soils, geology and hydrogeology within the scheme area. Geological constraints will be considered further when defining the suite of viable options for flood relief.

The European Commission, in February 2012 published the Soil Thematic Strategy which was a proposal for European Law for the protection of soil. In May 2014, the Commission withdrew the proposal for a Soil Framework Directive. Thus, other than geological heritage sites (which include proposed Geological Natural Heritage Areas and County Geological Sites and are identified in County Development Plans and County Heritage Plans), geological features (soils and bedrock) in Ireland are not afforded legal protection.
There is a statutory requirement placed on Local Authorities to have due regard for conservation of geological heritage features such as under the following legislation;

- The Planning and Development Act 2000 as amended;
- Planning and Development Regulations 2001; and
- Wildlife (Amendment) Act 2000 [enabling Natural Heritage Areas].

The primary data sources for identifying constraints comprised the following

- Geological Survey of Ireland (GSI) online database;
- EPA; and
- Teagasc.

6.2 Existing Environment and Key Constraints

6.2.1 Bedrock Geology

The Geological Survey of Ireland (GSI) online database (www.gsi.ie) was consulted for available edaphic, geological and hydrological information of the site and its environs.

The bedrock geology map for the scheme area is provided in **Figure 6-2**:. The scheme area is comprised entirely of Ballina Limestone Formation, detailed in **Table 6-1** below.

Table 6-1: Bedrock Geology Formations occurring within the Scheme Area.

Bedrock Geology	Description	Lithological Description	System	Series
Ballina Limestone Formation (Upper)	Grey limestone, thin shale	Dark grey fine-grained limestones with subordinate interbedded calcareous shale. Its coral fauna is characterised by caniniids and phaceloid lithostrotionids. The incoming of cerioid lithostrotionids in the upper part marks the distinction between the lower and upper	Carboniferous	Dinantian

There are no karst features within the scheme area or within a 5km ZoI of the scheme area. As denoted in **Section 6.3.3** bedrock that is prone to extensive karstification may result in weaknesses below the ground surface and lead to fractures, faults and caves. These areas may cause subsidence if placed under pressure from the construction.

6.2.2 Mineral Site Locations

There is one mineral site location within the scheme area and a further three within 5km of the scheme area; these are detailed in **Table 6-2** below[19].

Table 6-2: Mineral Site Locations

Mineral Location Number	Mineral Type	Mineral	Grid Reference	Townland	Distance from scheme area	Description	Notes
1214	SAGR	Sand and gravel	131700, 321800	Carha	4.73km north east	Non-metallic	Composed of angular blocks, striated blocks or morainic origin, fine sand and mixed sands and gravels. Several pits had been open in 1973 for mixed sands and gravels. Overlies Ballina Limestone Formation.
2444	CLBR	Clay, brick	124250, 319050	Ballina	Within scheme area	Non-metallic	Brick field noted in old 6 inch map
1216	SAGR	Sand and gravel	128300, 317800	Behybeg	1.88km east	Non-metallic	Esker deposit rests on boulder clay consisting of a sandy matrix with heavily striated limestone blocks as well as granite, amphibotite and pale sandstone. Overlies Ballina limestone Formation 9Upper).
1347	CLBR	Clay, Brick	119320, 320200	Ballymanagh	3.56km west	---	3 brickfields-inactive. Heavy loam clay free from boulders – little plasticity notes in near surface clays. Yellow strong bricks made in past. Reserves almost unlimited. Bedrock in Ballina Limestone.

Crushed rock aggregate potential within the scheme area is mostly of high potential, with smaller sections of moderate and very high potential throughout, see **Figure 6-1:** Crushed Rock Aggregate Potential for Ballina

[19] https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=ebaf90ff2d554522b438ff313b0c197a&scale=0 Accessed: 20th April 2020.

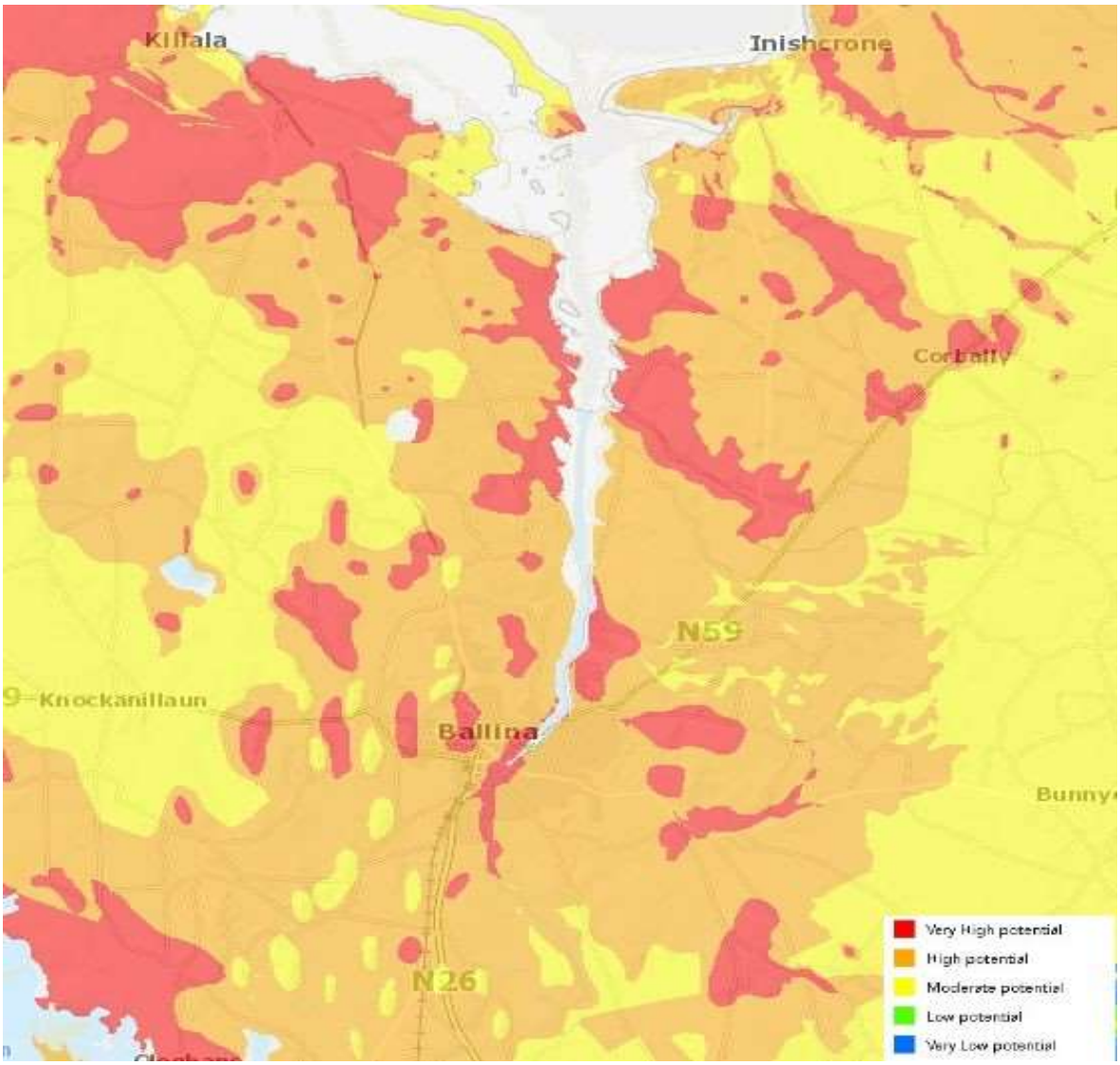


Figure 6-1: Crushed Rock Aggregate Potential for Ballina

6.2.3 Aquifer Classification and Vulnerability

Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease at which groundwater may be contaminated by human activities.

The scheme area is dominated by high groundwater vulnerability and there is an area of moderate groundwater vulnerability in the south east of the scheme area. There are patches of extreme and rock at or near surface or karst scattered throughout the scheme area.

The entirety of the scheme area is located within a Regionally Important Aquifer-Karstified (RK). This groundwater vulnerability distribution is illustrated in **Figure 6-3.**

Alterations to local hydrogeology can lead to contamination or drainage of groundwater, leading to pollution or loss of groundwater dependant habitats which occur within the scheme area.

Bedrock that is prone to extensive karstification may result in weaknesses below the ground surface and lead to fractures, faults and caves. These areas may cause subsidence if placed under pressure from the construction.

6.2.4 Groundwater

There are thirty-five groundwater bodies within the Moy and Killala Bay WFD Catchment. The scheme area is located within Ballina GWB and Ballina Gravels Group 1 GWB. Ballina GWB is 265km^2 and is

located between Crossmolina and Ballina. The land is relatively flat to undulating ground and the groundwater flow is generally towards rivers and lakes however due to the karstified nature of the GWB locally groundwater flow can be highly variable[20]. The groundwater bodies located within the Moy and Killala Bay WFD Catchment are detailed in **Table 6-3** below.

Table 6-3: Groundwater bodies present within the Moy and Killala Bay WFD Catchment

Name	Code	Distance from Scheme Area	European sites within the Moy and Killala Bay WFD Catchment that intersect the groundwater body
Aghagower	IE_WE_G_0021	36.08km	None
Ballina	IE_WE_G_0035	Within Scheme Area	Killala Bay/ Moy Estuary SAC River Moy SAC Killala Bay/ Moy Estuary SPA Bellacorick Bog Complex SAC Lough Conn and Lough Cullin SPA
Ballina Gravels Group 1	IE_WE_G_0113	Within Scheme Area	River Moy SAC
Ballina Gravels Group 2	IE_WE_G_0116	5.84km	Lough Hoe Bog SAC
Ballygawley	IE_WE_G_0039	26.81km	None
Ballyhean	IE_WE_G_0022	30.44km	None
Ballymote	IE_WE_G_0037	27.2km	None
Bellacorick-Killala	IE_WE_G_0041	2.11km	Killala Bay/ Moy Estuary SAC Killala Bay/ Moy Estuary SPA Bellacorick Bog Complex SAC
Belmullet	IE_WE_G_0057	15.29km	Killala Bay/ Moy Estuary SPA Lackan Saltmarsh and Kilcummin Head SAC Bellacorick Bog Complex SAC Owenduff/ Nephin Complex SAC
Beltra Lough North	IE_WE_G_0025	9km	River Moy SAC Lough Conn and Lough Cullin SPA
Beltra Lough South	IE_WE_G_0024	16.87km	None
Clare-Corrib	IE_WE_G_0020	42.49km	None
Clifden Castlebar	IE_WE_G_0017	20.14km	None
Collooney	IE_WE_G_0048	10.04km	Ox Mountains Bogs SAC
Cong-Robe	IE_WE_G_0019	36.21km	None
Corrib Gravels	IE_WE_G_0063	40.27km	River Moy SAC
Crossmolina Gravels	IE_WE_G_0107	8.3km	River Moy SAC
Curlew Mountains	IE_WE_G_073	29.39km	None
Deel	IE_WE_G_0031	13.36km	River Moy SAC Bellacorick Bog Complex SAC Owenduff/ Nephin Complex SAC
Easky East	IE_WE_G_0050	10.68km	Ox Mountains Bogs SAC
Easky West	IE_WE_G_0049	8.56km	None
Foxford	IE_WE_G_0034	0.34km	Killala Bay/ Moy Estuary SAC River Moy SAC Killala Bay/ Moy Estuary SPA Lough Conn and Lough Cullin SPA Lough Hoe Bog SAC Lough Nabrickkeagh Bog SAC Ox Mountains Bogs SAC
Gorteen	IE_WE_G_0028	32.88km	None
GWDTE-Turloughmore Sligo (SAC000637)	IE_WE_G_0104	26.87km	None

[20] https://secure.dccae.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/BallinaGWB.pdf

Name	Code	Distance from Scheme Area	European sites within the Moy and Killala Bay WFD Catchment that intersect the groundwater body
Gweestion-Moy Gravels Group 1,	IE_WE_G_0112	31.33km	River Moy SAC
Gweestion-Moy Gravels Group 2	IE_WE_G_0115	34.88km	River Moy SAC
Kilkelly Charlestown	IE_WE_G_0032	19.22km	River Moy SAC Balla Turlough SAC
Killala North	IE_WE_G_0046	12.99km	Killala Bay/ Moy Estuary SPA Lackan Saltmarsh and Kilcummin Head SAC
Killala South	IE_WE_G_0047	5.69km	Killala Bay/ Moy Estuary SAC Killala Bay/ Moy Estuary SPA Lackan Saltmarsh and Kilcummin Head SAC
Laherdaun	IE_WE_G_0030	10.11km	River Moy SAC Bellacorick Bog Complex SAC Lough Conn and Lough Cullin SPA Owenduff/ Nephin Complex SAC
Lavagh-Ballintougher	IE_WE_G_0038	28.33km	None
Malranny	IE_WE_G_0027	16.14km	Owenduff/ Nephin Complex SAC
Swinford	IE_WE_G_0033	16.66km	River Moy SAC Balla Turlough SAC Ballinafad SAC
Swinford Gravels	IE_WE_G_0033	19.88km	None
Tobercurry	IE_WE_G_0029	24.42km	None

6.2.5 Geological Heritage

The GSI and the Irish Geological Heritage programme (IGH) are in partnership with the NPWS of the Department of Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media to identify and select important geological and geomorphological sites throughout the country for designation as NHAs (Natural Heritage Areas).The most recent audit for Geological Heritage Sites was conducted by the GSI in 2005. No Geological Heritage Sites were identified within a 5km ZoI of the scheme area. The IGH programme also identifies sites of national or local geological importance which are classed as County Geological Sites (CGS) though they are not protected under statutory conditions they are noted as being important. There are no CGS located within 5 km of the scheme area.

6.2.6 Geohazards

Geohazards are natural earth processes that pose a risk to human life. They can range from geological hazards such as landslides, bog-bursts, coastal erosion and subsidence to hydrometeorological hazards like floods and high tides. Soft ground areas are also considered to be geo-hazards. Such hazards are identified as part of this constraints assessment and will be considered throughout each stage of the scheme development.

There are no karst features including turloughs within the scheme area and the landslide susceptibility of the area is low or low (inferred) with some small areas classed as water.[21]

[21] https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228 Accessed on 02/09/2020.

6.2.7 Commercial Geology (Quarries and Mines)

There is an active quarry located 8 km from the scheme area. This quarry is an active Limestone quarry, with the registration number QS0341. Due to distance from scheme area no constraints are expected.

6.2.8 Subsoils & Soils

The Irish Soil Information System maps by Teagasc, Environmental Protection Agency (EPA) Science and Science, Technology and Research & Innovation for the Environment (STRIVE) programme was utilised to investigate the soils found within the vicinity of the scheme area.

The scheme area is dominated by made and deep well drained mineral derived soils from mainly basic parent materials (BminDW); see **Figure 6-4**:**.** The other soil types present within the scheme area include;

- Deep poorly drained mineral soil derived from mainly calcareous parent materials (BminPD);
- Mineral Alluvium soils (AlluvMIN);
- Shallow well drained mineral soil derived from mainly calcareous parent materials (BminSW);
- Shallow poorly drained mineral soil derived from mainly basic parent materials (BminSP);
- Poorly drained mineral soils with peaty topsoil derived from mainly calcareous parent materials (BminSPPT); and
- Cutaway peats (Cut).

Made soils depicted in purple in **Figure 6-4**: below dominates the centre of the scheme area and BminDW dominates the edges of the scheme area. BminPD is located in patches throughout the scheme area. AlluvMIN is located to the north and south of the scheme area, with sections of BminSW occur in the east and west. Small sections of BminSP occur in the east of the scheme area. Two small patches of BminSPPT are located in the north east of the scheme area. Based on this information it is unlikely that there would be any negative implications due to the nature of made ground being so prominent, the area is already urban.

The scheme area is dominated by the subsoils limestone till (Carboniferous) (TLs) and made ground (made). There are sections of bedrock at surface (Rck), Limestone sands and gravels (Carboniferous) (GLs), Basic Esker Sands and Gravels (BasEsk), Estuarine sediments (silts/clays) (Mesc), Cutover Peat (Cut) and Alluvium differentiated (A) within the scheme area with similar distribution to the soils described above. The subsoils within the scheme area are illustrated in **Figure 6-5** below.

6.2.8.1 Contaminated Land

There are number of EPA licenced facilities including three Industrial Emissions(IE)/Industrial Pollution Control (IPC) licenced facilities and a landfill within the scheme area, including:

- Thomas Archer (Ballina) Limited [EPA reg no P0360-01] is located in the east of Ballina town on Bunree road and is licensed for Industrial Emissions. Licence has been surrendered.
- Henniges Elastomers Ireland GmbH [EPA reg no. P0243-01] is located at the western edge of Ballina town on the Crossmolina Road and is licenced for Industrial Emissions.
- Hollister ULC [EPA reg no. P0918-01] is located just south of Ballina at Rehins, Foxford Road and is licenced for Integrated Pollution Control.
- Rathroeen Landfill [EPA reg no. W0067-02 is located to the north east of Ballina and is a licensed landfill.

Interaction with potential contaminated ground must be considered as part of the scheme development.

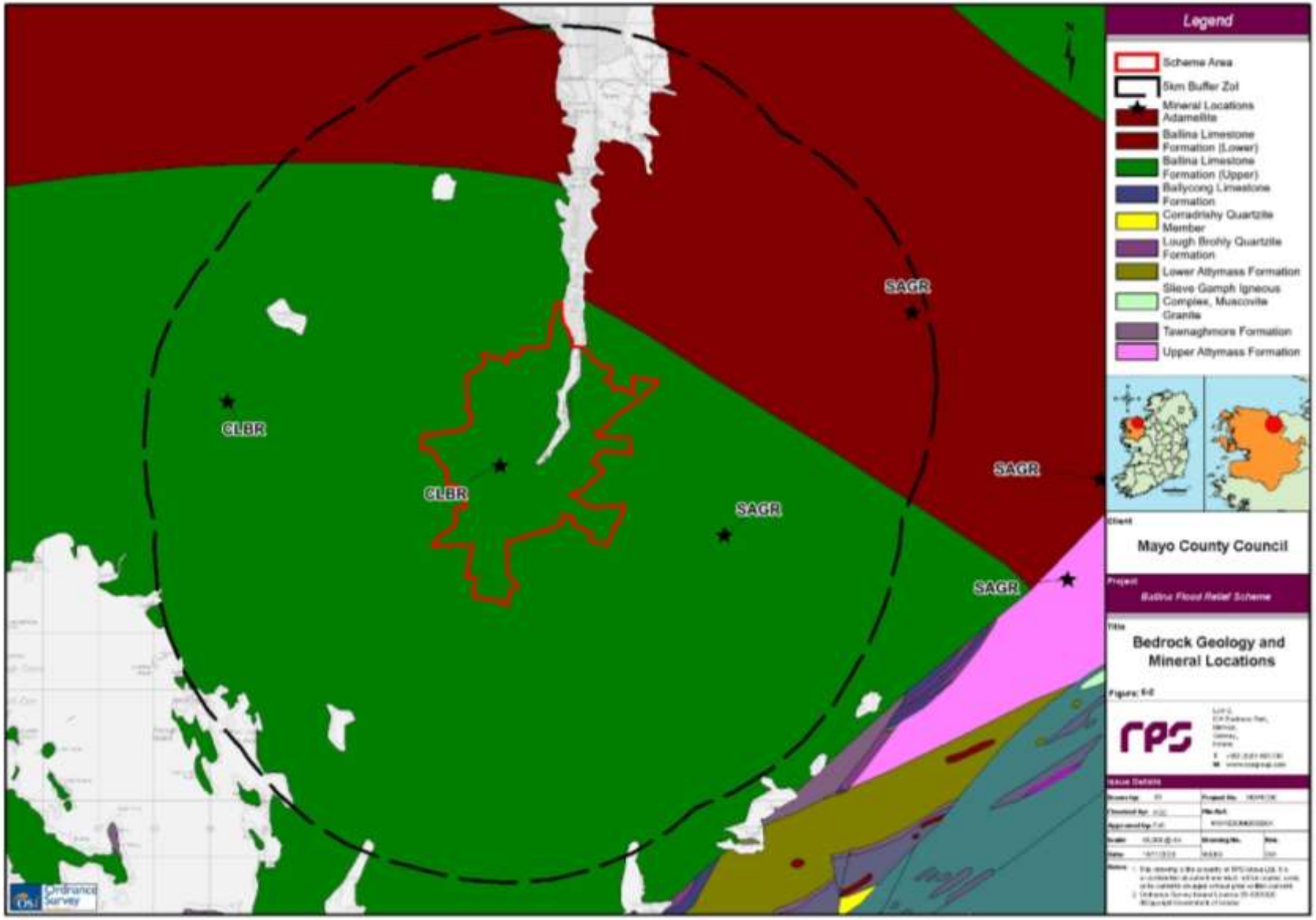


Figure 6-2: Bedrock Geology within the Scheme Area

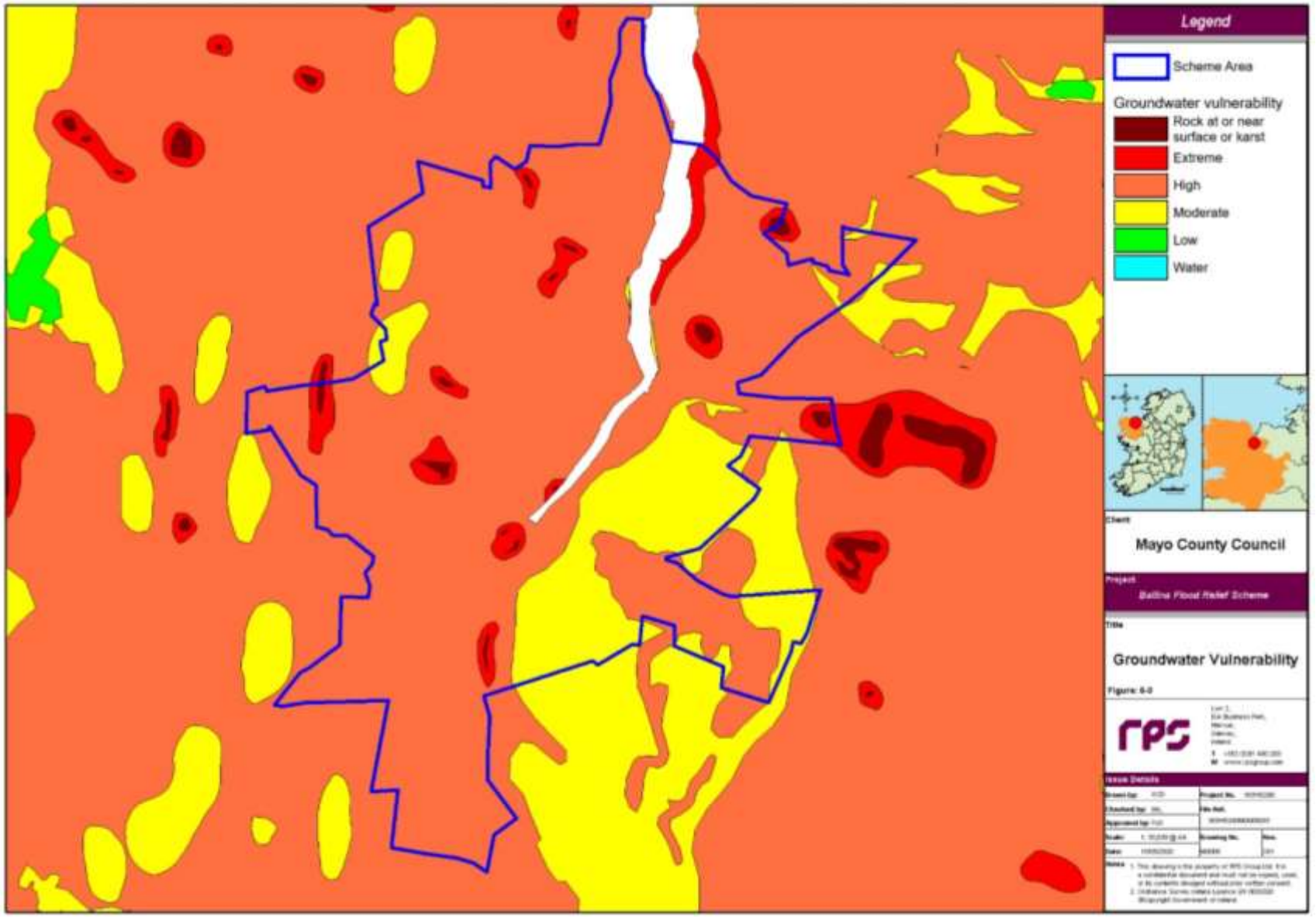


Figure 6-3: Groundwater Vulnerability within the Scheme Area

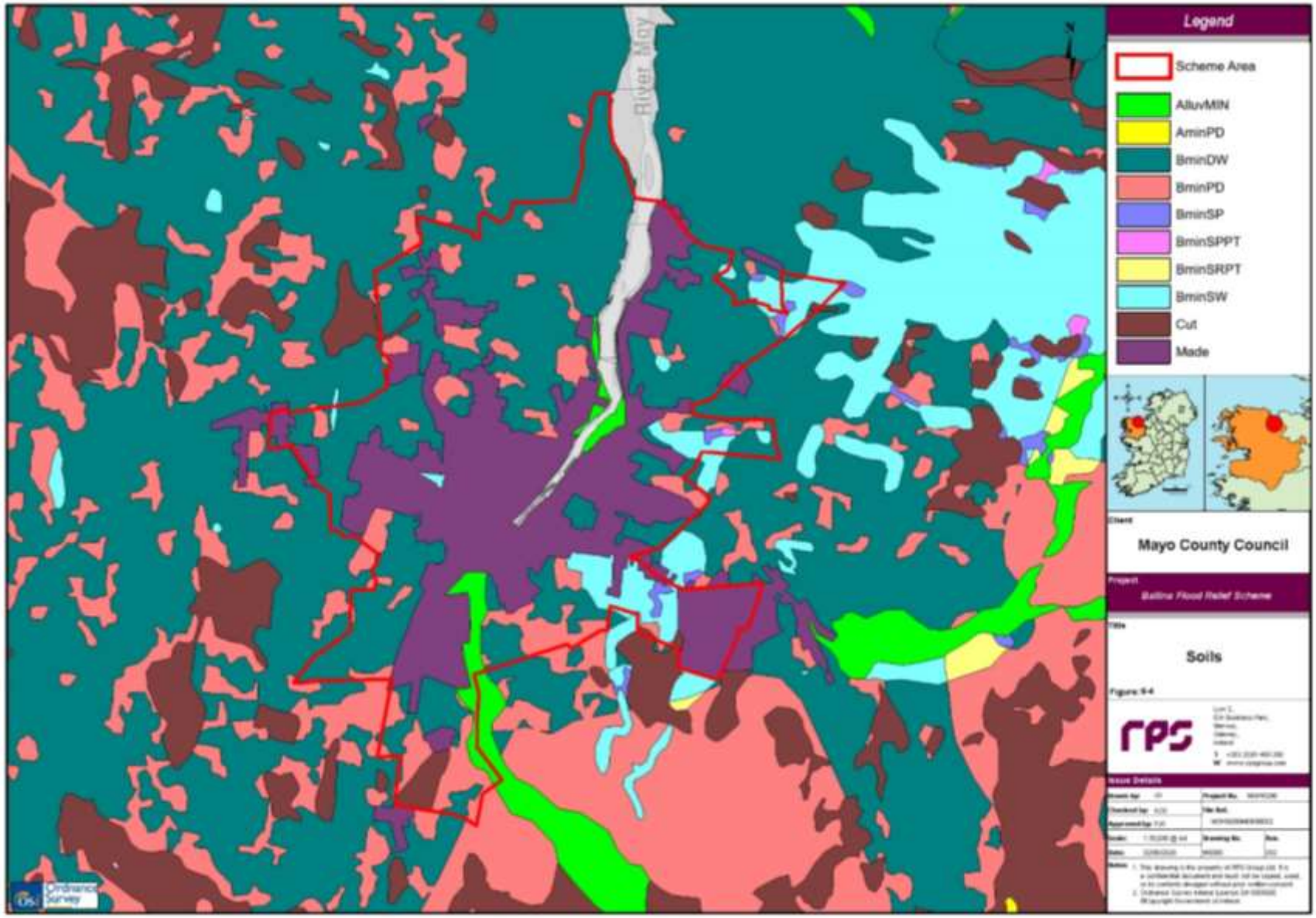


Figure 6-4: Soils within the Scheme Area

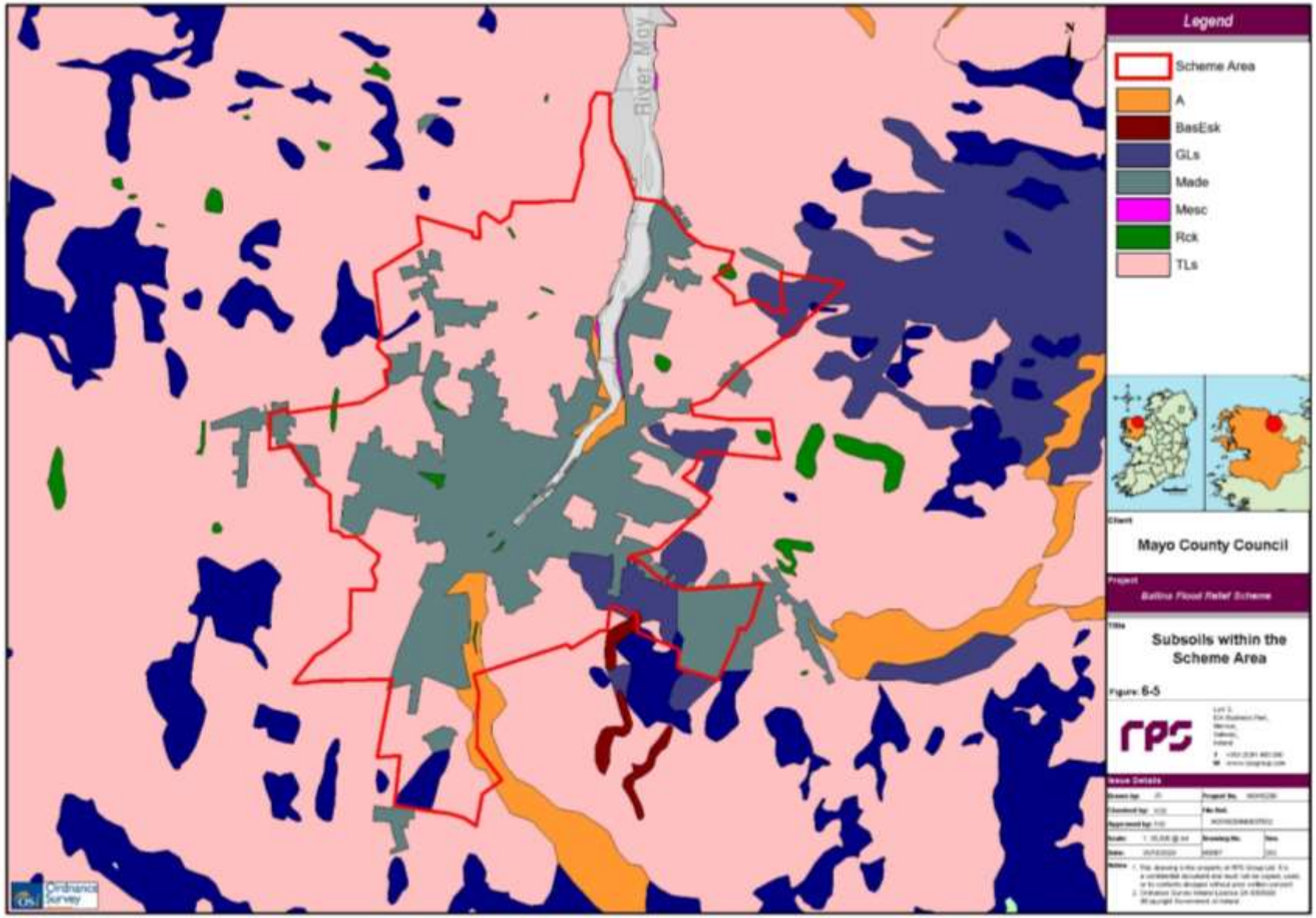


Figure 6-5: Subsoils within the Scheme Area

6.3 Summary of Key Constraint Land, Soils, Geology and Hydrogeology

No Geological Heritage Sites were identified within a 5km ZoI of the scheme area

The scheme area is dominated by made ground, deep well drained mineral soil derived from mainly basic parent materials (BminDW) and Mineral Alluvium soils adjacent to waterbodies. The other soil types present within the scheme area are listed in **Section 6.2.8.** The subsoils comprise made ground, Limestone Till (Carboniferous) (TLs) and alluvium.

Construction associated with soft and made ground soil types will require adherences to best practice and construction standards to avoid any potential negative impacts. Interaction with potential contaminated ground must also be considered as part of the scheme development.

The bedrock geology of the scheme area is composed entirely of Ballina Limestone Formation. The entirety of the scheme area is located within a Regionally Important Aquifer-Karstified (RK). The scheme area is dominated by high groundwater vulnerability and there is an area of moderate in the south east. There are patches of extreme vulnerability and rock at or near surface or karst scattered throughout the scheme area.

Cognisance must be given to the constraints posed by the presence of the varied groundwater vulnerability areas, karstified nature of the landscape and poorly drained mineral soils of the scheme area, of which will require further assessments. Due consideration is to be given to any design and option selection process to avoid any negative adverse impacts to these receptors.

Geotechnical investigation will be carried out once the potential flood relief measures are developed in order to identify local geology and ground conditions.

7 WATER

7.1 Introduction

This section identifies the key constraints within the scheme area relating to water resources including hydrology and drainage.

This section should be read in conjunction with the assessments presented within the Biodiversity Soils Geology and Hydrogeology sections of this report.

7.2 Methodology

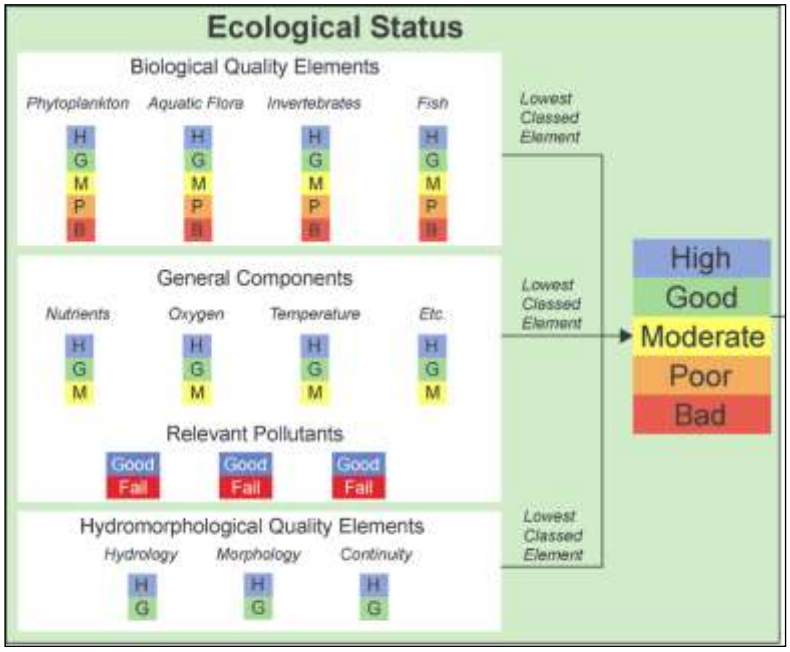
The hydrological and drainage features of the scheme area were determined by consulting the following data sources:

- OS survey vector, six inch and 'discovery' series mapping; Aerial photography;
- The Office of Public Works (www.floodmaps.ie);
- River Basin Management Plan 2018-2021 (https://www.housing.gov.ie/);
- Ballina Main Drainage Scheme As-Constructed Drawings
- IW InfoNet Drainage Maps
- Water Framework Directive (WFD) national website and Water Maps viewer; (www.wfdireland.ie); and
- Environmental Protection Agency, (https://www.epa.ie/).

This section discusses the surface waterbodies that flow through the scheme area. Water quality data of the waterbodies associated with the scheme area is detailed in **Table 7-1**. The surface waterbodies found within the scheme are shown in **Figure 7-1.** Details on infrastructure associated with the surface water bodies, i.e. water treatment and waste water treatment, are considered in **Section 9 - Material Assets: Non-Agricultural.**

7.2.1 Water Quality and the Water Framework Directive

Directive 2000/60/EC (the Water Framework Directive) was adopted by the European Parliament and Council in 2000. The Water Framework Directive (WFD) establishes a legal framework for the protection, improvement and sustainable management of inland surface waters, transitional waters, coastal waters and groundwater. The aim of the WFD is to prevent the deterioration in the existing status of waters (including the maintenance of "High Status" where it exists) and to ensure that all waters, with some limited exceptions, achieve at least "Good Status", see graphic below.



The scheme area lies within the WFD Catchment number 34, Moy & Killala Bay. This catchment includes all streams entering the tidal water in Killala Bay between Benwee Head Co. Mayo and Lenadoon Point, Co. Sligo, and the area drained by the River Moy draining a total area of 2,352km². Castlebar is the largest urban area in the catchment. The other main urban centres are Ballina, Swinford, Crossmolina, Foxford, Tubbercurry, Kiltimagh, and Enniscrone.

The River Moy (EU waterbody Code: IE_WE_34M021100) is a significant watercourse which navigates through Ballina town. The EPA Surface Water Quality database indicates that the River Moy has a "*Moderate*" water status (Q3-4)[22] and is *'Not at Risk.'*

The River Moy joins with the Moy Estuary within Ballina town. The Moy Estuary is classified as having a '*Moderate*' water status and is '*At Risk*' of not achieving the WFD objectives. The Farrannoo, Quignalecka, Bunree, Brusna, Quignamanger and Knockanelo all flow directly into the Moy Estuary. The Brusna has a *Good* (Q4) water status and the Knockanelo has a *Moderate* (Q3-4) water status. They are both '*Not at Risk'* of achieving their WFD objectives. The four other watercourses are currently under review.

The Garrankeel, Ballina, Belleek, Ardoughan and Knocklehaugh are also located within the scheme area. Knocklehaugh is directly connected to the River Moy and the three other watercourses are directly connected to the Moy Estuary. Ardoughan and Belleek both have '*Moderate*' water status (Q3-4) and are '*Not at Risk'* of achieving their WFD objectives. The three other watercourses are currently under review.

Ardnaree and Tullyegan both flow directly into the River Moy. Ardnaree has a '*Moderate*' water status (Q3-4) and is '*Not at Risk'* of achieving its WFD objectives. Ardnaree is currently under review.

Refer to **Figure 7-1** and **Table 7-1** for details on locations and status of watercourses within the scheme area. Water Framework Directive Status mapping can be seen in **Figure 7-2**: Water Framework Directive Status Map

There is an Urban Waste Water Treatment Plant (UWWTP), Ballina WWTP (Site ID: D00160) located in the north of Ballina town. Bachelor's Walk Pumping Station pumps stormwater to this UWWTP via a rising main.

The Ballina drainage network includes significant sections of combined sewer system which contains a number of Storm Water Overflows (SWOs) and Pumping Station Emergency Overflows which discharge into the River Moy SAC..

[22] https://gis.epa.ie/EPAMaps/ (Accessed on 20/4/20)

Table 7-1: Surface Watercourses and Waterbodies within the Scheme Area

Local/ EPA Name	EU_CD	River/ Transitional Waterbody WFD Status 2013-2018	WFD Risk Score	EPA Q-value 2018 (macroinvertebrate quality)	Monitoring Location
Moy Estuary	IE_WE_420_0300	*Moderate*	At Risk	-	Arran Bridge (RHS), Upstream of Ballina WWTP at jetty MY010 – Moy Estuary nr Ballina WWTP Outfall (MY15) Upstream of Ballina WWTP MY015 – Ballina Treatment Outfall Downstream of Ballina WWTP MY020 – Ice House, Crocketstown MY030 – Crocketts Quay
River Moy	IE_WE_34M021100	*Moderate*	Not at Risk	Q3-4 - Moderate	1km u/s Ardnaree Bridge (LHS)
Brusna River	IE_WE_34G010200	*Good*	Not at Risk	Q4 – Good	Bunree Bridge
Tullyegan	IE_WE_34T8309-20		Review	-	-
Garrankeel	IE_WE_34R0102-00		Review	-	-
Quignalecka	IE_WE_34R0102-00		Review	-	-
Ballina	IE_WE_34R0102-00		Review	-	-
Ardoughan	IE_WE_34M021100	*Moderate*	Not at Risk	Q3-4 - Moderate	1km u/s Ardnaree Bridge (LHS)
Knockanelo	IE_WE_34M021100	*Moderate*	Not at Risk	Q3-4 - Moderate	1km u/s Ardnaree Bridge (LHS)
Ardnaree	IE_WE_34M021100	*Moderate*	Not at Risk	Q3-4 - Moderate	1km u/s Ardnaree Bridge (LHS)
Knocklehaugh	IE_WE_34T8309-20		Review	-	-
Bunree	IE_WE_34D3109-90		Review	-	-
Belleek	IE_WE_34M021100	*Moderate*	Not at Risk	Q3-4 - Moderate	1km u/s Ardnaree Bridge (LHS)
Quignamanger	IE_WE_34D3109-90		Review		-
Farrannoo	IE_WE_34R0102-00		Review	-	-

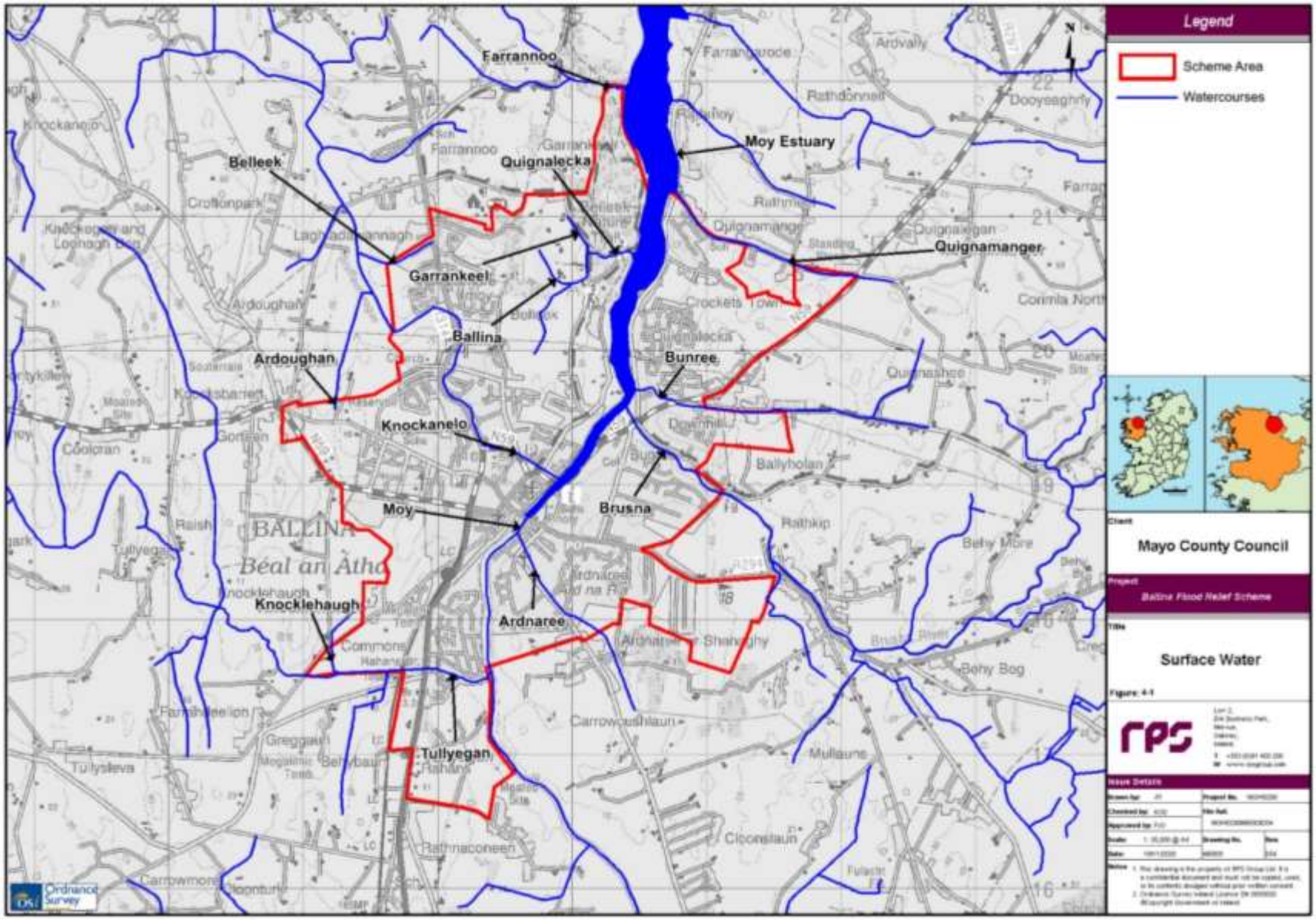


Figure 7-1: Surface Water within the Scheme Area

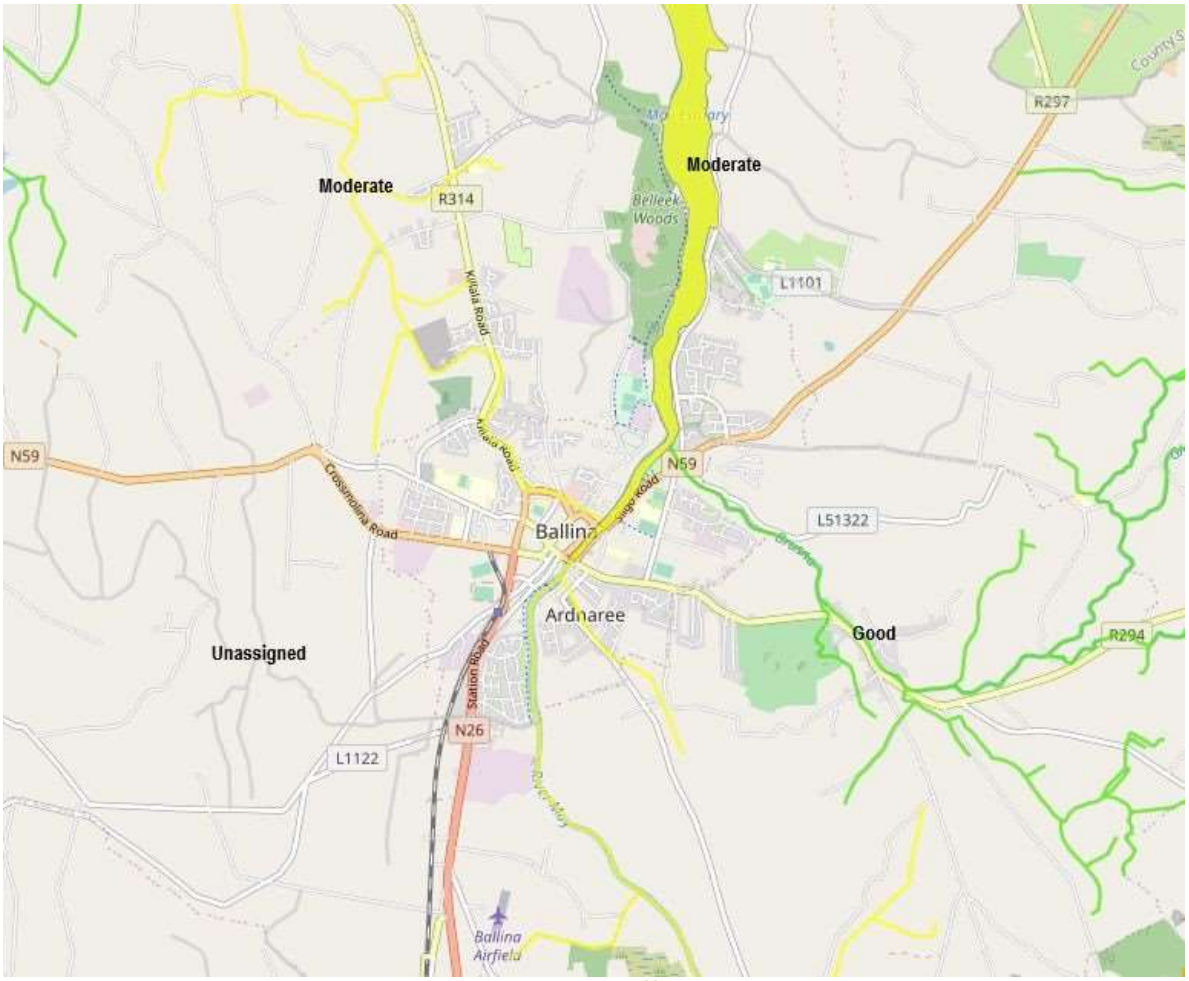


Figure 7-2: Water Framework Directive Status Map[23]

7.2.2 Fisheries

Aquaculture is a commercial industry within Killala Bay, downstream of the scheme area northern boundary, near Killala.

The River Moy has long been famous as Ireland's premier Salmon river. Most of the main Moy channel, and some of its larger tributaries provide excellent spring Salmon and grilse fishing are Designated Salmonid Waters under S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations 1988. Sea trout are also abundant in the River Moy.

7.2.3 Surface Water Designations

Enniscrone Beach, downstream in Killala Bay and Ross Beach are Designated Bathing Waters (IEWEBWC420_0000 _0100 and IEWEBWC420_0000_0200). An area within in Killala Bay is a Designated Shellfish Water (IE_WE_420_0000) under the European Communities (Quality of Shellfish Waters) Regulations, 2006, as amended. The designated shellfish area within the Bay is 2.5 km^2 in area. It comprises an area of the River Moy Estuary and Killala Bay, (up to the high-water mark), from the western point of Bartragh Island south to Kilroe and from the townland of Bullockpark, northeast to Bartragh Island.

[23] https://gis.epa.ie/EPAMaps/Water accessed 25/11/2020

7.2.4 Nutrient Sensitive Water

The flood relief works are not taking place in or near nutrient sensitive waters.

7.2.5 Aquatic Species

White-clawed Crayfish, sea lamprey, brook lamprey, salmon and otter are listed as the QI species for the River Moy SAC and Sea Lamprey is also a QI of Killala Bay/ Moy Estuary SAC. Further details on aquatic species are addressed above under Biodiversity in **Section 5.3.6.3.**

7.2.6 Flooding

The Office of Public Works Past Floods Database (https://www.floodinfo.ie/) and information provided in the brief was used to obtain information on the flood history of the scheme area. The OPW indicative flood maps were used to identify areas that had the potential for significant flooding within the scheme area and to identify areas where hazards of flooding are likely due to historical flooding of those areas. The OSI Historical[24] Mapping dataset was also consulted to investigate whether any areas are liable to flooding. As shown in **Figure 7-3**, Ballina town has undergone numerous flood events of various degrees of severity over the years. The River Moy historically overflowed its banks at two locations in Ballina town. **Table 7-2** describes historical flood events within Ballina.

Table 7-2: Historical Flood Events within Ballina.

Flood Event	Flood Type	Flood Source
Ballina – Bachelors Walk	Recurring	Coastal/ Estuarine Waters
Ballina – Howley Street	Recurring	Coastal/ Estuarine Waters
Moynallty Ballina	Dated Flood – 01/11/1989	Coastal/ Estuarine Waters
Flooding in Ballina	Dated Flood - 18/12/13 and 03/01/14	

Figure 7-3: Historical Flood Events within the scheme area (source www.floodinfo.ie)

[24] https://www.osi.ie/products/professional-mapping/historical-mapping/ (Accessed 30/03/20)

The OPW undertook a National Catchment Flood Risk Assessment and Management (CFRAM) Programme to give a clear and comprehensive picture of flood risk in areas of potentially significant flood risk and to set out how to manage the flood risk effectively and sustainably.

The Programme focussed on 300 communities at potentially significant flood risk, referred to as Areas for Further Assessment (AFAs). These were identified through a national screening exercise and include in the order of 80% of properties at risk in Ireland from rivers and seas, the primary sources of flooding in Ireland. 90 of these 300 areas were coastal areas. Ballina was identified as one such AFA.

In consultation with Local Authorities the OPW, assisted by engineering consultants, embarked on extensive and detailed analysis to assess and map the risk of flooding in the AFAs. These maps were informed by public consultation, including a statutory consultation in November 2015

Flood Risk Management Plans were prepared for 29 River Basins (including Moy & Killala Bay which contains Ballina) set out the proposed measures, both structural and non-structural, to manage the flood risk in each of the 300 AFAs.

Flood maps for the area can be found in **Appendix D**.

7.3 Drinking Water

The scheme area for Ballina FRS is located within drinking water (groundwater) area, IE_WE_G_0035. Steps will need to be taken to ensure that construction work does not impact upon the integrity and quality of this groundwater supply.

Groundwater recharge within Ballina town is variable with the scheme are being predominantly made up of a groundwater recharge of 159mm/year and 477mm/year. This is illustrated in **Figure 7-4.**

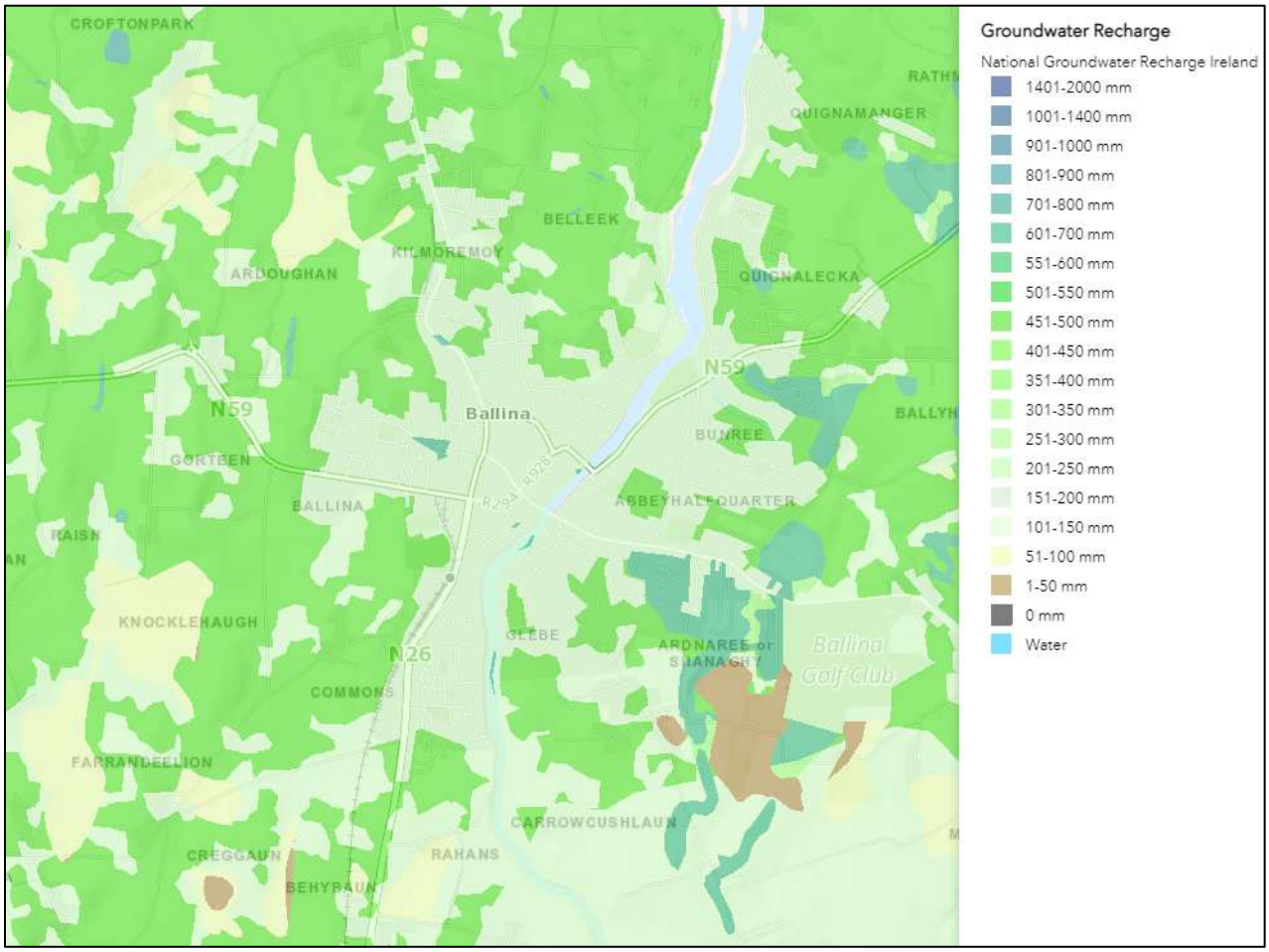


Figure 7-4: Groundwater Recharge in Ballina

7.4 Summary of Water Constraints

The main surface waterbodies within the scheme area are the River Moy and Moy Estuary as shown in **Figure 7-1.** Fisheries are an important part of Ballina therefore access and water quality standards will need to be maintained to allow this sector to continue to thrive in the area.

These will require the application of design standards and construction best practice in order to avoid degrading any surface or groundwater quality rating for the scheme area.

The Tullyegan, Garrankeel, Brusna and Quignamanger watercourses all flow into the River Moy (SAC) in the scheme area. The River Moy flows in a northwardly direction joining the Moy Estuary within the scheme area. Moy Estuary then flows northwards into Killala Bay.

The River Moy is currently at '*Moderate'* status and the Moy Estuary is currently at '*Moderate'* status as per the River/ Transitional Waterbody WFD Status 2013-2018. Biological water quality baseline studies will be carried out during the option selection stage at locations where works are likely to be carried out.

Moy Estuary is designated as part of the Killala Bay/ Moy Estuary SAC/ pNHA and Killala Bay/Moy Estuary SPA. The River Moy is designated as part of River Moy SAC. These are located within the scheme area therefore the potential for likely significant effects to these European sites must be assessed and demonstrated that significant adverse effects will not occur as a result of any proposed flood relief solution. Lackan Saltmarsh and Kilcummin Head SAC will also need to be assessed in this manner; however, any possible impacts are likely to be indirect as opposed to direct. Designated Shellfish Water (IE_WE_420_0000) could be impacted by a potential pollution event, this could in turn cause a public health event. The likelihood of these events are extremely low however they are possible.

Flood relief works have the potential impact on the biology, water quality, hydrology, and morphology of watercourses. Where required, suitable mitigation measures must be developed for the project in line with best practice measures in order to avoid negative impacts to water quality.

The scheme area is within drinking water (groundwater) area, IE_WE_G_0035. Measures will need to be taken to ensure that construction work does not impact upon the integrity of this groundwater source.

8 AIR, CLIMATE AND NOISE

8.1 Introduction

This section identifies the constraints associated with the proposed scheme in relation to Air, Climate and Noise. Identifying the potential sensitive receptors at this stage in the process allows them to be taken into account in the design process to avoid or minimise adverse impact on sensitive receptors.

8.2 Methodology

This assessment has been carried out by means of a desktop review of available mapping from the proposed scheme and the designated area of study with reference to potential constraints. Relevant heading criteria assessed were sourced from the guidance document, '*Guidelines on the information to be contained win Environmental Impact Assessment Reports* as published (Draft, 2017)[25]'.

8.3 Existing Environment and Key Constraints

8.3.1 Air Quality

Constraints with regards to Air and Nosie from the proposed scheme are largely concerned with the potential for impacts to sensitive receptors. In the assessment of constraints, the sensitive receptor locations for Air Quality include areas of residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present.

Under the Clean Air for Europe Directive (2008/50/EC) EU Member States must designate "Zones" for the purpose of managing air quality. For Ireland, four Zones have been defined in the Air Quality Standards Regulations (2011); A, B, C and D. These zones are largely categorised based on population counts derived from 2011 CSO Census as follows;

- **Zone A**: Dublin
- **Zone B**: Cork
- **Zone C**: Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise.
- **Zone D**: Rural Ireland; i.e. the remainder of the State excluding Zones A, B and C.

Air quality is classified using a four-band scale of; Good, Fair, Poor, and Very Poor. The scheme area is located in Zone D. The closest air quality monitoring location is in Castlebar, Co. Mayo. The Castlebar site is currently in use and is located on the John Moore Road to the south of the town centre. Ozone, nitrogen oxides and PM_{10} are monitored at this location. The air quality for this location was classified as "*Good*"[26].

During the construction stage of the project the air quality of the area could be negatively impacted by dust particles that rise from works, this impact will be temporary and localised to the area of works.

Air pollution from construction activities may also affect the sensitive habitats in the vicinity of the works. Due to the largely urban scheme area, construction sites will be limited in size and the amount of plant and machinery that can be used will be limited. Therefore, potential impacts from air pollution will be to sensitive ecological receptors within 200m[27] of the works, which includes Killala Bay/ Moy Estuary SAC/ pNHA and the River Moy SAC.

It is not envisaged that a flood relief scheme recommended by the engineering study will increase the volume of traffic within the scheme area in the long term. During the construction phase of the project, there will likely be impacts to traffic movement in proximity to the works. The contract documents will

[25] https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf
[26] https://gis.epa.ie/EPAMaps/default - Accessed: 20th April 2020.

[27] Guidance for the treatment of Air Quality during the Planning and Construction of National Road Schemes' (NRA 2011)

need to include constraints around timing and phasing of works to minimise the potential impacts on traffic flows through the town.

It is not envisaged that a flood relief scheme will have a long-term detrimental effect on air quality in the scheme area. Any impacts to air quality will be short term and temporary.

8.3.2 Climate

Flooding is a natural process, but is a significant risk to people, the economy and our environment and cultural heritage. It is likely that climate change will have a significant impact on flood risk in Ireland.

Accelerated sea level rise is being observed and is projected to continue to rise into the future, increasing risk to our coastal communities and assets. It is projected that the number of heavy rainfall days per year will increase, which would lead to an increase in both fluvial and pluvial (urban storm water) flood risk.

From the Mayo Climate Adaptation Strategy[28], climate change is a major challenge for County Mayo and poses a major risk to communities, businesses, environment and way of life.

Flooding is a largest source of climate related impact and loss around the County, particularly in Ballina, which is exposed to fluvial flooding. There are also knock on effects to the environment, economy and social activities as a result of incremental changes to climate.

These include changes in the timing of seasonal life cycle events for animals and plants, agricultural shifts effecting food production process, longer term impacts of precipitation, temperature change and extreme events in infrastructure, clean water and human well-being.

The Adaptation Strategy will play a key role in promoting the transition from planning to implementation of adaptation and the mainstreaming of climate adaptation across Mayo County Council.

In 2019, the OPW published the *Climate Change Sectoral Adaptation Plan for Flood Risk Management* (*2019 - 2024)*. This plan was prepared under the Climate Action and Low Carbon Development Act, 2015, and the National Adaptation Framework, 2018, in line with the Sectoral Planning Guidelines for Climate Change Adaptation.

This Plan considers the impacts of climate change on flooding and flood risk, as well as on flood risk management and identifies 21 adaptation actions needed to ensure effective and sustainable management of flood risk into the future. These actions include ongoing research and assessment of the potential impacts of climate change for flooding and flood risk, the consideration of these impacts in the development and implementation of ongoing and future flood risk management measures, and coordination with other sectors and local authorities as part of a whole of Government approach to sustainable and effective flood risk management. The objectives of the Plan are as follows:

- **Objective1:** Enhancing our knowledge and understanding of the potential impacts of climate change for flooding and flood risk management through research and assessment.
- **Objective 2:** Adapting flood risk management practice to effectively manage the potential impact of climate change on future flood risk
- **Objective 3:** Aligning adaptation to the impact of climate change on flood risk and flood risk management across sectors and wider Government policy

As part of the Ballina FRS detailed scheme development, design and implementation, there is a requirement to assess the adaptation options to the potential impacts of climate change and for a draft Scheme Climate Change Adaptation Plan (SCCAP) to be prepared on foot of these assessments The SCCAP is to be prepared in consultation with the Climate Action Regional offices.

The assessment and the draft SCCAP should determine the most robust strategy and design for short-term investment in flood risk management measures, taking account of the range of mid- to-long-term future investments that may be necessary. This will help ensure that future flood relief works are sustainable and resilient to climate change.

[28] https://www.mayo.ie/getmedia/ede67b0e-a4e4-4e7c-a40b-fb1fcbdfd00c/Mayo-Climate-Adaptation-Strategy.pdf

8.3.2.1 Rainfall and Temperature

Ireland has a wet temperate oceanic climate. Met Eireann provides annual temperature and rainfall data which can be accessed on their website[29]. The nearest weather station is located at Knock Airport. The annual temperatures and precipitation amounts are set out in **Table 8-1** and **Table 8-2** below.

Table 8-1: Total Rainfall data in mm for Knock Airport

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2020	122.5	277.4	117.6	21.0	30.8	126.8	159.6	104.9	75.4	178.8	115.2		**984.8**
2019	93.2	99.2	182.4	96.5	78.1	114.2	85.9	207.6	116.7	104.6	103.0	174.0	**1455.4**
2018	201.0	101.3	63.6	112.9	67.3	54.1	82.6	140.2	104.2	103.3	136.9	139.3	**1306.7**
2017	55.4	87.6	134.9	23.6	65.4	113.0	134.3	144.3	170.6	122.0	135.4	156.2	**1342.7**
mean	135.4	102.9	118.1	81.6	92.0	91.5	95.7	107.9	111.3	141.3	134.2	141.4	**1353.3**

Table 8-2: Mean temperature in degrees Celsius for Knock Airport

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2020	5.0	4.2	5.1	9.3	11.4	12.3	12.6	14.6	12.0	8.6	7.7		**9.4**
2019	5.0	6.5	6.0	8.3	10.2	11.7	15.0	14.0	12.2	8.4	5.5	5.2	**9.0**
2018	4.1	2.8	3.9	7.7	11.7	15.0	14.8	13.5	10.9	8.8	6.4	6.5	**8.9**
2017	5.2	5.0	7.1	8.1	11.9	12.8	13.6	13.2	11.5	10.2	6.3	5.0	**9.2**
mean	4.0	4.2	5.7	7.3	10.0	12.2	13.9	13.7	12.0	8.9	6.2	4.3	**8.5**

8.3.3 Noise

The Environmental Noise Directive (2002/29/EC) sets out the obligation of member states to assess and manage environmental noise and is the main EU instrument to identify noise pollution levels. The directive mandates that Member States must prepare and publish, every 5 years, noise maps and noise management action plans for:

- Agglomerations with more than 100,000 inhabitants;
- Major roads (more than 3 million vehicles a year);
- Major railways (more than 30,000 trains a year); and
- Major airports (more than 50,000 movements a year, including small aircrafts and helicopters).

[29] https://www.met.ie/climate/available-data/monthly-data accessed 03/09/2020

Mayo County Council produced a Noise Action Plan 2018-2023, this plan states that within Mayo County there are three primary routes that could be noted as Major roads N5 (Westport to Longford), the N17 (Charlestown to Galway) and the N26 (Ballina to Swinford). The Rail Network running to Ballina does not reach 30,000 trains per year and therefore is not considered under the Noise Action Plan, no major airport is located within the scheme area. Based on the information provided in this plan, roads are the leading cause of noise pollution in Ballina.

The noise environment in the scheme area arises from activities associated with an urban area and busy road network and quieter suburban residential areas.

There will be no noise impacts associated with the operational stage. Significant noise levels will arise during construction (mainly caused by machinery) but they will be temporary and restricted to machinery operating in specific areas. Noise impacts will be temporary in nature and will be minimised using operating procedures in BS5228: Noise and vibration control on construction sites – Part 1 Noise. The location of the proposed scheme within an urban environment with existing noise impacts, reduces the significance of the noise constraints of the works. Some vibration impacts may arise during construction. A pre-construction survey of vibration sensitive properties such as the Abbey and control measures outlined in BS5228: Part 2 Noise and vibration control on construction sites – Part 2 Vibration will be utilised to control any potential impacts.

8.4 Noise, Vibration and Air Pollution on Biodiversity

The movement of plant and vehicles may cause disturbance to wildlife through noise pollution and vibration. Temporary disturbance of fauna, potentially causing them to abandon their habitat, can result from the increased noise and human activity levels associated with heavy machinery and the construction works. Vibration may also cause disturbance to aquatic species and habitats. However, due to the short duration, and nature and scale of the works, the effects from noise and vibration on the ecological receptors is thought to be minimal.

Air pollution from construction activities may affect the sensitive habitats in the vicinity of the works. The principal pollutants of concern which originate from construction plant and machinery are the nitrogen oxides (NOx), in terms of impact on sensitive ecosystems. Nitrogen oxides (NOx) may have a positive or negative impact by acting as a fertiliser or a phytotoxicant. Effects are mainly on vegetation growth, photosynthesis, and nitrogen assimilation/metabolism. Due to the largely urban scheme area, construction sites will be limited in size and the amount of plant and machinery that can be used at any one time will be limited. Therefore, potential impacts from air pollution will be to sensitive ecological receptors within 200m (NRA, 2011) of the works.

Dust or particles falling onto plants can physically smother the leaves affecting photosynthesis, respiration and transpiration. Due to the proximity of sensitive ecological receptors, air pollution from construction activities may affect the sensitive habitats in the vicinity of the works. The NRA's '*Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes'* (2011) sets out the assessment criteria for the impact of dust emissions from construction activities, with standard mitigation in place; this is shown in **Table 8-3.**Table 8-3: Assessment Criteria for the Impact of Dust Emissions from Construction Activities, With Standard Mitigation in Place

Table 8-3: Assessment Criteria for the Impact of Dust Emissions from Construction Activities, With Standard Mitigation in Place[30]

Source		Potential Distance for Significant Effects (Distance from source)		
Scale	Description	Soiling	Pm_{10}	Vegetation Effects

[30] Source: Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes - National Roads Authority (2011)

Source		Potential Distance for Significant Effects (Distance from source)		
Major	Large construction sites, with high use of haul routes	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul routes	50m	15m	15m
Minor	Minor construction sites, with limited use of haul routes	25m	10m	10m

Source: Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes - National Roads Authority (2011)

8.5 Summary of Air, Climate and Noise Constraints

The construction phase poses the greatest potential impact to air quality within the scheme area.

However, these impacts will be short term in nature and with the adherence of best practice construction measures will create minimal impact. Due to the nature of the works it is not envisaged that the operational phase will impact upon the surrounding air quality.

As the proposed scheme will be taking place in an urban environment which is already subjected to noise and vibration from passing traffic, it is not anticipated that the proposed scheme will greatly impact on the existing levels, therefore, not deemed a significant constraint.

The potential impacts to biodiversity from noise, vibration and air pollution will be assessed further as the scheme progresses. However, impacts to ecological receptors from these pollution sources are thought to be short term and localised.

The FRS assessment and the draft SCCAP should determine the most robust strategy and design for short-term investment in flood risk management measures, taking account of the range of mid- to-long-term future investments that may be necessary. This will help ensure that future flood relief works are sustainable and resilient to climate change.

9 MATERIAL ASSETS: NON-AGRICULTURAL

9.1 Introduction

Material assets can be defined as economic assets of natural and human origin, or cultural assets of a physical and social type. This section identifies the constraints aspects of the proposed scheme in relation to material assets with particular reference to transport infrastructure, utilities and non-agricultural land use. It identifies the existing material assets and also aims to ascertain any key proposals for future development of material assets within the scheme area I.e. new roads, water mains etc that may pose a constraint to works associated with the flood relief scheme in the future.

Material assets within the scheme area include:

- Utilities;
- Roads and Transportation network;
- Waste water infrastructure;
- Waste management facilities;
- EPA facilities;
- Potable water infrastructure; and
- The build environment.

9.2 Methodology

The following sources of information were consulted in the assessment of material assets within the scheme area:

- EPA online mapped Licensed facilities (waste, IPPC);
- TII;
- Mayo County Council website; and
- EPA Waste Water Discharge License Applications for Waste Water Agglomerations within the scheme area.

9.3 Existing Environment and Key Constraints

9.3.1 Utilities

Utilities in the scheme area include water supply networks, telecommunications, storm and foul sewers, electricity supply and gas pipelines. The potential for conflict with such utilities will be investigated during assessment of viable options and scheme design.

9.3.2 Road and Transport Network

9.3.2.1 Rail Network

Ballina railway station is located in the south west of Ballina town on station road which is within the scheme area. The station is the terminus of the Dublin to Ballina service.

9.3.2.2 Road Network

There are three primary routes in Ballina including the N5 (Westport to Longford), the N17 (Charlestown to Galway) and the N26 (Ballina to Swinford). The N59 is the western route between Sligo Town and Galway City and traverses Ballina, east to west.

9.3.2.3 Airports and Ports

There are no airports or runways located within the scheme area. There are also no ports located within the scheme area.

9.3.3 Water and Wastewater Infrastructure

There is an Urban Waste Water Treatment Plant (UWWTP) [EPA reg no D0016-01] located in the north of Ballina town. This WwTP was assigned a “pass” grade by the EPAs Urban WWT 2014 assessment. There are seven WW Pumping Stations within the agglomeration.

Eight storm water overflow discharge points are located within the scheme area as identified in the Wastewater Discharge License for the town. There is one primary effluent emission point *from the WWTP) located at Irish grid reference E125171, N320226.

The majority of the water supply for the town of Ballina comes from the Wherrew Water Treatment Plant (WTP) located on the shores of Lough Conn with a portion of the Ballina area served by the Lisglennon WTP. There is a reservoir and a number of Booster Pumping Stations within the town including at Crofton Park, Behy Road and Castleconner.

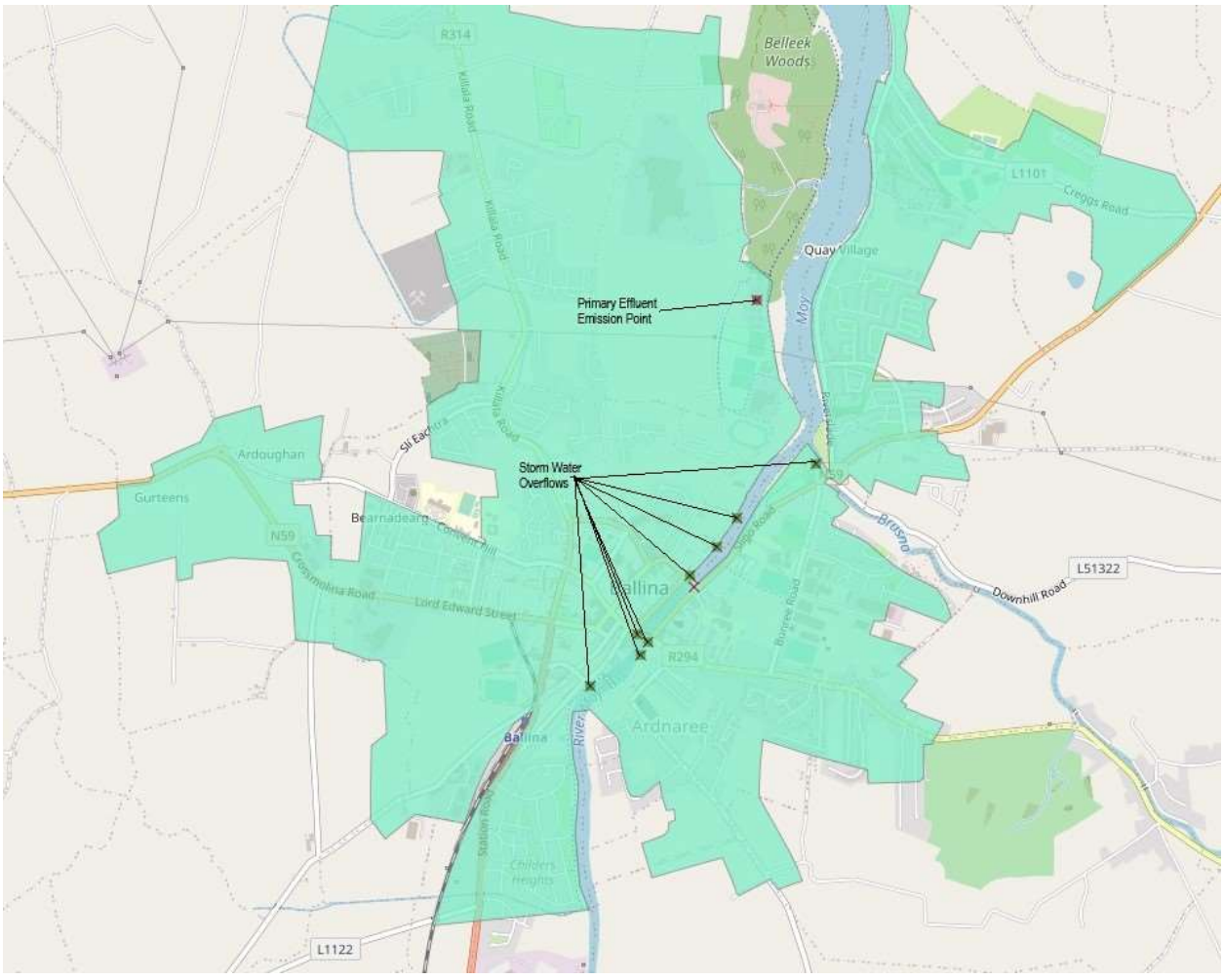


Figure 9-1: Effluent and Stormwater Emission Locations

9.3.4 Waste Management

Rathroeen Landfill [EPA reg no. W0067-02 is located to the north east of Ballina and is a licensed landfill by the EPA for the management of waste.

9.3.5 EPA licenced Facilities

The following EPA licenced facilities are as follows:

- Thomas Archer (Ballina) Limited [EPA reg no P0360-01] is located in the east of Ballina town on Bunree road and is licensed for Industrial Emissions. Licence has been surrendered.
- Henniges Elastomers Ireland GmbH [EPA reg no. P0243-01] is located at the western edge of Ballina town on the Crossmolina Road and is licenced for Industrial Emissions.
- Hollister ULC [EPA reg no. P0918-01] is located just south of Ballina at Rehins, Foxford Road and is licenced for Integrated Pollution Control.
- Rathroeen Landfill [EPA reg no. W0067-02 is located to the north east of Ballina and is a licensed landfill.

9.4 Summary of Key Material Assets: Non-agricultural Identified Constraints

The primary constraints within the scheme area are the existing utilities and existing transport infrastructure. Early consideration of how options can integrate or avoid with the existing material assets in the area is essential and will require engagement with service providers to ensure that utilities can be avoided and/ or modified to mitigate impacts.

Regard must also be had to future changes that are likely to take place in the scheme area e.g. through the Water Services Investment Programme, investment by Transport Infrastructure Ireland, Irish Rail, EirGrid etc

It is not anticipated that the proposed scheme will interact or result in any negative impacts caused to the Material Assets – Non-Agricultural receptors in proximity of the scheme area.

10 MATERIAL ASSETS: AGRICULTURE

10.1 Introduction

This section presents the agricultural constraints associated with the scheme.

10.2 Methodology

The following information was considered during the assessment of agricultural constraints within the scheme area;

- Census of Agriculture, 2010;
- CORINE (Co-Ordinated Information on the Environment) 2018;
- 'Google Earth' 2014 to 2018,
- Property Registration Authority of Ireland website; and
- Teagasc EPA Soil & Subsoil Mapping, 2006.

10.3 Existing Environment and Key Constraints

The Census of Agriculture (2010) figures showed a total of 12,458 farms in Co. Mayo. The total area of farmed land including commonage was approximately 383,542 hectares with an average farm size of 22.4 hectares, which is below the national average of 32.5 hectares. There is 68.7% of County Mayo in agricultural use. In 2016, 68.4% of the specialist sheep farms were located in the Border, Midland and Western (BMW) region, the average sheep flock size was 118 sheep. There was 37.4% of Ireland's cattle population located in the BMW region with an average herd size of 47 cattle[31]. Farming practices in Mayo are outlined in **Table 10-1** below.

Table 10-1: Farming Practices in Mayo[32]

Enterprise Type	Number of Farms	Percentage of Total (%)
Specialist tillage	19	<1%
Specialist dairying	312	2.5%
Specialist beef production	7,497	60.2%
Specialist sheep	2,272	18.2%
Mixed grazing livestock	1,372	11.1%
Mixed crops and livestock	33	<1%
Mixed field crops	913	7.3%
Other	40	<1%
Total	**12,458**	**100**

The CORINE (Co-Ordinated Information on the Environment) land cover mapping was generated and is maintained by the European Community (EC). The impetus for this mapping was to provide a comparable and standardised data source of geo-spatial information across the European environment, with the most recent iteration of the land use and habitat classification data series made available in 2018 (Referred to

[31] http://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2013/
[32] Data sourced from the 2010 Census of Agriculture

in this report as CORINE 2018). **Figure 4-4** illustrates the CORINE (2018) land cover distributions across the scheme area and it is described in **Section 4.3.1**.

Aerial photography was searched for any identifiable farming practices, such as, dairy paddock systems and internal roadways, circular collecting yards, large galvanised sheds, horse facilities and pig and poultry housing.

At this stage of the project there are no details on the extent of land ownership and therefore the size of any farms is not known, however the scheme area is largely urban and impacts to agricultural lands and practices is thought to be minimal.

10.4 Key Constraints Material Assets: Agricultural Identified Constraints

It is evident from the desk study that intensive agricultural practices are not common within the scheme area. “Google Earth” was used with maps spanning 2014-2018 and “Bing Maps” with imagery dating 2020. It can be noted that based on the lack of intensive agricultural practices in the proposed study site, impacts to soils will not be discussed in more detail on an agricultural basis. See **Chapter 6** for any further information on soil types associated with the scheme area. At this stage of assessment, it is not anticipated that the proposed scheme will interact or result in any negative impacts caused to the agriculture receptors in proximity of the scheme area.

11 CULTURAL HERITAGE

11.1 Introduction

UNESCO define the term 'Cultural Heritage' as encompassing several aspects of tangible assets (*immovable:* archaeological sites and monuments, architectural heritage buildings; *movable:* artefacts; and *underwater:* shipwrecks and ruins) and intangible assets (e.g. folklore, oral tradition and language). Broadly, 'Cultural Heritage' includes the designated and non-designated heritage categories of (i) archaeology (known and unknown), (ii) architectural (built) heritage and (iii) history and folklore.

This section presents the cultural heritage constraints within the scheme area.

11.2 Methodology

This study has been compiled based on the Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes and Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes as published (2005) by Transport Infrastructure Ireland (TII) and is based on a desk study analysis.

The objective of the constraints study is to identify all known archaeological monuments, protected (architectural) structures and other features of cultural heritage significance within the defined scheme area including the legal status, if any, of these features. Ultimately this shall serve to inform the Design Team of all relevant heritage constraints, including sites vulnerable to impact.

The desktop study sought to identify all recorded archaeological monuments, architectural heritage structures, surveyed gardens/demesnes and significant cultural heritage features within the scheme area, and the legal status of same is presented below. An archaeological and historical overview of the scheme area is provided, along with discussion of key significant constraints and identifiable areas of heritage note. The collated information shall provide a cursory insight into the historical development of the scheme area over time and shall assist in an overall evaluation of potential presence of hitherto unrecorded cultural heritage sites.

The Record of Monuments and Places (RMP) for County Mayo, published by the Archaeological Survey of Ireland, was the principal sources consulted for identifying known archaeological sites. The Record of Protected Structures (RPS) and the National Inventory of Architectural Heritage (NIAH) for County Mayo were also consulted to assess the designated architectural heritage resource within the scheme area.

In addition, the following sources were consulted as part of the desktop study:

- *National Museum of Ireland (NMI) Findspots (2010):* this GIS dataset (in progress) provided via www.heritagemaps.ie records the discovery locations and other recorded information on Irish archaeological objects, including those within the museum's collections.
- *Historical publications and cartographic sources:* a cursory review of various published and unpublished sources and historical maps were undertaken.
- *Place names Database of Ireland:* this online database (www.logainm.ie) provides a comprehensive management system for data, archival records and place names research conducted by the State. A review of townlands pertaining to the scheme area was undertaken.
- *Documentary sources:* select published reference material specific to the heritage of the scheme area was reviewed.

11.3 Legal Framework

There are a number of mechanisms under the *National Monument Act 1930* (as amended), the *Heritage Act 1995* and relevant provisions of the *National Cultural Institutions Act 1997*, that are applied to secure the protection of archaeological remains, which are held to include all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes.

The *National Monuments Act 1930* (as amended) secures designation of sites of national significance as National Monuments, enters archaeological sites onto the Register of Historic Monuments (RHM) and the Sites and Monuments Record (SMR); and includes sites in the Record of Monuments and Places (RMP). All RMP sites receive statutory protection under the Act. The Act also allows for the placing of Preservation Orders and Temporary Preservation Orders on endangered sites, which secures

designation protection as that for National Monuments. There are 41 no. RMPs located within the scheme area. Full details pertaining to the archaeological resource and the legal framework are provided in **the Cultural Heritage Report (JCA, 2020).**

Section 3 of the *National Monuments (Amendment) Act 1987* as amended by the Section 18 of the *National Monuments (Amendment) Act 1994* makes specific provision for underwater archaeological objects, including that a person shall not dive on, damage, or generally interfere with, any wreck or archaeological object, except in accordance with a licence issued by the Minister of the Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media under Section 3 (5) of the Act.

Protection of the architectural heritage in Ireland is provided for through a range of legal instruments that include the *Heritage Act 1995*, the *Architectural Heritage (National Inventory) and National Monuments (Misc. Provisions) Act 1999*, and the *Planning and Development Act 2000*. Under the *Planning and Development Act 2000* all Planning Authorities are obliged to keep a 'Record of Protected Structures' (RPS) of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. The relevant development plan pertaining to the scheme area at the time of writing is the *Mayo County Development Plan 2014-2020* which has direct reference to Appendix B RPS listings contained in the *Ballina and Environs Development Plan 2009-2015*. There are 50 no. individual structures protected by RPS designation located within the scheme area, 2 no. of which are also RMP sites and the remaining 48 no. of which are recorded on the NIAH (see below). It is noted that there are 2. no designated Areas of Architectural Conservation (ACAs) located within the town of Ballina per the *Ballina and Environs Development Plan 2014-2020*.

The National Inventory of Architectural Heritage (NIAH) was established to record architectural heritage structures within the State and to advise local authorities in relation to structures of architectural heritage significance within their administrative areas. There are 107 no. NIAH structures located within the scheme area boundary, 48 no. of which are also listed on the RPS. Full detail pertaining to the architectural heritage resource and the legal framework is provided in **Appendix C**.

In December 2015 Ireland ratified the 2003 UNESCO *Convention for the Safeguarding of the Intangible Cultural Heritage*. Ireland's obligations under the 2003 Convention include establishing a *National Inventory for Intangible Cultural Heritage* to protect, promote and celebrate Irish living cultural heritage practices, customs, crafts and traditions. Full details relating to same are provided **Appendix C.**

11.4 Existing Environment and Key Constraints

A summary of the identified recorded cultural heritage constraints pertaining to the scheme area and its immediate environs is presented below. It's also noted that the Ballina Arts Centre and the Mary Robinson Centre (under construction) are both located on the banks of the River Moy.

11.4.1 Archaeological Heritage

There are 41 no. recorded RMP sites and/or their respective Zones of Notification located within the scheme area spanning from the prehistoric to modern periods, see **Table 11-1**, **Figure 11-1** and **Figure 11-2** below.

The prehistoric sites consist of two megalithic tombs (RMP MA030-052001- and RMP MA030-073----), a megalithic structure (RMP MA030-053001-), two mounds (RMP MA030-052002- and RMP MA030-053002-) and a cairn (RMP MA030-054----), eight *eulachan fiadh* or burnt mounds (RMP MA030-098----, RMP MA030-099----, RMP MA030-100----, RMP MA030-101----, RMP MA030-102----, RMP MA030-103----, RMP MA030-106---- and RMP MA030-105----) and a mound barrow (RMP MA030-093----). *Fulachta fiadh* and barrows typically date to the Bronze Age period.

The early to late medieval period is also well represented by two ringforts (RMP MA030-057---- and RMP MA039-024----), four enclosures (RMP MA030-050----, RMP MA030-038----, RMP MA030-039---- and RMP MA039-023----) a late 14th century Augustinian Friary (RMP MA030-074---), the possible medieval site of St Patrick's holy well, saint's stone and cross (RMP MA030-052003-, RMP MA030-052004- & RMP MA030-052005-) next to the main Ballina-Killala road, the recorded tradition of 13th century castle in the grounds of the present day Ballina House (RMP MA030-055---), and an extensive early medieval ecclesiastical complex at Kilmoremoy traditionally associated with St Patrick, comprising two churches (RMP MA030-051001-, RMP MA030-051003-) an enclosure ditch (RMP MA030-051005-), a graveyard and burial ground (RMP MA030-051002- and RMP MA030-051004-) a saint's stone and cross inscribed stone (RMP MA030-051006- and RMP MA030-051007-). Recent archaeological investigations at

Kilmoremoy has also revealed further early medieval and possible Bronze or Iron age activity in a field adjacent to the ecclesiastical site (RMP MA030-051008-).

A small number of post medieval sites have received additional designation as recorded monuments, including a bridge and gate house located on the River Moy (RMP MA030-056001-, RMP MA030-056002-, RPS no. 11, NIAH 31204105) and a monument (RMP MA030-037---- , RPS no. 3, NIAH 31303019) dedicated to the memory of Sir Francis Arthur Knox-Gore, Baronet and Lord Lieutenant of Sligo (1803-1873) within the grounds of Belleek Abbey. The official founding of the town in 1723 led to a thriving port and market town together with the building of the urban built environs relating to same. The 18th and 19th urban core centred around Pearse Street and adjoining streets, and still remains the town core today. In 1817 William Malley brought large trading vessels to Crocketstown which in turn established the town as a seaport. Building continued in the form of St Muredach's Cathedral (1827), Belleek Manor, Ballina House and the Upper and Lower bridges, with thoroughfares also noted to have been established along the banks of the Moy. There are no artefactual findspots noted from within the boundaries of the scheme area, however two gold lunulae have been found immediately to the north in the townland of Farranoo (NMI 1965:30,31) as per www.heritagemaps.ie. Full inventory descriptions of the recorded sites within the scheme area are presented in **Appendix C**.

Table 11-1: Recorded Archaeological RMP sites located within the Scheme Area

RMP Ref.	Townland	Type	Easting (ITM)	Northing (ITM)
MA030-037----	Garrankeel	Monumental structure	525380	820985
MA030-038----	Quignalecka	Enclosure	525709	820827
MA030-039----	Quignalecka, Quignamanger	Enclosure	525740	820816
MA030-050----	Gorteen (Tirawley By.)	Enclosure	523000	819395
MA030-051001-	Kilmoremoy	Church	523885	819920
MA030-051002-	Kilmoremoy	Graveyard	523889	819927
MA030-051003-	Kilmoremoy	Church	523885	819920
MA030-051004-	Kilmoremoy	Burial ground	523717	819875
MA030-051005-	Kilmoremoy	Enclosure	523717	819844
MA030-051006-	Kilmoremoy	Ritual site - holy/saint's stone	523722	819844
MA030-051007-	Kilmoremoy	Cross-inscribed stone	523717	819844
MA030-051008-	Kilmoremoy	Excavation - miscellaneous	523956	819996
MA030-052001-	Ballina (Tirawley By.)	Megalithic tomb - unclassified	524057	819710
MA030-052002-	Ballina (Tirawley By.)	Mound	524057	819711
MA030-052003-	Ballina (Tirawley By.)	Ritual site - holy well	524005	819744
MA030-052004-	Ballina (Tirawley By.)	Cross	523984	819736
MA030-052005-	Ballina (Tirawley By.)	Ritual site - holy/saint's stone	523984	819736
MA030-074001-	Abbeyhalfquarter	Religious house - Augustinian friars	524692	818774
MA030-074002-	Abbeyhalfquarter	Building	524692	818774
MA030-074003-	Abbeyhalfquarter	Graveyard	524695	818787
MA030-091----	Abbeyhalfquarter	Redundant record	524767	818819
MA030-056001-	Abbeyhalfquarter, Ballina	Bridge	524819	819016
MA030-056002-	Abbeyhalfquarter, Ballina	Gatehouse	524816	819019
MA030-098----	Ardoughan	Fulacht fia	523173	819566
MA030-099----	Ardoughan	Fulacht fia	523175	819598
MA030-053001-	Belleek	Megalithic structure	525189	820460
MA030-053002-	Belleek	Mound	525200	820415
MA030-054----	Belleek	Cairn - unclassified	525200	820416
MA030-055----	Ballina (Tirawley By.)	Castle - unclassified	525330	819691
MA030-057----	Quignamanger	Ringfort - rath	526367	820215
MA030-073----	Ballina (Tirawley By.)	Megalithic tomb - unclassified	523762	818182
MA030-093----	Quignalecka	Barrow - mound barrow	526069	819717
MA030-094----	Ballina (Tirawley By.)	Burial ground	523797	819184
MA030-100----	Ballina (Tirawley By.)	Fulacht fia	523529	819401
MA030-101----	Ballina (Tirawley By.)	Fulacht fia	523505	819400
MA030-102----	Belleek	Fulacht fia	524514	820607
MA030-103----	Belleek	Fulacht fia	524523	820566
MA030-105----	Ballina (Tirawley By.)	Burnt mound	523922	819495
MA030-106----	Quignashee	Fulacht fia	526727	820238
MA039-023----	Rahans	Enclosure	524370	816894
MA039-024----	Rahans	Ringfort - rath	524206	816638

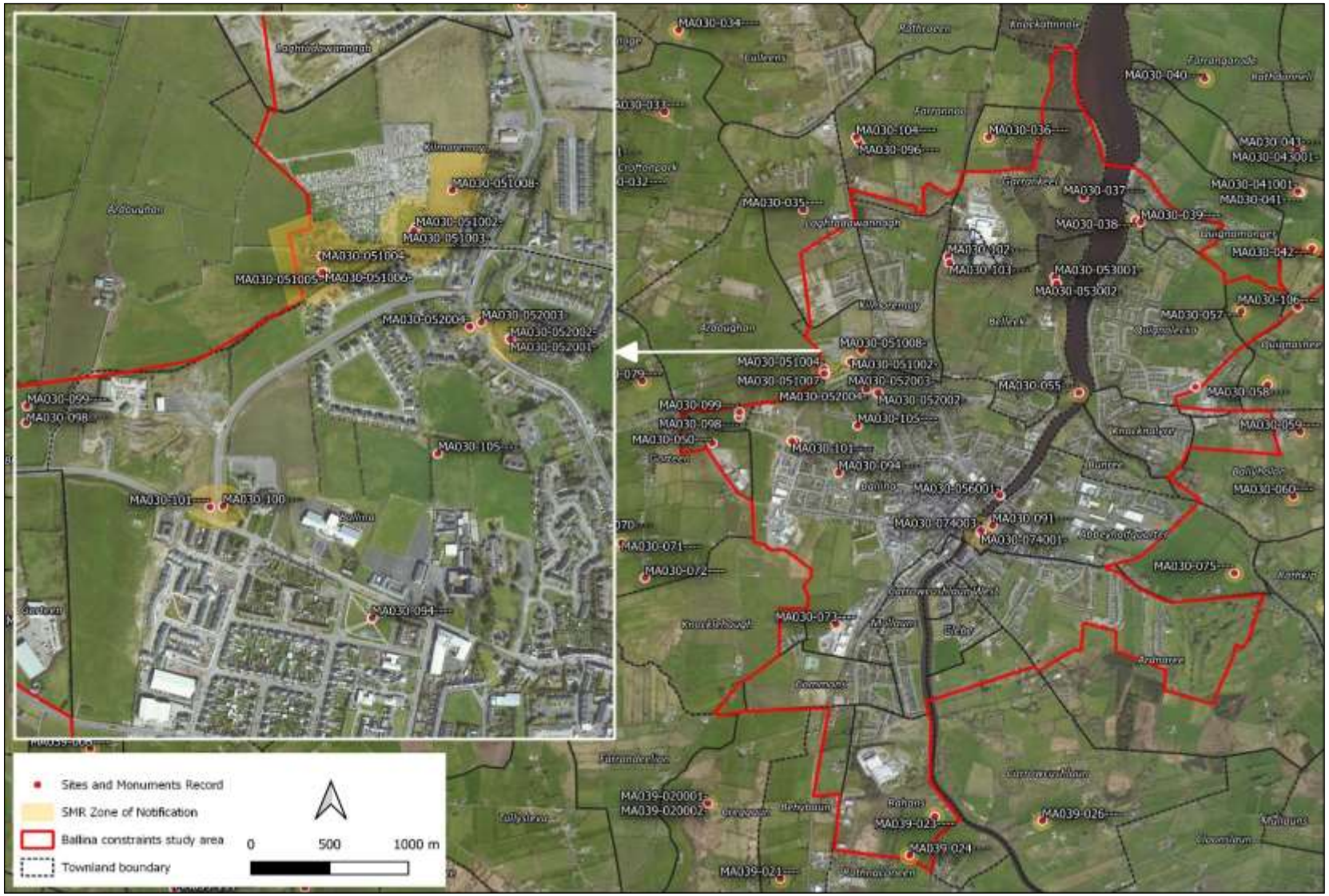


Figure 11-1: Recorded archaeological sites located within the Scheme Area (incl. western zoom)

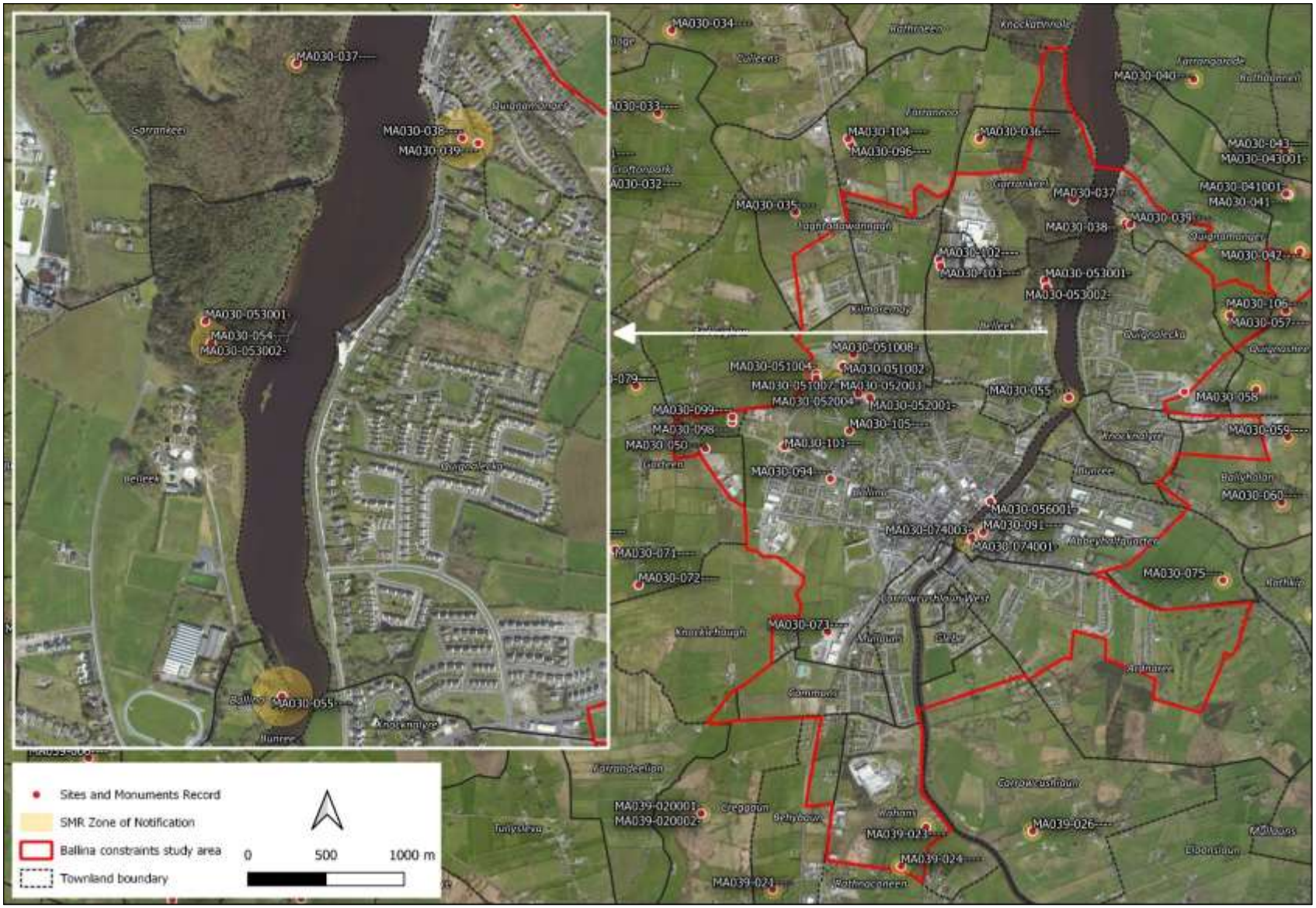


Figure 11-2: Recorded archaeological sites within the Scheme Area (incl. northern zoom)

11.4.2 Architectural Heritage

There are 50 no. structures listed on the RPS per the *Mayo County Development Plan 2014-2020 and Ballina & Environs Development Plan 2009-2015* that are located within the scheme area (see **Table 11-2** and **Figure 11-3** below). There are 107 no. NIAH structures located within the scheme area, 48 no. of which are also listed on the RPS (see **Table 11-2** and **Figure 11-3**) below. These include two country houses: 'Belleek Manor' (formerly 'Abbey') and its demesne (RPS 2 & 4/NIAH 31303017, 31303018, 31303022) and 'Ballina House' (formerly 'Belleek Castle') (RPS 7/NIAH 31303024).

The ACA areas of the urban core and layout of Pearse Street and adjoining streets, as well as the Quays at Crocketstown are notable areas of heritage significance.

A First World War concrete ship, the SS Creteboom (RPS 1/NIAH 31303025), an Ice House (RPS 5/NIAH 31303029) and three bridges (RPS 6/NIAH 31303031, RPS 11/NIAH 31204105, and RPS 33/NIAH 31204104) are all located on the River Moy and its tributary, the Brusna River.

The majority of recorded built heritage within the scheme area reflects the late 19th century development of the town of Ballina and includes commercial and residential properties as well as landmark structures such as Saint Muredach's Catholic Cathedral (RPS 29/NIAH 31204113), Ballina Courthouse (RPS 39/NIAH 31204018), Ballina Railway Station (NIAH 31204022), and the Vaughan Jackson Monument (RPS 40/NIAH 31204025). Full NIAH inventory details are presented in **Table 11-2**.

The demesne of 'Belleek Manor '(formerly 'Abbey') is also listed in the NIAH Garden Survey (Survey ID 4647).

It is noted that there is another 'named' house ('Rahans House') sited within the townland of the same name within the southern portion of the scheme area on the 1st edition 6 inch OS (*c*. 1836) and 25-in OS historical mapping (*c.* 1910). The house is depicted as surrounded by a demesne landscape on the western bank of the River Moy on both editions of mapping, however the house is no longer extant.

Table 11-2: Recorded Architectural Heritage sites located within the Scheme Area

RPS Ref	NIAH Ref.	Townland	Type	Easting (ITM)	Northing (ITM)
1	31303025	GARRANKEEL	Building misc	525598	821335
2	31303017	GARRANKEEL	Country house	525172	821081
2	31303018	GARRANKEEL	Stables	525136	821101
4	31303022	BELLEEK	Gate lodge	525054	819530
5	31303029	QUIGNALECKA	Building misc	525480	820418
6	31303031	BUNREE, KNOCKNALYRE OR DOWNHILL	Bridge	525432	819452
7	31303024	BALLINA [TIRA. BY.]	Country house	525263	819685
8	31204119	ABBEYHALFQUARTER	School	525200	819095
9	31204102	BALLINA [TIRA. BY.]	House	524780	819158
10	31204001	BALLINA [TIRA. BY.]	Convent/nunnery	523964	819241
10	31204003	BALLINA [TIRA. BY.]	School	523923	819192
11	31204105	ABBEYHALFQUARTER,BALLINA [TIRA. BY.]	Bridge	524833	818998
12	31204006	BALLINA [TIRA. BY.]	Building misc	523743	818934
13	31204061	BALLINA [TIRA. BY.]	Bank/financial institution	524608	819019
14	31204080	BALLINA [TIRA. BY.]	Church/chapel	524637	818994
15	31204079	BALLINA [TIRA. BY.]	Orphanage/children's home	524625	819002
16	31204066	BALLINA [TIRA. BY.]	Bank/financial institution	524567	818973
17	31204068	BALLINA [TIRA. BY.]	Hotel	524554	818961
18	31204069	BALLINA [TIRA. BY.]	House	524558	818943
19	31204070	BALLINA [TIRA. BY.]	House	524547	818939
20	31204071	BALLINA [TIRA. BY.]	House	524540	818932
21	31204072	BALLINA [TIRA. BY.]	House	524537	818927
24	31204074	BALLINA [TIRA. BY.]	Bank/financial institution	524526	818914
25	31204049	BALLINA [TIRA. BY.]	House	524548	819002
26	31204035	BALLINA [TIRA. BY.]	Outbuilding	524452	819005

RPS Ref	NIAH Ref.	Townland	Type	Easting (ITM)	Northing (ITM)
27	31204108	BALLINA [TIRA. BY.]	House	524654	818899
28	31204109	BALLINA [TIRA. BY.]	House	524661	818903
29	31204113	ABBEYHALFQUARTER	Cathedral	524770	818822
30	31204112	ABBEYHALFQUARTER	Gates/railings/walls	524686	818785
31	31204052	BALLINA [TIRA. BY.]	House	524741	819104
31	31204053	BALLINA [TIRA. BY.]	House	524750	819094
31	31204054	BALLINA [TIRA. BY.]	House	524756	819086
31	31204055	BALLINA [TIRA. BY.]	House	524771	819075
31	31204056	BALLINA [TIRA. BY.]	House	524777	819070
31	31204057	BALLINA [TIRA. BY.]	House	524783	819065
31	31204058	BALLINA [TIRA. BY.]	Store/warehouse	524787	819096
32	31204132	ABBEYHALFQUARTER	House	524667	818725
33	31204104	ABBEYHALFQUARTER,BALLINA [TIRA. BY.]	Bridge	524615	818769
34	31204133	ARDNAREE OR SHANAGHY	House	524652	818513
35	31204103	ARDNAREE OR SHANAGHY,MULLAUNS [TIRA. BY.]	Weir	524498	818599
36	31204134	CARROWCUSHLAUN WEST	Church/chapel	524593	818472
37	31204094	BALLINA [TIRA. BY.]	School	524430	818755
38	31204033	BALLINA [TIRA. BY.]	School	524221	818808
39	31204018	BALLINA [TIRA. BY.]	Court house	524218	818739
40	31204025	BALLINA [TIRA. BY.]	Monument	524226	818847
41	31204098	BALLINA [TIRA. BY.]	Monument	524572	819234
42	-	KILMOREMOY	Medieval Church and Graveyard	523886	819921
43	-	BALLINA (Tirawley By.)	Megalithic Tomb	523762	818182
Co 007 & 3	31303019	GARRANKEEL	Monument	525379	820982
22,23	31204073	BALLINA [TIRA. BY.]	House	524530	818922
former 32	31204026	BALLINA [TIRA. BY.]	House	524265	818867
-	31204097	BALLINA [TIRA. BY.]	Water pump	524335	818570
-	31204002	BALLINA [TIRA. BY.]	Graveyard/cemetery	523986	819352
-	31204008	BALLINA [TIRA. BY.]	House	524001	818840
-	31204009	BALLINA [TIRA. BY.]	House	523971	818847
-	31204010	BALLINA [TIRA. BY.]	House	523949	818851
-	31204012	BALLINA [TIRA. BY.]	House	524181	818732
-	31204013	BALLINA [TIRA. BY.]	House	524176	818742
-	31204014	BALLINA [TIRA. BY.]	House	524184	818751
-	31204015	BALLINA [TIRA. BY.]	House	524186	818757
-	31204016	BALLINA [TIRA. BY.]	House	524188	818765
-	31204017	BALLINA [TIRA. BY.]	House	524190	818771
-	31204022	BALLINA [TIRA. BY.]	Railway station	524093	818384
-	31204023	BALLINA [TIRA. BY.]	Post box	524108	818411
-	31204024	BALLINA [TIRA. BY.]	House	524137	818412
-	31204030	BALLINA [TIRA. BY.]	House	524304	818803
-	31204031	BALLINA [TIRA. BY.]	House	524286	818806
-	31204032	BALLINA [TIRA. BY.]	House	524256	818808
-	31204038	BALLINA [TIRA. BY.]	Shop/retail outlet	524432	818911
-	31204039	BALLINA [TIRA. BY.]	Post box	524415	818953
-	31204040	BALLINA [TIRA. BY.]	House	524392	818975
-	31204041	BALLINA [TIRA. BY.]	House	524384	818988
-	31204042	BALLINA [TIRA. BY.]	House	524485	818921
-	31204043	BALLINA [TIRA. BY.]	House	524485	818930
-	31204045	BALLINA [TIRA. BY.]	House	524509	818956
-	31204046	BALLINA [TIRA. BY.]	House	524523	818968
-	31204050	BALLINA [TIRA. BY.]	House	524597	819047
-	31204059	BALLINA [TIRA. BY.]	House	524730	819075
-	31204064	BALLINA [TIRA. BY.]	House	524577	818985
-	31204065	BALLINA [TIRA. BY.]	House	524572	818980
-	31204075	BALLINA [TIRA. BY.]	House	524503	818900

RPS Ref	NIAH Ref.	Townland	Type	Easting (ITM)	Northing (ITM)
-	31204076	BALLINA [TIRA. BY.]	House	524506	818902
-	31204081	BALLINA [TIRA. BY.]	Manse	524647	818989
-	31204083	BALLINA [TIRA. BY.]	Garda station/constabulary barracks	524635	818962
-	31204084	BALLINA [TIRA. BY.]	House	524469	818857
-	31204085	BALLINA [TIRA. BY.]	House	524464	818844
-	31204086	BALLINA [TIRA. BY.]	House	524453	818826
-	31204088	BALLINA [TIRA. BY.]	House	524449	818874
-	31204089	BALLINA [TIRA. BY.]	Post box	524517	818837
-	31204090	BALLINA [TIRA. BY.]	House	524530	818838
-	31204096	BALLINA [TIRA. BY.]	House	524432	818773
-	31204099	BALLINA [TIRA. BY.]	Post box	524940	819312
-	31204101	BALLINA [TIRA. BY.]	House	524849	819273
-	31204106	BALLINA [TIRA. BY.]	Quay/wharf	524704	818913
-	31204107	BALLINA [TIRA. BY.]	Shop/retail outlet	524611	818867
-	31204110	BALLINA [TIRA. BY.]	Miller's house	524709	818962
-	31204114	ABBEYHALFQUARTER	Cross	524757	818851
-	31204116	ABBEYHALFQUARTER	School	524781	818865
-	31204120	ABBEYHALFQUARTER	House	525188	819227
-	31204121	BUNREE	House	525275	819344
-	31204122	ABBEYHALFQUARTER	House	524682	818750
-	31204123	ABBEYHALFQUARTER	House	524700	818737
-	31204124	ABBEYHALFQUARTER	House	524708	818737
-	31204127	ABBEYHALFQUARTER	Post box	524713	818723
-	31204128	ABBEYHALFQUARTER	House	524857	818653
-	31204129	ARDNAREE OR SHANAGHY	House	524915	818614
-	31204135	CARROWCUSHLAUN WEST	House	524551	818505
-	31204136	ARDNAREE OR SHANAGHY	House	524734	818306
-	31303032	KNOCKNALYRE OR DOWNHILL	Store/warehouse	525477	819463

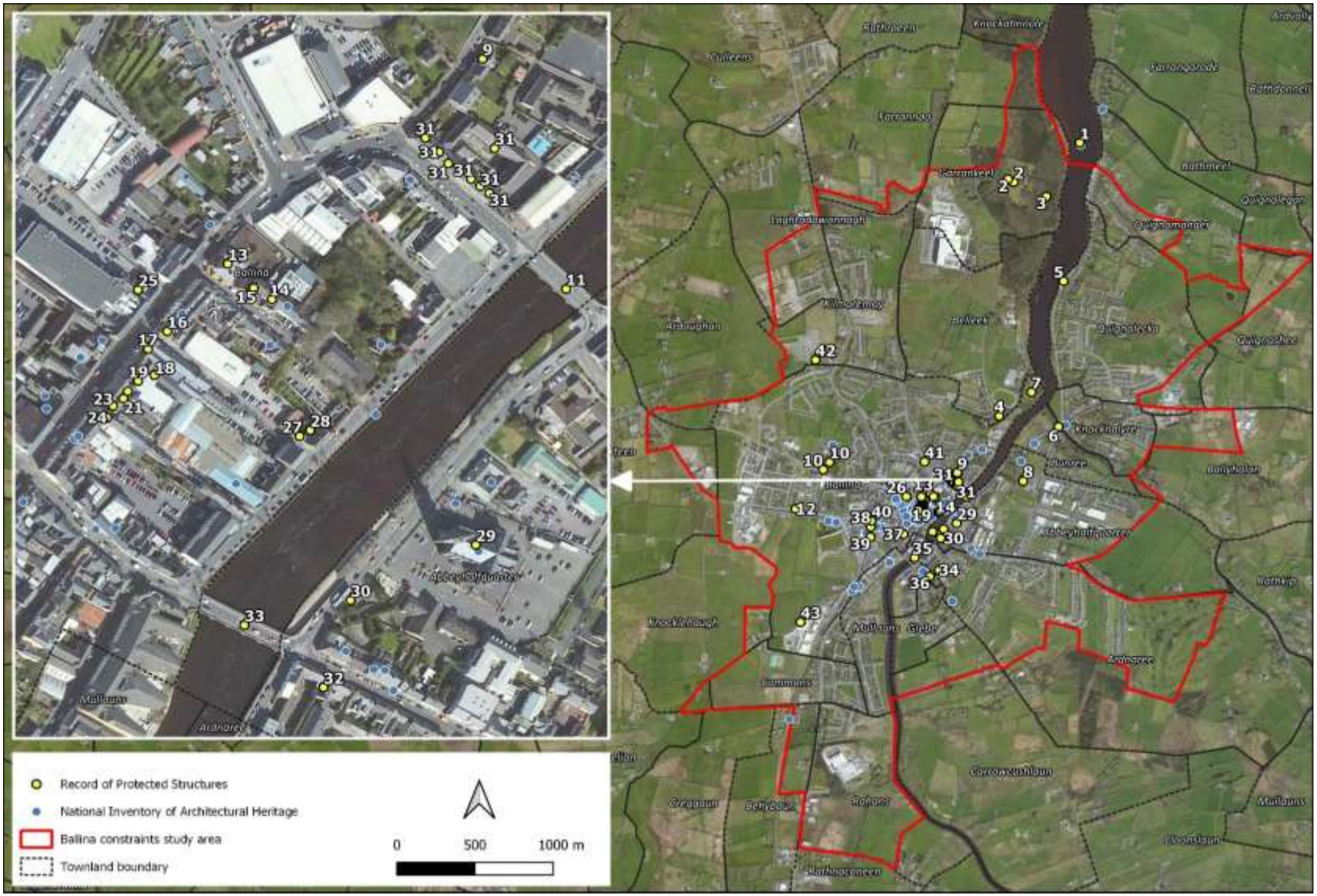


Figure 11-3: Recorded architectural heritage sites within the Scheme Area

11.4.3 History & Folklore

Townlands are the smallest unit of land division in the Irish landscape and many may preserve early Gaelic territorial boundaries that pre-date the Anglo-Norman conquest. The layout and nomenclature of the Irish townlands was recorded and standardised by the work of the Ordnance Survey in the 19th century. The Irish translations of the townland names often refer to natural topographical features, but name elements may also give an indication of the presence of past human activity within the townland.

There are 30 no. townlands represented within the scheme area, and it is also noted that the Moy River itself has formed the historical boundary between the counties of Mayo and Sligo. Although not designated Cultural Heritage features, townland boundaries in their respective built-form can have early medieval origins, whilst the translations of these placenames can add to the overall evidence-base of continued human settlement from prehistoric times into the early/late medieval period. A full set of tabulated townland translations is presented in **Appendix C**.

The translations of the townland names within the scheme area were sourced from www.logainm.ie and record not only topographical features such as 'mouth of the ford' (Ballina), 'rocky place' (Creggaun), 'little field' (Gorteen) and 'land of the flood' (Farrandeelion) but also offer potential indications of the location of known recorded archaeological sites such as the ringforts at Rathmeel and Rathnaconeen. The townland of Kilmoremoy takes its name from the recorded ecclesiastical site MA030-051---; Laghtadawannagh townland takes its name from the burial site of 'the two monks' MA030-035---;, Quignalegan townland takes its name from a standing stone MA030-044---; and similarly, Ardnaree townland refers to 'Hill of the King' or 'Hill of the Executions', said to be the resting place of four maols (who murdered Ceallach, a 7th century Bishop of Kilmoremoy ecclesiastical site), associated with megalithic tomb RMP MA030-073---. Interestingly, there are also folklore tales relating to some of these sites (Kilmoremoy and Quignalegan in particular), as recorded in *The Schools Collection (1937-1939)*. Further details of the folklore collection are presented in **Appendix C**.

11.4.4 Multiple Heritage Designation Sites

Initial examination of the extensive cultural heritage datasets pertaining to the constraints scheme area indicate that there are a number of key sites of notable extant (above ground) remains and of multiple (statutory and non-statutory) designation (RMP status, RPS designation and/or NIAH record). These sites that retain multiple cross-designations (e.g. RMP, RPS and NIAH) can be primary indicators of overall heritage value, importance and significance of the site type and its inherent qualities therein and as such have been identified as notable key sites within the scheme area (see **Table 11-3**).

Of particular note are the bridges and salmon weir to the River Moy (RPS 11/NIAH 31204105/RMP MA030-056001- & MA030-056002-; RPS 33/NIAH 31204104; and RPS 35/NIAH 31204103).

The Lower Bridge (originally New Bridge) RPS 11/NIAH 31204105/RMP MA030-056001- & MA030-056002-; is a four-arch road over river bridge built 1833-35 spanning the River Moy. Prior to the building of same, there was a bridge still extant at this location in the early 18th century when it was recorded by Rev. William Henry (1739) as *'a stately bridge in the midst of which rises a large square tower with a gate and guard room (RMP MA030-056002-) for defence of this pass. The tide flows up the river to this place' (*Source: Historic Environment Viewer). There are no extant remains of the earlier bridge or gatehouse although it is possible that associated underwater heritage features/finds may exist.

The Upper Bridge (originally Arran Bridge) RPS 33/NIAH 31204104 is a five-arch road over river bridge built 1835-36, spanning the River Moy at the southern area of Ballina town environs, and the adjacent Ardnaree Abbey (RMP MA030-074001- to MA030-074003-), located along Cathedral Road. The latter Augustinian abbey would have been an important settlement location during the medieval period. There is a distinct heritage cluster at this location comprising a number both archaeological and built heritage receptors including the abbey site and its respective Zone of Notification, St Muredach's Cathedral, gates and railings; and houses along Abbey Street (see **Figure 11-4**).

Further south, the salmon weir (RPS 35/NIAH 31204103) which is recorded by Lewis[33] *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.

Pearse Street with its linear layout and adjoining streets of Tone Street, Tonal Street, O'Rahilly Street, Casement Street and James Connolly Street retain a number of 18th and 19th century Victorian and Georgian built heritage facades and structures of note, that have been identified as an ACA per the *Ballina and Environs Development Plan 2009-2015*. In addition, another key area of built heritage significance is at Crocketstown or the Quays which also includes the location of the former Ice-House (now a hotel/restaurant) and has also been identified as an ACA per the *Ballina and Environs Development Plan 2009-2015*. The in-river concrete ship remains (built 1919 and sank in 1937) of the SS Creteboom (RPS 1/NIAH 31303025) is located just outside the scheme area, although given its iconic landmark value and historical associations, is worthy of note.

The Knox-Gore Mausoleum located within the grounds of Belleek Castle (RPS 2/NIAH 31303017 & 31303018) is listed in both the *Mayo County Development Plan 2014-2020* (RPS 007) and *Ballina and Environs Development Plan 2009-2015* (RPS 3/NIAH 31303019). Other built structures associated with Belleek Castle include the gate-lodge (RPS 4/NIAH 31303022) as well as the overall designed landscape (Garden ID 4647). The archaeological sites of a cairn, unclassified megalithic tomb and a mound (RMP MA030-054---, RMP MA030-053001- and RMP MA030-053002- respectively) are also located within the demesne grounds, along the west banks of the River Moy. Similarly, another key site, Ballina House (RPS 7/NIAH 31303024) and attendant grounds also retain the remains of the original Belleek Castle (RMP MA030-055---), built against an elevated terrace on the west banks of the Moy, on the north edge of Ballina town. It is sited at a slight bend and narrowing of the river, and opposite to its confluence with a tributary river, the Brusna.

The medieval church and graveyard complex at Leigue, Kilmoremoy is a recorded archaeological site that is also afforded RPS designation (RMP MA030-051001- and RMP MA030-051002- /RPS 42); as does the National Monument (Ref. 145) Cloghogle Portal Dolmen at Primrose Hill (RMP MA030-073---/RPS 43). Both recorded sites have significant heritage value and sensitivities.

[33] Lewis, S. (1837) A Topographical Dictionary of Ireland. Available at https://www.libraryireland.com/topog/B/Ballina-Tyrawley-Mayo.php

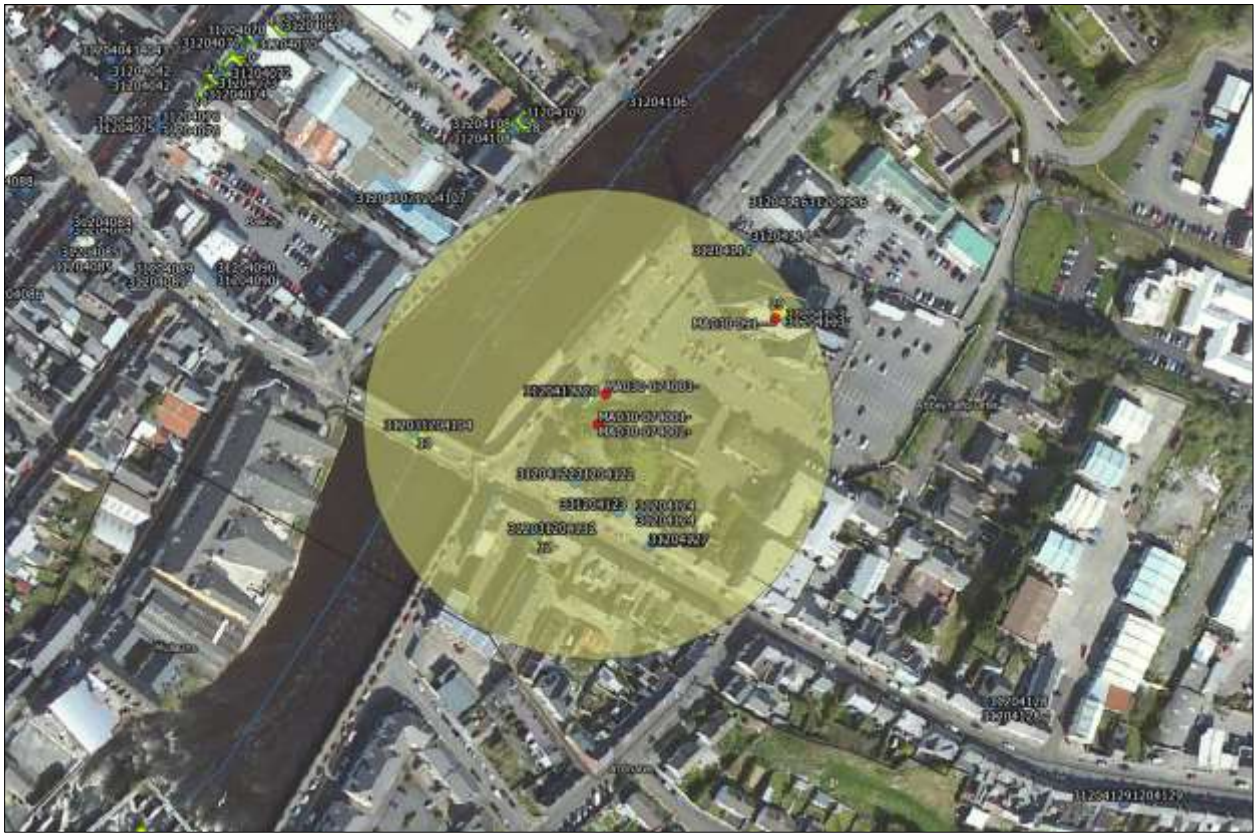


Figure 11-4: Cluster heritage sites along Cathedral Road, Ballina

(yellow diamond: RPS sites, blue dot: NIAH sites, red dot: RMP sites, green: archaeological Zone of Notification)

Table 11-3: Multiple Designation Key Heritage Sites within the Scheme Area

RPS Ref.	NIAH Ref.	RMP Ref.	Townland	Type	Easting (ITM)	Northing (ITM)
1	31303025	-	GARRANKEEL	Building misc	525598	821335
2	31303017	-	GARRANKEEL	Country house	525172	821081
2	31303018	-	GARRANKEEL	Stables	525136	821101
Co 007 & 3	31303019	MA030-037---	GARRANKEEL	Monument	525379	820982
4	31303022	-	BELLEEK	Gate lodge	525054	819530
5	31303029	-	QUIGNALECKA	Ice House	525480	820418
6	31303031	-	BUNREE, KNOCKNALYRE OR DOWNHILL	Bridge	525432	819452
7	31303024	MA030-055---	BALLINA [TIRA. BY.]	Country house	525263	819685
8	31204119	-	ABBEYHALFQUARTER	School	525200	819095
9	31204102	-	BALLINA [TIRA. BY.]	House	524780	819158
10	31204001	-	BALLINA [TIRA. BY.]	Convent/nunnery	523964	819241
10	31204003	-	BALLINA [TIRA. BY.]	School	523923	819192
11	31204105	MA030-056001- & MA030-056002-	ABBEYHALFQUARTER, BALLINA [TIRA. BY.]	Bridge	524833	818998
12	31204006	-	BALLINA [TIRA. BY.]	Building misc	523743	818934
13	31204061	-	BALLINA [TIRA. BY.]	Bank/financial institution	524608	819019
14	31204080	-	BALLINA [TIRA. BY.]	Church/chapel	524637	818994
15	31204079	-	BALLINA [TIRA. BY.]	Orphanage/children's home	524625	819002
16	31204066	-	BALLINA [TIRA. BY.]	Bank/financial institution	524567	818973
17	31204068	-	BALLINA [TIRA. BY.]	Hotel	524554	818961
18	31204069	-	BALLINA [TIRA. BY.]	House	524558	818943
19	31204070	-	BALLINA [TIRA. BY.]	House	524547	818939
20	31204071	-	BALLINA [TIRA. BY.]	House	524540	818932
21	31204072	-	BALLINA [TIRA. BY.]	House	524537	818927
22,23	31204073	-	BALLINA [TIRA. BY.]	House	524530	818922
24	31204074	-	BALLINA [TIRA. BY.]	Bank/financial institution	524526	818914
25	31204049	-	BALLINA [TIRA. BY.]	House	524548	819002
26	31204035	-	BALLINA [TIRA. BY.]	Outbuilding	524452	819005
27	31204108	-	BALLINA [TIRA. BY.]	House	524654	818899
28	31204109	-	BALLINA [TIRA. BY.]	House	524661	818903

RPS Ref.	NIAH Ref.	RMP Ref.	Townland	Type	Easting (ITM)	Northing (ITM)
29	31204113	-	ABBEYHALFQUARTER	Cathedral	524770	818822
30	31204112	MA030-074001- & MA030-074002- & MA030-074003-	ABBEYHALFQUARTER	Abbey, Gates/railings/walls	524686	818785
31	31204052	-	BALLINA [TIRA. BY.]	House	524741	819104
31	31204053	-	BALLINA [TIRA. BY.]	House	524750	819094
31	31204054	-	BALLINA [TIRA. BY.]	House	524756	819086
31	31204055	-	BALLINA [TIRA. BY.]	House	524771	819075
31	31204056	-	BALLINA [TIRA. BY.]	House	524777	819070
31	31204057	-	BALLINA [TIRA. BY.]	House	524783	819065
31	31204058	-	BALLINA [TIRA. BY.]	Store/warehouse	524787	819096
32	31204132	-	ABBEYHALFQUARTER	House	524667	818725
33	31204104	-	ABBEYHALFQUARTER, BALLINA [TIRA. BY.]	Bridge	524615	818769
34	31204133	-	ARDNAREE OR SHANAGHY	House	524652	818513
35	31204103	-	ARDNAREE OR SHANAGHY, MULLAUNS [TIRA. BY.]	Weir	524498	818599
36	31204134	-	CARROWCUSHLAUN WEST	Church/chapel	524593	818472
37	31204094	-	BALLINA [TIRA. BY.]	School	524430	818755
38	31204033	-	BALLINA [TIRA. BY.]	School	524221	818808
39	31204018	-	BALLINA [TIRA. BY.]	Court house	524218	818739
40	31204025	-	BALLINA [TIRA. BY.]	Monument	524226	818847
41	31204098	-	BALLINA [TIRA. BY.]	Monument	524572	819234
42	-	MA030-051001- & MA030-051002-	KILMOREMOY	Medieval Church and Graveyard	523886	819921
43	-	MA030-073---	BALLINA (Tirawley By.)	Megalithic Tomb	523762	818182

11.5 Cultural Heritage Identified Constraints

The purpose of this constraints study is to provide an analysis of the archaeological, architectural and cultural heritage resources within the defined scheme area.

The scheme area is host to a variety of archaeological and architectural heritage assets and there is also potential for the presence of unrecorded archaeological and architectural sites within the scheme area including the Rivers.

The scheme area contains:

- 41 no. recorded archaeological RMP sites and/or respective associated Zones of Notification;
- 50 no. RPS recorded architectural heritage structures;
- 107 no. recorded NIAHs;
- 2 ACAs;
- One National Monument (Ref. 145, RMP MA030-073----); and
- No sites retaining Preservation Orders.

The scheme area contains a number of sites of multiple designation (RMP status, RPS designation and/or NIAH record) as listed in **Table 11-3** above. Of particular note are the following sites that may be impacted by the proposed project:

- the bridges and salmon weir to the River Moy (RPS 11/NIAH 31204105/RMP MA030-056001- & MA030-056002-; RPS 33/NIAH 31204104; and RPS 35/NIAH 31204103);
- Pearse Street ACA and the Quays at Croketstown ACA;
- Belleek Castle and associated archaeological including structures, tombs, gardens etc;
- The medieval church and graveyard complex at Leigue, Kilmoremoy;
- National Monument (Ref. 145) Cloghogle Portal Dolmen at Primrose Hill (RMP MA030-073---/RPS 43);
- A First World War concrete ship, the SS Creteboom (RPS 1/NIAH 31303025);
- An Ice House (RPS 5/NIAH 31303029); and
- Saint Muredach's Catholic Cathedral (RPS 29/NIAH 31204113).

The presence of the river networks would have been particularly attractive to past settlers. This, together with the overall low-lying topography, as well as the evidence-base per recorded RMPs suggest that the scheme area is generally deemed to be of good archaeological potential to retain presently unrecorded archaeological find and features. It is also noted that the watercourses located within the scheme area also retain archaeological potential. Should any flood relief works be required as part of the project, licenced underwater archaeological surveys may be required to assess the potential for unrecorded underwater finds/features therein

Any alternatives/option design considered for the Ballina FRS and subsequent environmental impact assessment, which will involve a desk study and field walkover inspection of archaeological and built heritage receptors, and possibly a (separate) underwater archaeological survey, will ensure that known and extant cultural heritage sites and features are identified, and any potential likely impacts are measured, with mitigation measures detailed for same, as appropriate.

Many sites, with little or no remaining surface expression may still retain well-preserved finds and features below existing ground level. Specific mitigation requirements to address potential ‘unknowns’ can only be identified as items for review once the location of works options is defined. Additional non-intrusive archaeological surveys such geophysical survey may be appropriate if a specific set of investigative questions require more detailed analyses at that stage. At some locations, further exploratory archaeological test excavation may be also considered, either to further augment additional (non-intrusive) survey indicators or, to be adopted in areas where geological bedrock or soil conditions are not conducive to geophysical survey equipment.

12 LANDSCAPE AND VISUAL

12.1 Introduction

This chapter provides a review of constraints relating to landscape and townscape character alongside visual amenity. It includes a review of planning policy and guidance where relevant to the scheme area and the issues that may arise through construction and implementation of the scheme.

12.2 Methodology

This Landscape and Visual Constraints Study includes an appraisal of international, national and local designated landscapes, county landscape character assessments and desktop analysis of topographical and other landscape mapping and datasets. This study identifies the significant features in the landscape which determine its character and includes an analysis of tourism and recreational use. The baseline landscape and visual amenity presented below is informed by the following:

- Any national or other relevant strategies i.e. RSES – refer to any landscape policies for Mayo;
- Current Mayo County Development Plan 2014-2020 and accompanying Landscape Appraisal of County Mayo;
- Ballina Town and Environs Development Plan 2009 to 2015, Variations No 1, 2 ,3;
- Aerial photography; and
- Google maps.

The Landscape Character Map of County Mayo is shown in **Figure 12-1.**

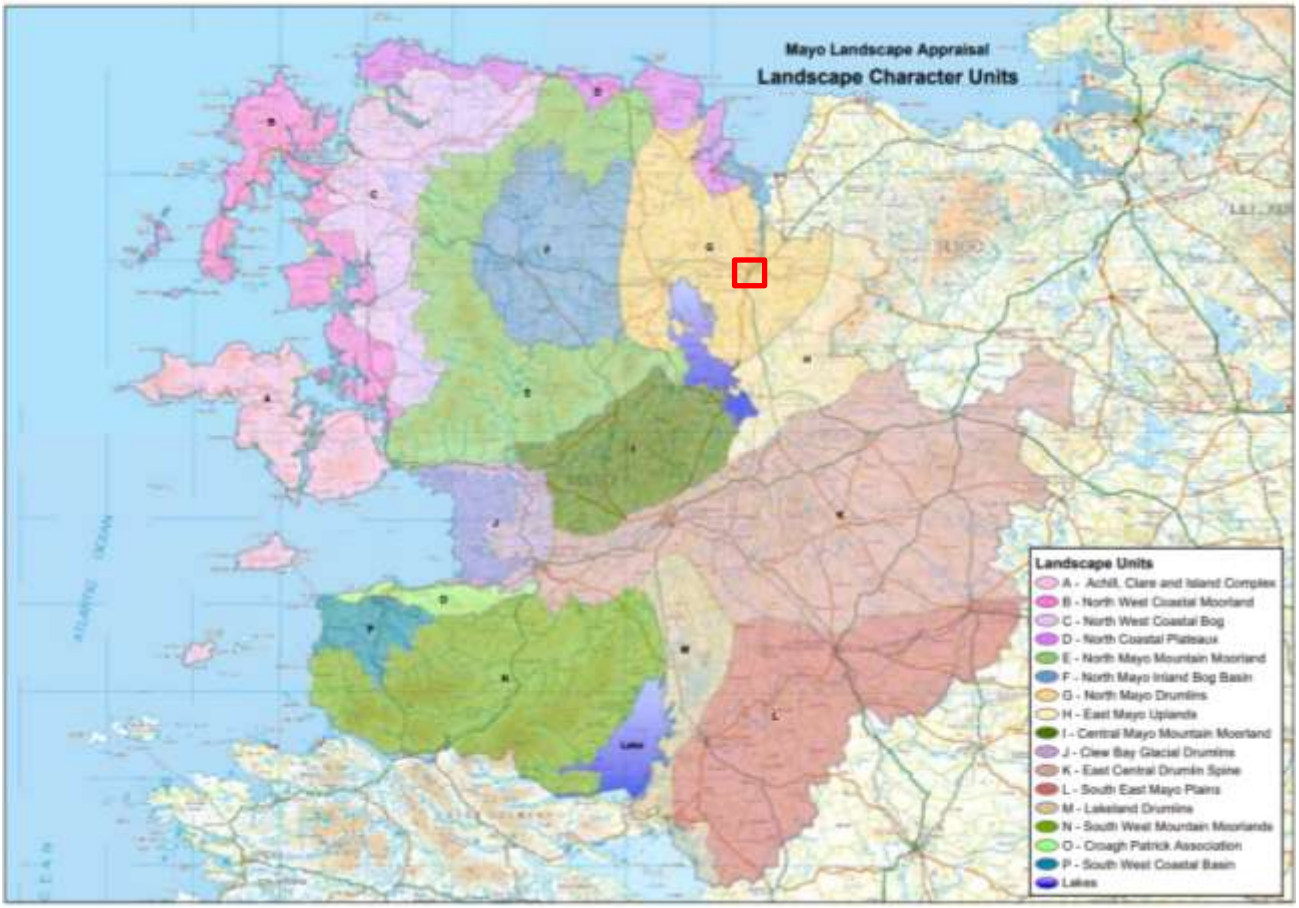


Figure 12-1: Landscape Character Map of County Mayo (Source: Landscape Appraisal of County Mayo)

12.3 Existing Environment and Key Constraints

12.3.1 Landscape Policy at County and Local Level

The relevant landscape policies and objectives at both county and local level are proved in the following sections.

12.3.1.1 Mayo County Development Plan 2014-2020[34]

Objectives:

LP-01 - It is an objective of the Council, through the Landscape Appraisal of County Mayo, to recognise and facilitate appropriate development in a manner that has regard to the character and sensitivity of the landscape and to ensure that development will not have a disproportionate effect on the existing or future character of a landscape in terms of location, design and visual prominence.

VP-01 - It is an objective of the Council to ensure that development does not adversely interfere with views and prospects worthy of preservation and protection as outlined on Map 4, or on the views to and from places and features of natural beauty or interest (e.g. coastline, lakeshores, protected structures, important historic sites) when viewed from the public realm.

Policies:

P-09 - It is a policy of the Council to conserve and enhance the local distinctiveness reflected in the built environment, the natural landscape and the cultural heritage of the Key Towns and to sustainably manage these assets to maximise benefits for all particularity in areas such as improved quality of life, tourism, education and recreation.

12.3.1.2 Ballina Town and Environs Development Plan 2009 to 2015

The Ballina Town and Environs Development Plan 2009 to 2015 (Variations No 1, 2 ,3[35]) highlights the fact that the banks of the River Moy are a strong and distinctive feature of the Town and could be improved and developed. The River is a major amenity and a major part of the general character of the place; the sort of feature that is remembered by a visitor. It also has a major amenity in Belleek Woods. This is enhanced by its riverside location. It is of added value due to its proximity to the town.

The Quay Area is a distinct centre in itself, with a strong and very attractive character enhanced by its river frontage and the trees of Belleek Woods opposite. It has significant unrealised potential, possibly as a tourist focus.

Objectives:

TM1 - It is the objective of Ballina Town Council and Mayo County Council to protect and develop the Moy Fishery and to facilitate its development as an angling, amenity and tourist resource

Policies:

It is the policy of the Council to protect designated scenic landscapes, views, routes and landscape features of local value from inappropriate development

[34] https://www.mayo.ie/getmedia/2bacbcba-ad2d-4b6c-ac01-d0edecebb704/1-1-Document1,29000,en.pdf accessed 02/09/2020
[35] https://www.mayo.ie/getmedia/416a3ec3-bdf8-4594-8e7c-6d5ef5712376/1-Document1,28976,en.pdf accessed 02/09/2020

12.3.1.3 Baseline Landscape Character Areas and Areas of High Landscape Sensitivity or Value

Landscape Character

Figure 12-1 shows the overall landscape character types within County Mayo. The location of the scheme area is shown in red.

The scheme area is located within Landscape Character Unit G, situated in drumlins categorised as Area G – North Mayo Drumlins. The Landscape Appraisal of County Mayo described this area as follows:

Area G: North Mayo Drumlins – *'This area of drumlin topography contains mild low lying lakeland drumlins at the southern end merging into similar coastal topography in the north east surrounding Killala Bay. More severe, steeper drumlins occur around the foothills of the mountains to the north-west and the Ox Mountains to the east. The flood plain of the River Moy is also incorporated within this area. The land cover is dominated by pasture with sporadic areas of moorland and patches of exposed rock in the rugged drumlins to the east. Hedgerows and small patches of scrub and woodland create a patchwork of farmer landscapes in this area*

The main agricultural activity in this area is livestock production. The region is dominated by extensive areas of pasturelands and some pockets of peat bog. This region includes the significant urban settlement of Ballina.

The boundary to the west is defined by a combination of land cover, geology, soil type, and a change to flat bogland topography. To the north west, south west and east, the change in slope and topography are the predominant factors, while to the north the inland limits of directly draining coastal water sheds have been used'.

Critical Landscape Factors include the following:

- *Undulating topography;*
- *Shelter Vegetation;*
- *Prominent Ridge Lines; and*
- *Localised Lake Vistas.*

12.3.1.4 Designations

The shoreline of the River Moy is designated as vulnerable. There is a broad-leaved forest north of Ballina, to the west of the River Moy and agricultural land with significant areas of natural vegetation to the north and south east of Ballina that are designated as sensitive as per the Mayo County Development Plan.

Ballina is denoted as falling under Landscape Protection Policy Area 4 within the County Development Plan. Under Policy Area 4 road projects, rural dwellings, industrial or commercial development, communication masts and forestry al have a low potential to create adverse impacts on the existing landscape character.

12.3.1.5 Views and Sensitive Receptors

Under the Mayo County Development Plan 2014-2020 - VP-01, it is an objective of the Council to ensure that development does not adversely interfere with views and prospects worthy of preservation and protection as outlined on Map 4, or on the views to and from places and features of natural beauty or interest (e.g. coastline, lakeshores, protected structures, important historic sites) when viewed from the public realm. There is one viewpoint located just outside of the scheme area. This viewpoint looks directly at Belleek woods and castle the integrity of this viewpoint will need to be maintained.

The River Moy is also designated as vulnerable and best efforts should be used to keep the integrity of the aesthetic nature so far as is possible.

Within Ballina town, the view of the St Muredach's cathedral from the River Moy, is well known and effort should be made to ensure that the overall impact of this view is not affected by the project.

12.3.1.6 NIAHs, Gardens, Tourist attractions

Belleek Wood Castle is located within the scheme area and is used as a wedding venue, the grounds are regularly used for recreational walking. Further information on NIAH's are discussed in Section 11 above.

12.3.1.7 Townscape

Local Authorities must provide for the preservation of townscapes etc. through designation of ACAs. There are two designated ACAs located within the town of Ballina per the *Ballina and Environs Development Plan 2014-2020.* Pearse Street with its linear layout and adjoining streets of Tone Street, Tonal Street, O'Rahilly Street, Casement Street and James Connolly Street have been identified as an ACA and another key area of built heritage significance is at Crocketstown or the Quays which also includes the location of the former Ice-House (now a hotel/restaurant).

Any changes that materially affect the character of a protected structure will need further assessment and consideration. Further information on ACAs are discussed in Section 11 and Appendix C.

12.4 Conclusion

Cognisance of the sensitive landscape areas present within the scheme area will be required during the option selection process in order not to significantly impact the characteristic features of the landscape character areas present.

The options should also consider how protection of residential views out to the river will be impacted from key areas within the scheme area and how views from within the river to the surrounding landscape maybe impacted i.e. for users of the river (boating etc).

Opportunities to enhance the amenity value of the area should be explored during detailed design.

The design of the scheme must adapt to the receiving environment in any particular location in terms of materials, form, gradient, and new vegetation

13 OTHER CONSTRAINTS

13.1 Waste Management

There will be a requirement to handle, store, remove and dispose of waste material in accordance with the relevant waste management legislation. Waste material will be generated from two sources:

- Wastes resulting from general construction on-site; i.e. waste fuels, oils from machinery, cement and concrete from required masonry works and wastewater from sanitary facilities.
- Excess excavated materials generated from general site clearance and earthwork excavations, including, where necessary, bridge abutments, as well as construction and demolition waste from proposed bridge works and other construction activities.

The nature of the wastes generated from site clearance and earthworks will generally be vegetation, topsoil, subsoil and stone. Where this material is to be stored on-site and reused it is important that it is not stored close to any watercourses or lakes. Any excavated material which is deemed unacceptable for re-use in the works will have to be removed off-site for disposal or for processing and as such may be required to be removed or disposed of under a waste permit or certificate of registration from the local authority.

It is important to ensure that correct procedures for storage and disposal of such wastes and excess materials are noted and implemented.

It is important that the location of any site compounds is assessed as part of the EIAR.

14 INTERACTION BETWEEN THE ENVIRONMENTAL FACTORS AND SUMMARY OF CONSTRAINTS

14.1 Interaction Between Environmental Factors

It is a requirement under of the Article 3(1)(e) of the EIA Directive that the interaction of environmental are assessed. However, in order to fully understand the potential interactions between environmental factors, detailed information on the proposed development is required. The key characteristics of the project will be important in influencing such interaction. In addition, it should also be noted that interactions may only occur at different phases of the project such as at construction stage and operational stage or time of year etc.

The matrix in **Table 14-1** shows the potential interactions between environmental factors. From the matrix below there is potential for interaction between most environmental factors. However, this will be assessed further in environmental assessments to be completed as the project progresses and the characteristics of the project are known.

Table 14-1: Interaction between Environmental Factors

Population and Human Health	✓						
Biodiversity	✓	✓					
Land, Soils, Geology and Hydrogeology	✓	✓					
Water	✓	✓	✓				
Air, Climate and Noise	✓	✓	✓	✓			
Material Assets	✓	✓	✓	✓	✓		
Cultural Heritage	✓	✓	✓	✓	✓	✓	
Landscape	✓	✓	✓	✓	✓	✓	✓
	Biodiversity	**Population and Human Health**	**Land, Soils, Geology and Hydrogeology**	**Water**	**Air, Climate and Noise**	**Material Assets**	**Cultural Heritage**

14.2 Summary of Constraints

There are some environmental constraints that need to be considered before finalising the flood relief scheme option. The main environmental constraints are summarised in **Table 14-2** below.

Table 14-2: Summary of Environmental Constraints

Category	Source	What is the Constraint	How should the Constraint be addressed
Legislative, Planning and Policy	EU and National Legislation National, Regional, County and Local Planning Policy	• Compliance with the Water Framework Directive, Habitats Directive, Birds Directive, Directive on the Assessment and Management of Flood Risks and the EIA Directive will create constraints on the proposed measures to varying degrees depending on the final project and location of same. • Archaeological and Cultural Heritage legislation pertaining to protected structures may constrain proposed structural works.	Throughout the various stages of the process the requirements of the relevant legislation and policy should be adhered to including the constraints, option assessment, EIA, AA etc Consultation with statutory bodies including the NPWS, IFI, OPW, National Monuments Service etc to ensure compliance with legislation.

Category	Source	What is the Constraint	How should the Constraint be addressed
Stakeholders Consultation	Table 3 2 lists the stakeholders contacted as part of this stage in the project and a summary of the submission received.	• In July 2020, a number of the key stakeholders to the project were identified and contacted in writing to inform them that the proposed scheme was being undertaken. The stakeholders were each invited to contribute observations and comments on environmental elements of the project regarding the proposed scheme. • Submissions from consultees may constrain the design an location of FRS measures.	All constraints, observations and comments received from these stakeholders are being considered as part of the environmental assessment of the proposed scheme. Stakeholder will be consulted with throughout the process using various mediums such as mailshots, PCDs, project website etc and the team will engage with stakeholders on particular elements of the design as required.
Population and Human Health	Central Statistics Office, Mayo County Development Plan (2014- 2020) Ballina and Environs Development Plan (2009-2015)	• Properties represent a constraint which should, where practicable, be avoided during the development of options. Residential houses generally represent a considerable constraint and avoidance of residential properties, where possible, is generally the considered best approach. Commercial properties also represent a considerable constraint and in most cases are best avoided. However, extensive properties may be able to absorb a degree of land take and ultimately benefit from improved flood relief infrastructure. • The FRS has the potential to impact community facilities, amenity sites and tourist attractions. • It is not expected that there will be any changes to land use zoning within the scheme area, due to the largely residential and commercial town centre of Ballina. However Future FRS proposals should be cognisant of the Recreational/ Leisure zoned lands adjacent to the River Moy to ensure access to these areas is maintained. • Access to the River for recreational activities and anglers will need to be maintained	The proposed scheme should have consideration of the zoning objectives set out in the Local Area Plan and County Development plan. It is recommended that the location of all properties / facilities, in particular health centres and schools, within the scheme area are considered to ensure services are not interrupted. Scheme design should aim to be sympathetic to the existing land uses. It is necessary to ensure that the Flood Relief Scheme will not adversely affect the value and visual qualities of public amenities within the scheme area, and enhancement opportunities are implemented where appropriate.
Biodiversity	NPWS natural heritage database for designated areas and Rare and Threatened Species Database NBDC, BSBI, New Atlas of the British and Irish Flora databases	• The proximity of designated sites is a significant constraint to the proposed scheme. There is potential connectivity via hydrological and hydrogeological pathways to the following sites; the River Moy SAC, Killala Bay/ Moy Estuary SAC/ pNHA and Killala Bay/Moy Estuary SPA, Lackan Saltmarsh and Kilcummin Head SAC/ pNHA. There is potential for hydrogeological	Avoidance of all designated sites and important ecological features should be prioritised where possible. In the event where works located within or in proximity to designated sites and ecological features appropriate mitigation measures should be implemented to avoid or minimise disturbance. Further surveys and assessments are required for terrestrial and aquatic habitats and species protected under

Category	Source	What is the Constraint	How should the Constraint be addressed
	GeoHive online mapping EPA – water bodies and water quality, Catchments resource GSI – geology, soils and hydrogeology WFD website Conservation status of birds in Ireland (Colhoun and Cummins, 2013) OSI maps and orthophotography Mayo County Development Plan 2014-2020	connectivity between the scheme area and Bellacorick Bog Complex SAC/ pNHA, Lough Conn and Lough Cullin SPA, Cloonagh Lough (Mayo) pNHA, Lough Conn and Lough Cullin pNHA and Lough Alick pNHA as they all intersect Ballina groundwater body. • In addition to the habitats and species protected under designated sites, there are numerous records for rare and protected species which will require further assessments for habitats and protected flora species, Wildlife Act species or species listed Annex II/IV/V of the EU Habitats Directive, as well as protected bird species under the Birds Directive and important bird assemblages that are likely to be found within the scheme area. • Water quality impacts to receiving waters such as the River Moy and Moy Estuary has the potential to significantly impact protected species/ habitats which may be present. • Non-native invasive species listed on the Third Schedule to the EC Birds and Natural Habitats Regulations 2011, as amended were recorded within the scheme area.	Wildlife Act, Annex II/IV/V of the EU Habitats Directive and Birds Directive. When designing the scheme, it will be necessary to ensure that movement of species between identified ecological sites are not impaired by the provision of the Flood Relief Scheme (i.e. fish, mammal, invertebrates etc.). Where works within important waterbodies cannot be avoided timing of works and best site practice should be incorporated into the physical design and construction of the Flood Relief Scheme to minimise pollution risk and alteration of hydrology The NPWS and IFI should be consulted when determining viable options for flood relief and at further stages of scheme development and appropriate mitigation should be determined The requirements of the IFI in their consultation response received on the 29/07/2020 should be considered in the design of the proposed scheme. Further surveys for non-native invasive species will be required to inform the design and to identify potential interactions with the infected sites. A management plan will also need to be prepared to ensure compliance with Regulation 49 of the 2011 Regulations
Soils, Geology and hydrogeology	Geological Survey of Ireland – geology, soils and hydrogeology EPA The Irish Soil Information System Teagasc	• The landcover for the scheme area is dominated by discontinuous urban fabric (CORINE 2018 Code: 112). Agricultural areas (231) are present in patches along the boundary of the scheme area. The centre of the scheme area consists of continuous urban fabric (111), the south east of the scheme area intersects an area of sport and leisure facilities (142), from the north to the centre of the scheme area there is a section of watercourse (522) and the north west of the scheme area intersects an area of mixed forest (313).The scheme area is dominated by made ground, deep well drained mineral soil derived from mainly basic parent materials (BminDW) and Mineral Alluvium soils adjacent to waterbodies. The other soil types present within the scheme area are listed in Section 6.2.7. The subsoils comprise made ground, Limestone Till (Carboniferous) (TLs) and alluvium.	Ground conditions within the scheme area will be identified through geotechnical investigation during the next stages of scheme development. Construction associated with soft and made ground will require adherences to best practice and construction standards to avoid any potential negative impacts. Cognisance must be given to the constraints posed by the presence of the varied groundwater vulnerability areas, karstified nature of the landscape and poorly drained mineral soils of the scheme area, of which will require further assessments. Due consideration is to be given to any design and option selection process to avoid any negative adverse impacts to these receptors.

Category	Source	What is the Constraint	How should the Constraint be addressed
		• The bedrock geology of the scheme area is composed entirely of Ballina Limestone Formation. The entirety of the scheme area is located within a Regionally Important Aquifer-Karstified (RK). • The scheme area is dominated by high groundwater vulnerability and there is an area of moderate groundwater vulnerability in the south east. There are patches of extreme vulnerability and rock at or near surface or karst scattered throughout the scheme area.	
Water	OSI survey vector, six inch and 'discovery' series mapping Aerial photography OPW Works Flood Maps River Basin Management Plan 2018-2021 Ballina Main Drainage Scheme As-Constructed Drawings IW InfoNet Drainage Maps WFD national website and Water Maps viewer EPA waterbody mapping	• The main surface waterbodies within the scheme area are the River Moy and Moy Estuary as shown in **Figure 7-1.** • These will require the application of design standards and construction best practice in order to avoid degrading any surface or groundwater quality rating for the scheme area. • The River Moy flows in a northwardly direction joining the Moy Estuary within the scheme area. Moy Estuary then flows northwards into Killala Bay. Ardnaree and Tullyegan both flow directly into the River Moy. The Farrannoo, Quignalecka, Bunree, Brusna, Quignamanger and Knockanelo all flow directly into the Moy Estuary. The Garrankeel, Ballina, Belleek, Ardoughan and Knocklehaugh are also located within the scheme area. • The River Moy is currently at '*Moderate*' status and the Moy Estuary is currently at '*Moderate*' status as per the River/ Transitional Waterbody WFD Status 2013-2018. Biological water quality baseline studies will be carried out during at option selection at locations where works are likely to be carried out. Moy Estuary is designated as part of the Killala Bay/ Moy Estuary SAC/ pNHA and Killala Bay/Moy Estuary SPA. The River Moy is designated as part of River Moy SAC. These are located within the scheme area therefore potential for likely significant effects to these European sites must be assessed. • The Ballina drainage network is primarily a combined sewer system	The design and construction methodology for the scheme must be such that it does not jeopardise the waterbody-specific objectives of the Water Framework Directive The hydrology of all watercourses that might be impacted by the proposed scheme should be assessed to ensure that the WFD hydromorphological status is not affected by the scheme The design should consider the presence of protected water resources and water dependent terrestrial ecosystems. Suitable mitigation measures should be developed for the project in line with best practice measures in order to avoid negative impacts to water quality

Category	Source	What is the Constraint	How should the Constraint be addressed
		which contains a number of Storm Water Overflows and Pumping Station Emergency Overflows which discharge into the River Moy SAC. • Flood relief works have the potential impact on the biology, water quality, hydrology, and morphology of watercourses. • Designated Shellfish Water (IE_WE_420_0000) could be impacted by a potential pollution event which may also result in public health concern.	
Air, Climate and Noise	*Guidelines on the information to be contained win Environmental Impact Assessment Reports* (EPA Draft, 2017)'.	• The construction phase poses the greatest potential impact to air quality within the scheme area. However, these impacts will be temporary in nature and with the adherence of best practice construction measures will create minimal impact. Due to the nature of the works it is not envisaged that the operational phase will impact upon the surrounding air quality. • As the proposed scheme will take place in an urban environment which is already subjected to noise levels from passing traffic, it is not anticipated that the proposed scheme will contribute significantly to the existing noise levels, therefore the potential impacts associated with noise during the construction phase is not deemed a significant constraint provided best practice measures are implemented. • The potential impacts to biodiversity from noise, vibration and air pollution will be assessed further as the scheme progresses. However, impacts to ecological receptors from these pollution sources are thought to be short term and localised. • As part of the Ballina FRS there is a requirement prepare a draft SCCAP in consultation with the Climate Action Regional offices.	The scheme design should take into account any air, noise/vibration sensitive receptors such as schools, retirement homes and biodiversity located in proximity to works associated with the flood relief scheme. The FRS assessment and the draft SCCAP should determine the most robust strategy and design for short-term investment in flood risk management measures, taking account of the range of mid- to-long-term future investments that may be necessary. This will help ensure that future flood relief works are sustainable and resilient to climate change.

Category	Source	What is the Constraint	How should the Constraint be addressed
Material Assets: Non-Agricultural	Central Statistics Office, Mayo County Development Plan 2014-2020; Ballina and Environs Development Plan (2009-2015)	• The primary constraints within the scheme area are the utilities and existing transport infrastructure. • Early consideration of how options can integrate with the existing material assets in the area is essential and will require engagement with service providers to ensure that utilities can be avoided and/ or modified to mitigate impacts.	The existing and proposed location of watermains and other underground services in the vicinity of any proposed flood relief scheme to be ascertained as part of the engineering study. Consultation with Mayo County Council and utility providers at the option selection stage is recommended. It is recommended that Mayo County Council and the Transport Infrastructure Ireland be consulted in relation to any effects on the existing and proposed roads infrastructure in the scheme area from any proposed flood relief scheme.
Material Assets: Agricultural	Census of Agriculture, 2010 CORINE (Co-Ordinated Information on the Environment) 2012 'Google Earth' 2014 to 2018 Property Registration Authority of Ireland website Teagasc EPA Soil and Subsoil Mapping, 2006	• At this stage of the project there are no details on the extent of land ownership and therefore the size of any farms is not known. However, when the imagery was compared with the land registry on the Property Registration Authority website a better understanding, from a high level, of agricultural practices and the intensity at which they may be farmed was reached. Geodirectory information shall be cross-referenced against these criteria to further identify potential agricultural constraints. • It is evident from the desk study that intensive agricultural practices are not common within the scheme area. "Google Earth" was used with maps spanning 2014-2018 and "Bing Maps" with imagery dating 2020.	At this stage of assessment, it is not anticipated that the proposed scheme will interact or result in any negative impacts caused to the material assets – agriculture receptors in proximity of the scheme area.
Cultural Heritage	The Record of Protected Structures (RPS) National Inventory of Architectural Heritage (NIAH) (building surveys and garden surveys) Database of Irish Archaeological Excavations National Museum of Ireland (NMI) Findspots Heritage Council Map Viewer	• The scheme area is host to a variety of archaeological and architectural heritage assets and there is also potential for the presence of unrecorded archaeological and architectural sites within the area. • There is one national monument, 2 ACAs, 50 no. RPSs, 41 no. recorded archaeological RMPs and 107 no. recorded NIAHs within the scheme area. • The scheme area contains a number of sites of multiple designation (RMP status, RPS designation and/or NIAH record) as listed in Table 11-1 above. Of particular note are the following sites that may be impacted by the proposed project:	At this stage of the project, cognisance should be taken of all recorded archaeological monuments and protected structures including National Monuments, recorded archaeological monuments and protected structures should be avoided and, in respect of recorded archaeological monuments, their zones of notifications should be allowed as a buffer zone free from development. Should this not be possible then archaeological investigations are recommended for cultural heritage that would be impacted by the scheme The National Monuments Service, the Architectural Advisory Unit and the Underwater Archaeological Unit of the Department of Arts, Heritage and the Gaeltacht should be consulted when determining viable options for flood relief and at further stages of scheme

Category	Source	What is the Constraint	How should the Constraint be addressed
	Archival NMI topographical file searches as at 2005 Archaeological datasets Historic Map Viewer: Dept. Culture, Heritage and Gaeltacht NIAH datasets Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media's Historic Environment Viewer	– the bridges and salmon weir to the River Moy (RPS 11/NIAH 31204105/RMP MA030-056001- & MA030-056002-; RPS 33/NIAH 31204104; and RPS 35/NIAH 31204103); – Pearse Street ACA and the Quays at Croketstown ACA – Belleek Castle and associated archaeological including structures, tombs, gardens etc – The medieval church and graveyard complex at Leigue, Kilmoremoy – National Monument (Ref. 145) Cloghogle Portal Dolmen at Primrose Hill (RMP MA030-073---/RPS 43). – A First World War concrete ship, the SS Creteboom (RPS 1/NIAH 31303025), – An Ice House (RPS 5/NIAH 31303029)	development and appropriate mitigation should be determined. Any alternatives/option design considered for the Ballina FRS and subsequent environmental impact assessment, which will involve a desk study and field walkover inspection of archaeological and built heritage receptors, and possibly a (separate) underwater archaeological survey, will ensure that known and extant cultural heritage sites and features are identified, and any potential likely impacts are measured, with mitigation measures detailed for same, as appropriate. Specific mitigation requirements to address potential 'unknowns' can only be identified as items for review once the location of works options is defined. Additional non-intrusive archaeological surveys such geophysical survey may be appropriate if a specific set of investigative questions require more detailed analyses at that stage. At some locations, further exploratory archaeological test excavation may be also considered, either to further augment additional (non-intrusive) survey indicators or, to be adopted in areas where geological bedrock or soil conditions are not conducive to geophysical survey equipment.
Landscape	Mayo County Development Plan 2014-2020 – Landscape Character Maps	• Cognisance of the sensitive landscape areas present within the scheme area will be required during the option selection process in order not to significantly impact the characteristic features of the landscape character areas present.	Landscape character areas and the associated recommendations under the Mayo County Development Plan are identified in this report such that the design of the scheme can be empathetic to the sensitivity and value of the local landscape. Minimise disturbance to hedgerows and stone walls Ensure protection of scenic views Minimise impacts from adjoining landowners' views to the river in particular from amenity, cultural or tourist areas. Minimise impacts from the river to the surrounding hinterland i.e. users of the river including boating, kayaking etc Conserve and enhance the characteristics of the landscape that are important to tourism. Where possible, enhance scenic routes, driving routes, walking routes and cycling routes.

Category	Source	What is the Constraint	How should the Constraint be addressed
			Opportunities to enhance the amenity value of the area should be explored during detailed design. The design of the scheme must adapt to the receiving environment in any particular location in terms of materials, form, gradient, and new vegetation
Other Constraints	Waste Management	There will be a requirement to handle, store, remove and dispose of waste material in accordance with the relevant waste management legislation. Waste material will be generated from two sources: • Wastes resulting from general construction on-site; i.e. waste fuels, oils from machinery, cement and concrete from required masonry works and wastewater from sanitary facilities. • Excess excavated materials generated from general site clearance and earthwork excavations, including, where necessary, bridge abutments, as well as construction and demolition waste from proposed bridge works and other construction activities.	The nature of the wastes generated from site clearance and earthworks will generally be vegetation, topsoil, subsoil and stone. Where this material is to be stored on-site and reused it is important that it is not stored close to any watercourses or lakes. Any excavated material which is deemed unacceptable for re-use in the works will have to be removed off-site for disposal or for processing and as such may be required to be removed or disposed of under a waste permit or certificate of registration from the local authority. It is important to ensure that correct procedures for storage and disposal of wastes and excess materials are noted and implemented. That the location of a site compound is established.