BALLINA FLOOD RELIEF SCHEME

Environmental Impact Assessment Report
Chapter 10: Terrestrial Biodiversity

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10 TERRESTRIAL BIODIVERSITY

10.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) has been prepared with respect to terrestrial biodiversity and assesses the significant effects of the Proposed Scheme on terrestrial designations, habitats and species. It has been prepared with reference to published guidance and should be read in conjunction with **Chapter 9: Aquatic Biodiversity**.

This chapter has been prepared by competent, experienced and professional RPS ecological consultants. The chapter has been drafted by one of its Senior Project Ecologists and technically reviewed by a Technical Director (Ecology). The baseline mammal, invasive alien plant species (IAPS), breeding bird, bat roost, bat activity and bat emergence/re-entry surveys completed to inform the assessment were undertaken by RPS and ecological sub-consultants employed by RPS. Over-wintering waterbird, habitat, update IAPS, update mammal and update bat roost assessment surveys were undertaken by various members of the RPS ecology team.

10.2 Methodology

10.2.1 Relevant Legislation, Policy and Guidance

This assessment has regard to the following policy document and guidelines:

National and International Legislation

- Planning and Development Act 2000, as amended
- Wildlife Act 1976, as amended
- European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011 (as amended)), hereafter the 'Birds and Habitats Regulations'
- European Union (EU) Birds Directive 2009/147/EEC
- EU Habitats Directive 92/43/EES (as amended)
- EU Environmental Impact Assessment (EIA) Directive (2014/52/EU)
- Flora (Protection) Order 2022

Relevant Policies and Plans

- National Biodiversity Action Plan 2017-2021 (Department of Culture, Heritage and the Gaeltacht, 2011)
- National Biodiversity Action Plan 2023-2030 (Department of Housing, Local Government and Heritage, 2023)
- Mayo County Development Plan 2022-2028 (Mayo County Council, 2022a)
- Ballina and Environs Development Plan 2009-2015 (Mayo County Council, 2009)
- Ballina Local Biodiversity Action Plan 2022 (Mayo County Council, 2022b)

Relevant Guidelines

- Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal and Marine (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018; version 1.2 updated April 2022)
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (National Roads Authority (NRA), 2009)
- Best Practice Guidance for Habitat Survey and Mapping (Smith *et al*., 2011)

- A Guide to Habitats in Ireland (Fossitt, 2000)
- Bat Mitigation Guidelines for Ireland – V2 (Marnell *et al*., 2022)
- Bat Surveys: Good Practice Guidelines, Third Edition (Bat Conservation Trust (BCT), 2016)[1]
- Environmental Planning and Construction Guidelines Series (NRA, 2005-2011)
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2006)

10.2.2 Zone of Influence

The biodiversity study area for each ecological parameter is determined by the Zone of Influence (ZoI) of the Proposed Scheme. According to CIEEM Guidelines (CIEEM, 2018), the ZoI for a project is:

> *"the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example, where there are ecological or hydrological links beyond the site boundaries."*

These guidelines further state that:

> *"Activities associated with the construction, operation (best and worst-case operating conditions), decommissioning and restoration phases should be separately identified."*

The ZoI will vary for different ecological features depending on their sensitivity to environmental change and types of impacts and effects arising from the Proposed Scheme. It is therefore appropriate to identify different ZoIs for different features. The features affected could include habitats, species, and the ecosystem and processes on which they depend. ZoIs are specified for different features and types of potential impact.

It is also important to acknowledge, '*that the absence of a designation or documented feature does not mean that no such feature exists within the site'* (EPA, 2022). As such, a ZoI should be identified for all features potentially occurring within the site of the Proposed Scheme, in addition to any known to occur. As recommended by CIEEM (2018), professionally accredited or published studies were used to determine ZoI for this Proposed Scheme.

Through the incorporation of relevant ZoIs for the Proposed Scheme, the Terrestrial Biodiversity study area is determined to extend outside the footprint of the Proposed Scheme, to include the following ecological features as set out in **Table 10-1.**

Table 10-1 Study area and zone of influence for different ecological features.

Ecological Features	Zone of Influence
Sites designated for nature conservation (as outlined in **Section 10.3.1** and **Section 10.3.2**)	All sites with connectivity to the Proposed Scheme
Habitats and flora (including invasive alien plant species)	100 m
Otter	150 m
Badger	150 m
Other protected terrestrial mammals	Redline boundary of the Proposed Scheme and adjoining habitats
Bats	Redline boundary of the Proposed Scheme and adjoining habitats
Marine mammals	Redline boundary of the Proposed Scheme and adjoining habitats
Amphibians and reptiles	Redline boundary of the Proposed Scheme and adjoining habitats
Terrestrial invertebrates	Redline boundary of the Proposed Scheme and adjoining habitats
Overwintering waterbirds	300 m
Breeding birds	Redline boundary of the Proposed Scheme and adjoining habitats

[1] The fourth edition of these guidelines were published in October 2023 (BCT, 2023), however, given the timing of publication, the third edition was referenced during bat surveys for the Proposed Scheme.

10.2.3 Sources of Information to Inform the Assessment

10.2.3.1 Desktop Study

The desk study involved a review of relevant legislation and policy, collation of existing available information on the receiving ecological environment and consultation with relevant statutory bodies.

Relevant Data Sources

The following resources and databases were referred to:

- Surveys of flora, fauna, and habitats available at Heritage Councils mapping website (https://heritagemaps.ie/WebApps/HeritageMaps/index.html) Study area: 10km hectads G21, G22. (Accessed May 2023).
- Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. 2013. *Bird Atlas 2007–11: The Breeding and Wintering Birds of Britain and Ireland*. BTO Books, Thetford. Study area: 10km hectads G21, G22.
- BirdWatch Ireland IWeBS data (https://birdwatchireland.ie/) including Irish Wetland Bird Survey (IWeBS) data Study area: 10km hectads G21, G22 and any IWeBS sites deemed to be connected to the Proposed Scheme via foraging distances of SCI species. (Accessed May 2023).
- Data on rare/protected/threatened species and bat landscape suitability mapping held online by the National Biodiversity Data Centre (NBDC) (www.biodiversityireland.ie/) Study area: 10km hectads G21, G22. (Accessed November 2023).
- Environmental Protection Agency (EPA) online interactive mapping tools (https://gis.epa.ie/EPAMaps) and (https://www.catchments.ie/maps/) for water quality data including surface and ground water quality status, and river catchment boundaries. Study area: groundwater catchment and Water Framework Directive (WFD) Management Units intersected by the Proposed Scheme. (Accessed November 2023).
- Geohive online Environmental Sensitivity Mapping tool (https://airomaps.geohive.ie/ESM/). Study area: 10km hectads G21, G22. (Accessed May 2023).
- Geological Survey Ireland (GSI) (https://www.gsi.ie/en-ie/Pages/default.aspx) Study area: groundwater catchment and WFD Management Units intersected by the Proposed Scheme. (Accessed May 2023).
- Information on ranges of Annex I Habitats and mobile QI populations in Volume 1 of National Parks and Wildlife Service's (NPWS) Status of EU Protected Habitats and Species in Ireland (NPWS, 2019) and associated digital shapefiles. Study area: 10km hectads G21, G22. (Accessed November 2023)
- Data held by the Botanical Society of Britain and Ireland (BSBI) (https://bsbi.org/). Study area: 10km hectads G21, G22. (Accessed May 2023)
- Information on the location, nature and design of the Proposed Scheme (**Chapter 5** of this EIAR)
- Information on the River Basin Management Plan 2018-2021 DHPLG (2018) – (https://www.gov.ie/en/publication/429a79-river-basin-management-plan-2018-2021/) and the draft River Basin Management Plan 2022-2027 DHLGH (2021) (https://www.gov.ie/en/consultation/2bda0-public-consultation-on-the-draft-river-basin-management-plan-for-ireland-2022-2027/). Study area: WFD Management Units intersected by the Proposed Scheme. (Accessed May 2023)
- Information on the Water Action Plan 2024 A River Basin Management Plan for Ireland (DEHLGH, 2024). (Accessed Sept 2024)
- Mapping of Natura 2000 Site boundaries and Conservation Objectives for relevant sites, available online from the NPWS included site synopses, Natura 2000 Standard Data forms and Conservation Objective Supporting Documents where available (https://www.npws.ie/protected-sites) Study area: all sites considered to be connected to the Proposed Scheme. (Accessed November 2023)

- Data on rare/protected/threatened species held by the NPWS (https://www.npws.ie/mapsanddata). Study area: 10km hectads G21, G22. (Accessed May 2023)
- Office of Public Works (OPW) drainage maintenance maps and data (https://www.floodinfo.ie/map/drainage_map/). Study area: WFD Management Units intersected by the Proposed Scheme. (Accessed May 2023)
- Ordnance Survey of Ireland now Tailte Éireann – Mapping and Aerial photography (https://osi.maps.arcgis.com/apps/webappviewer/index.html?id=bc56a1cf08844a2aa2609aa92e89497e). Study area: 150 m buffer around the redline of the Proposed Scheme. (Accessed November 2023)
- Irish Red Lists (Curtis & McGough, 1988; Fitzpatrick *et al*., 2006; Marnell *et al*., 2009; Byrne *et al*., 2009; Regan *et al*., 2010; Nelson *et al*., 2011; King *et al*., 2011; Lockhart *et al*., 2012; Wyse Jackson *et al*., 2016; Nelson, 2016; Marnell, *et al*. 2019) https://www.npws.ie/publications/red-lists. (Accessed May 2023)
- Data on the distribution of rare and protected flora held within the NPWS's Flora (Protection) Order 2022 Map Viewer https://www.npws.ie/maps-and-data/npws-flora-protection-order-2022-map-viewer-vascular-plants-charophytes-and-lichens. Study area: 10km hectads G21, G22 (Accessed December 2023)

10.2.3.2 Field Surveys

A series of multidisciplinary and taxon-specific surveys were undertaken between 2020 and 2023 during the optimum seasons for the habitats and species in question. These ecological field surveys informed the characterisation of the baseline environment against which impacts and effects on biodiversity are assessed. These surveys are presented in **Table 10-2**.

Table 10-2: Summary of Field Surveys Undertaken

Survey Type	Dates	Description
Preliminary Ecological	04/06/2020, 05/08/2020	Initial ecological walkover surveys to assess the conditions scheme wide and to inform more detailed surveys required.
Habitat	12/07/2022, 13/07/2022, 14/07/2022, 22/08/2022, 20/09/2022, 03/05/2023, 04/05/2023	Phase 1 habitat classification to Fossitt (2000) scheme wide.
Invasive Alien Plant Species (IAPS)	07/06/2022, 27/06/2022, 04/07/2022, 05/07/2022, 22/08/2022, 20/09/2022, 03/05/2023, 04/05/2023	Identification of Third Scheduled listed species of the Birds and Habitats Regulations scheme wide.
Breeding Bird	21/04/2021, 08/06/2021, 27/06/2022, 29/06/2022, 28/04/2023, 13/06/2023	Early and late season breeding bird line and point transect surveys scheme wide at pre-determined key locations along the Proposed Scheme.
Overwintering Waterbird	24/11/2022, 20/12/2022, 19/01/2023, 20/02/2023, 27/03/2023	Waterbird surveys along the Moy estuary and potential upstream storage areas to characterise the general wintering bird population adjacent to the Proposed Scheme.
Bat	11/04/2021, 12/04/2021, 15/04/2021, 09/06/2022, 18/07/2022, 26/07/2022, 27/07/2022, 07/08/2022, 22/08/2022, 12/09/2022, 13/09/2022, 14/09/2022, 20/09/2022, 21/09/2022	Bat roost assessments of trees and structures scheme wide Bat activity transect surveys (Dawn/Dusk) along the main channel of the River Moy. Passive monitoring for bat activity (static detectors) along the main channel of the River Moy.
Protected Mammal	04/02/2021, 07/06/2022, 27/06/2022, 04/07/2022, 05/07/2022, 22/08/2022, 20/09/2022, 21/09/2022, 29/09/2022, 03/05/2023, 04/05/2023	Badger – assessment for evidence of sett entrances and field signs (e.g. latrines, hair, trails, prints, snuffle holes) scheme wide. Otter - assessment for evidence of holt entrances and field signs (e.g. spraint, slides, trails, prints, couches) scheme wide and camera trapping at potential holt locations.

10.2.4 Survey Methodologies

10.2.4.1 Desktop Study

10.2.4.1.1 Rare and Protected Flora

The principal source of information regarding the distribution of flora in Ireland is the Plant Atlas 2020 (Stroh *et al*., 2023). The data included in this atlas is from the 2000-2020 atlas survey. This atlas shows data for vascular plants in individual hectads (10 km^2 squares). The hectads relevant to the study area are: G21 and G22. These hectads were searched for any rare or protected species which may be recorded in the square during the 2000-2020 atlas survey (and previous surveys) carried out by the Botanical Society of Britain and Ireland (BSBI). The search included the vascular plants listed in Annex II and Annex IV of the EU Habitats Directive, Flora Protection Order (FPO) of 2022 (S.I. No. 235/2022) and the Irish Red Data Book (IRDB) (Wyse Jackson *et al.,* 2016). The searches also included BSBI maps[2], the NBDC database[3] and the NPWS's Flora (Protection) Order 2022 Map Viewer[4]

The following records were excluded from this assessment:

- Records greater than 25 years old.
- Records of species identified as Extinct in the Wild (EW), Regionally Extinct (RE) or Extinct (EX) in national red lists.
- Any species listed as Not Evaluated (NE), Data Deficient (DD), Least Concern (LC) or Near Threatened (NT) in national red lists.
- Any species listed as being on the Waiting List in national red lists.

10.2.4.1.2 Rare and Protected Fauna

10.2.4.1.2.1 National Biodiversity Data Centre

The NBDC maintains a database collating rare and protected species records for individual hectads (10 km by 10 km squares). The Proposed Scheme falls within the following hectads: G21 and G22. The records for these grid squares were consulted to investigate the likelihood of the presence of rare and protected species within the study area. The following records were excluded from this assessment:

- Mobile animal species records greater than 10 years old.
- Records of species identified as Extinct in the Wild (EW), Regionally Extinct (RE) or Extinct (EX) in national red lists.
- Any species listed as Not Evaluated (NE), Data Deficient (DD), Least Concern (LC) or Near Threatened (NT) in national red lists (with the exception of those species listed in **Section 10.2.4.1.2.3** through **Section 10.2.4.1.3**).
- Any species listed as being on the Waiting List in national red lists.

10.2.4.1.2.2 National Parks and Wildlife Service

The NPWS has published national datasets for protected habitats and species.[5] Additionally, the NPWS maintains sensitive biodiversity data which is not publicly available. A data request was submitted by RPS to obtain this sensitive data on 7th September 2022 for the G21 and G22 hectads. The following records were excluded from this assessment:

- Mobile animal species records greater than 10 years old.
- Records of species identified as Extinct in the Wild (EW), Regionally Extinct (RE) or Extinct (EX) in national red lists.
- Any species listed as Not Evaluated (NE), Data Deficient (DD), Least Concern (LC) or Near Threatened (NT) in national red lists (with the exception of those species listed in **Section 10.2.4.1.2.3** through **Section 10.2.4.1.3**).

[2] Available online at: https://bsbi.org/maps, Accessed June 2023
[3] Available online at: https://maps.biodiversityireland.ie/Map, Accessed June 2023
[4] Available online at: https://www.npws.ie/maps-and-data/npws-flora-protection-order-2022-map-viewer-vascular-plants-charophytes-and-lichens Accessed December 2023
[5] Available online at: https://www.npws.ie/maps-and-data/habitat-and-species-data [Accessed January 2023].

- Any species listed as being on the Waiting List in national red lists.

10.2.4.1.2.3 Protected Mammals

A number of terrestrial mammal species are afforded protection under international and national legislation in Ireland, including otter (*Lutra lutra*), badger (*Meles meles*), pine marten (*Martes martes*), hedgehog, *Erinaceus europaeus*), pygmy shrew (*Sorex minutus*), red squirrel (*Sciurus vulgaris*), Irish stoat (*Mustela erminea hibernica*), Irish hare (*Lepus timidus hibernicus*) and a number of deer species (red deer (*Cervus elaphus*), fallow deer (*Dama dama*), sika deer (*Cervus nippon*)). All of these species have been assigned a conservation status of *Least Concern* (Marnell *et al*., 2019), with the exception of sika deer which have not been assessed.

Otters are protected under Annex II of the E.U. Habitats Directive as a species for which core areas of their habitat must be protected within the Natura 2000 network, and Annex IV as species protected across their entire natural range. Pine marten are protected under Annex V of the EU Habitats Directive where their exploitation and taking in the wild is compatible with maintaining them in a favourable conservation status.

All species listed above (i.e. otter, badger, pine marten, hedgehog, pygmy shrew, red squirrel, Irish stoat, Irish hare and the three deer species) are all protected under the Wildlife Acts (1976 to 2022).

10.2.4.1.2.4 Reptiles and Amphibians

Common frog (*Rana temporaria*) is protected under Annex V of the EU Habitats Directive and the Wildlife Acts (1976 to 2022), while smooth newt (*Lissotriton vulgaris*) and common lizard (*Zootoca vivipara*) are both protected under the Wildlife Acts (1976 to 2022). Natterjack toad (*Epidalea calamita*) is also protected under Annex IV of the EU Habitats Directive and the Wildlife Acts, however, its distribution in Ireland is restricted to counties Kerry and Wexford and is very unlikely to occur in the ZoI of the Proposed Scheme.

10.2.4.1.2.5 Terrestrial Invertebrates

A number of terrestrial invertebrates in Ireland are protected under EU and national legislation including Kerry slug (*Geomalacus maculosus*), marsh fritillary butterfly (*Euphydryas aurinia*) and whorl snails (*Vertigo* spp.). Kerry slug is protected under Annex II and IV of the EU Habitats Directive and the Wildlife Acts (1976 to 2022) while three species of whorl snail (*Vertigo geyeri, Vertigo angustior, Vertigo moulinsiana*) and marsh fritillary butterfly are protected under Annex II of the Habitats Directive. Kerry slug primarily occurs across counties Kerry and Cork; however, they have also been recorded from more localised areas in counties Galway and Tipperary. This species is, therefore, unlikely to occur in the ZoI of the Proposed Scheme.

10.2.4.1.3 Bats

All Irish bat species (common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), Nathusius' pipistrelle (*Pipistrellus nathusii*), Leisler's bat (*Nyctalus leisleri*), Daubenton's bat (*Myotis daubentonii*), Natterer's bat (*Myotis nattereri*), whiskered bat (*Myotis mystacinus*), brown long-eared bat (*Plecotus auritus*), lesser horseshoe bat (*Rhinolophus hipposideros*)) are protected under the Wildlife Acts (1976 to 2022) and by the Habitats Directive which protects rare species, including bats, and their habitats. All bat species are listed in Annex IV of the Habitats Directive as species protected across their entire natural range and the lesser horseshoe bat is further listed, under Annex II, as a species for which core areas of their habitat must be protected within the Natura 2000 network.

They can be found roosting in both vegetation and structures (e.g. buildings, bridges etc.) and are known to use habitats such as trees, hedgerows and other linear features as commuting corridors between roosts and foraging habitat.

The Bat Landscapes Suitability Index (Lundy *et al*., 2011) provides a landscape conservation guide for Irish bat species and includes all bat species that commonly occur in Ireland. It identifies the geographical areas that are suitable for individual species and represents these areas in an index that ranges from 0 to 100 with 0 being the least favourable and 100 being the most favourable for bats.

10.2.4.1.4 Ornithology

10.2.4.1.4.1 Bird Atlases

The NBDC online map viewer was consulted for records of breeding and over-wintering birds for the following hectads: G21 and G22. The majority of these records originate from *The Bird Atlas 2007-2011: The Breeding and Wintering Birds of Britain and Ireland* (British Trust for Ornithology) (Balmer, et al., 2013). A data request was also submitted to NPWS on 7th September 2022 requesting records of rare or protected species from within hectads G21 and G22. The following sources of information were consulted in order to determine the conservation status of these bird species:

- NBDC online mapviewer http://maps.biodiversityireland.ie/#/Home
- The EU 'Birds Directive'
- The 'Red List' of BoCCI (Gilbert *et al*., 2021)

Records greater than 15 years old were excluded from this assessment.

10.2.4.1.4.2 IWeBS data

Records were obtained from BirdWatch Ireland's Irish Wetland Bird Survey (I-WeBS) database for the Killala Bay site (I-WeBS site code: 0D407) and for the Mount Ready subsite (I-WeBS subsite code: 0D412) (**Figure 10-1)** of Killala Bay for the winter seasons 2017/18 through 2021/22. Data were supplied by the Irish Wetland Bird Survey (I-WeBS), a scheme coordinated by BirdWatch Ireland under contract to the NPWS of the Department of Housing, Local Government and Heritage. These data were used to provide an insight into the winter bird species and numbers of same that are likely to occur adjacent to or near the Proposed Scheme.

A wetland is considered important in an all-Ireland context if it regularly holds 1% or more of one species, subspecies or population of waterbirds occurring in Ireland, and of international importance if it regularly supports the same proportion (i.e. 1%) of the relevant international population. As per the recommendations of the Ramsar Convention, key sites identified because of the numbers of birds should support such numbers on a regular basis (usually calculated as the mean winter maximum for the last five winters)[6]. Annual peak counts recorded for a number of species observed during the winter bird surveys were greater than the corresponding 1% national or 1% international significance thresholds (as per Lewis *et al*., 2019) for those species.

10.2.4.1.5 Invasive Alien Plant Species

Nationally, the *European Communities (Birds and Natural Habitats) Regulations 2011 [SI.477]* contain the provisions to address invasive alien species.

A full list of Third Schedule species (including animals) can be found at the Irish Statute Book website[7]. S.I. No. 477/2011 was amended in 2015 to remove Canadian waterweed (*Elodea canadensis*) and water lettuce (*Pistia stratiotes*) from the list of Third Schedule species[8].

Records of Third Schedule invasive alien plant species (IAPS) were obtained from Plant Atlas 2020 and also from the NBDC database for grid squares G21 and G22.

[6] Data Request Interpretive Notes – Irish Wetland Bird Survey (I-WeBS)
[7] https://www.irishstatutebook.ie/eli/2011/si/477/made/en/print.
[8] https://www.irishstatutebook.ie/eli/2015/si/355/made/en/print?q=European+Communities+Birds+and+Natural+Habitats+Regulations

10.2.4.2 Field Surveys

10.2.4.2.1 Habitat and Flora Surveys

10.2.4.2.1.1 Habitat Surveys

Site surveys were carried out on the 12th, 13th and 14th July 22nd August and 20th September 2022 and on the 4th and 5th May 2023 to classify terrestrial habitats occurring within the survey area with reference to the Heritage Council's habitat classification system (Fossitt, 2000). The survey area for the habitat surveys was all land within approximately 100 m from each proposed works area (**Figure 10-2**). The mapping of habitats had cognisance of the Heritage Council's mapping methodology (Smith *et al*., 2011). The information gained from the survey was used to describe habitat features, and to direct further habitat and species-specific survey work to inform this assessment and to keep the baseline up to date. Target notes were recorded as necessary on maps in the field to identify the location of additional ecological features.

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

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

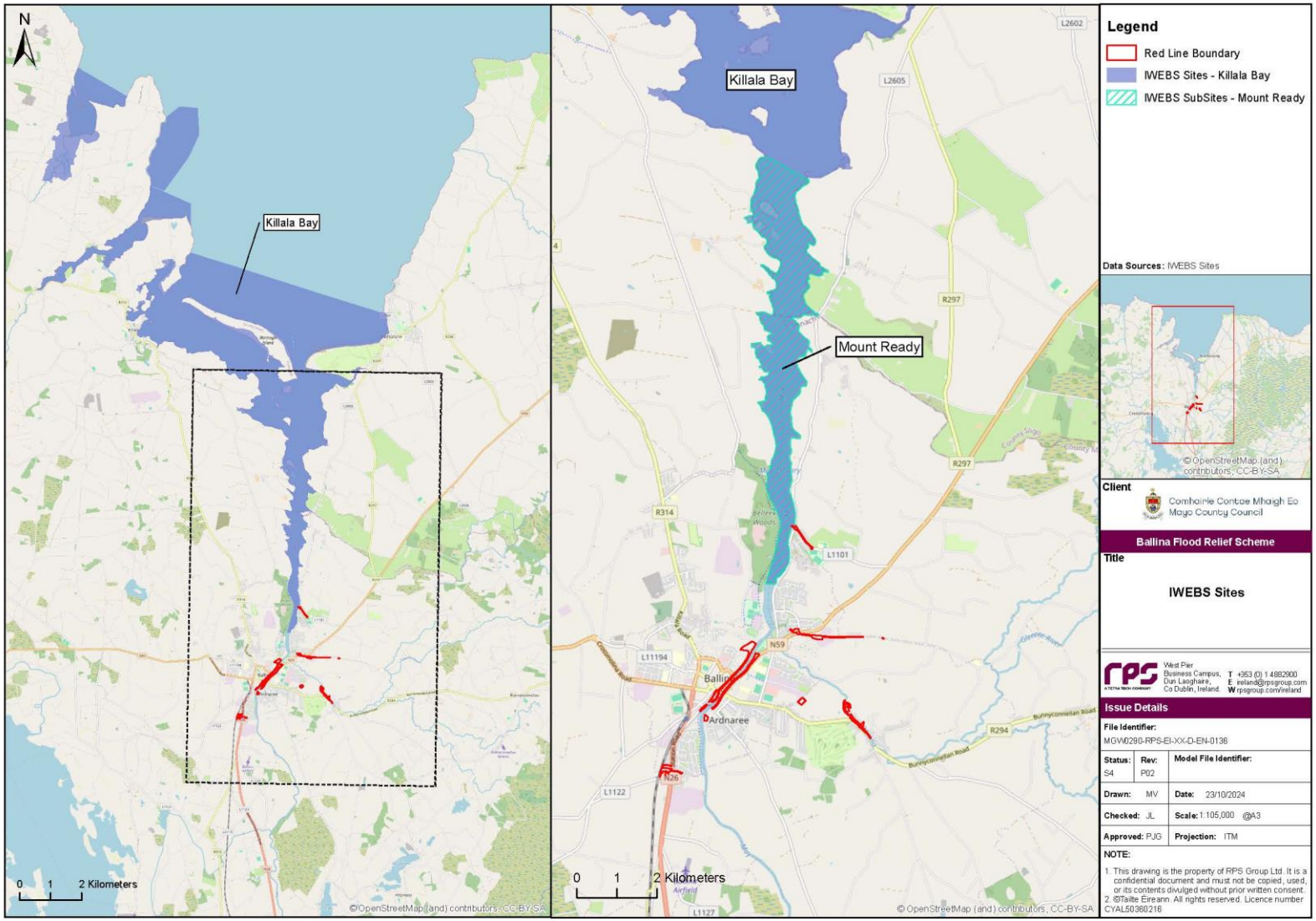

Figure 10-1 Killala Bay IWeBS Site and Mount Ready Subsite

Figure 10-2 Habitat Survey Area

10.2.4.2.1.2 Protected Flora Surveys

The desktop survey returned no protected flora records within 2 km of the Proposed Scheme area; therefore, no specific protected flora surveys were undertaken for the Proposed Scheme.

10.2.4.2.2 Non-Volant Mammal Species (Otter, Badger) Surveys

Ecological surveys were conducted on the 7th and 27th June 4th and 5th July 22nd August and 20th September 2022 and on the 4th and 5th May 2023 for observations of protected mammals (i.e. badger, otter) and protected mammal signs (e.g. foot-prints, spraints, latrines, setts/holts, guard hairs etc.). These surveys were undertaken to confirm the presence or absence of otter and badger activity, including breeding or resting locations (e.g. setts, holts, couches etc.), for all land within 150 m of the proposed work's areas and to detail otter and/or badger activity and the locations of such activity.

The surveys were conducted with reference to TII's Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (2008). The otter survey was conducted with reference to the National Otter Survey of Ireland 2010-2012 (Reid *et al*., 2013). The badger survey was conducted with reference to the "Surveying for Badgers: Good Practice Guidelines" (Scottish Badgers, 2018) and CIEEM Best Practice Methodology.

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

10.2.4.2.3 Bat Surveys

10.2.4.2.3.1 Bat Roost Assessment Surveys

Bat roost assessment surveys were undertaken with reference to the following guidelines:

- Collins, J. (ed.) (2016). Bat Surveys for Professional ecologists: Good Practice Guidelines (3rd ed.). The Bat Conservation Trust, London[9].
- Marnell, F., Kelleher, C. & Mullen E. (2022). Bat Mitigation Guidelines for Ireland – V2. *Irish Wildlife Manuals,* No. 134. National Park and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

Walkover surveys assessing bat roosts within the scheme area were conducted on the 9th June 26th July 22nd August and the 20th and 21st September 2022. Potential bat roosts were assessed using the criteria outlined in **Table 10-3.**

Table 10-3: Criteria for Assessing the Potential Suitability of the Proposed Scheme Site for Bats (taken from Collins, J. (ed) (2016))

Suitability	Description – Roosting Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain potential roost features (PRFs) but with none seen from the ground or features seen with only very limited roosting potential.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only-the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).

[9] The fourth edition of these guidelines were published in October 2023 (BCT, 2023), however, given the timing of publication, the third edition was referenced during bat surveys for the Proposed Scheme.

Suitability	Description – Roosting Habitats
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.

Trees

A detailed inspection of the exterior of trees across the Proposed Scheme area was undertaken to look for features that bats could use for roosting (Potential Roost Features (PRFs)). These inspections were undertaken from ground level and were used to determine the actual or potential presence of bats and the need for further survey and/or mitigation. All inspections were carried out in daylight hours and information was compiled on the tree, PRFs and evidence of bats. All trees surveyed were numbered and marked on a map and a description of each PRF observed was recorded. PRFs that may be used by bats include:

- Rot holes
- Hazard beams
- Other horizontal or vertical cracks or splits (e.g. frost cracks) in stems or branches
- Lifting bark
- Knotholes arising from naturally shed branches or branches previously pruned back to the branch collar
- Man-made holes (e.g. flush cuts) or cavities created by branches tearing out from parent stems
- Cankers in which cavities have developed
- Other hollows or cavities
- Double leaders forming compression forks with included bark and potential cavities
- Gaps between overlapping stems or branches
- Partially detached ivy with stem diameters in excess of 50mm
- Bat or bird boxes.

Signs of a bat roost (excluding the actual presence of bats), include:

- Bat droppings in, around or below a PRF
- Odour emanating from a PRF
- Audible squeaking at dusk or in warm weather
- Staining below the PRF

Structures

Buildings, bridges and walls and other structures within or immediately adjacent to the proposed works along the River Moy within the centre of Ballina town across the Proposed Scheme area were subject to a visual inspection for evidence of and potential for bats. The exterior of each structure was visually assessed for potential bat access points and evidence of bat activity using close focusing binoculars. Where accessible, features such as crevices and small gaps in the bridge or building structure, such as between the brick or stonework, beneath roofing material, at eaves and around window frames, which had potential as bat access points into the buildings were inspected. Evidence that these features/access points were actively being used by bats includes staining within the gaps, urine staining and bat droppings. Indicators that potential access points are not actively used by bats include general detritus and cobwebs within the access point. A note of potential features used by bats was made, where present.

Following structures and PRF assessment, the walls and structures along the River Moy within the centre of Ballina town and some trees along this same section of the river were subject to further detailed survey for bat activity.

10.2.4.2.3.2 Bat Activity Surveys

Emergence/re-entry surveys were carried out over the bat activity season from viewpoints (VPs) on each section of the River Moy within the centre of Ballina town as shown in **Figure 10-3.** Walls, bridges, and any built construction along the river were surveyed at either dusk or dawn and any bat activity in the viewpoint area during the survey was documented. Dusk surveys were undertaken approximately a half hour before

sunset until approximately an hour after sunset. Dawn surveys were undertaken approximately an hour and a half before sunrise until approximately a half hour after sunrise. The dates and details of these surveys is outlined in **Table 10-4**. Further details can be found in **Appendix 10.1**.

Song Meter 4 bat detectors were deployed at points in the survey areas and recorded for the duration of some of the emergence/re-entry surveys. Song Meter 4s were deployed on 11 different occasions along the River Moy and the location where they were deployed is presented in **Figure 10-4.** Song Meter 4 data were then downloaded and analysed to identify bat species using the river area. Other bat detectors used during the surveys were Echo Meter Touch, Elekon bat scanner and Pettersson Heterodyne.

Table 10-4: Bat Activity Surveys Carried out on the River Moy in Summer 2022

Date	Viewing Point	Dusk/Dawn	Sunrise	Sunset
18/07/2022	1	Dusk	N/A	21.57
18/07/2022	2	Dusk	N/A	21.57
18/07/2022	3	Dusk	N/A	21.57
18/07/2022	4	Dusk	N/A	21.57
26/07/2022	5	Dusk	N/A	21.46
27/07/2022	6	Dawn	05.39	N/A
27/07/2022	7	Dawn	05.39	N/A
27/07/2022	8	Dusk	N/A	21.44
27/07/2022	9	Dusk	N/A	21.44
07/08/2022	10	Dusk	N/A	21.25
07/08/2022	11	Dusk	N/A	21.25
07/08/2022	12	Dusk	N/A	21.25
07/08/2022	13	Dusk	N/A	21.25
12/09/2022	14	Dusk	N/A	20.01
12/09/2022	15	Dusk	N/A	20.01
12/09/2022	16	Dusk	N/A	20.01
13/09/2022	17	Dusk	N/A	19.59
13/09/2022	Boatyard Trees	Dusk	N/A	19.59
14/09/2022	Willow Tree along Bachelors Walk	Dawn	N/A	07.03

Figure 10-3 Location of Viewpoints (VPs) Used While Undertaking Bat Activity Surveys Across the Main Channel of the River Moy in Ballina Town

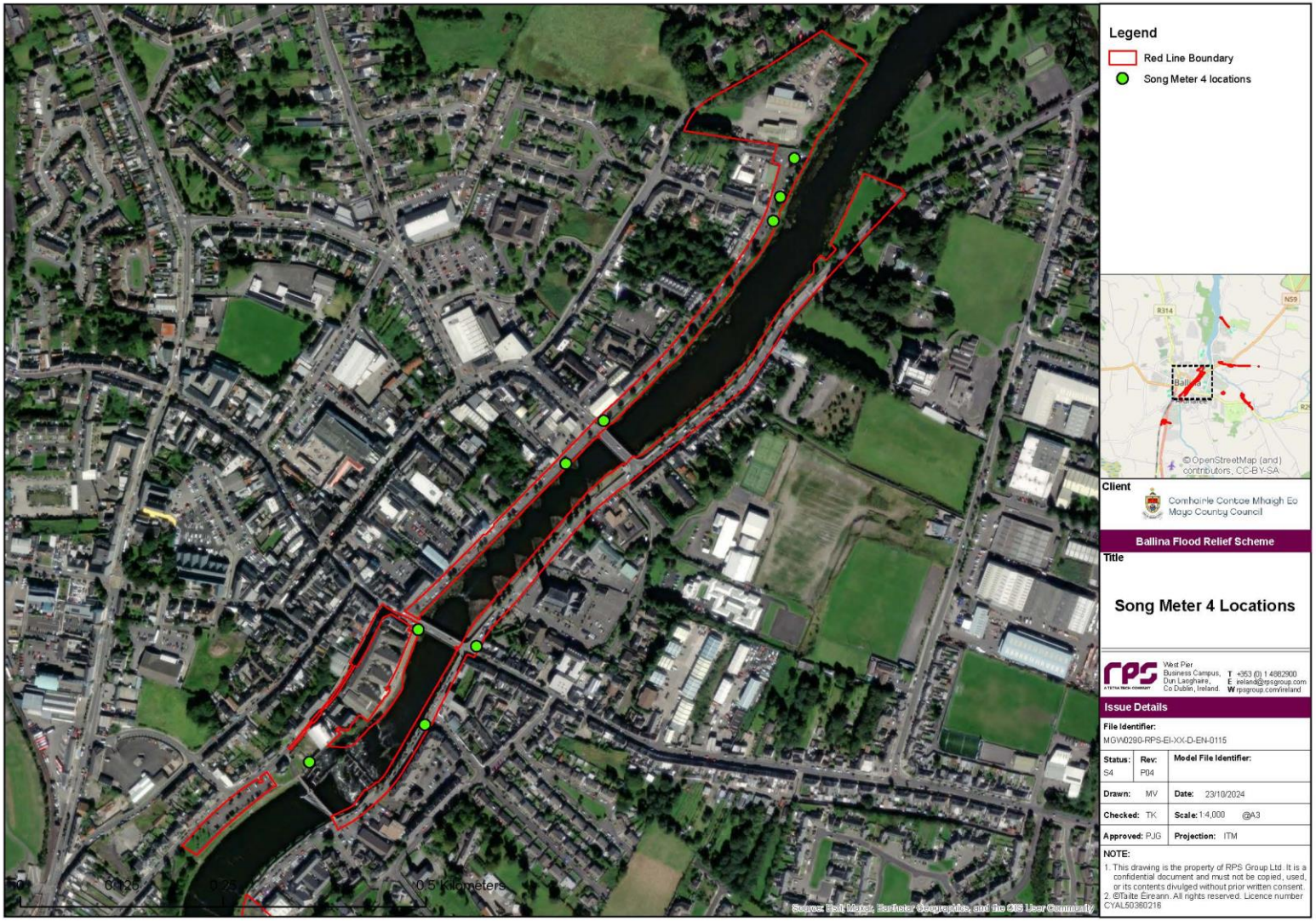

Figure 10-4 Location where Song Meter 4s were Placed while Surveying Bat Activity Across the Main Channel of the River Moy in Ballina Town

10.2.4.2.4 Ornithology

Several ornithology surveys were completed for the Proposed Scheme including:

- Targeted breeding bird surveys
- Overwintering waterbird surveys

10.2.4.2.4.1 Targeted breeding bird survey

Breeding bird surveys undertaken in 2021 (21st April 8th June) included six line transects and one point transect (**Appendix 10.2**). Surveys were expanded in 2022 to include additional areas meaning that eight line transects, and one point count was undertaken on 27th and 29th June 2022. Survey extents were altered in 2023 resulting in seven line transects and one point count being undertaken on 28th April 2023. These seven line transects and point count were repeated on 13th June 2023 with an additional point count also undertaken on this date (i.e. 13/06/2023)[10].

The bird surveys were conducted with reference to the methodology described by Bibby *et al*. (2000) and the Countryside Bird Survey Manual - Guidelines for Countryside Bird Survey participants (BirdWatch Ireland, 2012). In 2021, two survey visits were conducted: an early breeding season survey (before May 15th) to identify and determine the occurrence and abundances of resident breeding birds and a second later breeding season survey (after May 15th) to identify the occurrence and abundances of migratory breeding bird species. Using the same methodologies, two late season surveys were undertaken in June 2022, to consider the areas surveyed in 2021 and the additional areas added in 2022. An early season and a late season survey was undertaken in 2023. Survey dates are provided in **Table 10-5** and the study area extent is presented in **Figure 10-5**, **Figure 10-6** and **Figure 10-7.**

All bird species encountered (seen or heard) during the surveys were recorded, together with the abundance of each species. Birds flying over the site were also included as part of the observations. Casual records of birds encountered during the spot counts and field walkovers, but outside of dedicated survey period, were also noted.

Table 10-5: Breeding Bird Survey Details

Date and Period	Time	Conditions	Effort
April 21st, 2021 (Early Season)	07:07 – 09.38	Bright, dry and cool. Good visibility, Cloud 1/8. No rain, Windspeed BF 0-1.	Breeding Bird survey – line transect surveys and scan/overview of adjacent lands.
June 08th 2021 (Late Season)	06.08 – 08.21	Overcast, dry with moderate temperatures. Excellent visibility, Cloud 8/8. No rain. Windspeed BF 0-1.	Breeding Bird survey – line transect surveys and scan/overview of adjacent lands.
June 27th, 2022 (Late Season)	07.30 – 13.52	Wind: F3-4 SW. Rain: none – occasional showers. Cloud: 3/8 – 8/8. Vis: good.	Breeding Bird Survey – line transect surveys and scan/overview of adjacent lands.
June 29th, 2022 (Late Season)	07.06 – 10.50	Wind: F2 SW. Rain: none. Cloud: 5/8 – 8/8. Vis: Good	Breeding Bird Survey – line transect surveys and scan/overview of adjacent lands.
April 28th, 2023 (Early Season)	07:09 – 11.03	Drizzle clearing to drier conditions. Overcast with moderate temperatures. Good to moderate visibility. Cloud 8/8. Windspeed BF 0-1 SW	Breeding Bird Survey – line transect surveys and scan/overview of adjacent lands.
June 13th, 2023 (Late Season)	06.33 – 10.40	Overcast, occasional drizzle but mostly dry with moderate temperatures. Good visibility. Cloud 8/8. Windspeed BF 0-1 N	Breeding Bird Survey – line transect surveys and scan/overview of adjacent lands.

[10] Some of these survey locations were undertaken in areas that are no longer incorporated into the Proposed Scheme, therefore, they are not included in this report. See **Section 10.3.11.2.1**

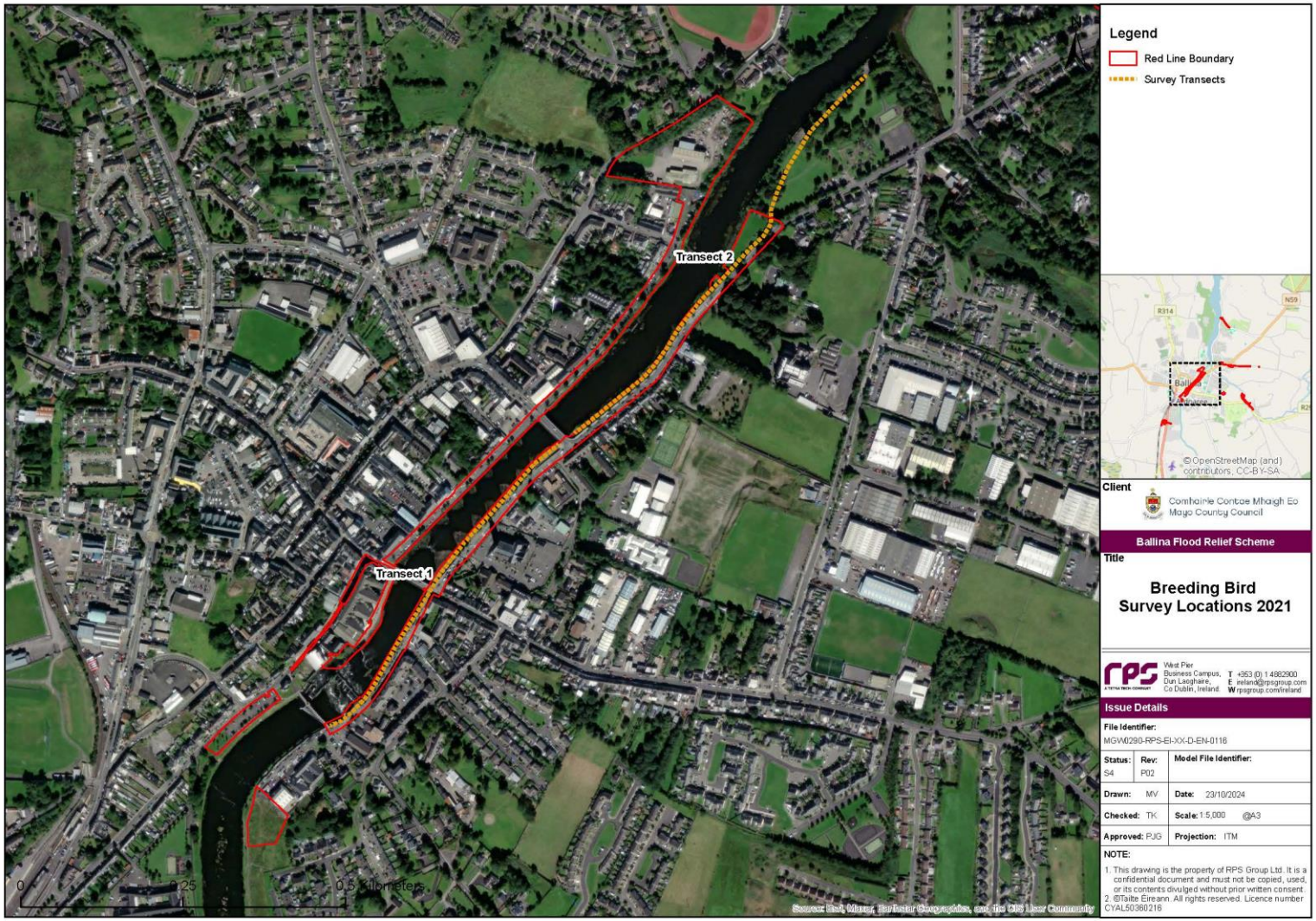

Figure 10-5: Breeding Bird Survey Locations 2021

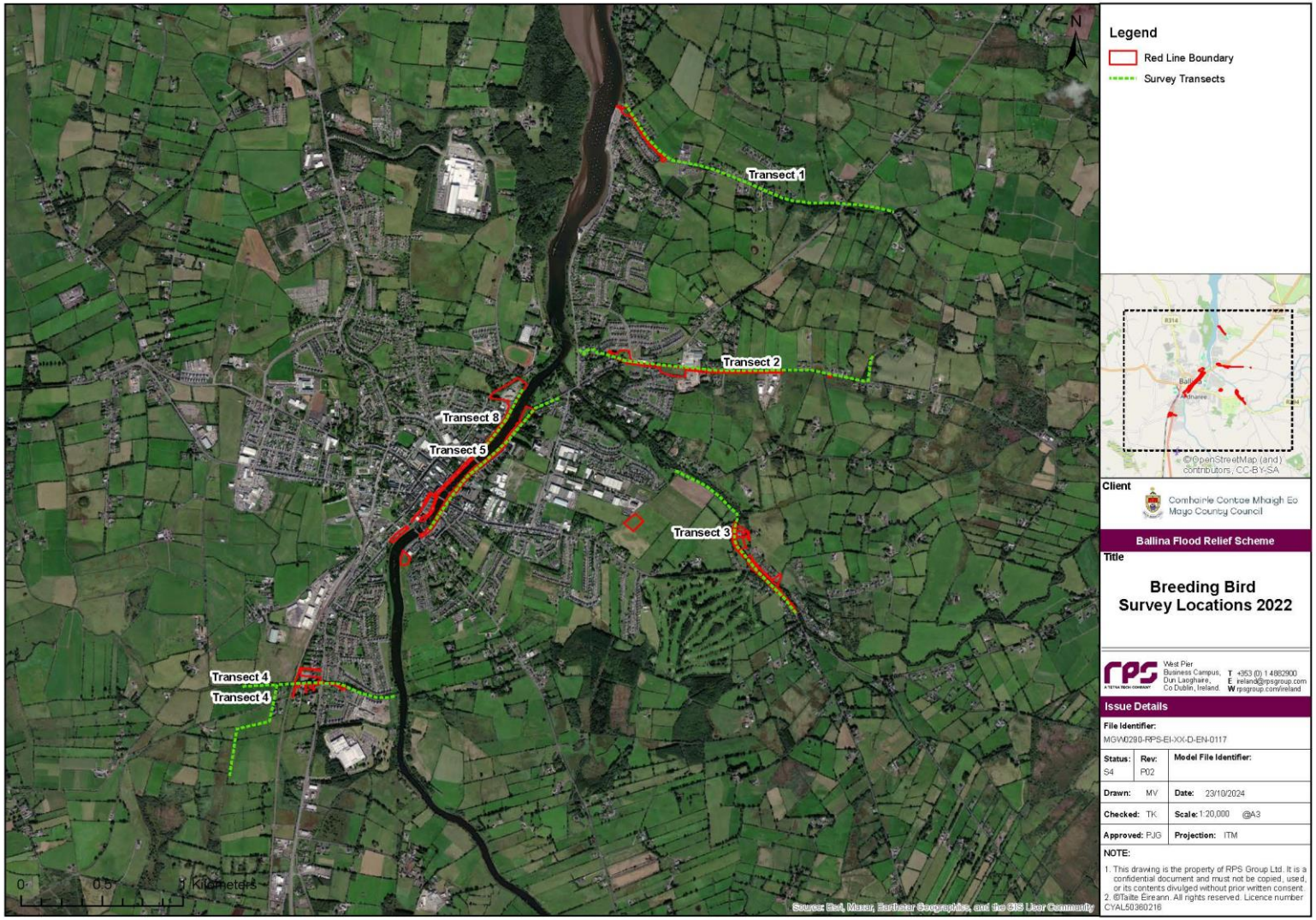

Figure 10-6 Breeding Bird Survey Locations 2022

Figure 10-7 Breeding Bird Survey Locations 2023

10.2.4.2.4.2 Overwintering Waterbird Surveys

Given the proximity and interconnectivity between the Proposed Scheme and Killala Bay/Moy Estuary Special Protection Area (SPA) (site code 004036) and the potential for indirect/ex-situ impacts on the Special Conservation Interests (SCI) of Lough Conn and Lough Cullin SPA (site code 004228), over-wintering avifaunal surveys were completed. These surveys were undertaken to ascertain the level of avifaunal usage within the footprint of the Proposed Scheme and to assess whether the Proposed Scheme area and its environs supported suitable feeding or roosting over-wintering habitat for avifauna associated with these SPAs and a number of pNHAs (e.g. Killala Bay/Moy Estuary pNHA, Lough Conn and Lough Cullin pNHA, Lough Alick pNHA, Cloonagh Lough (Mayo) pNHA) within the wider Ballina area. Surveys were completed in winter 2022/23 on the following dates: 24th November and 20th December 2022 and the 19th January 20th February and 27th March 2023. Surveys covered a range of tidal cycles in an attempt to capture the varied land use of SCI species throughout the tidal cycle. **Table 10-6** outlines the details of each site visit.

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

Two sites (Site 1 and Site 2: **Figure 10-8** and **Figure 10-9,** respectively) adjacent to the proposed works areas were assessed for overwintering waterbird usage. Site 1 encompassed the Moy estuary and habitats adjacent to the Quignamanger proposed works area while Site 2 encompassed the Moy estuary and other habitats within the centre of Ballina town adjacent to the proposed areas of work along the main channel of the River Moy. A 300 m buffer was applied to the red line boundary of the proposed works, based on the study of waterbird disturbance responses to construction by Cutts *et al*. (2013). All habitats within this 300 m buffer that was deemed suitable to support foraging over-wintering waterbirds that could be accessed on the day or was visible from public areas was surveyed.

Table 10-6: Summary of Site-Specific Overwintering Waterbirds Survey Data

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

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

Figure 10-8 Overwintering Waterbird Study Area – Site 1

Figure 10-9 Over Wintering Waterbird Study Area - Site 2

10.2.4.2.5 Invasive Alien Plant Species

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

10.2.5 Assessment Criteria and Significance

10.2.5.1 Assessment Methodologies

The assessment on terrestrial biodiversity has been completed with reference to the following guidance documents, which are specific to biodiversity:

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, Version 1.1- Updated September 2019 (CIEEM, 2018).
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes, Revision 2 (NRA, 2009).

The CIEEM (2018) guidelines have been used as the primary basis of the assessment. The process also takes cognisance of the EPA (2022) guidelines and incorporates NRA (2009) guidelines for the ecological valuation and geographic context.

10.2.5.2 Important Ecological Features

The methodology used to value ecological features is in accordance with the geographic frames of reference outlined by the NRA (2009) (see **Appendix 10.3**).

Important Ecological Features (IEF), as termed in CIEEM (2018), are defined here as those ecological features which are valued at Local Importance (higher value) or above (NRA, 2009 see **Appendix 10.3**). Ecological features below this value have been scoped out of further ecological impact assessment as any potential impact is deemed to be of Local Importance (lower value) or negligible.

10.2.5.3 Ecological Impact Assessment Process

The ecological impact assessment process, as described by CIEEM (2018), involves:

- Identifying and characterising impacts and their effects.
- Incorporating measures to avoid and mitigate negative impacts and effects.
- Assessing the significance of any residual effects after mitigation.
- Identifying appropriate compensation measures to offset significant residual effects.
- Identifying opportunities for ecological enhancement.

The assessment comprises the review of the baseline data gathered and the identification of IEFs with features valued on the basis of available information/guidance and using professional judgement.

10.2.5.4 Characterising and Determining Significance

Impacts on IEFs are characterised with the following qualitative terms, as relevant (CIEEM, 2018):

- **Positive or Negative**: Positive and negative impacts and effects should be determined according to whether the change is in accordance with nature conservation objectives and policy:

  - **Positive**: A change that improves the quality of the environment (e.g. by increasing species diversity, extending habitat or improving water quality). This may also include halting or slowing an existing decline in the quality of the environment.
  - **Negative**: A change which reduces the quality of the environment (e.g. destruction of habitat, removal of foraging habitat, habitat fragmentation, pollution).
- **Extent**: The extent is the spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions (e.g. noise transmission under water).
- **Magnitude**: Magnitude refers to size, amount, intensity and volume. It should be quantified if possible and expressed in absolute or relative terms (e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population).
- **Duration**: Duration should be defined in relation to ecological characteristics (such as the lifecycle of a species) as well as human timeframes. For example, five years, which might seem short-term in the human context or that of other long-lived species, would span at least five generations of some invertebrate species.
- **Frequency and Timing**: The number of times an activity occurs will influence the resulting effect. For example, a single person walking a dog will have very limited impact on nearby waders using wetland habitat, but numerous walkers will subject the waders to frequent disturbance and could affect feeding success, leading to displacement of the birds and knock-on effects on their ability to survive. The timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons (e.g. bird nesting season).
- **Reversibility**: An irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation.

There may be any number of possible impacts on IEFs arising from a development. However, it is only necessary to describe in detail the impacts that are likely to be significant. Impacts that are either unlikely to occur, or if they did occur are unlikely to be significant, are scoped out. If in doubt, the precautionary principle is applied, and the potential impact is assessed.

When assessing the significance of an effect and for the purposes of this assessment, the significance of an effect is simply any effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. A significant effect is a positive or negative ecological effect that should be given weight in judging whether to permit a project. For the purposes of ecological impact assessment, a “significant effect” is defined as an effect that either supports or undermines the biodiversity conservation for the IEF (CIEEM, 2018). These significant effects are qualified with reference to an appropriate geographical scale.

The approach to determining significance does not utilise a matrix of degrees of impact significance (such as EPA (2022)) but instead follows the industry standard for ecological impact significance (CIEEM, 2018) where effects are determined to be ‘significant’ or ‘not significant’.

10.2.6 Data Limitations and Difficulties Encountered

10.2.6.1 Desk Based Study

Sources of desk study information are neither exhaustive nor necessarily easily available, and an extensive effort was made to obtain ecological data in the public domain to inform the description of the baseline environment and its assessment. Additional information, not in the public domain, is likely to exist, but could not be obtained or assessed here. This limitation is acknowledged and incorporated into the assessment and is deemed to not affect the certainty or predictability of the assessment.

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

10.2.6.2 Field Study

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

10.2.6.2.1 Mammals

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

10.2.6.2.2 Invasive Alien Plant Species

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

10.2.6.2.3 Bats

The River Moy in Ballina town has large sections of stone walls, steps and other built constructions along its banks and associated with the salmon weir. Not every aspect of these structures could be accessed, but where possible they were inspected for signs of possible bat roost locations. To compensate for the difficulty of accessing some areas, vantage point surveys were laid out along the river's edge in order to encompass a view of built structures with the aim of locating bat roosts – if present – during these VP surveys. It must be noted that certain areas were difficult to view during the VP surveys due to bright street lighting and difficulty of getting close enough to certain points. No roost location was found during the inspections.

The street lighting along the river was a constraint at times with light reflecting on the river. This impeded the vision of the surveyor of commuting and foraging bats and is likely to cause reduction in foraging potential of some bat species.

Bat surveys were not undertaken during the winter months and therefore, confirming use of certain hibernation roost features by bats in winter was not possible, however, given the lack of suitable structures for such purposes this was not regarded to be a significant limitation. Once incorporated into the assessment these limitations are deemed to not affect the outcome or certainty of the assessment.

10.2.6.2.4 Harbour Seal

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

10.2.6.2.5 Ornithology

10.2.6.2.5.1 Overwintering waterbirds

The survey work for the overwintering waterbirds was carried out between November 2022 and March 2023. Therefore, it is limited to the mid and late winter period of a single season. However, given the availability of

existing waterbird data for the area and the limited overlap of the Proposed Scheme area with wintering waterbird habitat, it is considered that there is sufficient information available for the assessment. Once incorporated into the assessment the limitation is deemed to not affect the certainty or predictability of the assessment.

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

10.2.7 Consultations

Meetings and follow up consultations were arranged with stakeholders at all phases of the project. Comments and queries from stakeholders informed design and are addressed throughout this report. Comments relevant to this chapter and summarised in **Table 10-7**.

Table 10-7: List of Consultations

Consultees	Feedback	Location where Comments were Addressed
NPWS	Petrifying springs with tufa formation (Cratoneurion) [7220] have been recorded in the wider study area. The Department would like to note that these features are being proposed as potential qualifying interests of the River Moy SAC. Consequently, the Department considers that appropriate surveys to determine the presence of this habitat within the zone of influence of the Proposed Scheme should be undertaken. The EIAR should consider the effects of any potential impacts on this habitat within the zone of influence.	A petrifying spring was identified along the Quignamanger proposed works area. The potential impacts upon this habitat is dealt with in **Chapter 9: Aquatic Biodiversity.**

10.3 Description of the Existing Environment

This section outlines the baseline biodiversity for the study area, based on the desk studies and field surveys completed. The baseline has been used to identify the IEFs which have subsequently been taken forward with respect to the assessment of significant impacts and effects.

10.3.1 Designated Sites for Nature Conservation – International Sites

International sites within the ZoI of the Proposed Scheme consist of European Sites (i.e. SACs and SPAs) designated under the Habitats Directive and the Birds Directive and Ramsar sites designed under the Conventions on Wetlands of International Importance Especially as Waterfowl Habitat.

10.3.1.1 European Sites

The Appropriate Assessment (AA) Screening Report and Natura Impact Statement (NIS) prepared for the Proposed Scheme identified four European Sites within the ZoI of the Proposed Scheme. These are as follows:

- River Moy SAC (site code: 002298)
- Killala Bay/Moy Estuary SAC (site code: 000458)
- Killala Bay/Moy Estuary SPA (site code: 004036)
- Lough Conn and Lough Cullin SPA (site code: 004036)

Further details on these SACs and SPAs within the ZoI of the Proposed Scheme and an assessment of the effects of the Proposed Scheme on their Qis/SCIs are set out in the associated AA Screening Report and NIS for the Proposed Scheme.

10.3.1.1.1 Summary of Relevant European Sites and Connectivity to Proposed Scheme

An overview of the designated European Sites within the ZoI of the Proposed Scheme is outlined in **Figure 10-10.** How each of these designated European Sites interact with the Proposed Scheme is outlined in **Figure 10-11.**

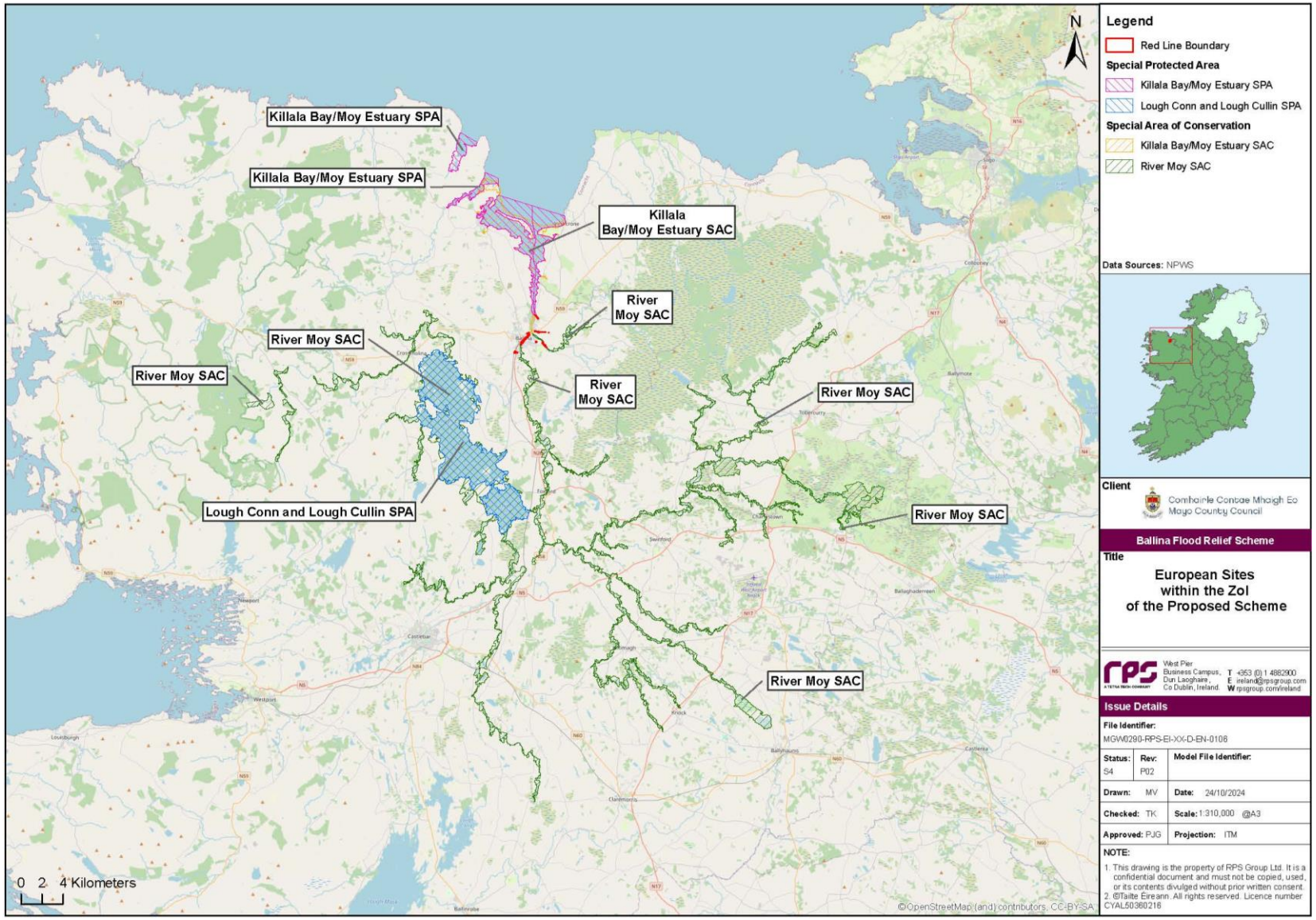

Figure 10-10 European Sites within the ZoI of the Proposed Scheme

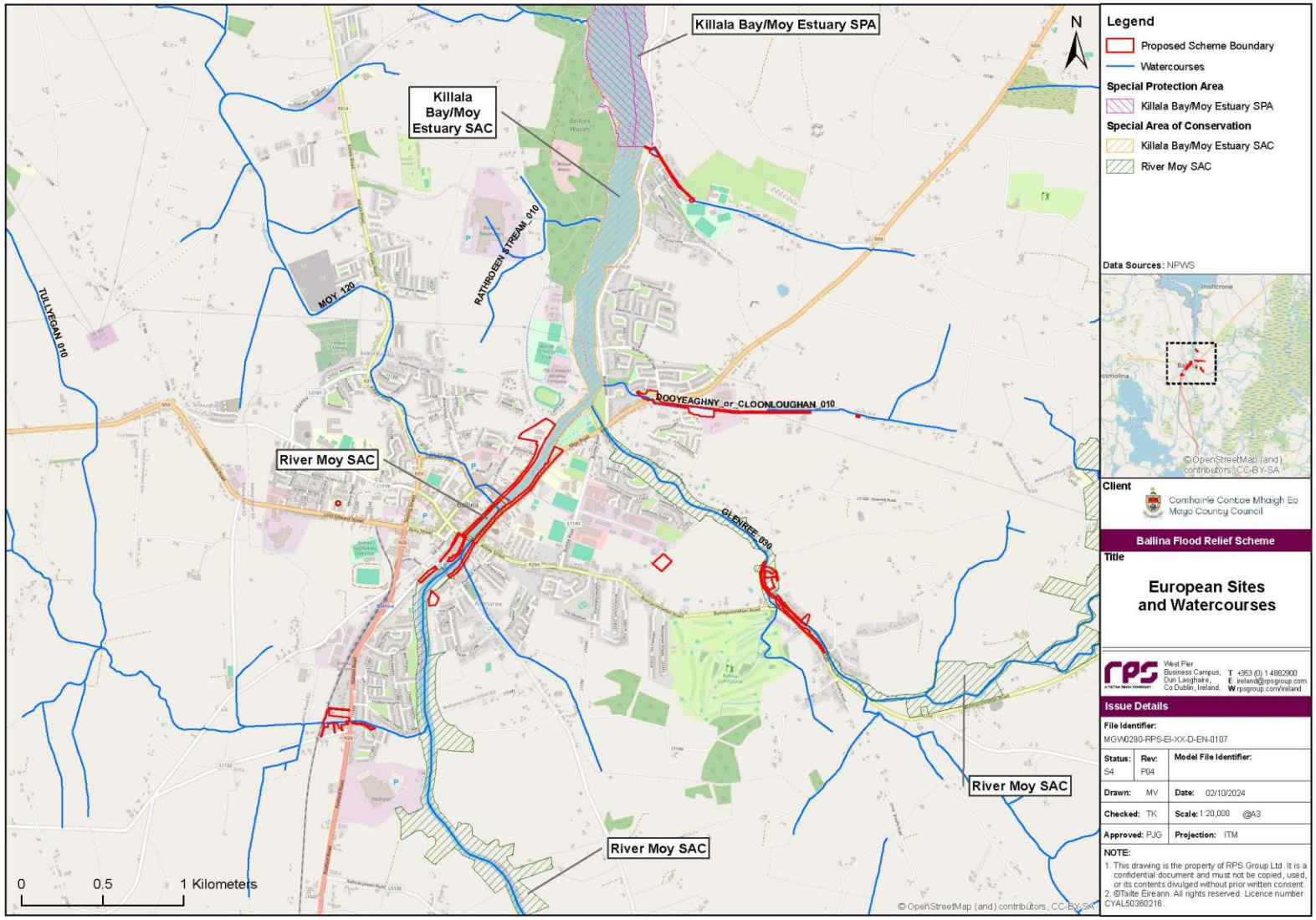

Figure 10-11 Interaction between European Sites and Proposed Scheme and watercourses in the vicinity of the Proposed Scheme

10.3.1.1.1.1 River Moy SAC (002298)

The River Moy SAC has been classified as being of International Importance for the purposes of this assessment as it is an internationally designated site.

10.3.1.1.1.2 Killala Bay/Moy Estuary SAC (000458)

Killala Bay/Moy Estuary SAC has been classified as being of International Importance for the purposes of this assessment as it is an internationally designated site.

10.3.1.1.1.3 Killala Bay/Moy Estuary SPA (004036)

Killala Bay/Moy Estuary SPA has been classified as being of International Importance for the purposes of this assessment as it is an internationally designated site.

10.3.1.1.1.4 Lough Conn and Lough Cullin SPA (004228)

Lough Conn and Lough Cullin SPA has been classified as being of International Importance for the purposes of this assessment as it is an internationally designated site.

10.3.1.2 Ramsar Sites

A singe Ramsar site lies within the ZoI of the Proposed Scheme, namely Killala Bay/Moy Estuary Ramsar site (Site Ref. 843). This site was designated on 07/06/1996. It is composed of an estuary and intertidal bay separated from the sea by a long sandy island. The site includes a well-development dune system, saltmarsh, sand and shingle beaches backed by sea-cliffs and extensive sand and mudflats exposed at low tide. The dunes support a rich and diverse flora that includes several rare or threatened plants. The intertidal flats provide important feeding sites for birds. Brent geese overwinter in the bay in internationally important numbers, and regionally or locally important numbers of several species of waterbirds use the site.

The Killala Bay/Moy Estuary Ramsar site encompasses a total area of 1,061 ha. It broadly overlaps with the Killala Bay/Moy Estuary SPA and is located within the Proposed Scheme area. The Moy Estuary is located within the Proposed Scheme area and is located within the Killala Bay/Moy Estuary Ramsar site. Therefore, there is direct overland and hydrological connectivity between the Proposed Scheme and the Ramsar site. The Proposed Scheme and the Ramsar site are both located within the Ballina groundwater body. Therefore, there is potential for hydrogeological connectivity between the Ramsar site and the Proposed Scheme.

An overview of the Ramsar site within the ZoI of the Proposed Scheme can be found in **Figure 10-12.** The exact boundary of this Ramsar Site was unobtainable; however, it is considered to have broadly the same boundary as Killala Bay/Moy Estuary SPA, therefore the boundary of the SPA is shown in **Figure 10-12**

Killala Bay/Moy Estuary Ramsar Site has been classified as being of International Importance for the purposes of this assessment as it is an internationally designated site.

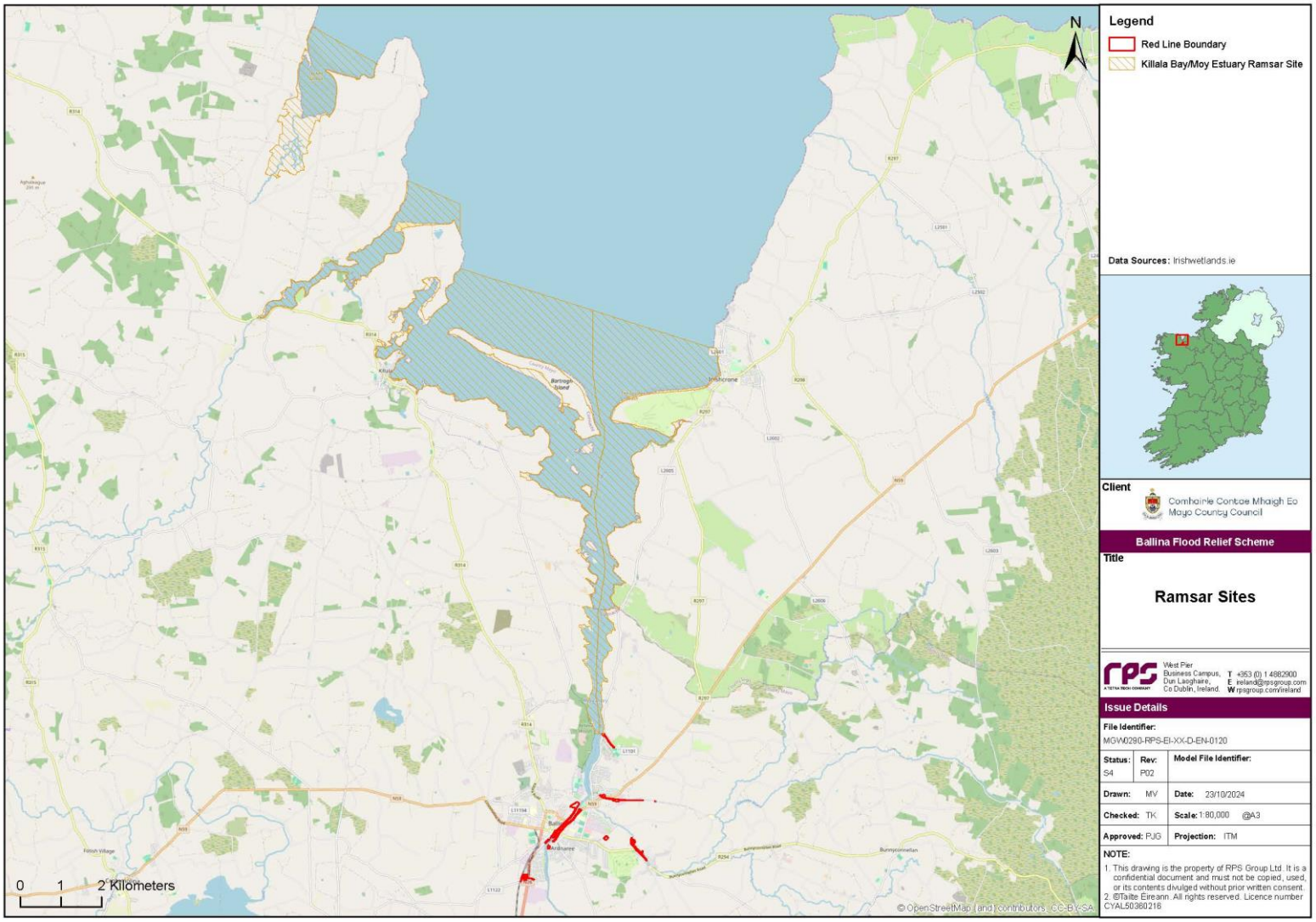

Figure 10-12 Ramsar sites within the ZoI of the Proposed Scheme

10.3.2 Designated Sites for Nature Conservation - National Sites

10.3.2.1 Natural Heritage Areas and Proposed Natural Heritage Areas

There is no connectivity (e.g. direct connectivity, hydrological, hydrogeological, ex-situ habitats etc.) between the Proposed Scheme and any nationally designated Natural Heritage Areas (NHAs), therefore, there are no NHA sites within the ZoI of the Proposed Scheme.

There are 5 proposed NHA (pNHA) sites within the ZoI of the Proposed Scheme, namely:

- Killala Bay/Moy Estuary pNHA (Site Code: 000458)
- Moy Valley pNHA (Site Code: 002078)
- Lough Conn and Lough Cullin pNHA (Site Code: 000519)
- Cloonagh Lough (Mayo) pNHA (Site Code: 001485)
- Lough Alick pNHA (Side Code: 001527)

An overview of the designated national sites (pNHAs) within the ZoI of the Proposed Scheme can be found in **Figure 10-13**. How each of these designated national sites interact with the Proposed Scheme is outlined in **Figure 10-14.**

Killala Bay/Moy Estuary pNHA overlaps with the Proposed Scheme. This pNHA is co-located with the Killala Bay/Moy Estuary SAC and Killala Bay/Moy Estuary SPA. It is proposed to be designated for the same habitats and species as the SAC. The Moy Estuary is located within the Proposed Scheme area and is designated as part of the Killala Bay/Moy Estuary pNHA. Therefore, there is direct overland and hydrological connectivity between the Proposed Scheme and the pNHA. The Proposed Scheme and the pNHA are both located within the Ballina groundwater body. Therefore, there is potential for hydrogeological connectivity between the pNHA and the Proposed Scheme.

This pNHA has been classified as being of National Importance for the purpose of this assessment as it is a nationally designated site. It is also co-located with Killala Bay/Moy Estuary SAC and Killala Bay/Moy Estuary SPA; therefore, the international value attributed to the SAC and SPA will take precedent for the purposes of the assessment.

Moy Valley pNHA is located approximately 11.5 km upstream of the Proposed Scheme. This pNHA overlaps with an approximate 10k m stretch of the River Moy SAC both upstream and downstream of Foxford, Co. Mayo, however, the pNHA covers a wider area (i.e. greater distance perpendicular to the left-hand and right-hand banks of the River Moy) than the SAC. Data pertaining to this pNHA is very difficult to source, however, it is presumed that it is proposed to be designated for a number of the species and/or habitats listed for The River Moy SAC. The mapping within the River Moy SAC Conservation Objectives (CO) datasheet does not indicate the presence of any mapped QI habitat of the River Moy SAC (Active raised bogs [7110]; Degraded raised bogs still capable of natural regeneration [7120], Depressions on peat substrates of the Rhynchosporion [7150], Alkaline fens [7230], Old oak woodlands [91A0], Alluvial forests [91E0]) within the area covered by the Moy Valley pNHA. BSBI mapping shows records of great burnet (*Sanguisorba officinalis*) from within the Moy Valley pNHA, nonetheless, indicating that this pNHA has perhaps been designated for the Annex habitat Lowland hay meadows [6510], of which great burnet is an indicator species. It is also presumed that this pNHA is designated for mobile aquatic QI species of the River Moy SAC such as otter, Atlantic salmon, brook lamprey, sea lamprey and white clawed crayfish.

As it is likely that this pNHA is proposed to be designated for migratory species, such as Atlantic salmon and sea lamprey, it is considered that there is connectivity between the Proposed Scheme and this pNHA as migratory species will use the Moy estuary during their life cycle.

This pNHA has been classified as being of National Importance for the purpose of this assessment as it is a nationally designated site. This site is co-located with sections of the River Moy SAC; therefore, the international value attributed to the SAC will take precedent for the purposes of the assessment for those parts of the pNHA within the SAC.

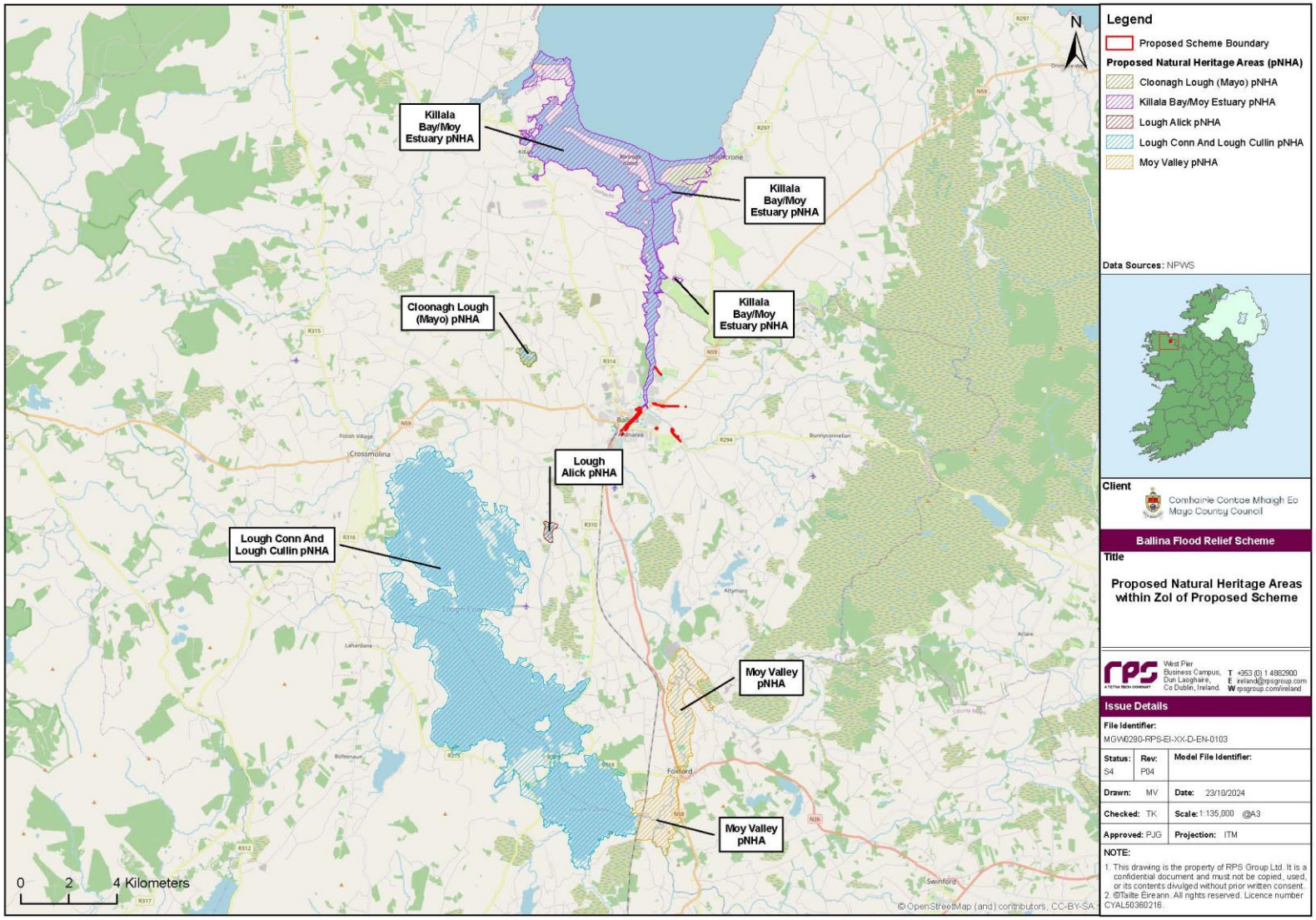

Figure 10-13 pNHAs within the ZoI of the Proposed Scheme

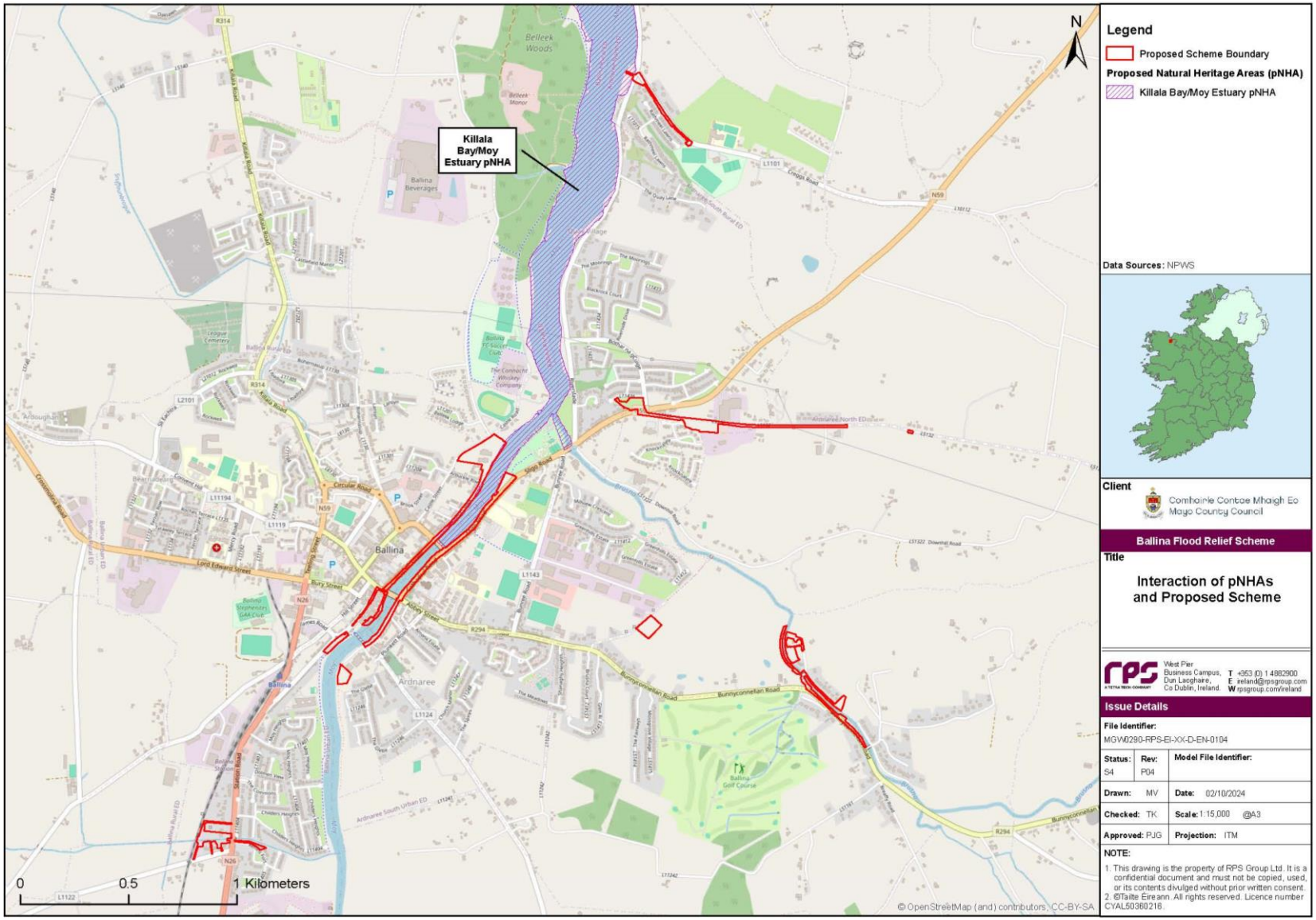

Figure 10-14: Interaction of pNHAs and the Proposed Scheme

Lough Conn and Lough Cullin pNHA is located approximately 5 km (as the crow flies) from the Proposed Scheme. It is co-located with Lough Conn and Lough Cullin SPA and also with the River Moy SAC. It is therefore, assumed to be proposed to be designated for the same species and habitats as these two European Sites.

Lough Conn and Lough Cullin pNHA is approximately 24 km upstream of the Proposed Scheme, therefore, it is considered that no direct hydrological connectivity between the Proposed Scheme and the pNHA exists. The pNHA and Proposed Scheme are both located within the Ballina groundwater body; however, the groundwater flows towards the nearest rivers and lakes (GSI, 2004), therefore groundwater is most likely to flow from the proposed works areas towards the River Moy. Consequently, it is unlikely for groundwater interaction to occur between the Proposed Scheme and the pNHA. Common gull, an SCI species of Lough Conn and Lough Cullin pNHA have been recorded in the vicinity of the Proposed Scheme. Given the overland distance (approximately 5 km) between the pNHA and the Proposed Scheme in combination with the foraging distance of common gull (50 km (Woodward *et al*., 2019)), it is considered that there is potential for ex-situ foraging connectivity between the pNHA and the Proposed Scheme area. Furthermore, as the pNHA is designated for migratory species, such as Atlantic salmon and sea lamprey, it is considered that there is connectivity between the Proposed Scheme and this pNHA as migratory species will use the Moy Estuary during their life cycle.

This pNHA has been classified as being of National Importance for the purpose of this assessment as it is a nationally designated site. This site is co-located with Lough Conn and Lough Cullin SPA and the River Moy SAC; therefore, the international value attributed to the SAC and SPA will take precedent for the purposes of the assessment.

Cloonagh Lough (Mayo) is located approximately 3.5 km (as the crow flies) from the Proposed Scheme. Cloonagh Lough is a small lake and has an interesting ecology because of its mixture of acidic and neutral or base areas. It has been proposed to be designated for a number of different habitats and species including reed beds and other emergent and floating lakeshore plants, mixed deciduous woodland, waterbirds, invertebrates and otter. The site may be used as an overwintering site for waterfowl within the Killala Bay area and there is a heronry on the island.

This pNHA is approximately 13 km upstream of Lough Conn and within a catchment that is not intersected by the Proposed Scheme, therefore, it is considered that no suitable direct hydrological connectivity between the Proposed Scheme and the pNHA exists. The pNHA and Proposed Scheme are both located within the Ballina groundwater body; however, the groundwater flows towards the nearest rivers and lakes (GSI, 2004), therefore groundwater is most likely to flow from the proposed works towards the River Moy. Consequently, it is unlikely for groundwater interaction to occur between the Proposed Scheme and the pNHA. As the site may be used as an overwintering site for waterfowl within the Killala Bay area it is considered that there is potential for ex-situ connectivity between the Proposed Scheme and the pNHA.

This pNHA has been classified as being of National Importance for the purpose of this assessment as it is a nationally designated site.

Lough Alick pNHA is located approximately 4 km (as the crow files) from the Proposed Scheme. Lough Alick is a small lake that drains directly into the River Moy. It is a calcareous lake with some marl accumulation on its bed. The lake is proposed to be designated for a rich fen flora which is notable for its diversity of orchids. It also supports a good diversity of emergent and floating vegetation on the lake shore. Black headed gulls and common gulls nest in small numbers on the lake while snipe are frequent in the marsh. Freshwater mussel (*Anodonta* spp.) also occur in the lake.

Lough Alick pNHA is approximately 11.5 km upstream of the Proposed Scheme, therefore, it is considered that no direct hydrological connectivity between the Proposed Scheme and the pNHA exists. The pNHA and Proposed Scheme are both located within the Ballina groundwater body; however, the groundwater flows towards the nearest rivers and lakes (GSI, 2004), therefore groundwater is most likely to flow from the proposed works towards the River Moy. Consequently, it is unlikely for groundwater interaction to occur between the Proposed Scheme and the pNHA. As the pNHA supports nesting common gull and black headed gull, it is considered that there is potential for ex-situ connectivity between the Proposed Scheme and the pNHA.

This pNHA has been classified as being of National Importance for the purpose of this assessment as it is a nationally designated site.

10.3.3 Habitats and Flora

10.3.3.1 Habitats

10.3.3.1.1 Field Survey

The following sections detail the terrestrial habitats (classified with reference to Fossitt (2000)) located within 100 m of the Proposed Scheme. Spatial locations for each habitat type as it occurs within the surveyed areas are also provided. In addition, the ecological value for each habitat with reference to NRA guidance (NRA, 2009) and their correspondence to habitats listed on Annex I of the EU Habitats Directive are also given.

Habitats identified within the areas surveyed for the Proposed Scheme determined to be of Local Importance (lower value) (NRA, 2009) were assigned as such due to being either common and widespread habitats or because they are habitats that support low botanical value.

The following descriptions should be read in conjunction with **Appendix 10.4** which provides drawings of the habitats that occur within 100 m of the Proposed Scheme.

The following habitats were identified within the areas surveyed for the Proposed Scheme:

- Depositing/lowland Rivers (FW2)
- Drainage Ditches (FW4)
- Calcareous Springs (FP1)[11]
- Reed and Large Sedge Swamps (FS1)
- Tall-herb Swamps (FS2)
- Improved Agricultural Grassland (GA1)
- Amenity Grassland (GA2)
- Dry Calcareous and Neutral Grassland (GS1)
- Dry Meadows and Grassy Verges (GS2)
- Wet Grassland (GS4)
- Dense Bracken (HD1)
- Riparian Woodland (WN5)
- Mixed Broadleaved Woodland (WD1)
- Scattered Trees and Parkland (WD5)
- Scrub (WS1)
- Immature Woodland (WS2)
- Ornamental/Non-Native Shrub (WS3)
- Hedgerows (WL1)
- Treelines (WL2)
- Spoil and Bare Ground (ED2)
- Recolonising Bare Ground (ED3)
- Buildings and Artificial Surfaces (BL3)

[11] This habitat was initially thought to be present at a single location within the Quignamanger proposed works area, however further analysis revealed this not to be the case. Nonetheless, details of this habitat are included here as the particular habitat present is commensurate with the Annex I priority habitat 7220 and was the subject of feedback received by the NPWS (**Section 10.2.7**). This Annex I habitat is discussed further in **Chapter 9: Aquatic Biodiversity**.

- Tidal Rivers (CW2)
- Mud Shores (LS4)

Depositing/lowland Rivers (FW2)

Depositing/lowland rivers occurred at all locations across the Proposed Scheme including Brusna, Bunree, Quignamanger and Tullyegan. The Brusna River at the point where the Proposed Scheme is to be implemented forms part of the River Moy SAC (Site Code 002298). The Moy Main channel also forms part of the River Moy SAC upstream of the Lower Bridge in the centre of Ballina Town. Downstream of the Lower Bridge the Moy main channel forms part of the Killala Bay/Moy Estuary SAC. The EPA has designated the Moy main channel as a transitional waterbody downstream of the Upper Bridge in the centre of Ballina town, therefore, the Moy is classified as a depositing/lowland river upstream of the Upper Bridge.

The Bunree and Tullyegan, do not form part of the overall River Moy SAC, however they are tributaries of the River Moy. The Tullyegan flows into the River Moy SAC approximately 500 m downstream of the Tullyegan proposed works area. The Bunree flows into Killala Bay/Moy Estuary SAC approximately 300 m downstream of the proposed works areas. A number of these watercourses are culverted to a greater or lesser degree both within and outside their respective proposed works areas including the Bunree and Quignamanger.

Vegetation observed within and at the edges of the smaller streams (Brusna, Tullyegan, Quignamanger, Bunree) included drab brook-moss (*Hygrohypnum luridum*), water mint (*Mentha aquatica*), lesser water-parsnip (*Berula erecta*), fool's watercress (*Helosciadium nodiflorum*), alternate water-milfoil (*Myriophyllum alterniflorum*), bulrush (*Typha latifolia*), liverworts (*Chiloscyphus* sp., *Pellia* sp., *Riccardia* sp.), red algae (*Hildenbrandia* spp.), common reed (*Phragmites australis*), starwort (*Callitriche* sp.), broad-leaved pondweed (*Potamogeton natans*), water figwort (*Scrophularia auriculata*), branched bur-reed (*Sparganium erectum),* ivy-leaved duckweed (*Lemna trisulca*), blue water-speedwell (*Veronica anagallis-aquatica*), marsh marigold (*Caltha palustris*), sweet grass (*Glyceria* sp.) and spikerush (*Eleocharis* sp.).

Species present in the main channel of the River Moy included water-crowfoot (*Ranunculus* sp.), pondweed (*Potamogeton gramineus x perfoliatus* (*P. x nitens*)), perfoliate pondweed (*P. perfoliatus*), water plantain (*Alisma plantago-aquatica*), spikerush, starwort (*Callitriche* sp.), Canadian waterweed (*Elodea canadensis*), fennel pondweed (*Stuckenia pectinata*), unbranched bur-reed (*Sparganium emersum*), branched bur-reed, moss (*Rhynchostegium* sp.) and yellow water-lily (*Nuphar lutea*).

The main channel of the River Moy upstream of the Upper Bridge is salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988)[12].

Depositing/lowland rivers have been classified as being of International Importance for the purposes of this assessment due to forming part of The River Moy SAC and Killala Bay/Moy Estuary SAC and as the River Moy is a designated salmonid river. This habitat is covered within **Chapter 9: Aquatic Biodiversity** of the EIAR.

The main channel of the River Moy contained large abundances of floating river vegetation (FRV) for the entire length of the channel adjacent to the proposed works areas. This habitat was dominated by *Ranunculus* species with lower abundances of pondweeds, starworts, alternate water-milfoil and Canadian waterweed. Some areas of the channel, however, contained more vegetation than others, for example, the left-hand side of the channel between the Upper Bridge and Lower Bridge was more heavily vegetated than the right-hand side of the channel between the two bridges. FRV is a somewhat dynamic habitat where abundances and extent of the habitat can change from year-to-year dependant on hydrology (e.g. as a result of drought or flood), nutrient loading of rivers etc. FRV can be used by salmonids and lamprey (e.g. for cover and foraging), however, it is not classified as a critical supporting habitat for either of these species i.e. they do not require FRV during their lifecycle as it is not crucial to the ecological functioning of either species.

This habitat (i.e. FRV) is commensurate with the Annex I habitat *watercourses of plain to montane levels with the* Ranunculion fluitantis *and* Callitricho-Batrachion *vegetation* [3260].

There is direct connectivity between the Proposed Scheme and this habitat as instream works will take place on the main channel of the River Moy in the centre of Ballina town. FRV has been classified as being of

[12] Note that such waters are designated based on these waters' capabilities of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*).

National Importance for the purposes of this assessment as it is a viable area of a habitat type listed in Annex I of the Habitats Directive.

The location of FRV in proximity to the Proposed Scheme is outlined in **Figure 10-15.**

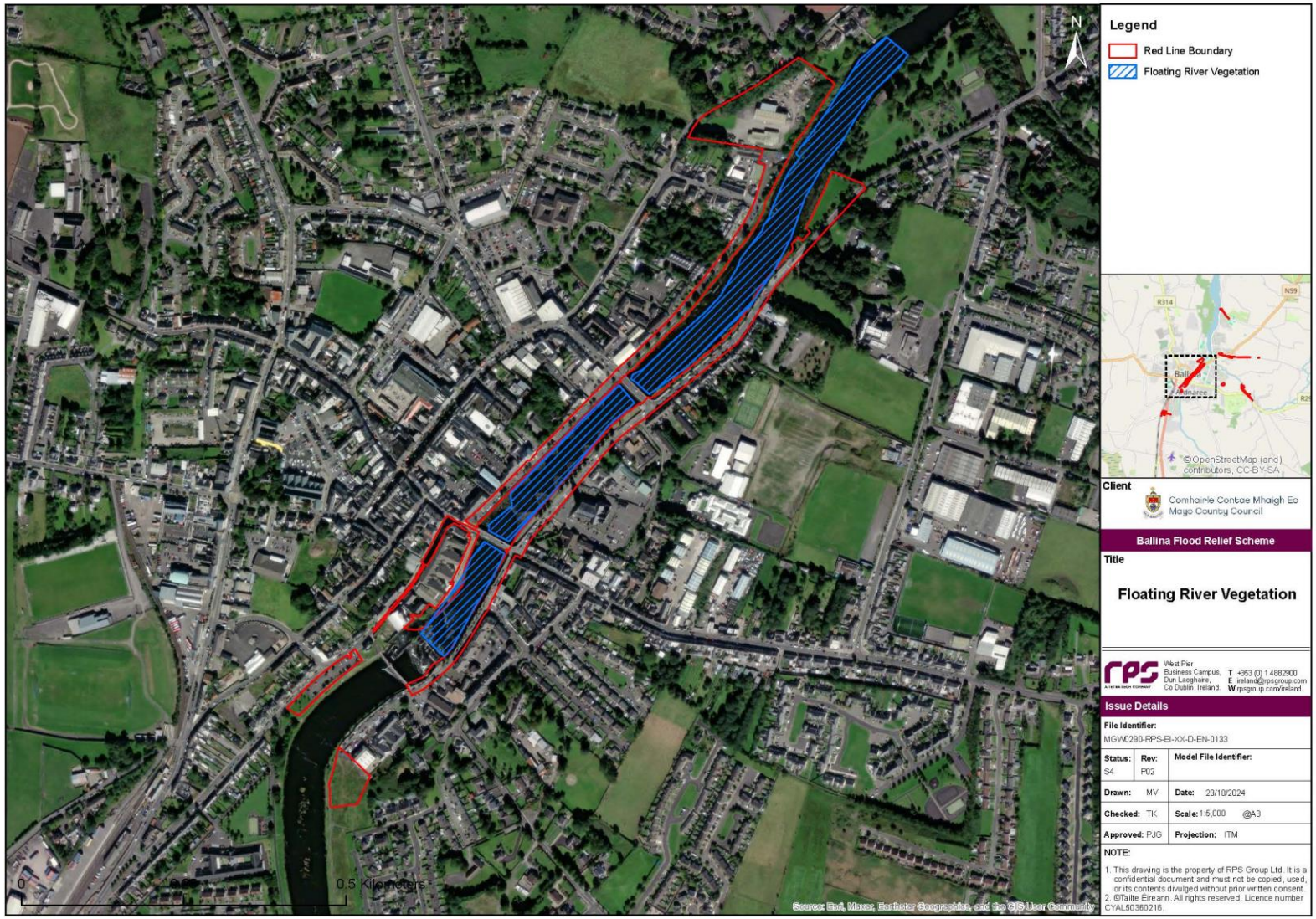

Figure 10-15 Floating River Vegetation Observed within close Proximity to the Proposed Scheme

Drainage Ditches (FW4)

Drainage ditches were observed in a single location across the Proposed Scheme, surrounding the proposed compound location along the Bunree/Behy Road. Drainage ditches were observed along the eastern, southern and western periphery of this area.

This habitat contained standing water and species observed within this habitat included fool's watercress, creeping buttercup (*Ranunculus repens*), water-starwort and yellow flag-iris (*Iris pseudacorus*). This habitat does not have links with any Annex I habitat and does not fall within the confines of any European Site.

Drainage ditches have been classified as being of Local Importance (lower value) for the purposes of this assessment as they contain small areas of semi-natural habitat that are of some local importance for wildlife e.g. for invertebrates, amphibians etc.

Calcareous Springs (FP1)

A potential calcareous spring was identified along the open channel of the Quignamanger stream near the junction of Quay Road and Creggs Road within a report of Annex I habitat *Petrifying Springs* [7220] across the wider Ballina area (Denyer, 2021). Tufa cascades were observed along this open channel and the species assemblage observed within this habitat during surveys for the Proposed Scheme was consistent with typical calcareous spring bryophyte species including endive pellia (*Pellia endiviifolia*), star-headed liverwort (*Marchantia polymorpha* subsp. *polymorpha*), fern-leaved hook-moss (*Cratoneuron filicinum*) and olive beard-moss (*Didymodon tophaceus*). Further analysis of this area as outlined in **Chapter 9: Aquatic Biodiversity** of the EIAR demonstrates no evidence of localised "springs" supporting the *7220 habitat here, however the tufa deposits and bryophyte assemblage are consistent with the *7220 habitat despite no spring being present at this point. This habitat is not considered further in this chapter but is assessed within **Chapter 9: Aquatic Biodiversity**.

Reed and Large Sedge Swamps (FS1)

A number of pockets of reed and large sedge swamps were recorded either side of the main channel of the River Moy within the confines of Ballina town for the entire length of the channel adjacent to the proposed works areas.

Species observed within this habitat included reed canary grass (*Phalaris arundinacea*), branched bur-reed, water plantain, unbranched bur-reed, sweet grass and fool's water-cress. This habitat does not have links with any Annex I habitats, however all of the FS1 habitat adjacent to the Proposed Scheme falls within the confines of either the River Moy SAC or Killala Bay/Moy Estuary SAC.

Reed and large sedge swamp has been classified as being of Local Importance (lower value) as they are small areas of semi-natural habitat that are of some local importance for wildlife e.g. lamprey. **Chapter 9: Aquatic Biodiversity** discusses this habitat further with respect to its supporting function for lamprey.

Tall-herb Swamps (FS2)

Tall herb swamp was observed on both banks of the River Moy main channel in the centre of Ballina town downstream of the Lower Bridge and also on the right-hand bank of the Moy estuary within the Quignamanger proposed works area. In general, this habitat was relatively species rich with little to no sign of management on the day of the survey.

Species present included purple loosestrife (*Lythrum salicaria*), marsh bedstraw (*Galium palustre*), marsh ragwort (*Jacobaea aquatica*), meadowsweet (*Filipendula ulmaria*), reed canary grass, branched bur-reed, water figwort, water dropwort (*Oenanthe* sp.), silverweed (*Potentilla anserina*), remote sedge (*Carex remota*), common valerian (*Valeriana officinalis*), spikerush, yellow flag iris, rushes (*Juncus* sp.), dandelion (*Taraxacum officinale* agg.), angelica (*Angelica sylvestris*), St. John's wort (*Hypericum* sp.), ribwort plantain (*Plantago lanceolata*), cock's-foot (*Dactylis glomerata*), bird's-foot trefoil (*Lotus corniculatus*), horse-tail (*Equisetum* sp.), marsh marigold, common club-rush (*Schoenoplectus lacustris*), lesser stitchwort (*Stellaria graminea*), butterbur (*Petasites hybridus*) and great willowherb (*Epilobium hirsutum*). Some low willow trees (*Salix* sp.) and other scrubby species or trees such as butterfly bush (*Buddleia davidii*) and alder (*Alnus glutinosa*) were also observed in a number of locations in this habitat.

This habitat in Ballina includes a section of the Annex I habitat *Hydrophilous tall herb fringe communities of plains and of the montane to alpine level* [6430]. The majority of this habitat observed adjacent to the Moy

main channel proposed works area falls within the confines of either the River Moy SAC or Killala Bay/Moy Estuary SAC.

Tall herb swamp has been classified as being of County Importance for the purposes of this assessment as it is an area of Annex I habitat that doesn't fulfil the criteria for valuation as of International or National importance. Some sections of this habitat are also commensurate with Annex I Habitat 6430.

Improved Agricultural Grassland (GA1)

Improved agricultural grassland was widespread across most of the proposed work areas with the exception of the sites along the River Moy and Tullyegan. This habitat was particularly dominant adjacent to the proposed works areas associated with Bunree and Brusna.

There was also a strong association between GA1 and hedgerows and treelines scheme wide as these two habitats commonly formed agricultural land parcel boundaries. Other habitats that occurred adjacent to GA1 included scrub (Bunree), mixed broadleaved woodland (Brusna) and amenity grassland (Brusna, Bunree, Quignamanger). This habitat was species poor and had minimal ecological importance.

Species present included perennial rye grass (*Lolium perenne*), dandelion, daisy (*Bellis perennis*) and clover (*Trifolium* sp.).

This habitat does not have links with any Annex I habitats, however, sections of this habitat adjacent to the Brusna proposed works area falls within the confines of the River Moy SAC.

Improved agricultural grassland is not examined further for the purposes of this assessment as it is considered to be of negligible biodiversity value. Loss of habitat within the confines of the River Moy SAC is assessed in **Section 10.4.2.1.1.1**.

Amenity Grassland (GA2)

Amenity grassland was recorded across all potential works areas across the Proposed Scheme. This habitat primarily relates to lawns, gardens and green spaces associated with residential properties and public buildings, such as schools. Other areas include graveyards, public parks, playing pitches and roadside verges. In general, this habitat has poor species diversity as it is heavily managed and so provides little ecological benefits.

Species present included ribwort plantain, red clover (*Trifolium pratense*), white clover (*Trifolium repens*), daisy, dandelion and mouse-ear chickweed (*Cerastium fontanum*).

This habitat does not have links with any Annex I habitats, however certain sections of this habitat adjacent to the Brusna proposed works area fall within the confines of the River Moy SAC.

Amenity grassland is not examined further for the purposes of this assessment as it is considered to be of negligible biodiversity value. Loss of habitat within the confines of the River Moy SAC is assessed in **Section 10.4.2.1.1.1**.

Dry Calcareous and Neutral Grassland (GS1)

Neutral grassland was observed along both the right-hand and left-hand banks of the River Moy adjacent to the proposed compound location sites upstream of the Salmon Weir. This habitat had little to no management visible on the day of the survey, however, it is regularly traversed by recreational walkers and/or anglers.

Species present within this habitat included grasses such as cock's-foot and sweet vernal grass (*Anthoxanthum odoratum*) and herbaceous species such as ribwort plantain, bush vetch (*Vicia sepium*), meadow buttercup (*Ranunculus acris*), dandelion, creeping buttercup, ox-eye daisy (*Leucanthemum vulgare*) and broad-leaved dock (*Rumex obtusifolius*). Some more typical wet grassland species such as meadowsweet, cuckoo flower (*Cardamine pratensis*), water mint and horsetail were observed in a small area with standing water.

This habitat does not have links with any Annex I habitat; however, the majority of this habitat was located within the confines of the River Moy SAC.

Dry calcareous and neutral grassland has been classified as being of Local Importance (lower value) for the purposes of this assessment as it contains small areas of semi-natural habitat that are of some local importance for wildlife e.g. invertebrates.

Dry Meadows and Grassy Verges (GS2)

Dry meadows and grassy verges occurred adjacent to the Brusna proposed works area around the Rathkip ringfort reconstruction and also in a small land parcel to the east of Rathkip/Shanaghy. Additionally, it occurred on the left-hand and right-hand banks of the River Moy upstream of the Salmon Weir. This habitat is characterised by tall vegetation which has little to no fertiliser input. There was little to no sign of management on the day of the survey.

Species present within this habitat included common valerian, ribwort plantain, meadowsweet, water figwort, selfheal (*Prunella vulgaris*), cock's-foot, knapweed (*Centaurea nigra*), Yorkshire fog (*Holcus lanatus*), false oat grass (*Arrhenatherum elatius*), meadow buttercup (*Ranunculus acris*), meadow foxtail (*Alopecurus pratensis*), ragwort (*Jacobaea vulgaris*), oxeye daisy (*Leucanthemum vulgare*) and dandelion.

This habitat does not have links with any Annex I habitats, however certain sections of this habitat adjacent to the Brusna proposed works area and proposed compound locations upstream of the Salmon Weir fall within the confines of the River Moy SAC.

Dry meadows and grassy verges have been classified as being of Local Importance (lower value) for the purposes of this assessment as it contains small areas of semi-natural habitat that are of some local importance for wildlife e.g. for invertebrates.

Wet Grassland (GS4)

Wet grassland was observed in a number of areas across the Proposed Scheme including the Brusna, Bunree and Tullyegan. Wet grassland habitats were observed adjacent to improved agricultural grassland, scrub, hedgerows, depositing/lowland rivers and to a lesser degree amenity grasslands and mixed broadleaved woodland.

Species observed in this habitat included great willowherb, false oat grass (*Arrhenatherum elatius*), meadow sweet, marsh thistle (*Cirsium palustre*), rushes and purple loosestrife.

A land parcel containing wet grassland adjacent to the Bunree/Behy Road proposed works area was very species rich. This area had no obvious management (e.g., cutting, fertiliser input etc.) on the day, however, signs of previous grazing (i.e. presence of dung) by equines was visible. This area contained sharp flowered rush (*Juncus acutiflorus*), silverweed, Yorkshire fog (*Holcus lanatus*), common spotted orchid (*Dactylorhiza fuchsia subsp. fuchsia*), sweet vernal grass, soft rush (*Juncus effusus*), red clover, ribwort plantain, purple loosestrife, tormentil (*Potentilla erecta*), common valerian, creeping buttercup, oxeye daisy, meadowsweet, water figwort, meadow buttercup, yellow rattle (*Rhinanthus minor*), meadow vetchling (*Lathyrus pratensis*), great willowherb, common vetch (*Vicia sativa*), bush vetch, star sedge (*Carex echinata*), heath spotted orchid (*Dactylorhiza maculata*), purple moor-grass (*Molinia caerulea*), heath woodrush (*Luzula multiflora*), tawny sedge (*Carex hostiania*), marsh cinquefoil (*Comarum palustre*), marsh bedstraw, marsh ragwort, marsh marigold, spear thistle (*Cirsium vulgare*), ling (*Calluna vulgaris*), bell heather (*Erica cinerea*), quaking grass (*Briza media*), meadow thistle (*Cirsium dissectum*), black bog rush (*Schoenus nigricans*), flea sedge (*Carex pulicaris*), glaucous sedge (Carex flacca) and lesser stitchwort. This land parcel contained pockets of the Annex I habitat *Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)* [6410].

Certain sections of this habitat adjacent to the Brusna proposed works area falls within the confines of the River Moy SAC.

Wet grassland has been classified as being of County Importance for the purposes of this assessment as black bog rush has been classified as an important plant species for County Mayo as per the County Mayo Biodiversity Action Plan (2010-2015). Additionally certain sections of this habitat adjacent to the Bunree/Behy Road proposed works area are commensurate with Annex I Habitat 6410.

Dense Bracken (HD1)

Dense bracken was recorded in the Bunree and Brusna proposed works areas approximately 51 m and 70m from the Proposed Scheme, respectively.

This habitat was dominated by bracken (*Pteridium aquilinum*). This habitat does not have links with any Annex I habitats.

Dense bracken is not examined further for the purposes of this assessment as it is considered to be of negligible biodiversity value and the Proposed Scheme does not have the potential to disturb this habitat.

Riparian Woodland (WN5)

Riparian woodland was observed on both banks of the River Moy adjacent to the boat yard/old dairy premises and Tom Ruane Park. The River Moy adjacent to these areas is tidal and therefore the water level fluctuates at the edge of this habitat as a result of tidal movements as indicated by river borne debris and grey mud on vegetation towards the river channel itself.

This habitat was dominated by willows with smaller abundances of alder, sycamore (*Acer pseudoplataus*) and hawthorn (*Crataegus monogyna*). The understory was dominated by brambles (*Rubus fruticosus* agg.) with butterbur. This habitat does not have links with any Annex I habitat, however, the majority of this habitat across the Proposed Scheme falls within the confines of Killala Bay/Moy Estuary SAC and/or Killala Bay/Moy Estuary SPA.

Riparian woodland has been classified as being of Local Importance (higher value) for the purposes of this assessment as it is a semi-natural habitat with high biodiversity in a local context and a high degree of naturalness.

Mixed Broadleaved Woodland (WD1)

Mixed broadleaved woodland was recorded across numerous sites including Quignamanger, Brusna, Bunree/Behy Road, Tullyegan and also adjacent to the River Moy main channel. This habitat was associated with watercourses at the Brusna and Bunree/Behy Road proposed works areas. It occurred on both sides of a railway embankment at the Tullyegan proposed works area and within or adjacent to commercial and residential properties at the Quignamanger, Bunree/Behy Road and Moy main channel proposed works areas.

Woody species present in this habitat varied scheme wide and included sycamore, willow, elder (*Sambucus nigra*), ash (*Fraxinus excelsior*), brambles, fuchsia (*Fuchsia magellanica*), butterfly bush, ivy (*Hedera hibernica*), alder, beech (*Fagus sylvatica*), hawthorn, bittersweet (*Solanum dulcamara*) and dog rose (*Rosa canina*). *Rhododendron ponticum*, a Third Schedule invasive alien plant species was also observed in this habitat adjacent to the Brusna proposed works area.

Ground flora included hedge bindweed (*Calystegia sepium*), nettles (*Urtica dioica*), herb Robert (*Geranium robertianum*), lords and ladies (*Arum maculatum*), ground ivy (*Glechoma hederacea*), hart's tongue fern (*Asplenium scolpendrium*) and ground elder (*Aegopodium podagraria*).

This habitat does not have links with any Annex I habitats, however, certain sections of this habitat adjacent to the Brusna proposed works area and the compound locations upstream of the Salmon Weir on the Moy main channel fall within the confines of the River Moy SAC.

Mixed broadleaved woodland has been classified as being of Local Importance (higher value) for the purposes of this assessment as it is a semi-natural habitat with high biodiversity in a local context and a high degree of naturalness.

Scattered Trees and Parkland (WD5)

Scattered trees and parkland was observed at a number of different proposed works area including Bunree/Behy Road and Moy main channel. Coverage area of this habitat is relatively low, wherever present. This habitat is often associated with amenity grassland.

Tree species present comprised a high abundance of non-native trees with lower abundances of native trees. Species observed included silver birch (*Betula pendula*), lime (*Tilia* sp.), hornbeam (*Carpinus* sp.), ash, hawthorn, alder, horse chestnut (*Aesculus hippocastanum)*, elm (*Ulmus* sp.) and willow.

This habitat does not have links with any Annex I habitats.

Scattered trees and parkland has been classified as being of Local Importance (lower value) for the purposes of this assessment as it contains small areas that are of local importance for wildlife e.g. for bird species for nesting and roosting.

Scrub (WS1)

Scrub was recorded across several proposed works areas primarily at Bunree/Behy Road with smaller pockets of scrub observed adjacent to the River Moy main channel, Quignamanger and Tullyegan proposed works areas.

Species observed across this habitat included gorse (*Ulex europaeus*), brambles, hawthorn, blackthorn (*Prunus spinosa*) and willow. In general, this habitat across the Proposed Scheme was relatively open.

This habitat does not have links with any Annex I habitats.

The scrub habitat across the Proposed Scheme is relatively young with an open canopy which has minimal value for biodiversity. Scrub, therefore, has been classified as being of Local Importance (lower value) for the purposes of this assessment as it contains small areas that are of local importance for wildlife e.g. for invertebrates.

Immature Woodland (WS2)

Two small pockets of immature woodland were recorded within 100 m of the proposed works area at Bunree/Behy Road. This habitat was located adjacent to mixed broadleaved woodland and amenity grassland.

This habitat was observed from a distance and therefore species composition was not obtained.

This habitat does not have links with any Annex I habitats.

Immature Woodland has been classified as being of Local Importance (lower value) for the purposes of this assessment as it provides some local importance for wildlife e.g. for invertebrate and bird species.

Ornamental Non-Native Shrub (WS3)

Ornamental/non-native shrub was widespread across the Proposed Scheme in low abundances. It was observed at most of the proposed works' areas, with the exception of Quignamanger.

Species present included fuchsia, cotoneaster (*Cotoneaster* sp.), Wilson's honeysuckle (*Lonicera nitida*), dogwood (*Cornus* sp.) and cherry laurel (*Prunus laurocerasus*).

This habitat does not have links with any Annex I habitats.

Ornamental non-native shrub is not examined further for the purposes of this assessment as it is considered to be of negligible biodiversity value.

Hedgerows (WL1)/Treelines (WL2)

Hedgerows and treelines were the dominant field boundaries across the Proposed Scheme and were observed adjacent to each proposed works area. They also formed boundaries to a small number of residential and commercial properties at a number of locations. Management of this habitat varied scheme wide with the majority having sides cut with tall scrub and/or trees, however some, especially along the Quignamanger, were cut back to the top of the associated bank.

Species observed in these habitats varied scheme wide and included hawthorn, sycamore, ash, blackthorn, brambles, gorse, willow, ivy, alder and Scot's pine (*Pinus sylvestris*).

This habitat does not have links with any Annex I habitats, however certain sections of this habitat adjacent to the Brusna proposed works area falls within the confines of the River Moy SAC.

Hedgerows and treelines have been classified as being of Local Importance (higher value) for the purposes of this assessment as it is a semi-natural habitat with high biodiversity in a local context and a high degree of naturalness.

Spoil and Bare Ground (ED2)

A single area of spoil and bare ground was observed across the Proposed Scheme at the proposed compound location adjacent to the Bunree/Behy Road proposed works area. This area contained recently deposited topsoil with no vegetation growth visible.

This habitat does not have links with any Annex I habitats.

Spoil and bare ground is not examined further for the purposes of this assessment as it is considered to be of negligible biodiversity value.

Recolonising Bare Ground (ED3)

Recolonising bare ground occurred at three separate locations within the vicinity of the Bunree/Behy Road proposed works area. This habitat was primarily composed of artificial surfaces that had been invaded by herbaceous ruderal plants.

Species present in this habitat included oxeye daisy, colt's foot (*Tussilago farfara*), brambles, red clover, fox and cubs (*Pilosella aurantiaca*), cat's ear (*Hypochaeris radicata*), dandelion, knapweed (*Centaurea nigra*) and ribwort plantain.

This habitat does not have links with any Annex I habitats.

Recolonising bare ground has been classified as being of Local Importance (lower value) for the purposes of this assessment as it contains small areas of semi-natural habitat that are of some local importance for wildlife e.g. invertebrates.

Buildings and Artificial Surfaces (BL3)

Building and artificial surfaces was the dominant habitat across a number of the proposed works areas including Moy main channel, Bunree/Behy Road and Quignamanger.

This habitat is species poor in nature. Some planted trees, primarily lime, were observed in this habitat in the centre of Ballina adjacent to the Moy main channel works area. Other species observed included annual meadow grass (*Poa annua*), daisy and willowherb (*Epilobium* sp.).

This habitat does not have links with any Annex I habitats, however, small sections of this habitat adjacent to the Brusna and Moy main channel proposed works' areas fall within the confines of the River Moy SAC. Additionally, a small section adjacent to the Quignamanger proposed works area falls within the confines of both Killala Bay/Moy Estuary SAC and Killala Bay/Moy Estuary SPA.

Buildings and artificial surfaces have been classified as being of Local Importance (lower value) for the purposes of this assessment as it contains small areas/features that are of some local importance for wildlife e.g. for bat species, invertebrates, birds etc.

Tidal Rivers (CW2)

The River Moy is classified as tidal downstream of the Salmon Weir in the centre of Ballina town. This habitat is, therefore, adjacent to two proposed works areas – Moy main channel, and Quignamanger. This habitat adjacent to the Proposed Scheme forms part of the River Moy SAC, Killala Bay/Moy Estuary SAC and Killala Bay/Moy Estuary SPA.

Numerous areas of the Annex I Habitat floating river vegetation [3260] were observed in this habitat adjacent to the Moy main channel proposed works area. The botanical species encountered in this Annex I habitat has been described above under the depositing/lowland rivers section.

Tidal rivers are commensurate with the Annex I Habitat *estuaries* [1130]. Estuaries is a QI of Killala Bay/Moy Estuary SAC and are not dealt with further in this chapter, however, this habitat is discussed in **Chapter 9: Aquatic Biodiversity**.

Mud Shores (LS4)

One pocket of mud shore was recorded across the Proposed Scheme. It was located at the downstream edge of the Quignamanger proposed works area along the right-hand bank of the River Moy estuary.

This habitat is commensurate with the Annex I Habitat *mudflats and sandflats not covered by sea water at low tide* [1140] which is a QI of Killala Bay/Moy Estuary SAC and is not dealt with further in this chapter. however, this habitat is discussed in **Chapter 9: Aquatic Biodiversity**.

10.3.3.2 Protected Flora

10.3.3.2.1 Desk Study

10.3.3.2.1.1 NBDC Rare and Protected Species Records

Following a data search of the NBDC records for the G21 and G22 grid squares, three rare and threatened flora species were identified (detailed in **Table 10-8**). Two of these species (great burnet, Irish lady's tresses) are listed on the Flora Protection Order (2022), while meadow crane's-bill was listed as Vulnerable in the Vascular plants red list (Wyse Jackson *et al*., 2016). Further examination of the NBDC database determined that none of these species were recorded from within or are likely to occur within the ZoI of the Proposed Scheme.

Table 10-8: NBDC database records of Protected Flora for G21 and G22 grid squares

Common Name	Scientific Name	Date of last Record	Grid Square	Status*	Preferred Habitat^
Great burnet	*Sanguisorba officinalis*	2003	G21	FPO; V; VU	A perennial herb of neutral grassland, occurring on alluvial or peaty soils in damp or dry, unimproved pastures, hay meadows and marshy meadows, on riverbanks and lake shores and in base-enriched flushes on grassy heaths. 0-460m.
Irish lady's tresses	*Spiranthes romanzoffiana*	2000	G21	FPO; R; NT	A rhizomatous herb of acidic, nutrient poor, periodically flooded or flushed vegetation, often growing on peaty soils by rivers, streams and lake margins. It frequently occurs amongst *Molinia caerulea* in pastures grazed by cattle or ponies. Reproduction is mostly vegetative. A lowland species.
Meadow crane's-bill	*Geranium pratense*	1999	G22	VU	A perennial herb of rough grassland on lane and road verges, railway banks and streamsides, and in damp hay meadows and lightly grazed pastures, mainly on calcareous soils; sometimes grown in cottage gardens and occurring as an escape or outcast close to human habitations.

**Protection status following criteria set out in Plant Red Data Book (Curtis & McGough, 1988: Stewart & Church, 1992) – Ex Extinct, E Endangered, V Vulnerable, R Rare, I Indeterminate, and K Insufficiently known. Ireland Red Lists (Wyse Jackson et al., 2016) – RE Regionally Extinct, CR Critically Endangered, EN Endangered, VU Vulnerable, NT Near threatened, LC least concern, DD data deficient, NA not assessed. FPO denotes that the species is protected under the Flora Protection Order, 2022. EU HD Annex I-V – denotes EU Habitats Directive Annexed I to V Species.*
^Ecological description of each species was obtained from the Plant Atlas 2020 website.[13]

10.3.3.2.2 Field Survey

No protected plant species were observed within the Proposed Scheme area during surveys.

Protected plant species are not examined further for the purposes of this assessment as it is not considered that the proposed works areas support any protected plant species.

[13] Plant Atlas 2020. Available online at: https://plantatlas2020.org/atlas [Accessed June 2023].

10.3.4 Otter

10.3.4.1 Desk Study

The NBDC data search returned nine records of otter for the G22 grid square and no recent (i.e. 10 years or less) records of otter for Grid Square G21 (as detailed in **Appendix 10.5**).

Otters are rarely found far from water and tend to occupy linear habitats along the aquatic – terrestrial interface. The home range of an adult otter varies widely, depending on the quality of foraging habitat, food supply and other resources. Male otters have been known to travel up to 30 km overnight in search of food or potential mates (Woodroffe, 2001).

10.3.4.2 Field Survey

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

Figure 10-16 provides an overview of the otter signs observed across the Proposed Scheme while **Appendix 10.6** and **Appendix 10.7** outline the location and description of these signs across the Proposed Scheme area in further detail. The location of holts and potential holts have not been included to protect the location of these features.

Otter have been classified as being of International Importance for the purposes of this assessment due to being a QI of The River Moy SAC.

Figure 10-16 Otter Signs observed during surveys across the scheme area

10.3.5 Badger

10.3.5.1 Desk Study

The NBDC data search returned 46 records of badger for the G21 grid square and 39 records for the G22 grid square (as detailed in **Appendix 10.5**).

Badgers are widespread nationally, and are generally associated with mosaics of pasture, woodland, scrub or hedgerow. They also utilise urban areas, where foraging habitat is available, and disturbance is minimal.[14]

10.3.5.2 Field Survey

Numerous signs of badger activity were recorded scheme wide while surveying, including mammal trails, snuffle holes, latrines/scat and potential setts. The specific badger evidence recorded occurred along the Bunree and Brusna sections of the Proposed Scheme. The habitats in which the evidence was recorded were agricultural grassland, scrub, hedgerows, treelines, woodland and parkland. Signs of other mammals were also observed including fox scat.

A potential badger sett was observed approximately 140m from the River Brusna proposed works area during surveys in July 2022. The works closest to this potential sett are located on the opposite side of the River Brusna to the potential sett with the nearest works area on the same side of the River Brusna as the potential sett being approximately 330 m away. During a re-survey of this area in May 2023 fox cubs were observed playing around (and entering) the entrance of this potential sett thus indicating that the den/sett was unlikely to be used by badgers at the time. No signs of badger (e.g. latrines, large piles of earth or bedding material etc.) were observed around this den entrance in May 2023. Therefore, it is considered that no badger setts were observed within 150 m of the Proposed Scheme area.

Figure 10-17 provides an overview of the badger (and other mammal signs) observed across the Proposed Scheme while **Appendix 10.8** and **Appendix 10.9** outline the location and description of these signs across the Proposed Scheme area, respectively, in further detail. The location of setts and dens and potential setts and dens have not been included to protect the location of these features.

[14] Vincent Wildlife Trust: Species Profiles. Available online at: https://www.vincentwildlife.ie/species/badger [Accessed January 2023].

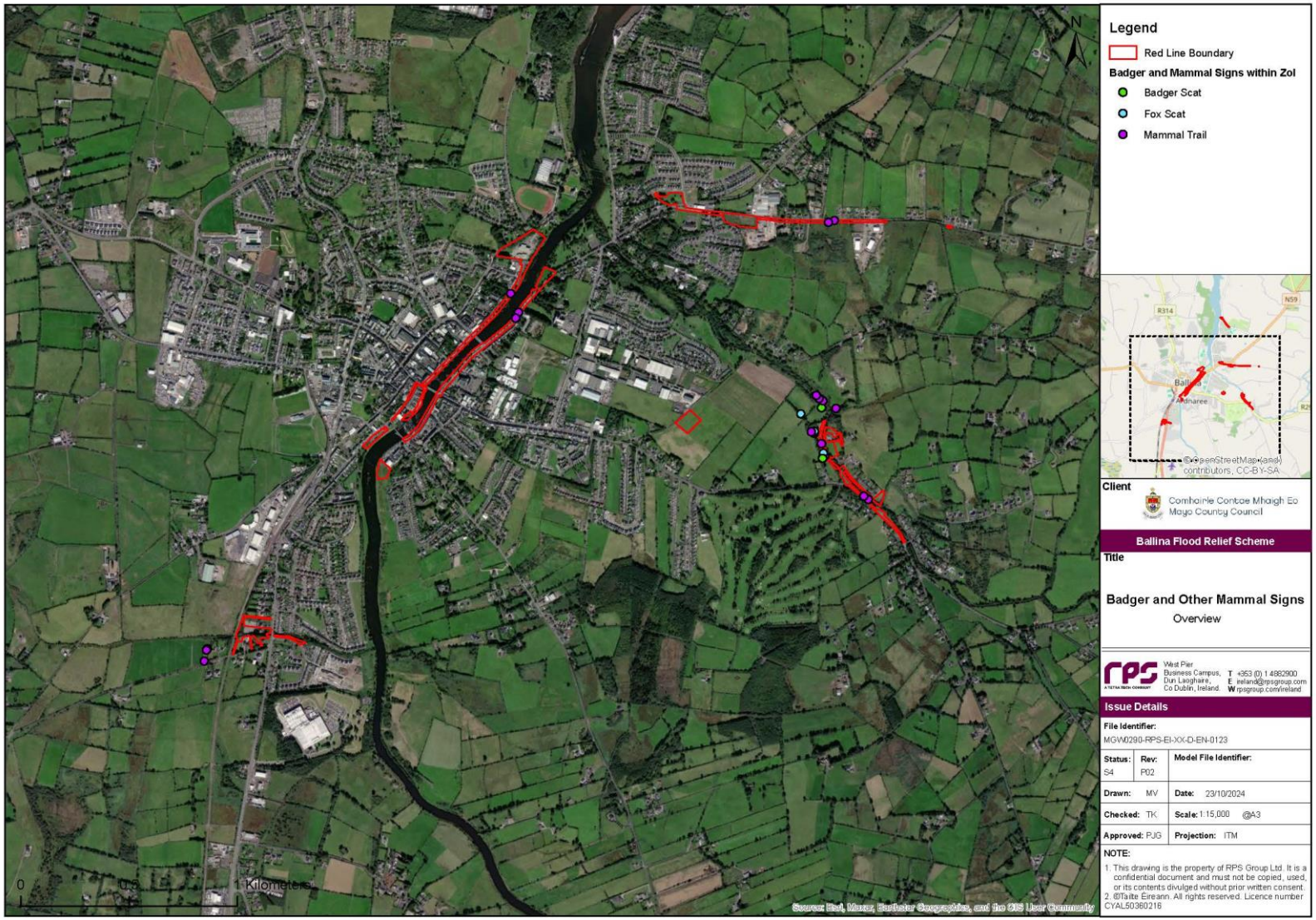

Figure 10-17 Overview of Badger and Other Mammal Signs Observed across the Proposed Scheme

Badger have been classified as being of Local Importance (higher value) for the purposes of this assessment as badger are protected under the Wildlife Acts and certain sections of the Proposed Scheme is likely to support resident and regularly occurring populations of this species.

10.3.6 Other Protected Terrestrial Mammals

10.3.6.1 Pine marten

10.3.6.1.1 Desk Study

Following an NBDC data search, two records for pine marten were identified within the G21 Grid Square while no records were held for the G22 Grid Square (as detailed in **Appendix 10.5**).

Pine marten are distributed throughout every county in Ireland. They require woodland or scrub cover, and they may have to adapt to more open habitats in the west of Ireland due to the clearance of woodland habitat.[14]

10.3.6.1.2 Field Survey

No individuals were observed, or signs identified during field surveys, and it is not considered likely that pine marten occur within the study area due to the absence of suitable habitat.

Pine marten is not examined further for the purposes of this assessment as it is not considered that the proposed works areas support this species.

10.3.6.2 European Hedgehog

10.3.6.2.1 Desk Study

Following an NBDC data search, six records for hedgehog were identified within the G21 Grid Square, and five records within the G22 Grid Square (as detailed in **Appendix 10.5**).

This species is considered common and widespread in Ireland and hedgehog are presumed to occur within grassland, woodland, and hedgerow.[14]

10.3.6.2.2 Field Survey

No individuals were observed, or signs identified during field surveys, however, given the widespread distribution of this species in Ireland it is considered likely that this species occurs within the study area due to the presence of suitable habitat.

Certain sections of the Proposed Scheme may support resident populations of hedgehog based on the presence of suitable habitat within some parts of the study area. However, no incidental signs of the species were recorded during the ecological surveys. Hedgehog have been classified as being of Local Importance (higher value) for the purposes of this assessment as hedgehog are protected under the Wildlife Acts and certain sections of the Proposed Scheme is likely to support resident and regularly occurring populations of this species. However, in the absence of evidence, despite the potential for the species to be present, they are not identified as an IEF. Nonetheless, precautionary mitigations are included for the species as part of the overall package of mitigation.

10.3.6.3 Eurasian Pygmy Shrew

10.3.6.3.1 Desk Study

Following an NBDC data search, one record for pygmy shrew was identified within the G22 Grid Square (as detailed in **Appendix 10.5**).

Pygmy shrew are common and widespread throughout Ireland and their preferred habitat includes hedgerow, grassland, woodland and peatland.[14]

10.3.6.3.2 Field Survey

No individuals were observed, or signs identified during field surveys. However, given the widespread distribution of this species in Ireland it is considered likely that this species occurs within the study area due to the presence of suitable habitat.

Certain sections of the Proposed Scheme may support resident populations of pygmy shrew based on the presence of suitable habitat within some parts of the study area. However, no incidental signs of the species were recorded during the ecological surveys. Pygmy shrew have been classified as being of Local Importance (higher value) for the purposes of this assessment as pygmy shrew are protected under the Wildlife Acts and certain sections of the Proposed Scheme is likely to support resident and regularly occurring populations of this species. However, in the absence of evidence, despite the potential for the species to be present, they are not identified as an IEF. Nonetheless, precautionary mitigations are included for the species as part of the overall package of mitigation.

10.3.6.4 Eurasian Red Squirrel

10.3.6.4.1 Desk Study

Following an NBDC data search, six records for red squirrel were identified within the G21 Grid Square, and seven records within the G22 grid square (as detailed in **Appendix 10.5**).

Red squirrel is widespread throughout Ireland, with a stronger presence in the southeast according to NBDC records. They are a woodland species and prefer hazel, beech and Scots pine to build nests.[14]

10.3.6.4.2 Field Survey

No individuals were observed, or signs identified during field surveys, and it is not considered likely that these species occur within the study area due to the absence of suitable habitat.

Red squirrel is not examined further for the purposes of this assessment as it is not considered that the proposed works areas support this species.

10.3.6.5 Irish Stoat

10.3.6.5.1 Desk Study

Following an NBDC data search, three records for Irish stoat were identified within the G21 Grid Square, and two records within the G22 grid square (as detailed in **Appendix 10.5**).

Irish stoats occur in most habitats with sufficient cover, including urban areas, but they occur most often in wooded areas, and readily climbed trees.[14]

10.3.6.5.2 Field Survey

No individuals were observed, or signs identified during field surveys. However, given the widespread distribution of this species in Ireland it is considered likely that this species occurs within the study area due to the presence of suitable habitat, despite the absence of records.

Certain sections of the Proposed Scheme may support resident populations of Irish stoat based on the presence of suitable habitat within some parts of the study area. However, no incidental signs of the species were recorded during the ecological surveys. Irish stoat have been classified as being of Local Importance (higher value) for the purposes of this assessment as Irish stoat are protected under the Wildlife Acts and certain sections of the Proposed Scheme is likely to support resident and regularly occurring populations of this species. However, in the absence of evidence, despite the potential for the species to be present, they are not identified as an IEF. Nonetheless, precautionary mitigations are included for the species as part of the overall package of mitigation.

10.3.6.6 Irish Hare

10.3.6.6.1 Desk Study

Following an NBDC data search, four records for Irish hare were identified within the G21 Grid Square, and ten records within the G22 Grid Square (as detailed in **Appendix 10.5**).

They are considered common and widespread in Ireland and are found in a wide range of habitats from coastal to mountain top, including upland and lowland bogs and farmland.[14]

10.3.6.6.2 Field Survey

No individuals were observed, or signs identified, during field surveys and it is not considered likely that these species occur within the study area due to the absence of suitable habitat.

Irish hare is not examined further for the purposes of this assessment as it is not considered that the proposed works areas support this species.

10.3.6.7 Deer Species

10.3.6.7.1 Desk Study

The NBDC data search did not return any records of deer species within the G21 or G22 Grid Squares.

Red deer preferred habitat consists of semi-woodland with open fields/uplands/lowland habitats, while fallow deer prefers deciduous and mixed woodland habitats with adjacent field systems, and sika deer are found in commercial forests and upland/lowland habitats.[14]

10.3.6.7.2 Field Survey

No individuals were observed, or signs identified, during field surveys and it is not considered likely that these species occur within the study area due to the absence of suitable habitat.

Deer species are not examined further for the purposes of this assessment as it is not considered that the proposed works areas support these species.

10.3.7 Bats

10.3.7.1 Desk Study

The NBDC search returned the following Annex IV bat species: 14 records of Daubenton's bat (*Myotis daubentonii*), 20 records of Leisler's (*Nyctalus leisleri*) and 28 records of soprano pipistrelle (*Pipistrellus pygmaeus*) for the G21 grid square, and 13 records of Leisler's, four records of common pipistrelle (*Pipistrellus pipistrellus sensu lato*) and 54 records of soprano pipistrelle for the G22 grid square (as detailed in **Appendix 10.5**).

10.3.7.1.1 Bat Landscape Suitability Index

The majority of the study area for the Proposed Scheme is classed under the bat suitability index as *Moderate* returning a score of 31.67, with the areas to the north (Quignamanger) of the ZoI classed as *Low-Moderate* returning a score of 27.22 (Lundy *et al.*, 2011) (**Table 10-9**).

Table 10-9: Bat Suitability Index (Lundy *et al*., 2011) across the Study Area for all Bats Combined

Bat Suitability Index	Works Area	Grid Square
31.67	Bunree/Behy Road	G21
31.67	Brusna	G21
31.67	Moy – Main Channel	G21

Bat Suitability Index	Works Area	Grid Square
31.67	Knockanelo	G21
31.67	Tullyegan	G21
27.22	Quignamanger	G22
27.22	Moy – Quay Road	G22

When broken down by species, a number of bat species showed a high bat suitability index (>35) across the various works areas (**Table 10-10**).

Table 10-10: Bat Suitability Index (Lundy et al., 2011) for each Bat Species across the Various Works Areas

Species	Suitability Index Grid Square G21*	Suitability Index Grid Square G22^
Common pipistrelle	43	39
Soprano pipistrelle	51	46
Nathusius' pipistrelle	9	6
Leisler's bat	48	41
Daubenton's bat	41	34
Natterer's bat	35	31
Whiskered bat	14	13
Brown long-eared bat	42	34
Lesser horseshoe bat	2	1

**Grid Square G21 covers the proposed works areas on the Moy Main Channel, Bunree/Behy Road, Brusna and Tullyegan.*
^Grid Square G22 covers the proposed works areas on the Quignamanger.

10.3.7.2 Field Survey

10.3.7.2.1 Bat Roost Assessment Surveys

10.3.7.2.1.1 Tree Surveys

The majority of trees across the survey area were assessed to be of *Low* or *Negligible* suitability as bat roosts (see **Appendix 10.1** and **Appendix 10.10**), however, two tree features (a single tree and an additional cluster of trees) were assessed as being of *Medium* suitability as bat roosts (**Appendix 10.1**, **Appendix 10.10 and Appendix 10.11**). The tree was a willow (*Salix* sp.) which was located in the garden of a residential property along the Quays in Ballina town. The cluster of trees were located on the left-hand bank of the River Moy adjacent to the boatyard. This cluster was composed of multi-stemmed sycamore with ivy growth. The willow tree and cluster of sycamore trees were subsequently surveyed during dawn and dusk activity surveys, respectively, and no bats were seen entering or leaving any trees during these surveys.

No trees subject to removal for the Proposed Scheme were found to contain roosting bats at time of survey.

10.3.7.2.1.2 Structure Surveys

The flood defence walls along the main channel of the River Moy in the centre of Ballina town were determined to be of *High* suitability for roosting bats and were subject to emergence/re-entry and activity surveys (see **Section 10.3.7.2.2** below). No bats were observed to be roosting in any walls to be upgraded across the Proposed Scheme. No other structures are to be impacted by the Proposed Scheme.

Excluding the flood defence walls along the centre of Ballina town, three structures across the Proposed Scheme were deemed to be of *Medium* suitability for roosting bats (**Table 10-11**). These included a railway bridge over the Tullyegan stream, an old house being used as a farm shed along the Bunree and a stone shed within the boatyard located at the junction of Arbuckle Row and Bachelors Walk on the left-hand bank of the River Moy (**Figure 10-18** and **Appendix 10.11**). The railway bridge and the old house were

considered to be sufficiently outside the proposed works area that no impacts were anticipated and were therefore not subject to activity or emergence/re-entry surveys. A single soprano pipistrelle was seen emerging from the boatyard shed (S-Moy001) at dusk on the 13th September 2022, indicating that this individual was roosting within the shed (see **Table 10-11** and **Table 10-12**).

Table 10-11: Structures (excl. Flood Defence Walls) and Trees that were deemed to be of *Medium* Suitability for Supporting Bat Roost across the Scheme Area

Bat Roost Suitability	ITM (X)	ITM (Y)	Site	Structure/ Tree Code	Description
Medium	523715	817635	Tullyegan	S-Tul001	Railway bridge with a number of small openings suitable as bat roosts.
Medium	526266	819556	Bunree/Behy Rd.	S-Bun001S	Looks like old building with block extension and a galvanised roof. No access could be gained and could only really see one side of building. Number of gaps between wall and eaves and hole under gable apex also suitable for bat access.
Medium	525023	819335	Moy Main Channel	S-Moy001	Stone boat shed within the boatyard on the left-hand bank of the River Moy at the junction of Arbuckle Row and Bachelors Walk.
Medium	524972	819219	Moy Main Channel	T-Moy001	Willow tree in the garden of a residential property along Bachelors Walk.
Medium	525047	819320	Moy Main Channel	T-Moy002	Cluster of sycamore trees adjacent to the boat yard on the left-hand bank of the River Moy at the junction of Arbuckle Row and Bachelors Walk.

Roosting bats have been classified as being of Local Importance (higher value) for the purposes of this assessment as certain sections of the Proposed Scheme have the potential to support resident and regularly occurring populations of this species.

Figure 10-18 Overview of Medium BRP Sites Across the Proposed Scheme

10.3.7.2.2 Bat Activity Surveys

10.3.7.2.2.1 Viewpoint Surveys

Four bat species (common pipistrelle, soprano pipistrelle, Daubenton's bat and Leisler's bat) were observed during bat activity surveys along the main channel of the River Moy in the centre of Ballina town (**Table 10-12**). The majority of the individual bats observed were foraging along the river or in close proximity to it with a small number of individuals considered to be commuting to other areas. The maximum number of any one species observed foraging over the river at any one time was three.

Table 10-12: Bat Species Recorded during Bat Activity Surveys on the Main Channel of the River Moy within Ballina Town

Date	Vantage Point (VP)	Species*	Commuting	Foraging	Emergence/Re-entry
18/07/2022	1 Dusk	PIPY, PIPI, MYODAU		X	No
18/07/2022	2 Dusk	PIPY, PIPI, MYODAU		X	No
18/07/2022	3 Dusk	PIPY, PIPI, MYODAU		X	No
18/07/2022	4 Dusk	PIPY, PIPI, MYODAU		X	No
26/07/2022	5 Dusk	PIPY, PIPI, MYODAU, NYCLEI		X	No
27/07/2022	6 Dawn	PIPY		X	No
27/07/2022	7 Dawn	PIPY	X		No
27/07/2022	8 Dusk	PIPY, NYCLEI		X	No
27/07/2022	9 Dusk	PIPY, NYCLEI		X	No
07/08/2022	10 Dusk	PIPY, MYODAUB, NYCLEI		X	No
07/08/2022	11 Dusk	PIPY, NYCLEI, MYODAU	X	X	No
07/08/2022	12 Dusk	PIPY, NYCLEI		X	No
07/08/2022	13 Dusk	PIPY, NYCLEI		X	No
12/09/2022	14 Dusk	PIPY, PIPI, MYODAUB		X	No
12/09/2022	15 Dusk Wall Ruin	No bats emerged			No
12/09/2022	16 Dusk	PIPY, MYODAUB		X	No
13/09/2022	17 Dusk	PIPY, NYCLEI, MYODAUB	X	X	Yes – PIPY#1
13/09/2022	Boatyard trees dusk	PIPY, DAUB	X	X	No
14/09/2022	Willow Tree dawn	PIPY		X	No

**PIPY: Soprano Pipistrelle; PIPI: Common Pipistrelle; MYODAUB: Daubenton's Bat; NYCLEI: Leisler's Bat.*

10.3.7.2.2.2 Passive Monitoring Surveys – Song Meter 4

Passive monitors (Song Meter 4) were deployed on 11 different occasions along the River Moy main channel in the centre of Ballina town during bat activity surveys. When these recordings were downloaded and checked, four bat species (common pipistrelle, soprano pipistrelle, Daubenton's bat and Leisler's bat) were identified on the recordings.

Commuting and foraging bats have been classified as being of Local Importance (higher value) for the purposes of this assessment as certain sections, especially along the Moy main channel, support resident and regularly occurring populations of commuting and foraging soprano pipistrelle, common pipistrelle, Daubenton's bats and Leisler's bats, which are protected under the Wildlife Acts.

10.3.8 Marine Mammals

10.3.8.1 Desk Study

A number of marine mammals (harbour seal (*Phoca vitulina*), common dolphin (*Delphinus delphis*), common porpoise (*Phocoena phocoena*), striped dolphin (*Stenella coeruleoalba*) records were returned in the NBDC data search (see **Appendix 10.5**). The majority of these records were from Grid Square G22; however, one report of harbour seal was from Grid Square G21. This sighting was located in the middle of an agricultural field and is therefore considered to be erroneous.

10.3.8.2 Field Study

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

Harbour seal have been classified as being of International Importance for the purposes of this assessment as they are QI species of Killala Bay/Moy Estuary SAC.

10.3.9 Amphibians and Reptiles

10.3.9.1 Desk Study

Following the NBDC data search, common frog smooth newt and common lizard were identified. One record of common frog and two records of smooth newt were recorded in the G21 grid square, and seven records of common frog and one record of common lizard were recorded in the G22 grid square (as detailed in **Appendix 10.5**).

Common frog and smooth newt are widespread and common nationally and NBDC records also indicate that they occur locally. Their preferred habitats include freshwater, woodland, grassland and hedgerow.[15] Common lizard occupies a range of habitats, including woodland, grassland, heathland and moorland.[15] NBDC records indicate that common lizard is more often recorded during the warmer months (April – Sept), and are widespread across Ireland, particularly coastal areas.

10.3.9.2 Field Survey

No records of or incidental evidence of any amphibian or reptile species were identified during field surveys.

There is limited potential for the Proposed Scheme to support resident populations of amphibians based on the low abundance of suitable habitat (e.g. wet grassland, drainage ditches) within the study area. No incidental signs of these species were recorded during the ecological surveys. In the absence of evidence, and in conjunction with the limited potential for the species to be present, they are not identified as an IEF. Nonetheless, precautionary mitigation measures are included for the species as part of the overall package of mitigation.

10.3.10 Terrestrial Invertebrates

10.3.10.1 Desk Study

Following an NBDC data search, one record for dark green fritillary (*Argynnis aglaja*) and three records for small blue (*Cupido minimus*) were identified in the G22 grid square (as detailed in **Appendix 10.5**). Neither

[15] The Wildlife Trusts (2023) Species Information. Available online at: https://www.wildlifetrusts.org/ [Accessed January 2023].

species are afforded legal protection in Ireland. Dark green fritillary is classed as *Vulnerable* (Regan *et al*., 2010). The NBDC records indicate that they are largely coastal, found on dry calcareous grassland, coastal grey dunes, machair, dune-slacks and limestone pavement. Small blue is classed as *Endangered* (Regan *et al*., 2010), and many of the sites where it is found are becoming less suitable due to loss of semi-natural grassland, under/overgrazing, erosion and urban development (Phelan *et al*., 2021). This specialist species is commonly found in dry calcareous grassland, coastal grey dunes, machair, limestone pavement, calcareous moraine and scree. Given the habitat preferences for both these species, it is not considered that they occur within the proposed works areas.

The NBDC also holds records for narrow-mouthed whorl snail (*Vertigo angustior*), a QI species of Killala Bay/Moy Estuary SAC, for grid square G22. The most recent record of this species is from 2006 and therefore is not included in the **Appendix 10.5**. This species is only known from one location within the SAC, which is the habitat surrounding a watercourse feeding into the estuary at Killanley, approximately 4 km downstream from the Quignamanger proposed works areas. As such, it is considered to be outside the ZoI of the Proposed Scheme. No other Annexed invertebrate species (marsh fritillary (*Euphydryas aurinia*), Kerry slug (*Geomalacus maculosus*) and other *Vertigo* species) are known from within the G21 and G22 grid squares and the habitats in the vicinity of the Proposed Scheme are not considered suitable for these species.

10.3.10.2 Field Survey

No records of or incidental evidence of any rare/protected terrestrial invertebrate species were identified during field surveys.

Terrestrial invertebrate species are not examined further for the purposes of this assessment as it is not considered that the proposed works areas support these species.

10.3.11 Ornithology

10.3.11.1 Desk Study

The protected bird species' records from NBDC found within the 10 km grid squares that intersect the Proposed Scheme (G21 and G22) are detailed below in **Appendix 10.12.** Sixty-six species records were returned from this search. Given the presence of the Moy Estuary within these grid squares, the majority of protected bird species' records were of waterbirds. Of these records 23 were classified as red-listed within the Birds of Conservation Concern In Ireland (BoCCI) 2020-2026 (Gilbert *et al*., 2021), while 36 were classified as amber-listed species within the BoCCI 2020-2026. Twelve species are listed under Annex I of the EU Bird's Directive (2009/147/EC) while 40 species are SCI species. Of these 40 SCI species seven (bar tailed godwit, redshank, dunlin, curlew, golden plover, grey plover, ringed plover) are SCI species of Killala Bay/Moy Estuary SPA while two (tufted duck, common scoter) are SCI species of Lough Conn and Lough Cullin SPA.

10.3.11.1.1 I-WeBS Survey Data

10.3.11.1.1.1 Killala Bay Site

Thirty-one wintering bird species were recorded within the Killala Bay site across all five survey seasons for which data were obtained (**Table 10-13**). Of these 31 species, ten are listed as SCI of either Killala Bay/Moy Estuary SPA or Lough Conn or Lough Cullin SPA (tufted duck, common scoter, ringed plover, golden plover, grey plover, sanderling, dunlin, bar-tailed godwit, curlew, redshank).

The only wetland bird species regularly recorded in internationally important numbers was light-bellied brent goose (*Branta bernicla hrota*) where mean winter maximum numbers exceeded the 1% international significance thresholds for four of the five winter seasons for which data were obtained.

The Killala Bay site was deemed to support numbers of national importance of seven species (light-bellied brent goose, red-breasted merganser, cormorant, ringed plover, sanderling, redshank, greenshank) as each of these species was deemed to be regularly occurring (i.e. occurred on site every year/season for the last 5

years/seasons) and the mean count of each of these species (i.e. the mean of the last 5 years of peak yearly counts for each species) is above the 1% national threshold as provided by Lewis *et al.* (2019).

The peak mean winter maximum for the past 5 winters (2017/18 to 2021/22), the national and international thresholds and the national long-term trends for these 31 bird species is outlined in **Table 10-13**.

10.3.11.1.1.2 Mount Ready Subsite

Thirty-two waterbird species were recorded within the Mount Ready subsite of the Killala Bay site (**Table 10-14**). Of these 32 species six are listed as SCI of Killala Bay/Moy Estuary SPA (golden plover, grey plover, dunlin, bar-tailed godwit, curlew, redshank) and one (common gull) is listed as an SCI of Lough Conn and Lough Cullin SPA.

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

The peak mean winter maximum for the past 3 winters (2019/20 to 2021/22), the national and international thresholds and the national long-term trends for these 32 bird species is outlined in **Table 10-14.**

Table 10-13 BirdWatch Ireland Database Results for Killala Bay I-WeBS Site (Site Code 0D407)

Common Name	Scientific Name	Annex I Species	SCI Bird Species	Season of Last Record	Peak*	National (1%) Threshold^	International (1%) Threshold^	National Long-term Trend+	Long-term Trend for Killala Bay+
Mute swan	*Cygnus olor*	N	N	2021/22	42	90	90	Stable or increasing	Stable or increasing
Whooper swan	*Cygnus cygnus*	Y	Y	2019/20	37	340	150	No data	No data
Light-bellied brent goose	*Branta bernicla hrota*	N	Y	2021/22	654	350	400	Stable or increasing	Stable or increasing
Shelduck	*Tadorna tadorna*	N	Y	2021/22	155	100	2,500	Stable or increasing	Moderate decline
Wigeon	*Mareca penelope*	N	Y	2021/22	348	560	140,000	Intermediate decline	Moderate decline
Teal	*Anas crecca*	N	Y	2021/22	259	360	5,000	Stable or increasing	Stable or increasing
Mallard	*Anas platyrhynchos*	N	Y	2021/22	98	280	53,000	Intermediate decline	Moderate decline
Tufted duck	*Aythya fuligula*	N	Y	2021/22	10	270	8,900	No data	No data
Common scoter	*Melanitta nigra*	N	Y	2021/22	502	110	7,500	No data	No data
Red-breasted merganser	*Mergus serrator*	N	Y	2021/22	48	25	860	Intermediate decline	Moderate decline
Red-throated diver	*Gavia stellata*	Y	Y	2021/22	7	20	3,000	No data	No data
Great Northern diver	*Gavia immer*	Y	Y	2021/22	25	20	50	No data	No data
Little grebe	*Tachybaptus ruficollis*	N	Y	2020/21	3	20	4,700	Stable or increasing	Large decline
Great crested grebe	*Podiceps cristatus*	N	Y	2019/20	1	30	6,300	Intermediate decline	No data
Cormorant	*Phalacrocorax carbo*	N	Y	2021/22	170	110	1,200	Stable or increasing	Stable or increasing
Little egret	*Egretta garzetta*	Y	N	2021/22	23	20	1,100	Stable or increasing	Stable or increasing
Grey heron	*Ardea cinerea*	N	Y	2021/22	36	25	5,000	Stable or increasing	Moderate decline
Oystercatcher	*Haematopus ostralegus*	N	Y	2021/22	394	610	8,200	Stable or increasing	Large decline
Ringed plover	*Charadrius hiaticula*	N	Y	2021/22	401	120	540	Intermediate decline	Intermediate decline
Golden plover	*Pluvialis apricaria*	Y	Y	2021/22	378	920	9,200	Large decline	Large decline
Grey plover	*Pluvialis squatarola*	N	Y	2021/22	52	30	2,000	Large decline	Large decline
Lapwing	*Vanellus vanellus*	N	Y	2021/22	329	850	72,300	Large decline	Large decline
Knot	*Calidris canutus*	N	Y	2021/22	500	160	5,300	Intermediate decline	Large decline
Sanderling	*Calidris alba*	N	Y	2021/22	214	85	2,000	Stable or increasing	Stable or increasing
Dunlin	*Calidris alpina*	N	Y	2021/22	731	460	13,300	Large decline	Large decline
Black-tailed godwit	*Limosa limosa*	N	Y	2021/22	18	200	1,100	Stable or increasing	Moderate decline
Bar-tailed godwit	*Limosa lapponica*	Y	Y	2021/22	211	170	1,500	Large decline	Large decline
Curlew	*Numenius arquata*	N	Y	2021/22	544	350	7,600	Large decline	Large decline

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

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

Table 10-14 BirdWatch Ireland database results for the Mount Ready subsite (Subsite Code 0D412) within the Killala Bay I-WeBS site (Site Code 0D407)

Common Name	Scientific Name	Annex I Species	SCI Bird Species	Season of Last Record	Peak*	National (1%) Threshold^	International (1%) Threshold^	National Long-term Trend+	Long-term Trend for Killala Bay+
Mute Swan	*Cygnus olor*	N	N	2021/22	32	90	100	Stable or increasing	Stable or increasing
Light-bellied Brent Goose	*Branta bernicla hrota*	N	Y	2020/21	110	350	400	Stable or increasing	Stable or increasing
Shelduck	*Tadorna tadorna*	N	Y	2020/21	9	100	2500	Stable or increasing	Moderate decline
Wigeon	*Mareca penelope*	N	Y	2021/22	201	560	14000	Intermediate decline	Moderate decline
Teal	*Anas crecca*	N	Y	2021/22	194	360	5000	Stable or increasing	Stable or increasing
Mallard	*Anas platyrhynchos*	N	Y	2021/22	54	280	53000	Intermediate decline	Moderate decline
Red-breasted Merganser	*Mergus serrator*	N	Y	2021/22	7	25	860	Intermediate decline	Moderate decline
Great Northern Diver	*Gavia immer*	Y	Y	2021/22	2	20	50	No data	No data
Slavonian Grebe	*Podiceps auritus*	Y	Y	2019/20	1	-	-	No data	No data
Cormorant	*Phalacrocorax carbo*	N	Y	2021/22	23	110	1200	Stable or increasing	Stable or increasing
Little Egret	*Egretta garzetta*	Y	N	2021/22	6	20	1100	Stable or increasing	Stable or increasing
Grey Heron	*Ardea cinerea*	N	Y	2021/22	12	25	5000	Stable or increasing	Moderate decline
Moorhen	*Gallinula chloropus*	N	N	2021/22	3	-	-	No data	No data
Oystercatcher	*Haematopus ostralegus*	N	Y	2021/22	161	610	8200	Stable or increasing	Large decline
Golden Plover	*Pluvialis apricaria*	Y	Y	2020/21	58	920	9300	Large decline	Large decline
Grey Plover	*Pluvialis squatarola*	N	Y	2020/21	2	30	2000	Large decline	Large decline

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

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

10.3.11.2 Field Survey

10.3.11.2.1 Breeding Bird Surveys

The species assemblage recorded during the breeding bird surveys was typical for the range of habitats present within the Ballina FRS study area and its environs. Abundances of breeding avifauna using the study area and its environs were low and restricted to individuals or small flocks. The main channel of the River Moy did not support great abundances of instream aquatic or riverside avifauna, rather small flocks of birds overflying the channel or associated with the adjoining built up habitats. Bird species identified using the Moy watercourse during the surveys for feeding and foraging purposes included grey heron (*Ardea cinerea*), common sandpiper (*Actitis hypoleucos*), sand martin (*Riparia riparia*) and grey wagtail (*Motacilla cinerea*). Herring gull (*Larus argentatus*), lesser black-backed gull (*Larus fuscus*) and great black-backed gull (*Larus marinus)* were also identified within the environs and surroundings of the watercourse in small numbers. Small flocks of swift (*Apus apus*) (n=11) were identified foraging high over the River Moy and its adjoining buildings during the second survey, in June 2021, while flocks of six swifts were observed during the late season survey in June 2023. Kingfisher (*Alcedo atthis*) was not identified using the River Moy during the site surveys. The footprint of the proposed flood wall on the south/south-western bank of the river provides poor suitability for kingfisher breeding habitat. By contrast, the north/north-eastern bank of the river downstream of the N59 Lower Bridge provides more suitable kingfisher breeding habitat due to the presence of individual trees, shrubs and small pockets of scrub. However, it should be noted that kingfisher breeding activity has never been recorded along the River Moy within the confines of the Proposed Scheme during surveys undertaken between 2021 and 2023.

Most of the transects surveyed supported regular occurrences of resident breeding passerine species such as wren (*Troglodytes troglodytes*), robin (*Erithacus rubecula*), song thrush (*Turdus philomelos*), blackbird (*Turdus merula*), blue tit (*Cyanistes caeruleus*), chaffinch (*Fingilla coelebs*) and dunnock (*Prunella modularis*). These were typically associated with gardens, parklands and small areas of scrub and woodland adjoining the Proposed Scheme measures.

Migratory passerine species identified within the survey area included willow warbler (*Phylloscopus trochilus),* chiffchaff (*Phylloscopus collybita*), blackcap (*Sylvia atricapilla*), house martin (*Delichon urbicum*), swallow (*Hirundo rustica*) and swift. These species were mostly identified during the second (late season) survey. Willow warbler and blackcap were typically associated with scrub cover adjoining the River Moy riparian area in addition to those sections of the study area adjoined by scrub, woodland and parkland areas. House martin, swallow and swift were seen foraging over the urban and peri-urban habitats while sand martin were noted foraging over the River Moy.

Dipper (*Cinclus cinclus*), a specialist riverine species was identified on the Brusna River during the early season survey in 2023. Dipper nests were not identified along the section of the stream within the study area or its associated bridge structures.

A brief analysis of each transect is provided below. The findings of the breeding bird survey results from 2021, 2022 and 2023 are presented in full in **Appendix 10.2.** Transects 3, 4, 5, 6 and 7 from the 2021 survey, Transects 6, 7 and 9 from the 2022 survey and Transect 3 from the 2023 survey relate to areas no longer incorporated into the Proposed Scheme and have been removed from reporting here, however, they are reported upon in **Appendix 10.2**. Transects across the three breeding bird survey years (i.e. 2021, 2022, 2023) are not a direct repeat of each other i.e. Transect 1 in 2022 is not a direct repeat of Transect 1 in 2021, they relate to different areas. Nonetheless, the numbering of each transect within this report remains consistent with that in **Appendix 10.2** to avoid confusion when cross referencing to **Appendix 10.2**. The description of each transect in **Section 10.3.11.2.1.1** through **Section 10.3.11.2.1.3** should be read in conjunction with **Figure 10-5, Figure 10-6** and **Figure 10-7**.

10.3.11.2.1.1 Survey Results 2021

Line Transect 1

Most breeding bird activity associated with this transect was associated with birds occurring on or flying over/through the River Moy main channel. The red listed bird species' grey wagtail and swift were observed along this transect.

Line Transect 2

This transect supported consistent occurrences of common passerines typically associated with parkland habitats. Other species associated with pockets of scrub cover adjoining the western bank of the river included willow warbler and blackcap, while mute swan (*Cygnus olor*) was identified using the main channel of the River Moy, near its western bank.

A breakdown of the breeding avifauna recorded during 2021 surveys is presented in **Appendix 10.2.**

10.3.11.2.1.2 Survey Results 2022

Line Transect 1

This transect supported evidence of wren, linnet (*Carduelis cannabina*), dunnock, robin, blue tit and house martin with breeding and incidental records for robin, wren, rook (*Corvus frugilegus*), jackdaw (*Coloeus monedula*), willow warbler, magpie (*Pica pica*) and woodpigeon (*Columba palumbus*). The amber listed bird species swallow was observed along this transect.

Line Transect 2

The breeding bird surveys confirmed breeding evidence for Amber listed spotted flycatcher (*Musciapa striata*) with incidental records for swallow, wren, rook, jackdaw, pied wagtail (*Motacilla alba yarrellii*), woodpigeon, goldfinch (*Carduelis carduelis*), great tit (*Parus major*), magpie, dunnock, blue tit, house sparrow (*Passer domesticus*), starling (*Sturnus vulgaris*) and herring gull. The red listed bird species' house martin and meadow pipit (*Anthus pratensis*) were observed along this transect.

Line Transect 3

This transect survey did not identify breeding bird activity, although this area does support suitable breeding habitats for a range of passerine, riverine and certain raptor species, including kestrel (*Falco tinnunculus*) and sparrowhawk (*Accipiter nisus*). The transect recorded incidental records for robin, wren, rook, blue tit, chiffchaff and magpie.

Line Transect 4

The transect survey found evidence of breeding sparrowhawk and blue tit with incidental records for woodpigeon, rook, wren, jackdaw, swallow, robin, blue tit, hooded crow (*Corvus cornix*), collared dove (*Streptopelia decaocto*), common gull (*Larus canus*), house sparrow, dunnock, goldfinch, willow warbler and sedge warbler (*Acrocephalus schoenobaenus*). The red listed bird species' house martin and swallow were observed along this transect.

Line Transect 5

Tree and shrub cover associated with adjoining private residences afforded the most suitable habitats for passerine birds and corvids. Other species identified overflying the transect such as swallow were also noted. The red listed bird species' grey wagtail was observed along this transect.

Line Transect 8

. This transect did not uncover signs of breeding bird activity. However, the transect supported incidental records of rook, swallow, wren, black-headed gull (*Larus ridibundus*) and robin.

A breakdown of the breeding avifauna recorded during 2022 surveys is presented in **Appendix 10.2.**

10.3.11.2.1.3 Survey Results 2023

Line Transect 1

Most breeding bird activity associated with this transect was associated with birds occurring on or flying over/through the River Moy main channel. Species observed included house sparrow, wren, bluetit and chaffinch.

Line Transect 2

This transect supported consistent occurrences of common passerines typically associated with parkland habitats and adjoining residential dwellings such as wren, robin, blackbird and starling. Other species associated with pockets of scrub cover adjoining the western bank of the river included willow warbler and blackcap.

Line Transect 4

This transect supported common passerine and corvid species, mostly associated with adjoining gardens, shrubbery or overflying the area in addition to notable occurrences of riparian and wetland bird species including dipper, grey wagtail and mallard (*Anas platyrhynchos*). The westernmost section of the transect adjoins the estuarine section of the River Moy. This section of the River Moy supports feeding and foraging waterbird species including cormorant (*Phalacrocorax carbo*), herring gull, black-headed gull and grey heron.

Line Transect 5

Tree and shrub cover associated with adjoining areas of improved and semi-improved grassland afforded the most suitable habitats for passerine birds and corvids. Other species identified overflying the transect included swallow, house martin and sand martin.

Line Transect 6

The riparian environs and the wider area supported the usual suite of resident passerine and migratory passerine species, including blackcap and willow warbler. Riverine species identified within the river included dipper, grey wagtail and grey heron. The bridges spanning the Brusna River within the proposed works footprint did not exhibit suitable nesting habitat for these species. However, the areas of broadleaved woodland adjoining the survey area may provide suitable nesting habitats for species such as grey wagtail.

Line Transect 7

The compound footprint does not support tree, shrub or scrub cover and therefore reduces suitability for nesting passerine avifauna. The area's proximity to the River Moy means that it supports overflying or adjacent foraging riverine species such as sand martin, swallow, grey heron, grey wagtail and mallard. Passerine species heard calling from the environs of the compound footprint include willow warbler, wren, robin, song thrush and dunnock.

Point Transect 1

This area and its surrounds comprise open pastoral lands, which are largely unsuitable to support many resident and migratory breeding passerine species. Nonetheless, species such as swallow were identified foraging over these fields while meadow pipit was identified holding territory during the June 2023 survey.

Point Transect 2

A male grey wagtail and three fledged young were noted perching on a tyre within the river, downstream of the road bridge.

A breakdown of the breeding avifauna recorded during surveys in 2023 is presented in **Appendix 10.2.**

10.3.11.2.1.4 Breeding Bird Evaluation

Common gull has been classified as being of International Importance for the purposes of this assessment as it is an SCI of Lough Conn and Lough Cullin SPA for its breeding population. There is the potential that the individual observed during breeding bird surveys was a bird associated with this SPA using the Moy estuary for ex-situ foraging, however, there is also the potential that this bird is not associated with the SPA. Therefore, common gull that are potentially breeding outside Lough Conn and Lough Cullin SPA have been classified and being of County Importance purposes of this assessment as they are amber listed BoCCI species.

Grey wagtail, swift, house martin and meadow pipit have been classified as being of National Importance for the purposes of this assessment as they are red listed BoCCI species.

House sparrow, greenfinch (*Chloris chloris*), willow warbler, goldcrest, starling, herring gull, common sandpiper, sand martin, cormorant, swallow, mute swan, linnet, spotted fly catcher and black-headed gull and common gull have been classified as being of County Importance for the purposes of this assessment as they are amber listed BoCCI species.

All other breeding birds have been classified as being of Local Importance (higher value) for the purposes of this assessment as they are considered to be locally important populations of resident and regularly occurring breeding bird species which are green listed BoCCI species (or not listed as BoCCI as in the case of feral pigeon (*Columba livia*)).

10.3.11.2.2 Overwintering Waterbird Surveys – SCI Species

During the Winter 2022/23 bird surveys, across both Sites (i.e. overwintering waterbird survey Site 1 and Site 2 as outlined in **Figure 10-8** and **Figure 10-9**, respectively), 13 over-wintering SCI waterbird species were recorded (**Figure 10-19, Figure 10-20, Figure 10-21**):

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

Twelve over-wintering SCI waterbird species were observed during winter surveys at site 1 (Quignamanger) (**Table 10-15; Figure 10-19, Figure 10-20, Figure 10-21**). Three species (bar-tailed godwit, curlew, redshank) are SCI species of Killala Bay/Moy Estuary SPA while common gull is an SCI species of Lough Conn and Lough Cullin SPA.

Site 1 (which lies partially within Killala Bay/Moy Estuary SPA) did not contain sufficient numbers of overwintering waterbirds to indicate the site supported internationally or nationally important numbers of overwintering waterbirds. Peak counts of observed overwintering waterbird species at this site included: 19 bar-tailed godwit, 4 common gull, 4 curlew and 50 redshank, all lower than the 1% threshold of the international and national populations or, for gull species, 1% National Mean/Peak numbers as provided in Lewis *et al*. (2019) (**Table 10-15**). The result of the overwintering waterbird surveys for the 2022/23 season show that Site 1 was not a national or internationally important in-land or high tide roost site for overwintering waterbirds in the winter of 2022/23.

Nine SCI over-wintering waterbird species were observed during winter surveys at site 2 (Moy main channel) (**Table 10-15**). One species (redshank) is an SCI species of Killala Bay/Moy Estuary SPA while common gull is an SCI species of Lough Conn and Lough Cullin SPA.

Peak counts of observed overwintering waterbird species at Site 2 (Moy main channel) were all lower than the 1% threshold for internationally and nationally important populations or, for gull species, 1% National Mean/Peak numbers as provided in Lewis *et al*. (2019) (**Table 10-15**). The result of the overwintering waterbird surveys for the 2022/23 season show that Site 2 was not a national or internationally important in-land or high tide roost site for overwintering waterbirds in the winter of 2022/23 One individual common gull was recorded at this site in December 2022 and February 2023.

This species is an SCI of Lough Conn and Lough Cullin SPA, designated for their breeding populations. The minimum population of common gull recorded as a pair unit breeding at Lough Conn and Lough Cullin SPA was 40 (NPWS, 2020b). While the one common gull recorded on site during the winter 2022/2023 surveys exceeds the 1% population threshold for Lough Conn and Lough Cullin SPA (40 pair units NPWS, 2020b), the SPA is designated for breeding common gull. As such, any disturbance or displacement of wintering common gull onsite as a result of the Proposed Scheme would not have the potential to affect the conservation objectives of this SPA.

The result of the overwintering waterbird surveys for the 2022/23 season show that both Site 1 and Site 2 did not support nationally or internationally important numbers of overwintering waterbirds in the winter of 2022/23 as no international or national threshold was met for any over-wintering SCI waterbird species observed during the Winter 2022/23 survey period. Peak counts for each overwintering waterbird species per site can be found in **Table 10-15**.

Figure 10-19 SCI Waders and Waterbirds Observed During Overwintering Waterbird Surveys in Winter 2022/23.

Note: BA Bar-tailed Godwit; CA Cormorant; CU Curlew; H. Grey Heron; OC Oystercatcher; RK Redshank

Figure 10-20: SCI gull species observed during overwintering waterbird surveys in winter 2022/23.

Note: BH Black-headed Gull; CM Common Gull; HG Herring Gull

Figure 10-21: SCI waterfowl species observed during overwintering waterbird surveys in winter 2022/23.

Note: MA Mallard; T Teal; WN Wigeon; WS Whooper Swan

Table 10-15 Monthly Peak Counts of Overwintering Waterbird Species Recorded During Winter 2022/23 Surveys and Relevant Thresholds and SPA Population Numbers (Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA).

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

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

Overwintering SCI waterbirds have been classified as being of International Value for the purposes of this assessment as some species observed are SCI of Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA.

10.3.11.2.3 Overwintering Waterbird Survey – Non-SCI Species

Non-SCI species recorded during the overwintering waterbird survey in the winter of 2022/23 included the following red listed (BoCCI) species: grey wagtail the following amber listed (BoCCI) species: goldcrest (*Regulus regulus*), house sparrow mute swan and starling (*Sturnus vulgaris*) and the following green listed (BoCCI) species: great black-backed gull (*Larus marinus*), jackdaw pied wagtail redwing (*Turdus iliacus*), wood pigeon goldfinch*)*, robin blackbird wren*)*, hooded crow, magpie and rook (**Figure 10-22** and **Figure 10-23**).

Of these 17 non-SCI species one species is a gull (great black-backed gull[16]) while mute swan is classed as waterfowl. All other non-SCI species observed (with the exception of wood pigeon) were passerines.

Grey wagtail has been classified as being of National Importance for the purposes of this assessment as they are red listed BoCCI species.

Goldcrest, house sparrow, mute swan and starling have been classified as being of County Importance for the purposes of this assessment as they are amber listed BoCCI species.

All other non-SCI overwintering birds have been classified as being of Local Importance (higher value) for the purposes of this assessment as they are considered to be locally important populations of resident and regularly occurring bird species which are green listed BoCCI species.

[16] Great black-backed gull is listed as an SCI species for the candidate SPA (cSPA) North-west Irish Sea SPA (site code: 004236), however, as this is a candidate SPA, this species has not been listed as an SCI species for Ireland yet.

Figure 10-22 Non-SCI bird species observed during winter waterbird surveys in winter 2022/23.

Note: B. Blackbird; HS House Sparrow; RO Rook; GB Great Black-backed Gull; JD Jackdaw; SG Starling; GC Goldcrest; MG Magpie; WP Woodpigeon; GL Grey wagtail; PW Pied Wagtail; WR Wren; GO Goldfinch; R. Robin; HC Hooded Crow; RE Redwing

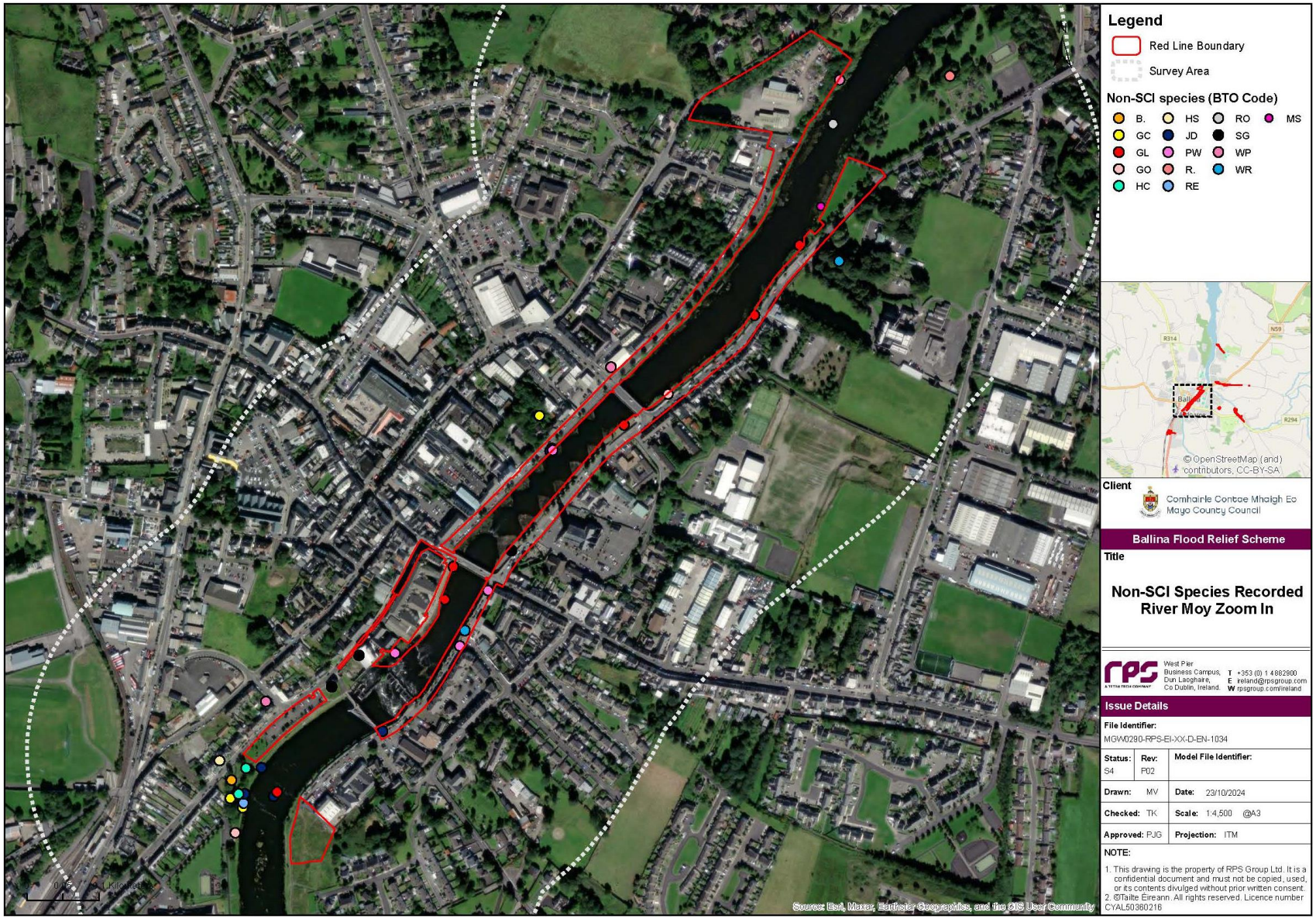

Figure 10-23 Close up of non-SCI bird species recorded at Site 2 during over-wintering waterbird surveys in winter 2022/2023

10.3.12 Invasive Alien Plant Species

10.3.12.1 Desk Study

A number of IAPS were identified from an NBDC data search of the two 10 km grid squares across which the Proposed Scheme is located (G21, G22) (**Table 10-16**). IAPS contained within the third schedule to the European Communities (Birds and Natural Habitats Regulations) 2011 (as amended) identified in the desk study include: Giant hogweed (*Heracleum mantegazzianum*), Himalayan knotweed (*Koenigia* polystachya), Japanese knotweed (*Reynoutria japonica*), three cornered leek (*Allium triquetrum*) and rhododendron (*Rhododendron ponticum*).

Table 10-16 NBDC database records of Invasive Alien Plant Species for G21 and G22 grid squares

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

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

10.3.12.2 Field Survey

Of the five Third Schedule IAPS returned from the desk study, three species were observed during surveys in 2022 and 2023 (Japanese knotweed, rhododendron and three-cornered leek). A further two Third Schedule IAPS, not identified during the desktop study were also observed during field surveys (Spanish bluebell (*Hyacinthoides hispanica*) and hybrid bluebell (*Hyacinthoides x massartiana*). **Appendix 10.13** details the locations and descriptions of each IAPS stand observed across the scheme area. **Figure 10-24** provides an overall view of each IAPS stand while **Appendix 10.14** show the locations of each IAPS stand in further detail. A significant number of these stands especially along Bachelors Walk and the Brusna are likely to interact with the proposed works areas.

Other, non-native species identified during surveys that are not Third Schedule listed but are regarded as being of medium or high impact invasive species (Kelly *et al.,* 2013) included cherry laurel (*Prunus laurocerasus*), Canadian waterweed (*Elodea canadensis*), sycamore (*Acer pseudoplatanus*), butterfly bush (*Buddleja davidii*) and Himalayan honeysuckle (*Leycesteria formosa*). IAPS are considered to be a threat to habitats and species across the Proposed Scheme.

Figure 10-24 Locations of each IAPS stand observed across the Proposed Scheme.

Note: Appendices 10.13 and 10.14 outline these locations in further detail.

10.3.13 Important Ecological Features IEFs

All ecological features identified within the ZoI for the Proposed Scheme have been identified and assessed as to whether they are considered IEFs to be scoped into the assessment of significant effects (**Table 10-17**). IEFs are defined as 'habitats, species and ecosystems, including ecosystem function and processes that may be affected, with reference to a geographical context in which they are considered important' (CIEEM, 2018).

The identification of IEFs scoped into the impact assessment is based on their ecological evaluation combined with whether or not they are at risk of significant negative impact from the Proposed Scheme. Receptors can be at risk of potential significant negative effect, but they may not necessarily be scoped in to impact assessment. This is because ecological resources of Local Importance (lower value), or less, do not represent 'key ecological receptors' for which detailed assessments are required (NRA, 2009). Key ecological receptor is the broadly equivalent term used in the NRA guidance (2009) for IEFs.

Table 10-17 Important Ecological Features Identified across the Proposed Scheme and Those Taken Forward to Impact Assessment (Items Shaded Light Grey Will Be Brought Forward for Assessment)

Ecological Features	Highest ecological valuation within ZoI of proposed Scheme	At risk of potential significant effect?	IEFs (Scoped into assessment)	Rationale	Notes
River Moy SAC	International	Yes	Yes	Works for the Proposed Scheme will take place within this SAC	Impacts to terrestrial QI of this IEF are only summarised in this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report and NIS.
Killala Bay/Moy Estuary SAC	International	Yes	Yes	Works for the Proposed Scheme will take place within this SAC	Impacts to terrestrial QI of this IEF are only summarised in this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report and NIS.
Killala Bay/Moy Estuary SPA	International	Yes	Yes	Works for the Proposed Scheme will take place within this SAC	Impacts to terrestrial QI of this IEF are only summarised in this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report and NIS.
Lough Conn and Lough Cullin SPA	International	Yes	Yes	Four individuals of common gull, a species associated with this SPA, were recorded during overwintering waterbird surveys.	Impacts to terrestrial QI of this IEF are only summarised in this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report and NIS.
Killala Bay/Moy Estuary Ramsar Site	International	Yes	Yes	Works for the Proposed Scheme will take place within this Ramsar site.	As this IEF was brought forward for SCI overwintering waterbirds, impacts to this IEF are only summarised in this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report and NIS.
Killala Bay/Moy Estuary pNHA	National	Yes	Yes	Works for the Proposed Scheme will take place within this pNHA	As this IEF was brought forward for SCI overwintering waterbirds, impacts to this IEF are only summarised in this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report and NIS.
Moy Valley pNHA	National	Yes	Yes	Potential for migrating species designated under this pNHA to be impacted by the Proposed Scheme	As this IEF was brought forward for migratory QI fish species, impacts to this IEF are not dealt with in this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report, NIS and **Chapter 9: Aquatic Biodiversity.**
Lough Conn and Lough Cullin pNHA	National	Yes	Yes	Four individuals of common gull, a species associated with	As this IEF was brought forward for SCI overwintering waterbirds, impacts to this IEF are only summarised in

Ecological Features	Highest ecological valuation within ZoI of proposed Scheme	At risk of potential significant effect?	IEFs (Scoped into assessment)	Rationale	Notes
				this SPA, were recorded during overwintering waterbird surveys. Potential for migrating species designated under this pNHA to be impacted by the Proposed Scheme	this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report and NIS.
Cloonagh Lough (Mayo) pNHA	National	Yes	Yes	There is potential for ex-situ disturbance to SCI species of this pNHA	As this IEF was brought forward for SCI overwintering waterbirds, impacts to this IEF are only summarised in this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report and NIS.
Lough Alick pNHA	National	Yes	Yes	There is potential for ex-situ disturbance to SCI species of this pNHA	As this IEF was brought forward for SCI overwintering waterbirds, impacts to this IEF are only summarised in this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report and NIS.
Floating River Vegetation [3260]	National	Yes	Yes	Instream works on the main channel of the River Moy have the potential to disturb this habitat.	
FW4 Drainage Ditches	Local Importance (lower value)	Yes	No	Consistent with NRA (2009) guidance whereby IEFs of Local Importance (lower value) are not brought forward for assessment.	
FS1 Reed and Large Sedge Swamps	Local Importance (lower value)	Yes	No	Consistent with NRA (2009) guidance whereby IEFs of Local Importance (lower value) are not brought forward for assessment.	
FS2 Tall Herb Swamp	County	Yes	Yes	Works on the main channel of the River Moy will take place within this habitat.	
GS1 Dry Calcareous and Neutral Grassland	Local Importance (lower value)	Yes	No	Consistent with NRA (2009) guidance whereby IEFs of Local Importance (Lower	

Ecological Features	Highest ecological valuation within ZoI of proposed Scheme	At risk of potential significant effect?	IEFs (Scoped into assessment)	Rationale	Notes
				Value) are not brought forward for assessment.	
GS2 Dry Meadows and Grassy Verges	Local Importance (lower value)	Yes	No	Consistent with NRA (2009) guidance whereby IEFs of Local Importance (Lower Value) are not brought forward for assessment.	
GS4 Wet Grassland	County Importance	Yes	Yes	Works on the Bunree/Behy Road culvert has the potential to disturb this habitat	
WN5 Riparian Woodland	Local Importance (higher value)	Yes	Yes	Works on the main channel of the River Moy will take place within this habitat.	
WD1 Mixed Broadleaved Woodland	Local Importance (higher value)	Yes	Yes	Works across the Proposed Scheme (but especially along the Brusna) has the potential to disturb this habitat	
WD5 Scattered Trees and Parkland	Local Importance (lower value)	Yes	No	Consistent with NRA (2009) guidance whereby IEFs of Local Importance (Lower Value) are not brought forward for assessment.	
WS1 Scrub	Local Importance (lower value)	Yes	No	Consistent with NRA (2009) guidance whereby IEFs of Local Importance (Lower Value) are not brought forward for assessment.	
WS2 Immature Woodland	Local Importance (lower value)	No	No	Consistent with NRA (2009) guidance whereby IEFs of Local Importance (Lower Value) are not brought forward for assessment and there is no overlap with the Proposed Scheme works area and this habitat.	

Ecological Features	Highest ecological valuation within ZoI of proposed Scheme	At risk of potential significant effect?	IEFs (Scoped into assessment)	Rationale	Notes
WL1/WL2 Hedgerows/Treelines	Local Importance (higher value)	Yes	Yes	Works across the Proposed Scheme has the potential to disturb this habitat	
ED3 Recolonising Bare Ground	Local Importance (lower value)	Yes	No	Consistent with NRA (2009) guidance whereby IEFs of Local Importance (Lower Value) are not brought forward for assessment	
BL3 Buildings and Artificial Surfaces	Local Importance (lower value)	Yes	No	Consistent with NRA (2009) guidance whereby IEFs of Local Importance (Lower Value) are not brought forward for assessment.	
Otter	International	Yes	Yes	Otter and otter signs have been recorded on a number of the watercourses across the Proposed Scheme including a holt which was observed within the Brusna proposed works area	As otter are a QI species, impacts to this IEF are only summarised in this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report and NIS.
Badger	Local Importance (higher value)	Yes	Yes	Given the baseline, there is the potential to disturb this species across the Proposed Scheme	
Bats – roosting	Local Importance (higher value)	No	No	Given the baseline, there is no potential to significantly disturb roosting bats during the proposed works.	
Bats – commuting and foraging	Local Importance (higher value)	Yes	Yes	Given the baseline, there is potential to disturb commuting and foraging bats across the Proposed Scheme, especially along the main channel of the River Moy	
Harbour seal	International	Yes	Yes	Harbour seals have been recorded in the estuary	As harbour seal are a QI species, impacts to this IEF are only summarised in this EIAR chapter. Impacts

Ecological Features	Highest ecological valuation within ZoI of proposed Scheme	At risk of potential significant effect?	IEFs (Scoped into assessment)	Rationale	Notes
				adjacent to the proposed works areas therefore there is the potential to disturb this species	are fully assessed in the associated AA Screening Report and NIS.
Breeding birds – Common gull (potential Lough Conn and Lough Cullin SPA population)	International Importance	Yes	Yes	The proposed Scheme has the potential to disturb breeding populations of these species	As common gull are an SCI species, impacts to this IEF are only summarised in this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report and NIS.
Breeding birds - grey wagtail, swift, house martin, meadow pipit	National Importance	Yes	Yes	The proposed Scheme has the potential to disturb breeding populations of these species	
Breeding birds - house sparrow, swallow, greenfinch, willow warbler, goldcrest, starling, herring gull, common sandpiper, sand martin, cormorant, common gull, mute swan, linnet, spotted fly catcher, black-headed gull, Mallard	County Importance	Yes	Yes	The proposed Scheme has the potential to disturb breeding populations of these species	
Breeding Birds (species other than those listed above)	Local Importance (higher value)	Yes	Yes	The proposed Scheme has the potential to disturb breeding populations of these species	
Over-wintering waterbirds – SCI species	International	Yes	Yes	Given the presence of suitable estuarine foraging habitat for this group across the Proposed Scheme there is potential for disturbance of this group	Overwintering waterbirds are SCI species', therefore, impacts to this IEF are only summarised in this EIAR chapter. Impacts are fully assessed in the associated AA Screening Report and NIS.
Over-wintering birds – non-SCI Grey wagtail	National	Yes	Yes	Given the presence of suitable foraging habitat for this species across the Proposed Scheme there is potential for disturbance of this species	
Over-wintering birds – non-SCI: goldcrest, house sparrow, mute swan, starling	County	Yes	Yes	Given the presence of suitable foraging habitat for this group across the Proposed Scheme	

Ecological Features	Highest ecological valuation within ZoI of proposed Scheme	At risk of potential significant effect?	IEFs (Scoped into assessment)	Rationale	Notes
				there is potential for disturbance of this group	
Over-wintering birds – non-SCI Green Listed	Local Importance (higher level)	Yes	Yes	Given the presence of suitable foraging habitat for this group across the Proposed Scheme there is potential for disturbance of this group	

10.3.14 Evolution of the Environment in the Absence of the Proposed Scheme

Hydraulic modelling has clearly demonstrated that the current infrastructure does not meet the required Target Standard of Protection (SoP) of 1% of the Annual Exceedance Probability (AEP) for fluvial areas and 0.5% of the AEP for coastal areas, also referred to as the 1-in-100 year and 1-in-200 year flood events, respectively. This means that there is an unacceptable risk of flooding and damage to property and infrastructure. Flooding will continue to affect areas identified to be at risk in the absence of the scheme. This can have ongoing and intermittent, negative effects on water quality in the case that surface waters flood through urban areas, mobilising contaminants before draining back to the Moy and its tributaries.

Additionally, the current flood defences need repair, in particular some of the quay walls along the River Moy and, if not addressed, may fail in the future, further increasing the flood risk and associated damage.

10.3.14.1 Designated Sites

Should flooding continue or a wall collapse occur in a do-nothing scenario it may reduce water quality within a number of designated sites (River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA, Killala Bay/Moy Estuary pNHA). This can have a knock-on effect of reducing the quality of QI habitats (e.g. estuaries) and associated habitats (e.g. floating river vegetation) thus reducing habitat quality within these sites for QI/SCI species (e.g. waterbirds, otter).

A do-nothing scenario, therefore, has the potential to cause significant negative impacts to the European Sites connected to the Proposed Scheme and/or influence QI/SCI habitats or species of these sites.

10.3.14.2 Habitats

A do-nothing scenario has the potential to impact upon floating river vegetation, tall herb swamp, reed and large sedge swamp, estuaries [1130] and mudflats and sandflats not covered by seawater at low tide [1140] should flooding continue or a wall collapse occur. Floating river vegetation is located within the main channel of the River Moy with higher abundances towards each river bank compared to the centre of the channel while tall herb swamp and reed and large sedge swamp are located on the river banks and side of the river channel, respectively. A wall collapse could smother sections of these habitats and reduce the area within the channel and on the riverbanks for these habitats to occupy. A wall collapse or continued flooding along the banks of the River Moy within the centre of Ballina town also has the potential to negatively impact upon 1130 and 1140 habitat further downstream via the addition of pollutants (dust, fragments of mortar/plaster, hydrocarbons, sewage etc.) to the system. Other habitats that could be affected by pollution laden flood waters include all habitats with the potential to be flooded e.g. mixed broadleaved woodland, scrub, riparian woodland, wet grassland etc.

A do-nothing scenario, therefore, has the potential to cause significant negative impacts upon habitats across the Proposed Scheme.

10.3.14.3 Protected Mammals

A wall collapse in a do-nothing scenario, has the potential to impact upon otter via the loss of couching spots within tall herb swamp habitat downstream of the Lower Bridge. A wall collapse or pollution laden flood waters may also impact upon foraging resources (e.g. fish) within the River Moy used by mammal species such as harbour seal and otter. Additionally, pollution laden flood waters have the potential to affect the terrestrial foraging resources of other protected mammal species such as hedgehog.

A do-nothing scenario, therefore, has the potential to cause significant negative impacts upon protected mammals across the Proposed Scheme.

10.3.14.4 Amphibians and Reptiles

Common frog and some other regularly occurring amphibian/reptile species may be present in the wet grassland habitats along the Proposed Scheme. A pollution laden flood event as a result of a do-nothing scenario has the potential to affect these species both directly i.e. via direct contact with toxic substances and indirectly e.g. via affecting foraging resources.

10.3.14.5 Ornithology

The Moy estuary supports over-wintering waterbird species. A wall collapse or pollution laden flood event with the potential to impact upon habitats such as estuaries [1130] and mudflats and sandflats not covered by seawater at low tide [1140] and upon prey items such as fish and invertebrates has the potential to impact upon waterbirds who rely on these resources for foraging.

A do-nothing scenario, therefore, has the potential to cause significant negative impacts upon waterbird species across the Proposed Scheme.

10.4 Characteristics of the Proposed Scheme Likely to Result in Significant Effects on the Environment

The following section details the potential impacts of the Proposed Scheme on biodiversity in the absence of mitigation measures. CIEEM (2018) Guidelines for Ecological Impact Assessment (EcIA) have been adopted to inform the impact assessment.

10.4.1 Identified Impacts and Effects

10.4.1.1 Construction Phase Impacts and Effects

The following construction phase activities are likely to give rise to ecological impacts, in the absence of suitable mitigation.

Table 10-18 Construction Phase Impacts and Effects

Impact Source	Construction Activity	Potential Ecological Impact and Effects
Habitat loss, degradation and/or fragmentation	Vegetation removal and earthworks	The habitats within the study area comprise a mosaic of terrestrial and aquatic habitats including rivers and streams, woodlands, hedgerows/treelines, agricultural grassland, semi-natural grassland, swamp and woodlands. Vegetation removal and earthworks during site clearance will result in the loss of habitat and its supporting function for a number of species within the footprint of the Proposed Scheme. This activity will also result in potential for habitat degradation due to polluted run-off, dust generation, disturbance from construction and spread of invasive species. Such degradation could also result in effects on species dependent on these habitats.
	Construction of structures and hard surfaces	Permanent and temporary loss of habitat including in-stream habitat during cofferdam and ramp placement. Potential for pollution events during the construction (e.g. from hydrocarbons or cement) which can reduce the quality of habitats directly or indirectly.
	Construction of permanent/ temporary or complete/ partial barriers to wildlife movements such as flood walls, embankments etc.	Changes to movement of mobile species through the landscape, including potential to result in fragmentation and changes in local populations.
Disturbance/Displacement	Excavations, removal of old floodwalls and footpaths, causing high levels of noise and vibration.	Excavations and demolition works can cause disturbance of animal species, especially significant during breeding season; high levels of noise and vibration may also result in avoidance of the local area by faunal species
	Artificial lighting	Lighting used during night working at the construction stage may cause disturbance to bats and other foraging mammals in the area such as otter and badger. Artificial lighting can affect emergence and foraging regimes in addition to prey abundance/availability for bats.

Impact Source	Construction Activity	Potential Ecological Impact and Effects
		It can also affect greater predation rates for small mammals and avifauna.
	Movement of construction personnel, plant and vehicles	Potential to cause disturbance to wildlife through noise, vibration and human presence.
Pollution to water and air	Construction site drainage	Run-off of pollutants may have an indirect impact on habitats and species, especially those which are water-dependant. Pollutants including silts, hydrocarbons and cement (surface water and groundwater impacts are discussed in **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water.**)
	Air pollution and dust deposition	Localised air pollution and dust deposition may have a negative effect on any habitats or species of conservation value in the area. The principal pollutants of concern are the nitrogen oxides (NO_x) and Particulate Matter (PM), in terms of impact on sensitive ecosystems. Nitrogen oxides (NO_x) may have a positive or negative impact by acting as a fertiliser or a phytotoxicant. Particulate matter can have negative effects resulting in physical smothering of vegetation, affecting their function and survival. It may also cause local smothering of nearby aquatic receptors or affect the respiratory system of birds. Effects are mainly on vegetation growth, photosynthesis and nitrogen assimilation/metabolism (air pollution and dust deposition levels are assessed in **Chapter 13: Air**).
Accidental killing/injury	Vegetation removal and open excavations	Potential for killing and/or injury during the construction activities as a result of open excavations and/or vegetation removal.
Spread of invasive species	Movement of construction personnel, vehicles and construction materials; including any excavated spoil.	Potential to cause the spread of invasive species.

10.4.1.2 Operational and Maintenance Phase Impacts and Effects

The following potential impacts are likely to occur during the operational and maintenance phase of the Proposed Scheme, in the absence of suitable mitigation.

Table 10-19 Operational and Maintenance Phase Impacts and Effects

Impact Source	Operational and Maintenance Activity	Potential Ecological Impact and Effects
Disturbance/Displacement	Various activities including vegetation removal, cleaning of windows, inspections of defences, trash removal from culverts etc.	Maintenance and upkeep works can cause disturbance of animal species which can be especially significant during the breeding season.
Habitat Severance/Barrier Effect	Physical presence of flood defences	The physical presence of flood defences can create a barrier within a landscape which can prevent species from moving throughout their locality
Habitat Degradation	Presence of new flood defences, storm water drainage outfalls and new surface water pumping station	These new structures and infrastructure have the potential to result in changes to surface water quality and/or hydrological regime. Surface water and changes in hydrological regime impacts and effects are discussed in **Chapter 9: Aquatic Biodiversity.**

10.4.2 Assessment of Effects

The following section presents the assessment of effects on biodiversity within the ZoI of the Proposed Scheme due to the Proposed Scheme. As outlined in **Section 10.2.5** this is focussed on the Important Ecological Features identified in **Section 10.3.** This includes consideration of the Do-nothing effect i.e. the existing trends with the potential to affect biodiversity in the absence of the Proposed Scheme. **Section 10.4.1.1** and **Section 10.4.1.2** above have identified the potential effects arising from the Proposed Scheme while **Section 10.4.2.1** details how each of these may affect the identified IEFs in the absence of mitigation.

10.4.2.1 Impact Assessment on IEFs

10.4.2.1.1 Designated Sites

A potential source-pathway-receptor link has been identified between the Proposed Scheme and five designated European Sites (River Moy SAC, Killala Bay/Moy Estuary SAC, Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay Moy Estuary Ramsar Site) and five national sites (Killala Bay/Moy Estuary pNHA, Moy Valley pNHA, Lough Conn and Lough Cullin pNHA, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA). These sites have been highlighted as IEFs in **Table 10-17.**

10.4.2.1.1.1 River Moy SAC

The Proposed Scheme falls within this European Site and connectivity between the works and the SAC has been established for the following Qualifying Interests (QIs):

- Sea Lamprey (*Petromyzon marinus*) [1095]
- Brook Lamprey (*Lampetra planeri*) [1096]
- Salmon (*Salmo salar*) [1106]
- Otter (*Lutra lutra*) [1355]

Impacts to QI fish species (sea lamprey, brook lamprey, salmon) and to watercourses (i.e. the River Moy) have been dealt with in the associated AA Screening Report and NIS and also within **Chapter 9: Aquatic Biodiversity**. Impacts on otter are also dealt with within the associated AA Screening Report and NIS. Effects on otter (without mitigation) are summarised here:

Table 10-20 Summary of Potential Effects on Otter Identified from the Proposed Scheme (Full Assessment in the Associated NIS)

Description of Potential Effect	Significance of Effect (Without Mitigation)
Construction Phase	
Habitat Loss, Fragmentation and Disturbance	Potential **significant, adverse, permanent** effects on otter movement within the Proposed Scheme area and potentially throughout the wider environment which may have implications for breeding success if populations become fragmented and unable to disperse through the wider environment to find a territory and/or mate.
Habitat Degradation – Spread of Invasive Species	Potential **significant, adverse, permanent** effects on otter movement within the Proposed Scheme area and potentially throughout the wider environment which may have implications for breeding success if populations become fragmented and unable to disperse through the wider environment to find a territory and/or mate.
Habitat Degradation – Pollution Event: Chemical Spill, Sedimentation etc.	Potential **significant, adverse, short- to medium-term** effects on otter populations within the Proposed Scheme area and potentially throughout the wider environment should breeding opportunities/success be impacted.
Habitat Degradation – Reduction in Foraging Resources and/or Abundance of Prey Items	Potential **significant, adverse, short- to medium-term** effects on otter populations within the Proposed Scheme area and potentially throughout the wider environment should breeding opportunities/success be impacted.
Loss of Breeding and Resting Sites.	Potential **significant, adverse, short to medium-term** effects on otter breeding success within the Proposed Scheme area and potentially throughout the wider environment should this potential reduction in recruitment affect wider otter abundance.
Disturbance/Displacement	Potential **significant, adverse, short to medium-term** effects on otter adjacent to the Proposed Scheme and the wider environment with the potential to affect breeding

Description of Potential Effect	Significance of Effect (Without Mitigation)
	success for up to three seasons with associated potential to reduce recruitment and affect wider otter abundance.
Habitat Severance/Barrier Effect	Potential **significant, adverse, short to medium-term** effects on otter adjacent to the Proposed Scheme and the wider environment with the potential to affect breeding success for up to three seasons with associated potential to reduce recruitment and affect wider otter abundance.
Mortality Risk	Potential **significant, adverse, short to medium-term** effects on otter adjacent to the Proposed Scheme and the wider environment with the potential to affect breeding success for up to three seasons with associated potential to reduce recruitment and affect wider otter abundance.
Operational Phase	
Disturbance/Displacement	Given the urban nature of the Proposed Scheme area and the intermittent and minor nature of the operational and maintenance phase works, any disturbance/displacement effect on otter is unlikely to cause significant effects. This effect is therefore considered to be **not significant.**
Habitat Degradation due to Changes in Water Quality	**Likely significant negative** intermittent, temporary effects on the River Moy in and downstream of Ballina with associated effects on otter.

10.4.2.1.1.2 Killala Bay/Moy Estuary SAC & Killala Bay/Moy Estuary pNHA

Killala Bay/Moy Estuary SAC and Killala Bay/Moy Estuary pNHA are co-located and are designated for the same habitats and species. As such both sites are dealt with in this section.

The Proposed Scheme falls within the confines of Killala Bay/Moy Estuary SAC and Killala Bay/Moy Estuary pNHA and connectivity between the works and the SAC and pNHA has been established for the following Qualifying Interests:

- Estuaries [1130]
- Mudflats and sandflats not covered by seawater at low tide [1140]
- Sea lamprey (*Petromyzon marinus*) [1095]
- Harbour seal (*Phoca vitulina*) [1365]

Impacts on QI fish species (sea lamprey), watercourses (i.e. the River Moy), estuaries and mudflats and sandflats have been dealt with in the associated AA Screening Report and NIS and also within **Chapter 9: Aquatic Biodiversity**. Impacts on harbour seal are also dealt with within the associated AA Screening Report and NIS. Effects on harbour seal (without mitigation) are summarised here:

Table 10-21 Summary of potential effects on harbour seal identified from the Proposed Scheme (full assessment in the associated NIS)

Description of Potential Effect	Significance of Effect (Without Mitigation)
Construction Phase	
Habitat Loss, Fragmentation and Disturbance	Given the very low numbers of harbour seal observed utilising the main channel of the River Moy in the centre of Ballina town and the extensive areas of suitable alternative foraging habitat within Killala Bay/Moy Estuary and the north and west coasts, outside the redline boundary, these works are unlikely to cause significant impacts. This effect is therefore considered to be **not significant**.
Habitat Degradation Pollution Event - Chemical Spill or Sedimentation	Potential **significant, adverse, short- to medium-term** effects on harbour seal populations within the Proposed Scheme area and potentially throughout the wider environment should breeding opportunities/success be impacted.
Habitat Degradation – Reduction in Foraging Resources and/or Abundance of Prey Items	Given the very low numbers of harbour seal observed utilising the main channel of the River Moy in the centre of Ballina town and downstream at Quignamanger and the extensive areas of suitable alternative foraging habitat within Killala Bay/Moy Estuary and the north and west coasts, outside the redline boundary, these works are unlikely to cause significant impacts. This effect is therefore considered to be **not significant**
Disturbance/Displacement	Given that both banks of the River Moy within the centre of Ballina town are within an urban area with an almost constant stream of traffic and pedestrians, it can be concluded that any seal utilising the river at this point are already habituated to the presence of humans and machinery. This, coupled with the extent of suitable alternative foraging habitat within Killala Bay/Moy Estuary and the north and west coasts, the proposed works have no potential to result in effects on harbour seal at any geographic scale. This effect is therefore considered to be **not significant.**
Operational and Maintenance Phase	
Habitat Degradation due to Changes in Water Quality	**Likely significant negative** intermittent, temporary effects on the River Moy in and downstream of Ballina with associated effects on harbour seal.

10.4.2.1.1.3 Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site, Lough Conn and Lough Cullin pNHA, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA and over-wintering waterbirds (SCI and non-SCI populations)

Each of these seven IEFs have been brought forward for assessment due to waterbirds and wetlands. The over-wintering waterbirds that were observed in the vicinity of the Proposed Scheme are outlined in **Section 10.3.11.2.2**. Killala Bay/Moy Estuary SPA and Killala Bay/Moy Estuary Ramsar Site are co-located, and both fall within the confines of the Proposed Scheme. Cloonagh Lough (Mayo) pNHA may be used as an overwintering site for waterfowl within the Killala Bay area and is it considered that there is potential for ex-situ connectivity between the Proposed Scheme and the pNHA. It is also considered that there is potential for ex-situ connectivity between the Proposed Scheme and Lough Conn and Lough Cullin SPA, Lough Conn and Lough Cullin pNHA[17] and Lough Alick pNHA due to the distance between the Proposed Scheme and these designated sites.

A number of over-wintering waterbird species listed for either Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA and Lough Conn and Lough Cullin pNHA were observed during over-wintering waterbird surveys (**Table 10-15**). These were:

- Bar-tailed godwit (*Limosa lapponica*) (SCI of Killala Bay/Moy Estuary SPA)
- Curlew (*Numenius arquata*) (SCI of Killala Bay/Moy Estuary SPA)
- Redshank (*Tringa totanus*) (SCI of Killala Bay/Moy Estuary SPA)
- Wigeon (*Anas Penelope)* (listed within Killala Bay/Moy Estuary Ramsar Site documentation and the Cloonagh Lough pNHA Site Synopsis)
- Mallard (*Anas platyrhynchos)* (listed within the Cloonagh Lough pNHA Site Synopsis)
- Teal (*Anas crecca)* (listed within the Cloonagh Lough pNHA Site Synopsis)
- Grey heron (Ardea cinerea) (listed within the Cloonagh Lough pNHA Site Synopsis)
- Black-headed gull (*Larus ridibundus*) (listed within the Lough Alick pNHA Site Synopsis)
- Common gull (*Larus canus*) (SCI species of Lough Conn and Lough Cullin SPA, listed within the Lough Alick pNHA Site Synopsis and also presumably listed for Lough Conn and Lough Cullin pNHA as Lough Conn and Lough Cullin SPA and Lough Conn and Lough Cullin pNHA are co-located)

The Natura 2000 Standard Data Form for Killala Bay/Moy Estuary SPA[18] states that the site supports an excellent diversity of wintering waterfowl and is one of the most important sites in the region. A number of the species that occur within the SPA have populations of national importance: bar-tailed godwit, ringed plover, grey plover, sanderling (not an SCI of the SPA), red knot (not an SCI of the SPA) and dunlin (Standard Data Form Killala Bay/Moy Estuary SPA). Golden plover also occurs in numbers close to national importance. There is also a regular population of light-bellied brent goose (not an SCI of the SPA) which, in some winters exceeds the threshold for international importance.

The Natura 2000 Standard Data Form for Lough Conn and Lough Cullin SPA[19] states that the SPA is one of only four breeding sites in Ireland for common scoter, supporting 40% of the all-Ireland total. Lough Conn and Lough Cullin is also of importance for wintering waterfowl, with a nationally important population of tufted duck (1% of all-Ireland total).

The Proposed Scheme has the potential to result in effects on seven IEFs (Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA, Lough Conn and Lough Cullin pNHA and overwintering waterbirds (SCI and non-SCI species)) due to effects on overwintering waterbirds (SCI and non-SCI species).

Impacts on SCI bird species are dealt with within the associated AA Screening Report and NIS. Effects on Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site,

[17] For migratory fish species considered to be QI of this pNHA see **Section 10.4.2.1.1.4**
[18] https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=IE0004036
[19] https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=IE0004228

Lough Conn and Lough Cullin pNHA, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA via effects on overwintering waterbirds (without mitigation) are summarised here:

Table 10-22 Summary of potential effects on SCI waterbirds identified from the Proposed Scheme (full assessment in the associated NIS)

Description of Potential Effect Construction Phase	Significance of Effect (Without Mitigation)
Habitat Loss, Fragmentation and Disturbance	Habitat loss, fragmentation and disturbance has the potential to affect up to 62 wintering waterbirds, which is the maximum number of birds of all species combined that were observed on any one date during surveys at Site 2 (including black headed gull). Given the very low numbers of birds utilising the habitats to be lost, the small area of habitat to be lost and the extensive areas of these habitats present outside the redline boundary, these works are unlikely to cause significant impacts. This effect is therefore considered to be **not significant**.
Habitat Degradation - Air Pollution	The vast majority of SCI bird species observations recorded during the 2022/23 survey for the Proposed Scheme along the Quignamanger site survey area (i.e. Site 1) were >65 m from the proposed works area while the majority of observations from the River Moy survey area (i.e. Site 2) were within 50 m of the proposed works areas **(Figure 10-19, Figure 10-20, Figure 10-21**). Therefore, habitat degradation as a result of air pollution has the potential to affect relatively low abundances of SCI bird species (approx. 70 combined between Site 1 and Site 2). Given the very low numbers of birds utilising the habitats within 50 m of the proposed works area, especially in the centre of Ballina town where the majority of SCI bird species records are <50 m from the proposed works areas, the mobility of the species in question and the extensive areas of suitable foraging and roosting habitats present outside the likely air pollution range of the works, these works are unlikely to cause significant effects. This effect is therefore considered to be **not significant.**
Habitat Degradation: Pollution Event -Chemical Spill or Sedimentation	Potential **significant, adverse, temporary to short-term** effects on SCI bird species populations within the Proposed Scheme area and potentially throughout the wider environment.
Habitat Degradation – Reduction in Foraging Resources and/or Abundance of Prey Items	Given the low numbers of birds utilising the habitats adjacent to the proposed works area, the mobility of the species in question and the extensive areas of suitable foraging habitats present outside the likely habitat degradation range of the works, these works are unlikely to cause significant effects. This effect is therefore considered to be **not significant.**
Disturbance/Displacement	This impact has the potential to affect approximately 236 wintering waterbirds, which is the maximum number of overwintering birds of all species combined that were observed on any one date during surveys across both sites (i.e. Site 1 and Site 2). Given the low numbers of birds utilising the habitats adjacent to the proposed works area, especially in the centre of Ballina town (62 individual SCI birds) where the loudest activity (use of a circular saw) is to take place, the potential habituation of waterbirds to disturbance and noise adjacent to the proposed works areas, the mobility of the species in question and the extensive areas of suitable foraging and roosting habitats present outside the likely disturbance range of the works, these works are unlikely to cause significant impacts. The minimum population of common gull recorded as a pair unit breeding at Lough Conn and Lough Cullin SPA was 40 (NPWS, 2020b). While the one common gull recorded on site during the winter 2022/2023 surveys exceeds the 1% population threshold for Lough Conn and Lough Cullin SPA (40 pair units NPWS, 2020b), the SPA is designated for breeding common gull. As such, any disturbance or displacement of wintering common gull onsite as a result of the Proposed Scheme would not have the potential to affect the conservation objectives of this SPA. This effect is therefore considered to be **not significant.**

Description of Potential Effect	Significance of Effect (Without Mitigation)
Construction Phase	
Operational and Maintenance Phase	
Disturbance/Displacement	Given the type of works to be carried out, the intermittent nature of the works, the urbanised area where these works are to be carried out, the mobility of the species in question and likely habituation of these species to human presence, any impact upon waterbirds due to disturbance/displacement during the operational and maintenance phase of the Proposed Scheme is considered to be **not significant.**
Habitat Degradation due to Changes in Water Quality	**Likely significant negative** intermittent, temporary effects on the River Moy in and downstream of Ballina and associated effects on SCI waterbirds.

Wetlands [A999]

Wetlands [A999] are listed as a QI of both Killala Bay/Moy Estuary SPA and Lough Conn and Lough Cullin SPA. It is therefore considered that wetlands are applicable to Killala Bay/Moy Estuary Ramsar site and Lough Conn and Lough Cullin SPA as these are co-located with the SPAs.

Wetlands within Killala Bay/Moy Estuary SPA and Ramsar site considered to be within the ZoI of the Proposed Scheme include estuaries, sandflats and mudflats not covered by seawater at low tide and other habitats downstream of the Proposed Scheme (that were outside the study area) that have the potential to be present within the confines of the SPA and Ramsar site e.g. wet grassland, saltmarsh etc. Potential effects on estuaries [1130], sandflats and mudflats not covered by seawater at low tide [1140] and other wetland habitats have been dealt with in the associated AA Screening Report and NIS and also within **Chapter 9: Aquatic Biodiversity.**

There is considered to be no potential pathway for the Proposed Scheme works to impact upon wetlands within Lough Conn and Lough Cullin SPA and pNHA.

10.4.2.1.1.4 Moy Valley pNHA & Lough Conn and Lough Cullin pNHA

These two IEFs have been brough forward for assessment in this section due to migratory aquatic species such as salmon. Both of these pNHAs are upstream of the Proposed Scheme and any migratory species reaching these pNHAs will pass through the Moy estuary and main channel of the River Moy in the centre of Ballina town. It is considered that there is connectivity between the Proposed Scheme and these pNHAs as migratory species will use the Moy Estuary during their life cycle.

Construction and operational and maintenance phase impacts with respect to migratory aquatic species are assessed within the associated AA Screening Report and NIS and also within **Chapter 9: Aquatic Biodiversity.** This assessment is also pertinent to the Moy Valley pNHA and Lough Conn and Lough Cullin pNHA.

10.4.2.1.2 Habitats

10.4.2.1.2.1 Floating River Vegetation

Floating river vegetation [3260] was observed on both sides of the River Moy main channel in the centre of Ballina town with higher abundances generally towards the left-hand bank compared to the right had bank. Floating river vegetation is an Annex I habitat; however, it is not listed as a QI of either the River Moy SAC or Killala Bay/Moy Estuary SAC. The definition of habitat 3260 has not yet been defined clearly in Ireland, however, the interpretation manual of European Habitats (EU Commission, 2007) includes the following species – *Ranunculus saniculifolius*, *R. trichophyllus*, *R. fluitans, R. peltatus, R. penicillatus spp., R. pseudofluitantis, R. aquatilis, Myriophyllum spp., Callitriche spp., Sium erectum, Zannichellia palustris, Potamogeton spp*. and *Fontinalis antipyretica*.

Table 10-23 outlines the potential effects on floating river vegetation as a result of the Proposed Scheme.

10.4.2.1.2.2 Tall Herb Swamp

Table 10-24 outlines the potential effects on tall herb swamp as a result of the Proposed Scheme.

10.4.2.1.2.3 Wet Grassland

Table 10-25 outlines the potential effects on wet grassland as a result of the Proposed Scheme.

10.4.2.1.2.4 Riparian Woodland

Table 10-26 outlines the potential effects on riparian woodland as a result of the Proposed Scheme

10.4.2.1.2.5 Mixed Broadleaved Woodland

Table 10-27 outlines the potential effects on mixed broadleaved woodland as a result of the Proposed Scheme

10.4.2.1.2.6 Hedgerows/Treelines

Table 10-28 outlines the potential effects on hedgerows/treelines as a result of the Proposed Scheme

Table 10-23 Potential effects on floating river vegetation identified from the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Construction Phase		
Habitat Loss, Fragmentation and Disturbance The Proposed Scheme will result in the loss of floating river vegetation within the main channel of the River Moy in the centre of Ballina town due to instream works	Giving a 5 m wide dry working area, instream works including ramp and cofferdam construction along both sides of the Ridgepool and along Bachelors Walk has the potential to result in the direct loss of approximately 7,100 m^2 (6,600 m^2 along the Ridgepool and 500m^2 along Bachelors Walk) of floating river vegetation habitat, as this is the maximum instream footprint calculated for the entire Proposed Scheme. Floating river vegetation is a dynamic habitat whose extent can change from year to year due to external forces e.g. floods causing scouring, drought etc. therefore an exact extent of this habitat likely to be lost due to the Proposed Scheme is difficult to determine. Aquatic macrophytes play a key role in the structure and functioning of river ecosystems. The assemblage of macrophytes within a system is dependent on a number of factors including climate, geology, biogeography, seedbanks and dispersal (Keddy, 2017). This assemblage is further influenced by disturbances and stressors that results in a group of species that can withstand or thrive in the local environmental conditions. Common localized environmental factors influencing macrophyte species assemblages include water quality, inundation regime, biotic interactions, floods and tidal movement (Larson, 2023). Aquatic habitats are dynamic in nature and species that live within these habitats are adapted to natural disturbances such as high flows, flooding and scouring. Many aquatic plants propagate predominantly by vegetative means including clonal growth as well as propagation by several asexual propagules, whereby a fragment of the parent plant breaks off and develops a new plant, however they can also reproduce via sexual reproduction. If an aquatic plant is fragmented during a disturbance event e.g. a flood, these fragmented sections may be washed downstream and dispersed to other habitats. Some aquatic macrophytes can colonise bare areas of sediment by propagation from the adjacent vegetation via rhizomes or stolons (Barrat-Segretain *et al.,* 1998). Data is lacking on the recovery time of aquatic macrophytes due to the creation of dry instream works areas via the construction of structures such as cofferdams. However, timing of macrophyte removal can affect recovery, for example, Kaenel & Uehlinger (1998), found recovery occurred in the same growing season when macrophytes were removed before flowering. The same study found that plants did not recover until the following spring if they were removed after flowering. In the stream where plants were removed before flowering plant regrowth was evident 4 weeks after plant removal. Another paper studying the recovery of macrophyte vegetation after flood events in July and December found that the effect of the disturbance varied according to the seasons and that the macrophyte communities were more sensitive in summer compared to	While natural recovery is likely to occur within this habitat over time, mitigation may be required to enhance recovery. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short to medium-term, adverse effects on a receptor of National value.**

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	winter (Barrat-Segretain & Amoros, 1995). This study also found that by the following spring, no significant differences were observed between the patches of vegetation that were disturbed in July and those that were disturbed in December. Both of these studies show a quick recovery time from disturbance, but recovery depends on a number of factors including habitat suitability, source of propagules for regeneration and vegetative spread from nearby stands of macrophytes. Capers (2003) found that aboveground vegetative propagules were more important than seeds in the colonisation of a freshwater tidal wetland. For propagules to survive they must stay in a life-supporting environment i.e. water. With cofferdams in place the likelihood of sediments and propagules drying out is very high. As a result, colonisation will most likely have to occur from the adjacent habitat once these structures have been removed, therefore, if hydraulic conditions are suitable, floating river vegetation may recolonise the watercourse. There is a dearth of information on this habitat in Ireland and little is known of the diversity of the plant communities of the habitat or its spatial distribution within Ireland (Kelleher, 2011). However, given that *Ranunculus* species, *Callitriche* species and *Fontanalis* moss are among the species defining the habitat, the distribution of the habitat may be considered very widespread in Ireland given that these groups are ubiquitous in Irish running waters (Kelleher, 2011). This opinion is further supported by the NPWS who indicate that the status and range of this habitat cover 822 10 km grid squares, which is almost the entirety of the terrestrial area of the republic of Ireland (NPWS, 2019). The NPWS Status of EU Protected Habitats and Species in Ireland (NPWS, 2019) states that in Ireland the highest riverine conservation interest for floating river vegetation is associated with lowland depositing and tidal rivers of which the Moy in the centre of Ballina town is. This document further states that *Ranunculus* dominated reaches frequently have low diversity and are of low conservation value and an abundance of the species generally indicates poor condition and damage. The main problems for river habitats in Ireland are damage through hydrological and morphological change, eutrophication and other water pollution. The overall status of this habitat is Unfavourable-Inadequate with a declining trend (NPWS, 2019). The most recent Q-Value for the River Moy in the centre of Ballina town is at a monitoring station named 1 km u/s Ardnaree Br (LHS) (Station Code: RS34M021050) which is located approximately 70 m upstream of the Salmon Weir. This station returned a Q-Value score of 3-4 ‘Moderate’ in 2022. This is down from a score of 4 ‘Good’ in both 2007 and 1993. The status of this section of the River Moy has been classified as Moderate in the most recent Water Framework Directive monitoring period (2016-2021).	

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	Given the high abundance of *Ranunculus* sp. within this habitat within the River Moy adjacent to the proposed works areas in conjunction with the declining water quality of the Moy, the floating river vegetation habitat along the main channel of the River Moy in the centre of Ballina town is considered to be in poor condition. Nonetheless, it is still considered to be of high conservation status as it occurs within a tidal river and is an Annex I habitat. The effect of habitat loss, fragmentation and disturbance on floating river vegetation during the construction phase of the Proposed Scheme is predicted to be confined to within the proposed works boundary. This effect at a single cofferdam site (i.e. 50 m stretch) is predicted to be temporary to short-term in duration as research indicates that recovery from disturbance should occur by the next growing season, however, it is unknown exactly how long a 5 m wide stretch of disturbance may take to recover, and this may take more than one growing season. The instream ramp that will be placed in front of the IFI building and warehouse will be left in place for a maximum of 18 months. The effect of habitat loss, fragmentation and disturbance on floating river vegetation due to the ramp, therefore, has the potential to be short to medium-term in duration as sediments upon which floating river vegetation relies are likely to be removed due to the installation of the ramp and these sediments may take considerable time to regenerate with vegetation taking further time to colonise on top of these sediments. Even though the river/estuary is a sediment deposition driven habitat at this point, given the scouring effect of the constrained channel it may take a number of years for sediments to build up sufficiently for this habitat to restore naturally after the disturbance from the Proposed Scheme. The overall effect of habitat loss, fragmentation and disturbance on floating river vegetation across the entire stretch of the River Moy is therefore considered to be short to medium-term in duration, dependant on the recovery time of both sediments and vegetation. This effect is considered to be reversible as there is believed to be sufficient propagules for habitat recovery in areas of the river not likely to be disturbed by cofferdam or ramp placement and also in upstream locations.	
Habitat Degradation: Pollution Event -Chemical Spill or Sedimentation The construction phase of the Proposed Scheme has the potential to degrade floating river vegetation habitat by a reduction in water quality due to a chemical spill or increased sedimentation.	Floating River Vegetation habitat could be deteriorated during the construction phase due to adverse changes in surface or ground water. Construction impacts with respect to surface and groundwater are assessed in **Chapter 9: Aquatic Biodiversity**, **Chapter 11: Land, Soils, Geology and Hydrogeology** and **Chapter 12: Water**. Each of these chapters concluded that there would be significant, adverse, short-term effects on surface and/or groundwater quality during the construction phase of the Proposed Scheme due to a pollution event.	The assessments within **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrogeology** and **Chapter 12: Water** are also pertinent to floating river vegetation habitat quality, therefore, in keeping with the findings of these chapters, the effects of a pollution event on FRV is considered to be **significant**.

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
		In the absence of mitigation, this impact is likely to result in **significant, short-term, adverse effects on a receptor of National value.**
Operational and Maintenance Phase		
Habitat Degradation due to Changes in Water Quality The operational and maintenance phase of the Proposed Scheme has the potential to result in changes to water quality associated with the new flood defences, new storm water drainage outfalls and new surface water pumping station to the Moy.	Flood walls will help prevent contamination arising from uncontrolled over-bank flows during extreme events, providing a positive effect on water quality supporting habitat quality for QI salmon and lampreys in the long-term for the freshwater River Moy. Upgraded storm water outfalls as described in the **Section 5.5.4** will be fitted with hydrocarbon interceptors. This is likely to reduce the level of waterborne contaminants reaching aquatic receptors in the River Moy but require regular maintenance to retain this function. The worst-case scenario (i.e., no maintenance) is assessed here. Four new pumping stations with upstream hydrocarbon interceptors will be installed as part of the Proposed Scheme to manage excess surface water during floods (refer to **Section 5.5.4** for details). The pumping stations will collect urban runoff and outfall directly to the River Moy. In the absence of treatment, discharged surface water could contain contaminants, primarily hydrocarbons and sediment with potential for adverse effects on otter and/or otter prey items related to water quality deterioration.	**Likely significant negative** intermittent, temporary effects on the River Moy in and downstream of Ballina with associated effects on FRV.
Habitat degradation due to changes in hydromorphology The operational and maintenance phase of the Proposed Scheme has the potential to result in changes in hydromorphology within the River Moy due to the presence of new flood defenses.	A change in hydromorphology such as and increase or decrease in flow or change in velocity may have a negative effect on floating river vegetation e.g. via scouring action. Operational and maintenance phase impacts with respect to surface hydromorphology are assessed in the **Chapter 9: Aquatic Biodiversity.** This chapter concluded that there would be no significant hydraulic effects on the River Moy from the operational and maintenance phase of the Proposed Scheme	The assessment within **Chapter 9: Aquatic Biodiversity** is also pertinent to the quality of floating river vegetation habitat, therefore, in keeping with the finding of that chapter, the effect of changes in hydromorphology on floating river vegetation is considered to be **not significant**.

Table 10-24 Potential effects on tall herb swamp identified from the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Construction Phase		
Habitat Loss, Fragmentation and Disturbance Giving a 5m wide working area on the river side of the flood walls to be improved along Clare Street and Bachelors Walk an approximate area of 3,200 m^2 of tall herb swamp will be removed and/or disturbed to facilitate construction. An additional 260m^2 of this habitat will be removed at the Quignamanger proposed works area to facilitate the culvert upgrade adjacent to the estuary. Further areas of this habitat may also be lost and/or disturbed due to unintended incursion by construction personnel, equipment or materials associated with the construction phase. Compaction of the soils beneath this habitat by construction machinery and/or personnel may also alter soil properties e.g. permeability or the ability of the habitat to regenerate.	The effect of habitat loss, fragmentation and disturbance on tall herb swamp during the construction phase of the Proposed Scheme is predicted to be confined to within 10 m of the proposed works areas on the main channel of the River Moy and Quignamanger. This effect is predicted to be short-term in duration as works along Bachelors Walk and Clare Street are expected to take 18 and 24 months, respectively while works at Quignamanger are expected to take 12 months and once works cease it is expected to take a number of years for this habitat to fully regenerate naturally. This effect is also considered to be reversible as natural regeneration can occur.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in a **significant, short-term, adverse effect on a receptor of County value.**
Habitat Degradation – Pollution event – chemical spill The construction phase of the Proposed Scheme has the potential to degrade tall herb swamp habitat by a reduction in water quality or direct input of pollutants due to a chemical (e.g. cement, hydrocarbon etc.) spill.	The effect of a chemical spill on tall herb swamp during the construction phase of the Proposed Scheme is predicted to be confined to within and directly adjacent to the proposed works areas where a spill occurs. This effect is considered to be short-term in duration as recovery from a significant spill can take a number of years. This effect is also considered to be reversible.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short-term, adverse effects on a receptor of County value.**
Habitat Degradation - Air Pollution via dust or vehicle emissions The construction phase of the Proposed Scheme has the potential to degrade tall herb swamp habitat via changes in air quality associated with dust and vehicle emission release.	The release of dust e.g. from removal or reconstruction of old walls during the construction phase of the Proposed Scheme has the potential to affect this habitat. The potential impacts to air quality from the construction phase of the Proposed Scheme that may affect tall herb swamp is primarily the generation of traffic emissions from material haulage and dust emissions from various construction/demolition works. Works along the River Moy and those at Quignamanger are most likely to affect tall herb swamp via air pollution. The primary activities within these areas which have the potential to generate dust include the removal of existing walls to allow for construction of new flood walls, excavation and construction of culverts, remediation of existing quay walls and removal of footpaths. The most significant works with dust generation potential are those that involve demolition, excavations and filling. Dust from construction sites can cover nearby vegetation and reduce the ability of botanical species within that habitat to photosynthesize. The	The assessment in **Chapter 13: Air** is pertinent to the habitat quality of tall herb swamp, therefore, in keeping with the conclusion of that chapter, the effects of air pollution on tall herb swamp habitat is considered to be **not significant.**

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	potential distance for significant vegetation effects from the air pollution source on major construction sites is 25 m and 10 m from minor construction sites, and soiling can occur up to 100 m, 50 m and 25 m from major, moderate and minor construction sites respectively (NRA, 2011). The principal pollutants of concern in terms of impact on sensitive ecosystems which originate from construction plant and road vehicles are the nitrogen oxides (NOx). 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. The works for the Proposed Scheme are not considered to be major. Nonetheless, the proposed works have the potential to release dust and vehicle emissions into the atmosphere which may affect nearby vegetation. Construction impacts with respect to air pollution is assessed in **Chapter 13: Air.** This chapter concluded that there would be no significant effects on air quality arising from the construction phase of the Proposed Scheme.	
Spread of Invasive Species Invasive species (three-cornered leek, hybrid bluebell) have been recorded from this habitat adjacent to Bachelors Walk and Clare Street. Construction works have the potential to spread these species within this habitat or import other Third Schedule invasive plant species (e.g. Japanese knotweed) from other works areas both within and outside the Proposed Scheme boundary.	Construction activities could lead to the dispersal of scheduled invasive species either via machinery, material, clothing or personnel. The introduction and spread of non-native invasive species can have significant impacts on the ecological functioning on terrestrial and aquatic habitats. In general, invasive species are aggressive colonisers of the habitat that they occupy, crowding out native species in addition to creating shading effects which reduces native species cover. They can also cause erosion, especially on riverbanks, when they die back in winter. This can, in turn have a significant effect on water quality. The effect of spread of invasive species on tall herb swamp during the construction phase of the Proposed Scheme is predicted to be of local spatial extent, limited to the immediate environs of where the invasive species has been introduced. This effect can be potentially permanent (>60 years) if management regimes are not implemented, however, it is considered reversible within this habitat once management regimes are implemented. *hydrophilous tall herb fringe communities of plains and of the montane to alpine level* [6430].	In the absence of mitigation, these works are likely to cause significant effects. In the absence of mitigation, this effect is likely to result in **significant, potentially permanent, adverse effects on a receptor of County value.**
Operational and Maintenance Phase		
Habitat Degradation due to Changes in Water Quality As tall herb swamp is a riparian habitat changes in water quality have the potential to affect this habitat. The operational and maintenance phase of the Proposed Scheme has the potential to result in changes to water quality associated with the new flood defences, new storm	Flood walls will help prevent contamination arising from uncontrolled over-bank flows during extreme events, providing a positive effect on water quality supporting habitat quality for QI salmon and lampreys in the long-term for the freshwater River Moy.	**Likely significant negative** intermittent, temporary effects on the River Moy in and downstream of Ballina and associated effects on tall herb swamp.

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
water drainage outfalls and new surface water pumping station to the Moy.	Upgraded storm water outfalls as described in the **Section 5.5.4** will be fitted with hydrocarbon interceptors. This is likely to reduce the level of waterborne contaminants reaching aquatic receptors in the River Moy but require regular maintenance to retain this function. The worst-case scenario (i.e., no maintenance) is assessed here. Four new pumping stations with upstream hydrocarbon interceptors will be installed as part of the Proposed Scheme to manage excess surface water during floods (refer to **Section 5.5.4** for details). The pumping stations will collect urban runoff and outfall directly to the River Moy. In the absence of treatment, discharged surface water could contain contaminants, primarily hydrocarbons and sediment with potential for adverse effects on otter and/or otter prey items related to water quality deterioration.	

Table 10-25 Potential effects on wet grassland identified from the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Construction Phase		
Habitat Loss, Fragmentation and Disturbance The Proposed Scheme will result in a loss of 2,570m^2 of wet grassland habitat within the Brusna proposed works area due embankment construction. This loss incorporates the area which will be used to accommodate the embankment itself (approximately 450m^2) and the surrounding areas that will be disturbed to facilitate the creation of the embankment (2,120m^2). There is also the potential for wet grassland to be disturbed along the Bunree/Behy Road to facilitate culvert installation.	The wet grassland habitat along the Brusna proposed works area lies entirely within the River Moy SAC and was primarily composed of rush species on the day of the survey. The section of wet grassland along the Bunree/Behy Road was very species rich and contained pockets of Annex I habitat Molinia meadows [6410]. The effect of habitat loss, fragmentation and disturbance on wet grassland during the construction phase of the Proposed Scheme is predicted to be confined to within the proposed works areas along the Brusna and Bunree/Behy Road where this habitat occurs. The loss of wet grassland habitat to accommodate the embankment along the Brusna is predicted to be permanent and irreversible while the loss of wet grassland habitat surrounding the embankment at the Brusna proposed works area and along the Bunree/Behy Road is predicted to be short-term in duration as the construction works along both the Bunree and Brusna are expected to take 18 months. Full recovery of wet grassland habitat once works cease is then expected to take an additional number of years.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this effect is likely to result in **significant, permanent adverse effects on a receptor of County value.**
Habitat Degradation – Pollution event – chemical spill An accidental chemical (including cement) or hydrocarbon spillage across these sections of the Proposed Scheme during the construction phase has the potential to impact upon this habitat.	The assessment within **Table 10-24** with respect to habitat degradation as a result of a chemical spill on tall herb swamp is also pertinent to wet grassland.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short-term, adverse effects on a receptor of County value.**
Habitat Degradation - Air Pollution via dust or vehicle emissions The construction phase of the Proposed Scheme has the potential to degrade wet grassland habitat via changes in air quality associated with dust and vehicle emission release.	The release of dust e.g. during culvert construction during the construction phase of the Proposed Scheme has the potential to affect this habitat. The potential impacts to air quality from the construction phase of the Proposed Scheme that may affect wet grassland is primarily the generation of traffic emissions from material haulage and dust emissions from various construction/demolition works. Works along the River Brusna and Bunree/Behy Road are most likely to affect wet grassland via air pollution. The primary activities within these areas which have the potential to generate dust include excavation and construction of culverts and embankment creation. The most significant works with dust generation potential are those that involve demolition, excavations and filling. The effects of air pollution on vegetation are outlined in **Table 10-24** above.	The assessment in **Chapter 13: Air** is pertinent to the habitat quality of wet grassland, therefore, in keeping with the conclusion of that chapter, the effects of air pollution on wet grassland is considered to be **not significant.**

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	Construction impacts with respect to air pollution is assessed in **Chapter 13: Air.** This chapter concluded that there would be no significant effects on air quality arising from the construction phase of the Proposed Scheme.	
Spread of Invasive Species A number of invasive species (three-cornered leek, Spanish bluebell, hybrid bluebell, Japanese knotweed and rhododendron) have been recorded from the Brusna proposed works area.	The effects of invasive species and how they can be spread by construction personnel and equipment is outlined in **Table 10-24** above. The assessment within **Table 10-24** with respect to the spread of invasive species on tall herb swamp is also pertinent to wet grassland.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, potentially permanent, adverse effects on a receptor of County value.**
Operational and Maintenance Phase		
Habitat Degradation – changes in hydrological regime The Proposed Scheme has the potential to cause the degradation of wet grassland habitat along the Bunree/Behy Road due to potential changes in hydrological regime.	The soils within the area of species rich wet grassland along the Bunree/Behy Road (opposite Steeltech Sheds Mayo) consist primarily of poorly drained surface and groundwater gleys (**Chapter 11 Land, Soil, Geology and Hydrogeology**) which are fed by rainwater with the soil type preventing free infiltration to the deeper subsoil and/or underlying aquifer. This effectively means that the soils directly under the wet grassland habitat are not free draining, hence the establishment of the wet grassland habitat on top of them. There is, however, a small amount of drainage from this area to the adjacent watercourse, i.e. the Bunree as evidenced by the slightly drier habitat towards the watercourse. The installation of a culvert along the Bunree in this location could prevent drainage from this habitat by creating a barrier between this habitat and the watercourse into which it drains thus changing the overall structure of the habitat itself with the potential to permanently waterlog this area. The impact of habitat degradation on wet grassland during the operational and maintenance phase of the Proposed Scheme is predicted to be confined to the section of wet grassland habitat adjacent to the proposed works area along the Bunree/Behy Road. The impact is considered to be permanent in duration as the culvert will be permanently in situ. It is also considered to be reversible should the culvert be removed.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, permanent, adverse effects on a receptor of County value.**

Table 10-26 Potential Effects on Riparian Woodland Identified from the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Construction Phase		
Habitat Loss, Fragmentation and Disturbance The Proposed Scheme will result in an approximate loss of 800 m^2 of riparian woodland habitat on the banks of the River Moy due to the construction of flood wall defences. Some of this habitat to be lost is within the confines of Killala Bay/Moy Estuary SAC adjacent to the boat yard and the old Ballina Dairies site.	The effect of habitat loss, fragmentation and disturbance on riparian woodland during the construction phase of the Proposed Scheme is predicted to be confined to within the redline boundary. The effect is considered to be permanent and irreversible as the erection of flood walls will prevent regeneration of this habitat.	Given the supporting function that this habitat can provided to QI/SCI species, in the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, permanent, adverse effects on a receptor of Local Importance (higher value).**
Habitat Degradation – Pollution event – chemical spill As works will take place within and adjacent to riparian woodland the construction phase of the Proposed Scheme has the potential to degrade this habitat via a reduction in water quality or direct input of pollutants due to a chemical (e.g. cement, hydrocarbon etc.) spill.	The assessment within **Table 10-24** with respect to habitat degradation as a result of a chemical spill on tall herb swamp is also pertinent to riparian woodland.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short-term, adverse effects on a receptor of Local Importance (higher value).**
Habitat Degradation - Air Pollution via dust or vehicle emissions The construction phase of the Proposed Scheme has the potential to degrade riparian woodland habitat via changes in air quality associated with dust and vehicle emission release.	The release of dust e.g. during culvert construction during the construction phase of the Proposed Scheme has the potential to affect this habitat. The potential impacts to air quality from the construction phase of the Proposed Scheme that may affect riparian woodland is primarily the generation of traffic emissions from material haulage and dust emissions from various construction/demolition works. Works along the River Moy are most likely to affect riparian woodland via air pollution. The primary activity along the section of the River Moy where riparian woodland is located that has the potential to generate dust is excavations for flood wall installation. Vehicle and machinery emissions may also affect this habitat. The effects of air pollution on vegetation are outlined in **Table 10-24**. Construction impacts with respect to air pollution is assessed in **Chapter 13: Air**. This chapter concluded that there would be no significant effects on air quality arising from the construction phase of the Proposed Scheme.	The assessment in **Chapter 13: Air** is pertinent to the habitat quality of riparian woodland, therefore, in keeping with the conclusion of that chapter, the effects of air pollution on riparian woodland is considered to be **not significant.**
Spread of Invasive Species Japanese knotweed was recorded from within this habitat on the left-hand bank of the River Moy adjacent to the old Ballina Dairies site	The effects of invasive species and how they can be spread by construction personnel and equipment is outlined in **Table 10-24**. The assessment within **Table 10-24** with respect to the spread of invasive species on tall herb swamp is also pertinent to riparian woodland.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**.

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
		In the absence of mitigation, this impact is likely to result in **significant, potentially permanent, adverse effects on a receptor of Local Importance (higher value).**

Table 10-27 Potential effects on mixed broadleaved woodland identified from the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Construction Phase		
Habitat Loss, Fragmentation and Disturbance The Proposed Scheme will result in a loss of approximately 4,356 m^2 mixed broadleaved woodland habitat across a number of proposed works areas (Quignamanger 410 m^2; Bunree 1,230 m^2; Brusna 2,360 m^2; Tullyegan 370 m^2) due to the construction of flood defences.	The effect of habitat loss, fragmentation and disturbance on mixed broadleaved woodland during the construction phase of the Proposed Scheme is predicted to be within the redline boundary. This effect is considered to be permanent as the flood defences will be in situ replacing this habitat. It is also considered to be irreversible.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant.** In the absence of mitigation, this impact is likely to result in **significant, permanent, adverse effects on a receptor of Local Importance (higher value).**
Habitat Degradation – Pollution event – chemical spill As works will take place within and adjacent to this habitat, an accidental chemical (including cement) or hydrocarbon spillage across these sections of the Proposed Scheme during the construction phase has the potential to impact upon this habitat.	The assessment within **Table 10-24** with respect to habitat degradation as a result of a chemical spill on tall herb swamp is also pertinent to mixed broadleaved woodland.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short-term, adverse effects on a receptor of Local Importance (higher value).**
Habitat Degradation - Air Pollution via dust or vehicle emissions The construction phase of the Proposed Scheme has the potential to degrade mixed broadleaved woodland habitat via changes in air quality associated with dust and vehicle emission release.	The release of dust and vehicle emissions during the construction phase of the Proposed Scheme has the potential to affect this habitat. The potential impacts to air quality from the construction phase of the Proposed Scheme that may affect mixed broadleaved woodland is primarily the generation of traffic emissions from material haulage and dust emissions from various construction/demolition works. Works along the Tullyegan, Quignamanger, Bunree and Brusna are most likely to affect mixed broadleaved woodland via air pollution. The primary activities within these areas which have the potential to generate dust include excavations, construction of culverts and embankment creation. Vehicle and machinery emissions during these works may also affect this habitat. The effects of air pollution on vegetation are outlined in **Table 10-24**. Construction impacts with respect to air pollution are assessed in **Chapter 13: Air**. This chapter concluded that there would be no significant effects on air quality arising from the construction phase of the Proposed Scheme.	The assessment in **Chapter 13: Air** is pertinent to the habitat quality of mixed broadleaved woodland, therefore, in keeping with the conclusion of that chapter, the effects of air pollution on mixed broadleaved woodland is considered to be **not significant.**
Spread of Invasive Species Japanese knotweed, three-cornered leek, Spanish bluebell, hybrid bluebell and rhododendron were recorded from within or adjacent to this habitat across a number of different areas of the Proposed Scheme.	The effects of invasive species and how they can be spread by construction personnel and equipment is outlined in **Table 10-24**. The assessment within **Table 10-24** with respect to the spread of invasive species on tall herb swamp is also pertinent to mixed broadleaved woodland.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, potentially**

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
		permanent, adverse effects on a receptor of Local Importance (higher value).

Table 10-28 Potential effects on hedgerow/treeline identified from the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Construction Phase		
Habitat Loss, Fragmentation and Disturbance The Proposed Scheme will result in an approximate permanent loss of 355 m of Hedgerow/Treeline habitat across a number of proposed works areas (River Moy 120 m; Brusna 60 m; Tullyegan 175 m) due to the construction of flood defences.	The effect of habitat loss, fragmentation and disturbance on hedgerows/treelines during the construction phase of the Proposed Scheme is predicted to occur within the redline boundary. The loss of hedgerow/treeline habitat to accommodate flood defences is predicted to be permanent and irreversible.	Given the urban nature of the Proposed Scheme area where hedgerows/treelines are not a dominant habitat type, it is considered that any loss of hedgerows/treelines due to these works are likely to cause significant impacts. This effect is therefore considered to be **significant.** In the absence of mitigation, this impact is likely to result in **significant, permanent, adverse effects on a receptor of Local Importance (higher value).**
Habitat Degradation – Pollution event – chemical spill As works will take place within and adjacent to this habitat, an accidental chemical (including cement) or hydrocarbon spillage across these sections of the Proposed Scheme during the construction phase has the potential to impact upon this habitat.	The assessment within **Table 10-24** with respect to habitat degradation as a result of a chemical spill on tall herb swamp is also pertinent to hedgerow/treeline.	Given the importance of hedgerows and treelines in the landscape for numerous taxa and the urban nature of the Proposed Scheme area where hedgerows/treelines are not a dominant habitat type, it is considered that any loss of hedgerows/treelines due to these works are likely to cause significant impacts. This effect is therefore considered to be **significant.** In the absence of mitigation, this impact is likely to result in **significant, short-term, adverse effects on a receptor of Local Importance (higher value).**
Habitat Degradation - Air Pollution via dust or vehicle emissions The construction phase of the Proposed Scheme has the potential to degrade hedgerow or treeline habitat via changes in air quality associated with dust and vehicle emission release.	The release of dust and vehicle emissions during the construction phase of the Proposed Scheme has the potential to affect this habitat. The potential impacts to air quality from the construction phase of the Proposed Scheme that may affect hedgerows/treelines is primarily the generation of traffic emissions from material haulage and dust emissions from various construction/demolition works. Works at every proposed works area has the potential to affect hedgerow/treeline habitat via air pollution. The primary activities within these areas which have the potential to generate dust include removal of existing walls to allow for construction of new flood walls, excavation and construction of culverts, remediation of existing quay walls, removal of footpaths and embankment creation. Vehicle and machinery emissions during these works may also affect this habitat.	The assessment in **Chapter 13: Air** is pertinent to the habitat quality of hedgerows/treelines, therefore, in keeping with the conclusion of that chapter, the effects of air pollution on hedgerows/treelines is considered to be **not significant.**

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	The effects of air pollution on vegetation are outlined in **Table 10-24**. Construction impacts with respect to air pollution is assessed in **Chapter 13: Air**. This chapter concluded that there would be no significant effects on air quality arising from the construction phase of the Proposed Scheme.	
Spread of Invasive Species Japanese knotweed, three-cornered leek, Spanish bluebell, hybrid bluebell and rhododendron were recorded from across the Proposed Scheme. The proposed works have the potential to spread these Third Scheduled species to this habitat.	The effects of invasive species and how they can be spread by construction personnel and equipment is outlined in **Table 10-24**. The assessment within **Table 10-24** with respect to the spread of invasive species on tall herb swamp is also pertinent to hedgerow/treeline.	Given the importance of hedgerows and treelines in the landscape for numerous taxa and the urban nature of the Proposed Scheme area where hedgerows/treelines are not a dominant habitat type, it is considered that any loss of hedgerows/treelines due to these works are likely to cause significant impacts. This effect is therefore considered to be **significant.** In the absence of mitigation, this impact is likely to result in **significant, potentially permanent, adverse effects on a receptor of Local Importance (higher value).**

10.4.2.1.3 Protected Species

10.4.2.1.3.1 Otter

Otter have been assessed in **Section 10.4.2.1.1** above.

10.4.2.1.3.2 Badger

A small number of badger and potential badger signs were recorded across the Proposed Scheme area including trails and scat (**Appendix 10.8** and **Appendix 10.9**). The majority of these signs were along the Brusna and the Tullyegan. A potential sett was observed, approximately 150 m away and on the opposite side of the river from the proposed works area on the Brusna. However, during a site visit in April 2023, a number of fox cubs were seen entering this den, ruling it out as being an active sett. As such badger are not considered to be widespread or very active throughout the Proposed Scheme area. Badger (i.e. the receptor) have been classified as being of Local Importance (higher value) for the purposes of this assessment as certain sections of the Proposed Scheme is likely to support low numbers of resident and regularly occurring populations of this species.

Table 10-29 outlines the potential effects on badger as a result of the Proposed Scheme.

Table 10-29 Potential effects on badger identified from the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Construction Phase		
Spread of Invasive Species A number of different invasive species were recorded across the Proposed Scheme including Japanese knotweed, rhododendron, three-cornered leek, Spanish bluebell and hybrid bluebell. The proposed works have the potential to spread these species within and outside the redline boundary resulting in a deterioration of habitats used by badger e.g. hedgerow/treeline or woodland habitat.	The spread of invasive species can prevent the movement of badger throughout the wider landscape e.g. if IAPS create dense, impenetrable stands along a trail used by badger. IAPS can also reduce the foraging quality of habitats for badger e.g. by invading grassland and rendering it unsuitable for foraging. The effect of spread of invasive species on badger during the construction phase of the Proposed Scheme is predicted to be of local spatial extent, limited to the immediate environs of where the invasive species has been introduced. This effect can be potentially permanent if management regimes are not implemented, however, it is considered reversible once management regimes are implemented.	Given the current baseline and the limited evidence of badger use of the Proposed Scheme area, these works are unlikely to cause significant impacts. This effect is therefore considered to be **not significant**.
Habitat Degradation – Pollution event – chemical spill As works will take place within and adjacent to habitats where badger signs have been recorded, an accidental chemical (including cement) or hydrocarbon spillage across these sections of the Proposed Scheme during the construction phase has the potential to impact upon badger as it may reduce the foraging area for this species.	The effect of a chemical spill on badger during the construction phase of the Proposed Scheme is predicted to be confined to within and directly adjacent to the proposed works areas. This effect is considered to be short-term in duration as vegetation recovery from a significant spill can take a number of years. This effect is also considered to be reversible.	Given the current baseline and the limited evidence of badger use of the Proposed Scheme area, these works are unlikely to cause significant impacts. This effect is therefore considered to be **not significant**.
Disturbance/Displacement The Proposed Scheme will include construction works adjacent to areas where a number of badger signs were observed along the Brusna and Tullyegan. These works have the potential to result in temporary disturbance activities (noise, personnel, artificial lighting) which could affect the use of available habitat by badgers for foraging and movement. Disturbance during periods of breeding or rearing can be particularly damaging and may jeopardise reproductive success.	Given that no setts were observed within the ZoI of the Proposed Scheme, the most likely source of disturbance on badger from the Proposed Scheme would be works during dusk and night-time hours which have the potential to interrupt foraging or commuting badger. The effect of disturbance/displacement on badgers during the construction phase of the Proposed Scheme is predicted to be confined to within 150 m of the redline boundary, however, it may also be wider reaching if works create a barrier to badger reaching favoured foraging areas. This effect is considered to be short-term in duration as the construction works will take a maximum of 36 months to completion. It is also considered to be reversible.	Given the current baseline and the limited evidence of badger use of the Proposed Scheme area, these works are unlikely to cause significant impacts. This effect is therefore considered to be **not significant**.
Mortality Risk There is potential for badger to be killed or injured during construction through accessing areas of construction, including excavations. Direct impacts on badgers during the construction phase of the Proposed Scheme could be injury or fatalities via collision with construction machinery,	Some night-time works will be required for the Proposed Scheme, especially during the winter/darker months. As a result, there is the potential for personnel and machinery to encounter badger during night-time works. The accidental killing or injury of a badger(s) during the construction phase of the Proposed Scheme is predicted to be confined to within the works boundary, however, the effect of this loss would be wider reaching having implications for the badger clan whose	Given the current baseline and the limited evidence of badger use of the Proposed Scheme area, these works are unlikely to cause significant impacts. This effect is therefore considered to be **not significant**.

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
especially should night-time works be conducted as badgers are crepuscular and nocturnal. There is also a risk of badgers getting trapped in earth workings which remain open overnight.	member was killed. This effect has the potential be short-medium term in duration e.g. should a pregnant female be injured or killed, and population recovery takes a number of years. This effect is irreversible at the individual level should a fatality occur.	
Operational and Maintenance Phase		
Habitat Severance/Barrier Effect The presence of flood walls and embankments have the potential to cause a habitat severance/barrier effect upon the movement of badger.	Badgers will forage across a wide range of habitats including woodland, linear features such as hedgerows and pastoral land. Typically, badgers move 1-2 km per night within the vicinity of their setts when foraging (O 'Corry-Crowe *et al*., 1993), however, there have been cases where individual animals have been recorded moving over long distances (e.g. up to 15 km) during relatively short periods, primarily during dispersal (Byrne *et al*., 2012). Badgers are omnivores feeding on earthworms and other insects such as bees, wasps, beetles, cranefly larvae, snails, slugs, caterpillars etc., amphibians, roots and fruits (Byrne *et al.,* 2012). Birds, bird eggs, rabbits and hares can also form part of a badger's diet. Given the distance that badgers can travel, habitat severance/barrier effect has the potential to effect badgers up to 15 km from the Proposed Scheme. This effect would be permanent and irreversible given the longevity of the flood defences.	Habitat severance caused by the erection of flood defences is likely to only affect badgers along the Brusna proposed works areas, however, given the locations of these defences (i.e. on the banks of the River Brusna) and the low levels of badger activity recorded in the vicinity of the proposed works areas, these defences are unlikely to cause significant effects on foraging and/or commuting badgers via severance of habitat. This effect is therefore considered to be **not significant.**

10.4.2.1.3.3 Bats – Commuting and Foraging

A number of different bat species (soprano pipistrelle, common pipistrelle, Daubenton's bat, Leisler's bat) were observed commuting and foraging along the main channel of the River Moy in the centre of Ballina town. Other sections of the Proposed Scheme (e.g. the Brusna, the Tullyegan) also have the potential to support roosting and foraging bats.

Table 10-30 outlines the potential effects on commuting and foraging bats as a result of the Proposed Scheme.

Table 10-30 Potential Effects on Commuting and Foraging Bats Identified from the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Construction Phase		
Habitat Loss, Fragmentation and Disturbance The Proposed Scheme will result in the loss of a number of different habitats likely to be used by commuting and foraging bats including 355 m of hedgerows/treelines, 4,356 m^2 of Mixed Broadleaved Woodland and 800 m^2 of Riparian Woodland. The width of the River Moy within the centre of Ballina town available for use by foraging and commuting bats will also be reduced due to the placement of the temporary ramp and cofferdams. Other habitats potentially used by commuting and foraging bats to be lost as a result of the Proposed Scheme includes grasslands (e.g. wet grassland, improved agricultural grassland, dry meadows and grassy verges and dry calcareous and neutral grassland.	Several habitats are particularly important for foraging bats including freshwater, woodland, grassland and linear habitats. Freshwater habitats are excellent feeding grounds for bats as many insects have aquatic larval stages and bats take advantage of the emerging insects. Bats also need open water to drink, and bankside vegetation provides food and valuable cover for foraging. Variation in vegetation along the banks of freshwater (river and lakes) favours high insect diversity. Grassy riparian margins, scrub and overhanging vegetation provide excellent conditions for insects and foraging bats. Woodland provides a wide diversity of insect food and a high degree of cover for bats. Woodland is favoured by bats that take prey directly from the surface of leaves. It is also more sheltered and often warmer than open environments, given valuable cover to foraging bats that avoid open areas. Grasslands can also support a range of insects suitable for foraging bats. Unimproved grasslands contain a wide variety of plants and hence support many different insects upon which bats can forage. Improved grasslands that are grazed by livestock can also be an important food source for some bat species that feed on insects associated with dung. Linear habitats (e.g. hedgerows, treelines, rivers, tree-lined footpaths etc.) and woodland edges are important features in the landscape for bats as they utilise these habitats for commuting from one area of their habitat to another. These features act as navigational landmarks and can also provide some protection from predators. Many bat species will not fly across open areas and instead they follow these features that provide shelter from wind for both bats and their insect prey as well as cover from predators. Bats may travel significant distances to circumnavigate open areas rather than cross them by the most direct route. If bats' commuting routes are severed, they can be cut off from their foraging habitats, making it harder for them to hunt and survive. Some habitats to be removed which are likely to be used by commuting and foraging bats (i.e. hedgerows/treelines, mixed broadleaved woodland, riparian woodland) are adjacent to a watercourse. The removal of these habitats will not result in the removal of commuting corridors due to the presence of the watercourses. However, given the urban nature of the Proposed Scheme area, the removal of bankside vegetation may result in light spill onto previously unlit areas from adjacent locations. Light spill can create barriers to commuting bats in addition to preventing some bat species from utilising previously exploited foraging areas. Vegetation removal may also affect the existing corridor by removing shelter from wind in addition to removing foraging resources. Habitat loss, fragmentation and disturbance on commuting and foraging bats during the construction phase of the Proposed Scheme has the potential to affect bats several kilometres from the redline boundary as bats roosts can be a number of kilometres from their foraging grounds. This effect is predicted to be permanent and irreversible as habitats are removed to facilitate the construction of certain flood defences.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant.** In the absence of mitigation, this impact is likely to result in **significant, permanent, adverse effects on a receptor of Local Importance (higher value)**.

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Habitat Degradation – Pollution event – chemical spill The habitat for bats could deteriorate during the construction phase due to adverse changes in surface or groundwater quality.	Aquatic habitat which supports prey species of bats (i.e. the aquatic phase of invertebrate species such as midges, mayflies, mosquitoes etc.) could be deteriorated during the construction phase due to adverse changes in surface or ground water quality. Construction impacts with respect to surface and groundwater are assessed in the **Chapter 9: Aquatic Biodiversity**, **Chapter 11: Land, Soils, Geology and Hydrogeology** and **Chapter 12: Water**. Each of these chapters concluded that there would be significant adverse effects on surface and/or groundwater quality during the construction phase of the Proposed Scheme due to a pollution event.	The assessments within **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrogeology** and **Chapter 12: Water** are also pertinent to commuting and foraging bat habitat quality, therefore, in keeping with the findings of these chapters, the effects of a pollution event on commuting and foraging bats is considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short-term, adverse effects on a receptor of Local Importance (higher value).**
Disturbance/Displacement The Proposed Scheme has the potential to disturb commuting and foraging bats during the construction phase e.g. by light pollution, noise disturbance from machinery, physical presence of humans during construction of features etc.	The Proposed Scheme will include construction works along the main channel of the River Moy, which has been shown to be used by commuting and foraging bats. As the scheme is located within Ballina town, bats using the area are exposed to existing light levels in the confines of the town. Street lighting is also present along the stretch of the Proposed Scheme adjacent to the Brusna, however, there are relatively dark areas along the proposed works areas. Night-time works with the aid of lighting has the potential to disturb and/or displace commuting and foraging bats from important food and shelter resources. Artificial lighting can alter a bat's behaviour as it can affect their roost emergence and re-entry times, consequently altering their feeding behaviour. It could lead to avoidance of foraging areas which may lead to degradation of physiological condition as they spend increased time seeking additional foraging areas. Light disturbance can be detrimental to bats as, when there is too much luminance, bats' vision can be reduced resulting in disorientation. Artificial lighting can attract insects which may attract certain species of bats (e.g. Leisler's and pipistrelle bats) but it can also deter other species such as *Myotis* (BCT & ILP, 2018). Consequently, bat species less tolerant of light are put at a competitive disadvantage and are less able to forage successfully and efficiently. This can have a significant impact upon fitness and breeding success, especially when insects preferentially congregate around artificial lighting depopulating the adjacent habitats. Artificial lighting is particularly harmful if used along linear habitats such as watercourses and hedgerows. Continuous lighting in the landscape, such as along roads or waterways, creates barriers which many bat species cannot cross, especially the slower-flying species (Fure, 2012) even at low light levels. Daubenton's bat feed along dark zones of watercourses, even in urban environments and show particular sensitivity to light levels, actively avoiding illuminated areas (NRA, 2005). Soprano and common	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short-term, adverse effects on a receptor of Local Importance (higher value).**

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	pipistrelle and Leisler's bat show less sensitivity to illumination and will continue to feed in lit areas. Works for the Proposed Scheme will be undertaken between 08:00 and 19:00 over a three-year time period. Therefore, construction lighting during the summer months will not be required due to the prolonged day length. Lighting will be used during the darker months when bats are likely to be less active and/or in hibernation. The effect from construction lighting will, therefore, be reduced to periods where lighting times will conflict with early spring (i.e. February/March), late autumn (i.e. October) and early winter (i.e. November) bat activity. Artificial lighting at these times is likely to negatively affect foraging and commuting bats. If disturbance/displacement creates a barrier within the landscape to commuting and foraging bats during the construction phase of the Proposed Scheme, this disturbance/displacement has the potential to effect bats several kilometres from the redline boundary as bats roosts can be a number of kilometres from their foraging grounds. This effect is considered to be short-term in duration as the construction works will take place over a maximum time period of 36 months. It is also considered to be reversible once works cease.	
Operational and Maintenance Phase		
Habitat Degradation due to Changes in Water Quality The operational and maintenance phase of the Proposed Scheme has the potential to result in changes to water quality associated with the new flood defences, new storm water drainage outfalls and new surface water pumping station to the Moy.	Flood walls will help prevent contamination arising from uncontrolled over-bank flows during extreme events, providing a positive effect on water quality supporting habitat quality for QI salmon and lampreys in the long-term for the freshwater River Moy. Upgraded storm water outfalls as described in the **Section 5.5.4** will be fitted with hydrocarbon interceptors. This is likely to reduce the level of waterborne contaminants reaching aquatic receptors in the River Moy but require regular maintenance to retain this function. The worst-case scenario (i.e., no maintenance) is assessed here. Four new pumping stations with upstream hydrocarbon interceptors will be installed as part of the Proposed Scheme to manage excess surface water during floods (refer to **Section 5.5.4** for details). The pumping stations will collect urban runoff and outfall directly to the River Moy. In the absence of treatment, discharged surface water could contain contaminants, primarily hydrocarbons and sediment with potential for adverse effects on otter and/or otter prey items related to water quality deterioration.	**Likely significant negative** intermittent, temporary effects on the River Moy in and downstream of Ballina and associated effects on foraging bats.

10.4.2.1.3.4 Harbour Seal

Harbour seal have been assessed in **Section 10.4.2.1.1.2.**

10.4.2.1.4 Ornithological Species

10.4.2.1.4.1 Breeding Birds

A wide range of birds were observed across the Proposed Scheme during breeding bird surveys. While not all of these species were observed exhibiting breeding behaviour during surveys, it is considered for the purposes of this assessment, as each of these species were observed during the breeding season, that there is potential for each species observed to be breeding in the vicinity of the Proposed Scheme, once suitable breeding habitat is present.

Breeding birds (i.e. the receptor) have been classified under four separate ecological valuations for this assessment dependant on their BoCCI status (Gilbert *et al*., 2021) or in the case of common gull because it is an SCI species of Lough Conn and Lough Cullin SPA. Red listed bird species (grey wagtail, swift, house martin, meadow pipit) have been classified as being of National Importance. Amber listed bird species (house sparrow, swallow, greenfinch, willow warbler, goldcrest, starling, herring gull, common sandpiper, sand martin, cormorant, mute swan, linnet, spotted fly-catcher, black-headed gull, mallard) have been classified as being of County Importance. While Green listed breeding birds likely to occur within the ZoI of the Proposed Scheme (robin, wren, rook, jackdaw, magpie, dunnock etc.) have been classified as being of Local Importance (higher value).

Common Gull

Common gull is an SCI species of Lough Conn and Lough Cullin SPA. There is the potential for individual breeding common gull of the Lough Conn and Lough Cullin population to forage within the River Moy estuary adjacent to the Proposed Scheme. This population potentially using the Moy estuary as ex-situ foraging habitat is considered to have the same effects as a result of the Proposed Scheme as over-wintering waterbirds who use the Estuary for foraging. Therefore, the assessment outlined in **Table 10-22** is pertinent to SCI breeding populations of common gull that may be using the estuary for foraging. Breeding populations of common gull that are not linked to the SCI are assessed in **Table 10-32**.

Red Listed Breeding Bird Species: Grey Wagtail and Meadow Pipit

Grey wagtail are associated with running water when breeding and may breed in manmade structures near streams or on a riverside embankment between stones and roots. They feed primarily on insects that they forage from within and adjacent to rivers. Meadow pipits are ground nesting birds who hide their nests among vegetation within their normal area of habitation. They are primarily insectivorous ground feeders eating spiders, moths, larvae, worms etc.

Table 10-31 outlines the potential effects on Red listed breeding birds as a result of the Proposed Scheme.

Amber Listed Breeding Bird Species: House Sparrow, Greenfinch, Willow Warbler, Goldcrest, Starling, Common Sandpiper, Sand Martin, Mute Swan, Linnet, Spotted Fly Catcher, Black Headed Gull, Common Gull, Mallard.

House sparrow nest in farm buildings and built-up areas, especially in cavities in buildings or gaps in other urban structures. They can also build nests within ivy. House sparrows are opportunistic feeders feeding on a variety of items including seeds, grains and other plant matter (buds, berries, fruits etc.) and insects.

Greenfinch nest in dense foliage along woodland edges, hedgerows and evergreen trees. They feed on seeds, split grains, buds and some insects.

Willow warbler breed in the highest densities in stands of willows along the edges of bogs and marshes. The also nest less frequently in hedgerows, forests and well vegetated gardens. Their diet consists almost exclusively of insects and other invertebrates.

Goldcrest nest in a variety of habitats including broadleaf forests, hedgerows, coniferous woodlands and suburban gardens. They feed almost exclusively on insects and other invertebrates.

Starling nest in holes or crevices in buildings and trees. They feed on both plant and animal material including invertebrates, fruits, cereal and seeds.

Common sandpiper nest on the ground amongst stones and low vegetation, usually very close to water, often on river or lakeside beaches. Additionally on inland lakes and the coast. They feed primarily on flies and aquatic insects.

Sand martin breed in burrows typically dug into river banks or quarries. They feed almost exclusively on insects caught in flight.

Mute swan breed on lakes, ponds and rivers and nests are a large mound constructed from reed stem and other aquatic vegetation. They feed on water plants and also graze on land, occasionally feeding on small amphibians, snails and insects.

Linnet breed in a variety of habitats, including rough grassland, uplands and coastal areas with gorse. They feed on seeds, split grains, buds and some insects.

Spotted fly catcher breed in broadleaf woodlands, well-vegetated hedgerows, parks and gardens. They feed almost exclusively on insects caught in flight.

Black headed gull nest on the ground in wetland areas, such as bogs and marshes and will also use manmade lakes. The feed on insects especially in arable fields but will also exploit domestic and fisheries waste.

Common gull nest on the ground in a wide variety of situations including islands, cliffs and shingle banks. Their diet consists of terrestrial and aquatic insects and invertebrates and fish. Mallard nest sites vary, mostly in ground where nests are hidden in vegetation. Their diet is highly variable and plant material, particularly seeds predominate. Other components include molluscs and crustaceans, grain and stubble.

Table 10-32 outlines the potential effects on Amber listed breeding birds as a result of the Proposed Scheme.

Green Listed Breeding Birds

A number of Green listed bird species were observed across the Proposed Scheme during breeding bird surveys including robin, wren, jackdaw, dipper, dunnock etc. Similar to the Amber listed bird species observed across the Proposed Scheme the Green listed bird species were observed across the Proposed Scheme nest in a variety of different habitats (e.g. along rivers, dense vegetation, hedgerows, cavities in trees or walls, cliffs, buildings, trees etc.). They also feed on a variety of different diet items including insects, seeds, fruits, grains, fish, carrion etc.

The Proposed Scheme has the potential to result in the following impacts on these Green listed bird species observed across the Proposed Scheme:

Table 10-33 outlines the potential effects on Green listed breeding birds as a result of the Proposed Scheme.

10.4.2.1.4.2 Overwintering Waterbirds

Overwintering waterbirds have been assessed in **Section 10.4.2.1.1.3**.

Table 10-31 Potential effects on Red listed bird species identified from the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Construction Phase		
Loss of Resting/Breeding/Nesting Sites The Proposed Scheme will result in the loss of a number of different bankside habitats likely to be used by breeding grey wagtail (such as 355 m of hedgerows/treelines, 4,356 m^2 of mixed broadleaved woodland and 800 m^2 of riparian woodland) and meadow pipit (such as 3,430 m^2 of dry meadows and grassy verges, 3,460 m^2 of tall herb swamp). These habitats are to be lost along the River Moy, River Brusna, Quignamanger and Tullyegan.	Grey wagtail are associated with running water when breeding and may breed in manmade structures near streams or on a riverside embankment between stones and roots. They feed primarily on insects that they forage from within and adjacent to rivers. Meadow pipits are ground nesting birds who hide their nests among vegetation within their normal area of habitation. They are primarily insectivorous ground feeders eating spiders, moths, larvae, worms etc. The effect of habitat loss, fragmentation and disturbance on grey wagtail and meadow pipit during the construction phase of the Proposed Scheme is predicted to be confined to within the proposed works areas, however, it may have wider implications on the breeding populations of these birds should they not be able to find suitable alternative nesting sites. This effect is predicted to be permanent and irreversible where habitat is to be removed to facilitate the construction of flood defences and temporary in the case of dry meadows and grassy verges within site compound 5. The receptor is considered to be of National Importance for this assessment as both grey wagtail and meadow pipit are Red Listed species in the current BoCCI (Gilbert *et al*., 2021).	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, permanent, adverse effects on a receptor of National Value.**
Habitat Degradation - Pollution Event: Chemical Spill, Sedimentation etc. The Proposed Scheme has the potential to impact upon foraging resources used by breeding grey wagtail and meadow pipit via the degradation of watercourses and habitats.	The foraging habitat for grey wagtail could deteriorate during the construction phase of the Proposed Scheme due to adverse changes in surface or ground water affecting prey species of the grey wagtail. Construction effects with respect to surface and ground water are assessed in **Chapter 9: Aquatic Biodiversity, Chapter 11 Land, Soils, Geology and Hydrogeology** and **Chapter 12: Water.** These assessments are also pertinent to the foraging habitat quality of grey wagtail. As works will take place within habitats likely to be used by meadow pipit, an accidental chemical (including cement) or hydrocarbon spillage across these sections of the Proposed Scheme during the construction phase has the potential to affect this species. The effect of a chemical spill on habitats used by meadow pipit during the construction phase of the Proposed Scheme is predicted to be confined to within and directly adjacent to the proposed works areas. This effect is considered to be short-term in duration as recovery from a significant spill can take a number of years. This effect is also considered to be reversible. The receptor is considered to be of National Importance in this assessment as meadow pipit are Red Listed species in the current BoCCI (Gilbert *et al*., 2021).	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short-term, adverse effects on a receptor of National value.**
Habitat Degradation - Air Pollution via dust or vehicle emissions	Due to the location of foraging habitat for Red listed bird species adjacent to the Proposed Scheme, air pollution from construction activities may affect Red listed bird species in the vicinity of the works. The potential impacts on air quality from the	The assessment in **Chapter 13: Air** is pertinent to the habitat quality of red listed breeding birds, therefore, in keeping with the

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
The construction phase of the Proposed Scheme has the potential to degrade habitat used by grey wagtail or meadow pipit via changes in air quality associated with dust and vehicle emission release.	construction phase of the Proposed Scheme that may affect Red listed bird species is primarily the generation of traffic emissions from material haulage and dust emissions from various construction/demolition works. All works adjacent to watercourses are likely to affect grey wagtail and meadow pipit via air pollution. The primary activities within these areas which have the potential to generate dust include the removal of existing walls to allow for construction of new flood walls, excavation and construction of culverts, remediation of existing quay walls, embankment creation and removal of footpaths. The most significant works with dust generation potential are those that involve demolition, excavations and filling. Pollution arising from the release of dust and vehicle emissions has the potential to directly affect bird species. The respiratory system of avian species is more sensitive than that of humans which, therefore, renders them more susceptible to the negative effects of air pollution (Sanderfoot & Holloway, 2017). Avian responses to air pollution can include respiratory distress, elevated stress levels and impaired reproductive success. Furthermore, exposure to air pollution may reduce population density, species diversity and species richness in bird communities. Air pollutants such as carbon dioxide (CO_2), ozone (O_3), sulphur dioxide (SO_2) and nitrogen oxides (NOx), which originate from developments, can cause direct impacts to birds such as respiratory distress including irreversible lung damage (Liang *et al.,* 2020; Sanderfoot & Holloway, 2017). These pollutants can also cause indirect impacts due to habitat degradation. As per Transport Infrastructure Ireland (TII) guidance – Air Quality Assessment of Specified Infrastructure Projects (PE-ENV-01106) (TII, 2022), the construction stage traffic associated with the Proposed Scheme is not predicted to increase by sufficient quantities (i.e. annual average daily traffic (AADT) changes by 1,000 or more or heavy duty vehicle (AADT) changes by 200 or more) to elicit a significant impact on air quality. Therefore, no air quality effects from vehicle emissions are predicted from the Proposed Scheme on bird species. Therefore, the greatest potential impact on air quality during the construction phase of the Proposed Scheme is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 350 m of a construction site, the majority of the deposition occurs within the first 50 m. The majority of the required works for the Proposed Scheme are over relatively small areas and will result in very localised emissions of dust. The activities along each proposed works areas that have the potential to effect air quality for avian species via the generation of dust have been assessed following the Institute of Air Quality Management (IAQM) (2014) criteria under the headings of demolition, earthworks, construction and trackout within **Chapter 13: Air**. This chapter concluded that there would be no significant effects on air quality arising from the construction phase of the Proposed Scheme.	conclusion of that chapter, the effects of air pollution on Red listed breeding birds is considered to be **not significant.**

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	The effect of habitat degradation caused by air pollution on Red listed bird species during the construction phase of the Proposed Scheme is predicted to be within and up to 50 m from the redline boundary. This effect is predicted to be short-term in duration as the construction works along the River Moy will take place over a maximum time period of 36 months while works on the Quignamanger are expected to last for 12 months. This effect is also considered to be reversible once works cease.	
Habitat Degradation - Spread of Invasive Species Japanese knotweed, three-cornered leek, Spanish bluebell, hybrid bluebell and rhododendron were recorded from across the Proposed Scheme. The proposed works have the potential to spread these Third Scheduled species to habitat used by grey wagtail and meadow pipit.	The effects of invasive species and how they can be spread by construction personnel and equipment is outlined in **Table 10-24**. The effect of spread of invasive species on grey wagtail and meadow pipit during the construction phase of the Proposed Scheme is predicted to be of local spatial extent, limited to the immediate environs of where the invasive species has been introduced. This effect can be potentially permanent if management regimes are not implemented, however, it is considered reversible once management regimes are implemented. The receptor is considered to be of National Importance in this assessment as both grey wagtail and meadow pipit are Red Listed species in the current BoCCI (Gilbert *et al*., 2021).	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, potentially permanent, adverse effects on a receptor of National Importance.**
Disturbance/Displacement The Proposed Scheme has the potential to disturb breeding wagtail and meadow pipit during the construction phase e.g. by noise disturbance from machinery, physical presence of humans during construction of features.	In general, birds are able to see and hear better than humans and are thus, more sensitive to increased light and noise pollution. During construction these stimuli (i.e., increased light and noise) could have an indirect impact on avian species. The Proposed Scheme will include construction works within and adjacent to grey wagtail and meadow pipit habitat. These works have the potential to result in temporary disturbance activities (noise, personnel, artificial lighting) which could affect the use of available habitat by grey wagtail and meadow pipit for foraging and nesting. Disturbance of grey wagtail and meadow pipit nesting adjacent to the proposed works area could cause them to abandon their nests resulting in a failed breeding attempt. Such disturbance events can result from the increased noise and human activity levels associated with heavy machinery and the construction works. Disturbance to avifauna has two main effects 1) decreasing time available for foraging and 2) increasing energy expenditure as a result of fleeing the source of the disturbance (Riddington *et al*. 1996). Possible responses to disturbance include i) changing feeding site and/or diet, if alternatives are available, ii) increasing the amount of time spent foraging; iii) increasing intake or assimilation rate; and/or iv) increasing the level of night-time feeding (if disturbance is lower at night). If none of these options are available, birds may incur an energy deficit and lose weight. Accordingly, disturbance can have a severe negative effect on bird species. Disturbance, in the general context, is defined in a 2009 Institute of Estuarine and Coastal Studies (IECS) report as discrete events that disrupt ecosystem, community or	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short-term adverse effects on a receptor of National Importance.**

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
	population structures or in some way alter resource levels i.e. food and space (Cutts *et al.,* 2009). It may also influence the survival of individual birds and reduce the function of the site either for roosting or feeding. The report states that disturbance varies in its magnitude, frequency, predictability, spatial distribution and duration and species vary greatly in their susceptibility to disturbance and this susceptibility is likely to vary with age, season, weather and the degree of previous exposure. The links between visual and audible stimuli are evident throughout the report and it is clear that noise by itself is not necessarily a cause for disturbance if not accompanied by a perceived visual threat. The 2009 IECS report refers to observations made during the construction of the South Humber Power Station, and it gives an illustrative overview of the effects of disturbance to waterbirds from different activities that may arise as a result of a construction project. The distance at which a response due to habitat disturbance on breeding grey wagtail and meadow pipit during the construction phase of the Proposed Scheme may be elicited is hard to determine. It is unknown whether these species are already habituated to disturbance given the urban nature of the proposed works areas and if so, to what extent. This effect of disturbance/displacement on breeding grey wagtail and meadow pipit is predicted to be short-term in duration as the construction works along the River Moy will take place over a maximum time period of 36 months while works on the Quignamanger are expected to last for 12 months. It may also take a number of years for the population of each of these species to recover should the breeding success of three breeding seasons be affected due to the Proposed Scheme. This effect, however, is also considered to be reversible once works cease. The receptor is considered to be of National Importance in this assessment as both grey wagtail and meadow pipit are Red Listed species in the current BoCCI (Gilbert *et al*., 2021).	
Mortality Risk Given the current baseline evidence, there is potential for breeding grey wagtail and meadow pipit to be killed or injured during construction primarily during vegetation clearance.	The accidental killing or injury of grey wagtail and/or meadow pipit during the construction phase of the Proposed Scheme is predicted to be confined to within the works boundary. The effect of this loss, however, could be wider reaching having implications for the wider population of grey wagtail/meadow pipit, especially should a nest with eggs or nestlings also be casualties. This effect has the potential to be short-term in duration as the population may take a number of years to recover. The receptor is considered to be of National Importance in this assessment as both grey wagtail and meadow pipit are Red Listed species in the current BoCCI (Gilbert *et al*., 2021).	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant.** In the absence of mitigation, this impact is likely to result in a **significant, short-term, adverse effect on a receptor of National value.**
Operational and Maintenance Phase		
Disturbance/Displacement - the Proposed Scheme has the potential to disturb breeding grey wagtail and meadow pipit during the operational and maintenance phase e.g., noise	The effects of disturbance/displacement on birds are described further up in this table. The schedule of operational and maintenance activities for the Proposed Scheme includes monthly, annual or bi-annual inspections of all flood defences and repairs of all these features as required. It also includes annual vegetation control and window	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant.**

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
disturbance from machinery and physical presence of humans.	cleaning of flood walls, replanting and landscaping as required of open spaces, quarterly petrol interceptor emptying and cleaning of stormwater drains and removal of trash and vegetation from diversion culverts and open channels and bi-annual vermin control and back drainage improvements of embankments. Given the nesting preferences of both grey wagtail and meadow pipit, the upkeep and vegetation control on certain flood defences (e.g. flood walls, embankments) has the potential to disturb breeding grey wagtail and meadow pipit. Should breeding be disturbed or aborted due to these upkeep works, it may take a number of years for the species population to recover. This effect is also considered to be reversible. The receptor is considered to be of National Importance in this assessment as both grey wagtail and meadow pipit are Red Listed species in the current BoCCI (Gilbert *et al*., 2021).	In the absence of mitigation, this impact is likely to result in a **significant, short-term, adverse effect on a receptor of National value.**
Habitat Degradation due to Changes in Water Quality The operational and maintenance phase of the Proposed Scheme has the potential to result in changes to water quality associated with the new flood defences, new storm water drainage outfalls and new surface water pumping station to the Moy.	The assessment within **Table 10-30** with respect to changes in water quality during the operational and maintenance phase of the Proposed Scheme on commuting and foraging bats is also pertinent to Red listed bird species.	**Likely significant negative** intermittent, temporary effects on the River Moy in and downstream of Ballina and associated effects on Red listed bird species.

Table 10-32 Potential effects on Amber listed bird species identified from the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Construction Phase		
Loss of Resting/Breeding/Nesting Sites The Proposed Scheme will result in the loss of a number of different habitats likely to be used by breeding amber listed species (such as 355 m of hedgerows/treelines, 4,356 m^2 of mixed broadleaved woodland and 800m^2 of riparian woodland, 3,430 m^2 of dry meadows and grassy verges, 3,460 m^2 of tall herb swamp, 310 m^2 of reed and large sedge swamp, 2,570 m^2 of wet grassland, 4,200 m^2 of scrub etc.).	The Proposed Scheme will result in the loss of a number of different habitats likely to be used by breeding Amber listed bird species observed across the Proposed Scheme including hedgerows/treelines, mixed broadleaved woodland, riparian woodland, old stone walls, dry meadows and grassy verges, tall herb swamp, reed and large sedge swamp, wet grassland and scrub. Therefore, this habitat removal is likely to affect these species. The assessment within **Table 10-31** with respect to a loss of resting/breeding/nesting sites on Red listed bird species is also pertinent to Amber listed bird species. The receptor is considered to be of County Importance for this assessment.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant.** In the absence of mitigation, this impact is likely to result in **significant, permanent, adverse effects on a receptor of County Value.**
Habitat Degradation - Pollution Event: Chemical Spill, Sedimentation etc. The Proposed Scheme has the potential to impact upon foraging resources used by breeding Amber listed bird species via the degradation of watercourses and habitats.	The foraging habitat for a number of these Amber listed bird species observed across the Proposed Scheme (e.g. mute swan, mallard, common gull, sand martin, common sandpiper) could deteriorate during the construction phase of the Proposed Scheme due to adverse changes in surface or ground water affecting prey species. Construction effects with respect to surface and ground water are assessed in **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrogeology** and **Chapter 12: Water.** These assessments are also pertinent to the foraging habitat quality of these species. The receptor is considered to be of County Importance in this assessment. The assessment within **Table 10-31** with respect to a pollution event on Red listed bird species is also pertinent to Amber listed bird species.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short-term, adverse effects on a receptor of County value.**
Habitat Degradation - Air Pollution via dust or vehicle emissions The construction phase of the Proposed Scheme has the potential to degrade habitat used by Amber listed bird species via changes in air quality associated with dust and vehicle emission release.	The effects of air pollution on avifauna are described in **Table 10-31.** Construction impacts with respect to air pollution is assessed in **Chapter 13: Air.** This chapter concluded that there would be no significant effects on air quality arising from the construction phase of the Proposed Scheme.	The assessment in **Chapter 13: Air** is pertinent to the habitat quality of amber listed breeding birds, therefore, in keeping with the conclusion of that chapter, the effects of air pollution on amber listed breeding birds is considered to be **not significant.**
Habitat Degradation - Spread of Invasive Species Japanese knotweed, three-cornered leek, Spanish bluebell, hybrid bluebell and rhododendron were recorded from across the Proposed Scheme. The proposed works have the	The effects of invasive species and how they can be spread by construction personnel and equipment is outlined in **Table 10-24** The assessment within **Table 10-31** with respect to the spread of invasive species on Red listed bird species is also pertinent to Amber listed bird species. The receptor is considered to be of County Importance in this assessment.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**.

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
potential to spread these Third Scheduled species to habitat used by Amber listed bird species.		In the absence of mitigation, this impact is likely to result in **significant, potentially permanent, adverse effects on a receptor of County Importance.**
Disturbance/Displacement The Proposed Scheme has the potential to disturb breeding Amber listed bird species during the construction phase e.g. by noise disturbance from machinery, physical presence of humans during construction of features.	The effects of disturbance/displacement on avian species is outlined in **Table 10-31**. This assessment is also pertinent to Amber listed bird species. The assessment within **Table 10-31** with respect to disturbance/displacement on Red listed bird species is also pertinent to Amber listed bird species. The receptor is considered to be of County Importance in this assessment.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short-term adverse effects on a receptor of County Importance.**
Mortality Risk Given the current baseline evidence, there is potential for breeding Amber listed bird species to be killed or injured during construction primarily during vegetation clearance.	The assessment within **Table 10-31** with respect to mortality risk on Red listed bird species is also pertinent to Amber listed bird species. The receptor is considered to be of County Importance in this assessment.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant.** In the absence of mitigation, this impact is likely to result in a **significant, short-term, adverse effect on a receptor of County Importance.**
Operational and Maintenance Phase		
Disturbance/Displacement - the Proposed Scheme has the potential to disturb breeding Amber listed bird species during the operational and maintenance phase e.g., noise disturbance from machinery and physical presence of humans.	The effects of disturbance/displacement on waterbirds are described in **Table 10-31** The assessment within **Table 10-31** with respect to disturbance/displacement during the operational and maintenance phase of the Proposed Scheme on Red listed bird species is also pertinent to Amber listed bird species. The receptor is considered to be of County Importance in this assessment.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant.** In the absence of mitigation, this impact is likely to result in a **significant, short-term, adverse effect on a receptor of County Importance.**
Habitat Degradation due to Changes in Water Quality	The assessment within **Table 10-30** with respect to changes in water quality during the operational and maintenance phase of the Proposed Scheme on commuting and foraging bats is also pertinent to Amber listed bird species.	**Likely significant negative** intermittent, temporary effects on the River Moy in and downstream of

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
The operational and maintenance phase of the Proposed Scheme has the potential to result in changes to water quality associated with the new flood defences, new storm water drainage outfalls and new surface water pumping station to the Moy.		Ballina and associated effects on Amber listed bird species.

Table 10-33 Potential effects on Green listed breeding bird species identified from the Proposed Scheme

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Construction Phase		
Loss of Resting/Breeding/Nesting Sites The Proposed Scheme will result in the loss of a number of different habitats likely to be used by breeding Green listed bird species, such as 355m of hedgerows/treelines, 4,356m^2 of mixed broadleaved woodland and 800m^2 of riparian woodland, 3,430m^2 of dry meadows and grassy verges, 3,460m^2 of tall herb swamp, 310m^2 of reed and large sedge swamp, 2,570m^2 of wet grassland, 4,200m^2 of scrub etc.	The Proposed Scheme will result in the loss of a number of different habitats likely to be used by breeding Green listed bird species observed across the Proposed Scheme including hedgerows/treelines, mixed broadleaved woodland, riparian woodland, old stone walls, dry meadows and grassy verges, tall herb swamp, reed and large sedge swamp, wet grassland and scrub. Therefore, removal of these habitats is likely to affect these species. The assessment within **Table 10-31** with respect to a loss of resting/breeding/nesting sites on Red listed bird species is also pertinent to Green listed bird species. The receptor is considered to be of Local Importance (higher value) for the purposes of this assessment.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant.** In the absence of mitigation, this impact is likely to result in **significant, permanent, adverse effects on a receptor of Local Importance (higher value)**
Habitat Degradation - Pollution Event: Chemical Spill, Sedimentation etc. The Proposed Scheme has the potential to impact upon foraging resources used by breeding Green listed bird species via the degradation of watercourses and habitats.	The foraging habitat for a number of these Green listed bird species observed across the Proposed Scheme (e.g. dipper, grey heron) could deteriorate during the construction phase of the Proposed Scheme due to adverse changes in surface or ground water affecting prey species. Construction effects with respect to surface and ground water are assessed in **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrogeology** and **Chapter 12: Water.** These assessments are also pertinent to the foraging habitat quality of these species. The assessment within **Table 10-31** with respect to a pollution event on Red listed bird species is also pertinent to Amber listed bird species. The receptor is considered to be of Local Importance (higher value) in this assessment.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short-term, adverse effects on a receptor of Local Importance (higher value)**
Habitat Degradation - Air Pollution via dust or vehicle emissions The construction phase of the Proposed Scheme has the potential to degrade habitat used by	The effects of air pollution on avifauna are described in **Table 10-31**.Construction impacts with respect to air pollution is assessed in **Chapter 13: Air.** This chapter concluded that there would be no significant effects on air quality arising from the construction phase of the Proposed Scheme.	The assessment in **Chapter 13: Air** is pertinent to the habitat quality of green listed breeding birds therefore, in keeping with the conclusion of that chapter, the effects of air

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Green listed bird species via changes in air quality associated with dust and vehicle emission release.		pollution on green listed breeding birds is considered to be **not significant.**
Habitat Degradation - Spread of Invasive Species Japanese knotweed, three-cornered leek, Spanish bluebell, hybrid bluebell and rhododendron were recorded from across the Proposed Scheme. The proposed works have the potential to spread these Third Scheduled species to habitat used by Green listed bird species.	The effects of invasive species and how they can be spread by construction personnel and equipment is outlined in **Table 10-24.** The assessment within **Table 10-31** with respect to the spread of invasive species on Red listed bird species is also pertinent to Green listed bird species. The receptor is considered to be of Local Importance (higher value) in this assessment.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, potentially permanent, adverse effects on a receptor of Local Importance (higher value).**
Disturbance/Displacement The Proposed Scheme has the potential to disturb breeding Green listed bird species during the construction phase e.g. by noise disturbance from machinery, physical presence of humans during construction of features.	The effects of disturbance/displacement on birds are described in **Table 10-31.** This assessment is also pertinent to Green listed bird species. The assessment within **Table 10-31** with respect to disturbance/displacement on Red listed bird species is also pertinent to Green listed bird species. The receptor is considered to be of Local Importance (higher value) in this assessment.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant**. In the absence of mitigation, this impact is likely to result in **significant, short-term adverse effects on a receptor of Local Importance (higher value).**
Mortality Risk Given the current baseline evidence, there is potential for breeding Green listed bird species to be killed or injured during construction primarily during vegetation clearance.	The assessment within **Table 10-31** with respect to mortality risk on Red listed bird species is also pertinent to Green listed bird species. The receptor is considered to be of Local Importance (higher value) in this assessment.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant.** In the absence of mitigation, this impact is likely to result in a **significant, short-term, adverse effect on a receptor of Local Importance (higher value).**
Operational and Maintenance Phase		
Disturbance/Displacement - the Proposed Scheme has the potential to disturb breeding Green listed bird species during the operational and maintenance phase e.g., noise disturbance from machinery and physical presence of humans.	The effects of disturbance/displacement on waterbirds are described in **Table 10-31** The assessment within **Table 10-31** with respect to disturbance/displacement during the operational and maintenance phase of the Proposed Scheme on Red listed bird species is also pertinent to Green listed bird species. . The receptor is considered to be of Local Importance (higher value) this assessment.	In the absence of mitigation, these works are likely to cause significant impacts. This effect is therefore considered to be **significant.** In the absence of mitigation, this impact is likely to result in a **significant, short-term, adverse effect on a receptor of Local Importance (higher value).**

Description of Potential Effect	Characterisation of Potential Effect prior to Mitigation	Significance of Effect (Without Mitigation)
Habitat Degradation due to Changes in Water Quality The operational and maintenance phase of the Proposed Scheme has the potential to result in changes to water quality associated with the new flood defences, new storm water drainage outfalls and new surface water pumping station to the Moy.	The assessment within **Table 10-30** with respect to changes in water quality during the operational and maintenance phase of the Proposed Scheme on commuting and foraging bats is also pertinent to Green listed bird species.	**Likely significant negative** intermittent, temporary effects on the River Moy in and downstream of Ballina and associated effects on Green listed bird species.

10.4.3 Summary of Likely Significant Effects

Table 10-34 and **Table 10-35** summarises construction and operational phase effects described in **Section 10.4.2.1**. The aim of this summary is to clearly identify likely and significant effects and establish where specific mitigation measures are required for avoidance, prevention and reduction of potentially negative effects. Only those areas requiring specific mitigation measures are carried through to **Section 10.5.**

Table 10-34 Construction Phase – Summary of Effects

Construction Phase Effects IEF	Significance of Effect (without mitigation)	Requires mitigation?
Habitat Loss, Fragmentation and Disturbance		
Floating River Vegetation	**Significant, short to medium-term, adverse effects on a receptor of National value.**	Yes – **Section 10.5.2.4**
Tall Herb Swamp	**Significant, short-term, adverse effect on a receptor of County Value.**	Yes – **Section 10.5.2.5**
Wet Grassland	**Significant, permanent, adverse effects on a receptor of County value.**	Yes – **Section 10.5.2.5.2**
Riparian Woodland	**Significant, permanent, adverse effects on a receptor of Local Importance (higher value)**	Yes – **Section 10.5.2.7**
Mixed Broadleaved Woodland	**Significant, permanent, adverse effects on a receptor of Local Importance (higher value.)**	Yes - **Section 10.5.2.8**
Hedgerows/Treelines	**Significant, permanent, adverse effects on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.2.9**
Otter	**Significant, permanent, adverse effects on a receptor of International Importance**	Yes – **Section 10.5.2.7, Section 10.5.2.8 and Section 10.5.2.9**
Harbour Seal	**Not significant**.	No
Bats – Commuting and Foraging	**Significant, permanent, adverse effects on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.2.5, Section 10.5.2.5.2, Section 10.5.2.7, Section 10.5.2.8, Section 10.5.2.9 and Section 10.5.2.13**
Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site, Lough Conn and Lough Cullin pNHA, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA and ooverwintering Waterbirds	**Not significant**.	No
Habitat Degradation – Spread of Invasive Species		
Tall Herb Swamp	**Significant, potentially permanent, adverse effects on a receptor of County value.**	Yes – **Section 10.5.1.8**
Wet Grassland	**Significant, potentially permanent, adverse effects on a receptor of County value.**	Yes – **Section 10.5.1.8**
Riparian Woodland	**Significant, potentially permanent, adverse effects on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.1.8**
Mixed Broadleaved Woodland	**Significant, potentially permanent, adverse effects on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.1.8**

Construction Phase Effects IEF	Significance of Effect (without mitigation)	Requires mitigation?
Hedgerows/Treelines	**Significant, potentially permanent, adverse effects on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.1.8**
Otter	**Significant, potentially permanent, adverse effects on a receptor of International value.**	Yes – **Section 10.5.1.8**
Badger	**Not significant**.	No
Breeding Birds – Grey Wagtail and Meadow Pipit	**Significant, potentially permanent, adverse effects on a receptor of National Importance.**	Yes – **Section 10.5.1.8**
Breeding Birds – Amber Listed Species	**Significant, potentially permanent, adverse effects on a receptor of County Importance.**	Yes – **Section 10.5.1.8**
Breeding Birds – Green Listed Species	**Significant, potentially permanent, adverse effects on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.1.8**
Habitat Degradation – Pollution Event: Chemical Spill, Sedimentation etc.		
Floating River Vegetation	**Significant, short-term, adverse effects on a receptor of National value**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**
Tall Herb Swamp	**Significant, short-term, adverse effects on a receptor of County value.**	Yes – **Section 10.5.1.6**
Wet Grassland	**Significant, short-term, adverse effects on a receptor of County value.**	Yes – **Section 10.5.1.6**
Riparian Woodland	**Significant, short-term, adverse effects on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.1.6**
Mixed Broadleaved Woodland	**Significant, short-term, adverse effects on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.1.6**
Hedgerows/Treelines	**Significant, short-term, adverse effects on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.1.6**
Otter	**Significant, short- to medium-term, adverse effects on a receptor of International value**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**
Harbour Seal	**Significant, short- to medium-term, adverse effects on a receptor of International value**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**
Badger	**Not significant**.	No
Bats – Commuting and Foraging	**Significant, short-term, adverse effects on a receptor of Local Importance (higher value)**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils,**

Construction Phase Effects IEF	Significance of Effect (without mitigation)	Requires mitigation?
		Geology and Hydrology and **Chapter 12: Water**
Breeding Birds – Grey Wagtail and Meadow Pipit	**Significant, short-term, adverse effects on a receptor of National value.**	Yes – **Section 10.5.2.1.4**
Breeding Birds – Amber Listed Species	**Significant, short-term, adverse effects on a receptor of County value.**	Yes – **Section 10.5.2.1.4**
Breeding Birds – Green Listed Species	**Significant, short-term, adverse effects on a receptor of Local Importance (higher value)**	Yes – **Section 10.5.2.1.4**
Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site, Lough Conn and Lough Cullin pNHA, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA and ooverwintering waterbirds	**Significant, short-term, adverse effects on a receptor of International value**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**
Habitat Degradation – Reduction in Foraging Resources and/or Abundance of Prey Items		
Otter	**Significant, short- to medium-term, adverse effects on a receptor of International value**	Yes - See **Chapter 9: Aquatic Biodiversity**
Harbour Seal	**Not significant**	No
Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site, Lough Conn and Lough Cullin pNHA, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA and ooverwintering waterbirds	**Not significant**	No
Habitat Degradation - Air Pollution		
Tall Herb Swamp	**Not significant**	No
Wet Grassland	**Not significant**	No
Riparian Woodland	**Not significant**	No
Mixed Broadleaved Woodland	**Not significant**	No
Hedgerows/ Treelines	**Not significant**	No

Construction Phase Effects IEF	Significance of Effect (without mitigation)	Requires mitigation?
Breeding Birds – Grey Wagtail and Meadow Pipit	**Not significant**	No
Breeding Birds – Amber Listed Species	**Not significant**	No
Breeding Birds – Green Listed Species	**Not significant**	No
Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site, Lough Conn and Lough Cullin pNHA, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA and ooverwintering waterbirds	**Not significant**	No
Loss of Breeding and Resting Sites.		
Otter	**Significant, adverse, short to medium-term effects on a receptor of International Value**	Yes – **Section 10.5.2.10**
Breeding Birds – Grey Wagtail and Meadow Pipit	**Significant, permanent, adverse effects on a receptor of National Value.**	Yes – **Section 10.5.2.1.4**
Breeding Birds – Amber Listed Species	**Significant, permanent, adverse effects on a receptor of County Value.**	Yes – **Section 10.5.2.1.4**
Breeding Birds – Green Listed Species	**Significant, permanent, adverse effects on a receptor of Local Importance (higher value)**	Yes – **Section 10.5.2.1.4**
Disturbance/Displacement		
Otter	**Significant, adverse, short to medium-term effects on a receptor of International Value**	Yes – **Section 10.5.2.1.4**
Harbour Seal	**Not significant.**	No
Badger	**Not significant**.	No
Bats – Commuting and Foraging	**Significant, short-term, adverse effects on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.2.1.4**
Breeding Birds – Grey Wagtail and Meadow Pipit	**Significant, short-term adverse effects on a receptor of National Importance.**	Yes – **Section 10.5.2.1.4**
Breeding Birds – Amber Listed Species	**Significant, short-term adverse effects on a receptor of County Importance.**	Yes – **Section 10.5.2.1.4**

Construction Phase Effects IEF	Significance of Effect (without mitigation)	Requires mitigation?
Breeding Birds – Green Listed Species	**Significant, short-term adverse effects on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.2.1.4**
Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site, Lough Conn and Lough Cullin pNHA, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA and ooverwintering waterbirds	**Not significant.**	No
Habitat Severance/Barrier Effect		
Otter	**Significant, adverse, short to medium-term effects on a receptor of International Value**	Yes – **Section 10.5.2.10**
Mortality Risk		
Otter	**Significant, adverse, short to medium-term effects on a receptor of International Value**	Yes – **Section 10.5.2.10**
Badger	**Not significant**.	No
Breeding Birds – Grey Wagtail and Meadow Pipit	**Significant, short-term, adverse effect on a receptor of National value.**	Yes – **Section 10.5.2.1.4**
Breeding Birds – Amber Listed Species	**Significant, short-term, adverse effect on a receptor of County Importance.**	Yes – **Section 10.5.2.1.4**
Breeding Birds – Green Listed Species	**Significant, short-term, adverse effect on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.2.1.4**

Table 10-35 Operational Phase – Summary of Effects

Operational Phase Effects IEF	Significance of Effect (without mitigation)	Requires mitigation?
Disturbance/Displacement		
Otter	**Not significant.**	No
Breeding Birds – Grey Wagtail and Meadow Pipit	**Significant, short-term, adverse effect on a receptor of National value.**	Yes – **Section 10.5.2.14.2**

Operational Phase Effects IEF	Significance of Effect (without mitigation)	Requires mitigation?
Breeding Birds – Amber Listed Species	**Significant, short-term, adverse effect on a receptor of County Importance.**	Yes – **Section 10.5.2.14.2**
Breeding Birds – Green Listed Species	**Significant, short-term, adverse effect on a receptor of Local Importance (higher value).**	Yes – **Section 10.5.2.14.2**
Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site, Lough Conn and Lough Cullin pNHA, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA and ooverwintering waterbirds	**Not Significant**	No
Habitat Severance/Barrier Effect		
Badger	**Not significant.**	No
Habitat Degradation due to Changes in Water Quality		
Floating River Vegetation	**Likely, significant adverse effect on a receptor of National Value.**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**
Tall Herb Swamp	**Likely, significant adverse effect on a receptor of County value.**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**
Otter	**Likely, significant adverse effect on a receptor of International Importance**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**
Harbour Seal	**Likely, significant adverse effect on a receptor of International Importance**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**
Bats – Commuting and Foraging	**Likely, significant adverse effect on a receptor of Local Importance (higher value).**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**
Breeding Birds – Grey Wagtail and Meadow Pipit	**Likely, significant adverse effect on a receptor of National Value.**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils,**

Operational Phase Effects IEF	Significance of Effect (without mitigation)	Requires mitigation?
		Geology and Hydrology and **Chapter 12: Water**
Breeding Birds – Amber Listed Species	**Likely, significant adverse effect on a receptor of County Importance.**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**
Breeding Birds – Green Listed Species	**Likely, significant adverse effect on a receptor of Local Importance (higher value)**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**
Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site, Lough Conn and Lough Cullin pNHA, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA and ooverwintering waterbirds	**Likely, significant adverse effect on a receptor of International Importance**	Yes - See **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**
Habitat Degradation due to changes in Hydrological Regime or Hydromorphology		
Floating River Vegetation	**Not significant**	No
Wet Grassland	**Significant, permanent, adverse effects on a receptor of County value.**	Yes – **Section 10.5.2.6.2**

10.5 Mitigation Measures

The proposed mitigation measures here address the impacts identified following consideration of the environment baseline against the project description.

Mitigation measures have also been proposed for certain IEFs and non-IEFs despite no significant impacts having been identified in the Impact Assessment (**Section 10.4**).

To avoid repetition between chapters of this EIAR, where relevant, mitigation measures within other chapters has been cross referenced in this chapter. The mitigation measures within each cross-referenced chapter have been reviewed and are deemed appropriate for the protection of sensitive ecological receptors identified within this chapter.

10.5.1 General Mitigation – Construction Phase

10.5.1.1 Contractor's Environmental Manager

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

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

10.5.1.2 Environmental Clerk of Works

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

The EnvCoW will:

- Have a suitable environmental qualification - degree in environmental / ecological sciences;
- Have demonstrable experience (minimum of 5 years) in overseeing construction projects; and
- Be a full member of a relevant environmental institute, such as the Chartered Institute of Ecology and Environmental Management (CIEEM), the Institute of Environmental Management, or equivalent.

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

The EnvCoW will be responsible for carrying out regular environmental auditing and monitoring to ensure of water, air and noise quality, to ensure works remain in compliance with the CEMP and agreed method

statements as required for the protection of the environment. The EnvCoW is to be notified of any environmental incident and is to sign-off on any mitigation and remediation measures proposed. The EnvCoW will be responsible for preparing and reporting compliance reports which will be sent to the Client and Contractor.

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

10.5.1.3 Ecological Clerk of Works

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

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

The ECoW will be required to be fully appraised of all the pollution control and biosecurity mitigation measures outlined in the EIAR and the reasons why they are applied. The ECoW shall be in attendance on site during the following construction activities:

- All site clearance
- Excavations, including topsoil stripping and earthworks activities
- Excavations, foundations and flood wall construction works
- Embankment creation
- Construction of culverts.

Prior to the commencement of construction works, the scope, programme and phasing of update habitat and species surveys will be defined by the ECoW in consultation with the Client and Main Contractor. Given the duration of the construction works, the update habitat and species surveys will need to be appropriately phased mindful of the planned work and seasonal constraints. This is to ensure that an up-to-date baseline is maintained to inform decision making including with respect to the need for derogation licensing. These surveys will be completed prior to any site preparation works at any one site.

Currently, derogation licencing is required for otter as two couches and a holt were observed within the redline boundary. An application for a derogation licence is currently underway. However, mindful of the mobile nature of the species concerned (e.g. bats and otters), the need for derogation licencing for any particular phase of works will need to be informed by the findings of the updated pre-construction surveys. The level of surveying will need to be sufficient to inform any derogation licensing which may be required. The need for derogation licensing will be determined by the ECoW prior to any works commencing, including site preparation works. The need for derogation licences will be kept under review by the ECoW as the works progress based on the findings of the update surveys completed.

The ECoW will oversee the implementation of the eradication of invasive alien species, however, the “sign off” of the works required to remove/eradicate invasive alien species will be completed by a specialist contractor specialising in such eradication.

A Construction Environmental Management Plan (CEMP) will be prepared prior to the commencement of works. The CEMP will include all the mitigation measures set out below with respect to the construction phase. The CEMP will be prepared in consultation with the Contractor. It will be the role of the ECoW to ensure that all the relevant ecological mitigation measures set out below and within the NIS are incorporated into the CEMP and implemented thereafter. The contractor will be obliged to update the CEMP to include any requirements conditioned in a planning permission.

In addition to the fencing of the Proposed Scheme boundary as part of the enabling works, any other vegetation within the Proposed Scheme boundary which is capable of being retained during the construction works will be fenced-off with suitable protective fencing and location to be specified by the ECoW. The fencing will form a clear barrier between retained habitats within and adjacent to the Proposed Scheme boundary which includes European Sites. This includes the retention of trees, hedgerow, woodland, grassland, aquatic features etc. The same measures as stipulated below with respect to avoiding unintended incursion will also be applied to these areas.

To avoid unintended incursion by personnel, equipment and materials, the construction site boundary will be fenced off and site access/egress points constructed. Only site access/egress points will be used by personnel and equipment. Signage will be placed at intervals along the fencing stating, "*no access or storage of materials beyond this point*" (or similar). The signage to face inwards into the construction site. As part of the on-site ECoW induction for construction personnel, it will be stated that there will be no access for personnel or equipment and no storage of construction materials beyond the fenced construction boundary.

The ECoW is responsible for the supervision and monitoring of all licensed activities to ensure implementation of biodiversity management requirements is achieved. The ECoW shall not delegate duties to other staff. The only exception is for unforeseen absence and annual leave cover, in which case the Site Manager shall appoint a suitably qualified back-up ECoW to temporarily fulfil the role. Training for each member of staff on their specific area of responsibility to implement environmental controls shall be carried out before the commencement of that operation. A record of all training carried out shall be maintained in the CEMP.

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

The proposed construction works and associated *insitu* control measures, will be supervised full-time by the ECoW.

Toolbox talks on the CEMP will be presented by the ECoW to all site staff immediately before works commence. The subject shall be the measures that have been put in place to protect the environment and the procedures, monitoring, and recording that is to be undertaken in accordance with the Construction Methodology, environmental commitments, and the CEMP. Site personnel will also be made aware of the ecological sensitivity of the site and its surrounds.

The ECoW will report any instances of failure of mitigations, spillage, non-conformances, maintenance and repair by way of specific Incident Reporting sheets that include how the issue was remedied.

The ECoW will attend all relevant stakeholder meetings throughout the construction (IFI, NPWS etc.).

Carry out ecological monitoring and survey work as may be required by the planning authority.

10.5.1.4 Pre-Construction Surveys

In advance of enabling works, the ECoW will complete preconstruction confirmatory surveys of selected ecological features whose distribution is dynamic over time, and which are known to have potential to occur within the ZoI of the Proposed Scheme works. These surveys will update the findings of the surveys completed to date (as set out in **Section 10.2.3**). This will include:

- Pre-construction surveys by an experienced ecologist will be carried out for otter. This includes a survey of any otter breeding/resting sites identified in the current baseline within the ZoI of the Proposed Scheme (150 m for breeding sites, where access allows; noting that TII guidance recommends 20 m for non-breeding sites). These will be undertaken in a representative season to ensure accuracy. Otter surveys will be carried out in accordance with NRA guidance (NRA, 2008a). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will be required and an application is currently underway.
- Pre-construction surveys by an experienced ecologist will be carried out for badger. This includes a survey of all areas within 150 m of the Proposed Scheme. These will be undertaken in a representative season to ensure accuracy. Badger surveys will be carried out in accordance with NRA guidance (NRA, 2008b). The findings of the pre-construction survey will be reviewed with

respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will not be required.

- Pre-construction surveys by an experienced ecologist will be carried out for Third Schedule IAPS within the ZoI of the Proposed Scheme. These will be undertaken in a representative season to ensure accuracy. Invasive species will be carried out having regard to guidance of Transport Infrastructure Ireland (TII 2020a, TII 2020b).
- Pre-construction surveys by an experienced ecologist will be performed on sites where tree removal or removal of tree limbs is required. These surveys will be undertaken to determine the presence or absence of bat roosts or breeding birds, and these will be undertaken in a representative season to ensure accuracy. Bat surveys shall be carried out with reference to Bat Mitigation Guidelines for Ireland (v.2) (Marnell *et al.,* 2022) and Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Ed.) (Collins, 2023). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will not be required for bats but may be required for breeding birds should clearance be required during the bird breeding season.
- Pre-construction surveys by an experienced ecologist will be performed on structures to be impacted by the Proposed Scheme e.g. quay walls along the main channel of the River Moy. These surveys will be undertaken to determine the presence or absence of bat roosts and breeding birds, and these will be undertaken in a representative season to ensure accuracy. Bat surveys shall be carried out with reference to Bat Mitigation Guidelines for Ireland (v.2) (Marnell *et al.,* 2022) and Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Ed.) (Collins, 2023). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will not be required.
- Pre-construction surveys by an experienced ecologist will be performed on the boat yard shed where a roosting bat was observed exiting during dawn surveys. This survey will be undertaken to determine the presence or absence of roosting bats and it will be undertaken in a representative season to ensure accuracy. The surveyor will also use their professional judgement with respect to the need to survey any other buildings or structures within or adjacent to the Proposed Scheme boundary likely to provide roosting opportunities for bats. Bat surveys shall be carried out with reference to Bat Mitigation Guidelines for Ireland (v.2) (Marnell *et al.,* 2022) and Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Ed.) (Collins, 2023). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will not be required.
- Breeding bird surveys will be undertaken to identify nest sites which are to be marked and avoided by construction if found until such time that the site is vacated by fledglings. Where bird or bat species are detected to be nesting or roosting, an exclusion zone will be determined by the ECoW, using best practice guidelines specific to the species. The same approach will be taken to wintering bird species. Breeding bird surveys shall be conducted with reference to the methodology described by Bibby *et al*. (2000) and the Countryside Bird Survey Manual - Guidelines for Countryside Bird Survey participants (BirdWatch Ireland, 2012).
- A season of overwintering waterbird usage of the River Moy Estuary shall be carried out prior to construction to ascertain if minimal usage of this area is typical for these species.

Based on the findings of the pre-construction surveys, the adequacy of the mitigation for each of these species set out in the EIAR will be reviewed and, if necessary, adjusted accordingly by the ECoW. The ECoW will also ensure that the CEMP will be updated accordingly. The pre-construction surveys will also inform the need or otherwise for derogation licensing (as detailed below). Any adjustment to the mitigation measures will be agreed with the local authority in advance of them being implemented.

The pre-construction surveys will be supplemented by further inspection by the ECoW (as deemed necessary by them) immediately prior to site clearance.

All surveys will be undertaken by suitably qualified ecologists with demonstrable experience in the survey and assessment of the feature.

10.5.1.5 Water Protection Measures

Water Protection Measures are outlined in **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**.

10.5.1.6 Environmental Incidents and Accidents

Measures to deal with Environmental Incidents and Accidents are outlined in **Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrogeology** and **Chapter 12: Water**. Additional measures specifically to address environmental incidents and accidents regarding terrestrial biodiversity are outlined below.

10.5.1.6.1 Damage to Flora and Fauna

- In the event of damage occurring to protected flora/fauna or designated area, the cause of the incident will be identified.
- If on-site vehicles or personnel were the cause of the incident, all works will cease until the Health and Safety Officer will declare the site a safe working area.
- When the site is declared secure, an assessment of the incident will be carried out.
- In the event of the death of any faunal species, species details, photographs and any other available information will be recorded.
- The ECoW and a county council representative will be informed of the incident.
- The NPWS will be notified of the incident by the ECoW.
- Mitigation measures will be put in place to manage the incident.

10.5.1.7 Watching Brief during Site Clearance

All vegetation removal and demolition of walls will be completed outside the breeding bird season (March to August, inclusive) unless no breeding birds are confirmed present by the ECoW immediately prior to the vegetation or structure being removed or unless required for the implementation of derogated measures with respect to otter or badger.

All vegetation removal shall be monitored by the ECoW to ensure there is no disturbance of any protected species e.g. otter, badger, birds, bats, stoat, hedgehog etc. If disturbance occurs, the ECoW will treat each species appropriately, e.g. contact NPWS for otter and bats, relocate hedgehogs, translocation of frog spawn or tadpoles etc.

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

10.5.1.8 Invasive Alien Plant Species Management

A number of third schedule IAPS (Japanese knotweed, rhododendron, hybrid bluebell, Spanish bluebell and three-cornered leek) were recorded across the Proposed Scheme. The locations of which are outlined in **Appendix 10.13** and **Appendix 10.14.** The presence of non-native invasive species within the study area provides the potential for the spread of these species by the proposed works. These species are highly invasive and out-compete native flora to form single species stands. In the case of Japanese knotweed, its presence along watercourses is particularly significant, as contaminated soil or vegetative material washed from an infected area can result in the spread of this species downstream. Appropriate mitigation measures including management and control measures are required within the proposed works area where each of these species are encountered for the prevention of spread of these species.

The Local Authority shall appoint a suitably qualified contractor to deal with any Third Schedule Invasive Alien Plant Species within the proposed works areas prior to any works commencing. This specialist will prepare an Invasive Alien Species Management Plan (IASMP) that will be followed during the treatment of the IAS identified across the Proposed Scheme. Any invasive plant species identified that are likely to be disturbed by the Proposed Scheme works will be dealt with prior to construction works taking place in accordance with the management plan. Works to eradicate invasive species will be completed and signed off by suitably experienced personnel. At the time of writing, the works will be completed with reference to the following guidance:

- Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010)
- Guidelines for the Management of Waste from National Road Construction Proposed development (NRA, 2014)
- The management of Invasive Alien Plant Species on National Roads – Standard (TII, 2020a)
- The management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020b)
- Invasive Species Ireland guidance (http://invasivespeciesireland.com)

All machinery or equipment that may have worked in environments where invasive species are present shall be suitably cleaned by pressure washer before being used on site to prevent the spread of invasive species. Machinery shall be washed down on permeable material such as terram which will collect any IAPS fragments. This permeable material shall then be disposed of at a facility licenced to accept IAPS contaminated material. Water used for this washing process shall always be intercepted and prevented from draining back into watercourses.

Where ongoing treatment of IAPS is occurring on stands in the vicinity of the proposed works area, appropriate exclusion fencing will be erected to prevent disturbance and spread of these stands.

10.5.1.9 Mitigation Measures for Noise and Vibration during Construction Activities

The extent of the noise and vibration producing operations is discussed as part of **Chapter 15: Noise and Vibration** which describes the noise assessment and mitigation measures to be undertaken in relation to noise and vibration impacts. This mitigation will also address potential impacts of noise and vibration on habitats during construction.

10.5.2 IEF-Specific Mitigation Measures

In addition to the overarching measures above, IEF-specific measures are detailed below.

10.5.2.1 River Moy SAC

10.5.2.1.1 Construction Phase

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts on the River Moy SAC:

- Otter Measures (**Section 10.5.2.10**)
- Water Protection Measures (**Chapter 9: Aquatic Biodiversity**, **Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)
- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Watching Brief During Site Clearance (**Section 10.5.1.7**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)
- Noise and Vibration Measures (**Chapter 15: Noise and Vibration**)

In addition to the measures listed above, the following measures will avoid, minimise and mitigate construction phase impacts on River Moy SAC:

- While loss of SAC area was not deemed significant, planting of trees and shrubby species that will be undertaken for the Proposed Scheme will help minimise any effects of loss of SAC area. The areas where this planting is to occur are identified within **Chapter 19: Landscape and Visual.** Planting will consist of the same species lost with trees/shrubs sourced to be of Irish native provenance.

10.5.2.2 Killala Bay/Moy Estuary SAC & Killala Bay/Moy Estuary pNHA

10.5.2.2.1 Construction Phase

The mitigation measures listed below with respect to habitats and species are also measures which will avoid, minimise and mitigate construction phase impacts on Killala Bay/Moy Estuary SAC and Killala Bay/Moy Estuary pNHA:

- Water Protection Measures (**Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)
- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Watching Brief During Site Clearance (**Section 10.5.1.7**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)
- Noise and Vibration Measures (**Chapter 15: Noise and Vibration**)

10.5.2.3 Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site, Lough Conn and Lough Cullin pNHA, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA and over-wintering waterbirds

10.5.2.3.1 Construction Phase

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts on the Killala Bay/Moy Estuary SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary Ramsar Site, Lough Conn and Lough Cullin pNHA, Cloonagh Lough (Mayo) pNHA, Lough Alick pNHA and overwintering waterbirds:

- Water Protection Measures (**Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)
- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)
- Noise and Vibration Measures (**Chapter 15: Noise and Vibration**)

10.5.2.4 Floating River Vegetation

10.5.2.4.1 Construction Phase

- Water Protection Measures (**Chapter 9: Aquatic Biodiversity**, **Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)
- River margin sediment/substrate reinstatement measures (**Section 9.5.1.3** and **Section 9.5.1.4 Chapter 9: Aquatic Biodiversity**)

In addition to the measures listed above, the following habitat specific mitigation measures will avoid, minimise and mitigate construction phase impacts on floating river vegetation:

- Prior to instream works along the main channel of the River Moy being undertaken, a full survey of floating river vegetation habitat shall be undertaken, including capturing the extent of this habitat to be disturbed and species composition.
- Ground protection mats e.g. bog matting, shall be used in each dry working area created via cofferdam placement to prevent against sediment compaction and disturbance.
- If recolonisation of the area has not occurred in the following growing season post disturbance, then propagules from nearby floating river vegetation habitat shall be used to reinstate the habitat. This may require the use of biodegradable matting on the riverbed to hold and contain propagules and to help prevent them from washing away. This is also dependant on sufficient sediment building up if extensive sediment disturbance had occurred.
- All works outlined above shall be undertaken with the supervision of a suitably qualified ecologist or ECoW.

10.5.2.4.2 Operational and Maintenance Phase

- Water Protection Measures (**Chapter 9: Aquatic Biodiversity**, **Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)

10.5.2.5 Tall Herb Swamp

Tall Herb Swamp will be disturbed along both banks of the River Moy downstream of the Lower Bridge and also at the Quignamanger proposed works area.

10.5.2.5.1 Construction Phase

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts on tall herb swamp:

- Water Protection Measures (**Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)
- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)

In addition to the measures listed above, the following habitat specific mitigation measures will avoid, minimise and mitigate construction phase impacts on tall herb swamp:

- In so much as possible, works along both banks of the River Moy downstream of the Lower Bridge are to take place from the roadside to avoid damage to this habitat.
- Fencing is to be erected at the boundary of the necessary works footprint within this habitat along all proposed works areas where this habitat occurs (Quignamanger, Clare Street, Bachelors Walk) to prevent unnecessary incursion of personnel and machinery. Silt fencing is also to be erected along this boundary to prevent any potential siltation of nearby watercourses. At any one time a maximum length of working area along Bachelors Walk and Clare Street which can be undertaken in 1 working week, is to be implemented. Works on additional areas will not commence until works on previous areas have been completed and tall herb swamp habitat reinstated (see next point).
- Where tall herb swamp habitat is to be disturbed by flood wall or culvert construction, turves are to be collected from the areas to be disturbed and stored on bog mats within adjacent working areas in a single layer i.e. no stacking of turves is to occur. The turves to be removed will be approximately 2m x 1m x 0.5m deep and will be collected with the use of a specially designed excavator bucket to lift and place the turves carefully on to bog mats so that they do not break up. The storing of turves on bog mats will facilitate their later removal and reinstatement without damaging the underlying habitat. Turves will be monitored during storage, and they will be watered when required to keep them moist. The depth of turves proposed is in line with practice elsewhere (Anderson, 2003), where in a wetland situation, the turf depth extracted for translocation was between 50 and 80 cm, depending on rooting depth. The deeper the turves, the greater likelihood of vegetation recovery.

Turves will be stored for no more than 1 working week and measures will be implemented to ensure no erosion of tall herb swamp habitat or turves occurs while works are ongoing e.g. monitoring of weather forecasts to ensure works are avoided during periods of heavy rainfall, monitoring of tides to ensure habitat area does not flood while works are ongoing etc. The area where turves are to be taken and reinstated will not be traversed by machinery prior to or after works to ensure compaction does not occur to help facilitate recovery post reinstatement. Anderson (2003) recommends that all turf translocation should take place in the dormant season for terrestrial habitats, therefore, the best time for undertaking works where sections of tall herb swamp are to be disturbed is during the autumn or early winter. This timing ensures that soils will be at their field capacity with maximum cohesiveness without containing excess water which will facilitate habitat recovery after reinstatement.

- Ground protection mats shall be used at all areas of tall herb swamp where turve extraction is not necessary e.g. access routes for personnel (if required) to prevent compaction and erosion of this habitat.
- The ECoW will undertake regular monitoring of habitat restoration undertaken to inform any adaptive mitigation measures as required and report such monitoring to relevant parties. All re-instated or indirectly impacted vegetation will be inspected at the completion of construction at which time the ECoW will report to the local authority and other relevant parties on habitat condition. If the condition of the habitat is unsatisfactory the ECoW will determine whether collection of local seed is additionally required to achieve effective vegetation restoration and take appropriate steps to source and sow such seed. Only seeds of native Irish provenance shall be used should such a measure be necessary.

10.5.2.5.2 Operational and Maintenance Phase

Water Protection Measures (**Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology and Chapter 12: Water**)

10.5.2.6 Wet Grassland

Wet grassland will be disturbed along Bunree/Behy Road and the Brusna proposed works areas.

10.5.2.6.1 Construction Phase

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts on wet grassland:

- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)

In addition to the measures listed above, the following habitat specific mitigation measures will avoid, minimise and mitigate construction phase impacts on wet grassland:

- Works on the culvert along the Bunree/Behy Road are to take place from the roadside with no footprint in the adjacent wet grassland field. Fencing is to be erected to at the edge of this field prior to works commencing to prevent accidental incursion.
- Ground protection mats are to be used on the access route within the wet grassland field to prevent unnecessary damage to this habitat. Fencing is to be erected around the edge of the proposed works area in this field prior to works commencing to prevent accidental incursion and damage to the habitat.

10.5.2.6.2 Operational and Maintenance Phase

The following habitat specific mitigation measures will avoid, minimise and mitigate operational and maintenance phase impacts on wet grassland:

- The culvert adjacent to the wet grassland field along the Bunree/Behy Road shall be of a French drain style to allow drainage from the wet grassland habitat and prevent a build-up of water within this area. This will ensure that they hydrological regime of the habitat does not change thus impacting upon the habitat itself.

10.5.2.7 Riparian Woodland

Riparian woodland will be disturbed along the left-hand bank of the River Moy adjacent to the boatyard for the Proposed Scheme.

10.5.2.7.1 Construction Phase

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts on riparian woodland:

- Environmental Incidents and Accidents (**Section 10.5.1.6**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)

In addition to the measures listed above, the following habitat specific mitigation measures will avoid, minimise and mitigate construction phase impacts on riparian woodland:

- Where possible, minimal disturbance of this habitat is to take place with structures to be set as far back from this habitat as practicable.
- Planting of trees that will be undertaken for the Proposed Scheme will help minimise any effects of loss of riparian woodland. Planting will consist of the same species lost with trees sourced to be of Irish native provenance. The areas where planting is to occur are identified within **Chapter 19: Landscape and Visual.**

10.5.2.8 Mixed Broadleaved Woodland

Mixed broadleaved woodland will be lost along the Tullyegan, the Quignamanger, the Brusna and the Bunree.

10.5.2.8.1 Construction Phase

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts on mixed broadleaved woodland:

- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)

In addition to the measures listed above, the following habitat specific mitigation measures will avoid, minimise and mitigate construction phase impacts on Mixed Broadleaved Woodland:

- Where possible, minimal disturbance of this habitat is to take place with structures to be set as far back from this habitat as practicable.
- Planting of trees that will be undertaken for the Proposed Scheme will help minimise any effects of loss of riparian woodland. Planting will consist of the same species lost with trees sourced to be of Irish native provenance. The areas where planting is to occur are identified within **Chapter 19: Landscape and Visual.**

10.5.2.9 Hedgerows/Treelines

Hedgerows/treelines will be removed for the proposed works along the Tullyegan, the Moy main channel and the Brusna.

10.5.2.9.1 Construction Phase

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts on hedgerows/treelines:

- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)

In addition to the measures listed above, the following habitat specific mitigation measures will avoid, minimise and mitigate construction phase impacts on hedgerows/treelines:

- Where possible, minimal disturbance of this habitat is to take place with structures to be set as far back from this habitat as practicable.
- Planting of trees that will be undertaken for the Proposed Scheme will help minimise any effects of loss of riparian woodland. Planting will consist of the same species lost with trees sourced to be of Irish native provenance. The areas where planting is to occur are identified within **Chapter 19: Landscape and Visual.**

10.5.2.10 Otter

Otter are considered to be widespread and very active throughout the Proposed Scheme area, therefore, the mitigation measures below are relevant to otter.

10.5.2.10.1 Construction Phase

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

- Pre-construction Surveys (**Section 10.5.1.4**)
- Water Protection Measure (**Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)
- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Watching Brief During Site Clearance (**Section 10.5.1.7**)
- Invasive Alien Plant Species Measurements (**Section 10.5.1.8**)
- Mitigation Measures for Noise and Vibration (**Chapter 15: Noise and Vibration**)

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

- Derogation Licencing (**Section 10.5.2.10.1.1**)
- Measures for Dealing with Otter Holts (**Section 10.5.2.10.1.2**)
- Measures Regarding Loss and Disturbance of Otter Habitat (**Section 10.5.2.10.1.3**)
- Measures to Protect Against Mortality (**Section 10.5.2.10.1.4**)

10.5.2.10.1.1 Derogation Licensing

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

However, mindful of the mobile nature of otter, the need for derogation licencing for any particular phase of works will need to be kept under review and informed by the findings of the pre-construction surveys. The level of surveying will need to be sufficient to inform any derogation licensing which may be required. The need for derogation licensing will be determined by the ECoW prior to any works commencing, including site

preparation works. The need for derogation licences will be kept under review by the ECoW as the works progress based on the findings of the pre-construction surveys completed.

10.5.2.10.1.2 Mitigation Measures for Dealing with Otter Holts

No construction personnel or machinery will be used within 150 m of otter holts unless subject to the provisions of a derogation licence. The location of otter holts are to be confirmed during the pre-construction survey. During the pre-construction survey, otter holts located within the Proposed Scheme boundary or within 150 m of this boundary will be clearly identified to all personnel working in the vicinity of the holt. Temporary boundary tape fencing (or similar) can used at the discretion of the ECoW to identify such holts subject to such measures themselves not impacting on the use of the holt. Neither blasting nor pile-driving will be undertaken within 150 m of active holt during the breeding season, unless subject to provisions of a derogation licence.

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

In the event that holts are to be closed (wholly or partially), this will be completed in accordance with the necessary derogation licence and with reference to the Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2008a). The need for further licencing is to be determined by the ECoW during pre-construction surveys and if any holts are encountered during vegetation clearance. The need for additional mitigation for derogation licensing purposes is to be reviewed and determined by the ECoW and relayed, as necessary to the local authority.

Where required, evacuation and destruction of holts will be carried out under the supervision of an appropriately qualified ecologist under licence from the NPWS. The locations of such holts will be determined by the ECoW in liaison with the Contractor and the requirement of any derogation licence.

As works along the Brusna are likely to make the existing holt unfavourable for use by otter, two artificial holts will be created to provide alternative resting areas for otter while works are ongoing. These two holts are to be located along the left-hand bank of the River Brusna downstream of the Rathkip/Shanaghy bridge. The design of these holts is outlined in **Appendix 10.15**.

10.5.2.10.1.3 Measures Regarding Loss and Disturbance of Otter Habitat

Two couches were recorded within tall herb swamp along Clare Street. Measures for the protection of tall herb swamp (**Section 10.5.2.5**) will also ensure no large-scale loss of otter resting spots for a prolonged period of time along the main channel of the River Moy. Both couches will be removed during the proposed works, however, couches are generally transitory in nature, with otter using a number of these resting spots across their territory. Tall herb swamp is present for an approximate length of 285 m along Clare Street. Mitigation for this habitat stipulates that works within this area are to take place for a maximum length of working area which can be undertaken in 1 working week with works on additional areas not to commence until works on previous areas have been completed and tall herb swamp habitat reinstated. It is considered that this programme of works will allow sufficient area of tall herb swamp undisturbed at any one time for otter to use as couching spots and will not result in the total loss of this area for otter use.

Otter along the Brusna and Tullyegan are most likely to be active at night, therefore night-time (including dawn and dusk) works along these areas will be avoided. The baseline data also indicates that otter are very active along the main channel of the River Moy, however, a live otter was observed during daylight hours at Ballina Quay during surveys indicating that otter within this area are not necessarily most active at night. Accordingly, restricting work hours to daylight hours along this area (i.e. Quignamanger and River Moy) will not necessarily avoid otter activity. Nonetheless, should night-time works be required along the River Moy and Quignamanger, the entire stretch/width of the river shall not be lit up while works are being undertaken, i.e. a dark stretch of the river should remain to facilitate the movement of otter past the works. This can be achieved by using directional lighting (i.e. lighting which only shines on the proposed works and not nearby

lands) to prevent overspill. This shall be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.

Planting of trees will be undertaken for the Proposed Scheme to help minimise any effects of loss of riparian woodland due to the creation of flood defences. Planting will consist of the same species lost with trees sourced to be of Irish native provenance. This planting will provide woody riverbank cover in a number of areas where currently no or sparce cover exists, including on the section of the River Brusna where the holt was identified, providing additional privacy for otters utilising this holt. The areas where planting is to occur are identified in **Appendix 10.16**.

10.5.2.10.1.4 Measures to Protect Against Mortality

A watching brief during vegetation clearance as detailed in **Section 10.5.1.7** will help protect against mortality of otter.

Any excavations greater in depth than 30cm which are left open overnight will either be temporarily covered over or a temporary ramp (e.g. scaffold board at suitable angle) will be inserted. This to prevent the entrapment of otter within the excavations and/or to enable their escape from the excavation.

10.5.2.10.2 Operational and Maintenance Phase

- Water Protection Measures (**Chapter 9: Aquatic Biodiversity**, **Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)

10.5.2.11 Harbour Seal

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts to harbour seal:

10.5.2.11.1 Construction Phase

- Water Protection Measures (**Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)

10.5.2.11.2 Operational and Maintenance Phase

- Water Protection Measures (**Chapter 9: Aquatic Biodiversity**, **Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)

10.5.2.12 Badger

A small number of badger and potential badger signs were recorded across the Proposed Scheme area particularly along the Brusna and Tullyegan, therefore, badger are not considered to be widespread or very active throughout the Proposed Scheme area. No significant effects were identified on badger from the Proposed Scheme, nonetheless, a number of mitigation measures to be implemented are relevant to badger.

10.5.2.12.1 Construction Phase

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

- Pre-construction Surveys (**Section 10.5.1.4**)
- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Watching Brief During Site Clearance (**Section 10.5.1.7**)
- Invasive Alien Plant Species Measurements (**Section 10.5.1.8**)
- Mitigation Measures for Noise and Vibration (**Chapter 15: Noise and Vibration**)

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

- Derogation Licencing (**Section 10.5.2.12.1.1**)
- Measures for Dealing with Badger Setts (**Section 10.5.2.12.1.2**)
- Measures Regarding Loss and Disturbance of Badger Habitat (**Section 10.5.2.12.1.3**)
- Measures to Protect Against Mortality (**Section 10.5.2.12.1.4**)

10.5.2.12.1.1 Derogation Licensing

The current baseline indicates that derogation licencing will not be needed for badger as no setts were observed within 150 m of the Proposed Scheme boundary.

However, mindful of the mobile nature of badger, the need for derogation licencing for any particular phase of works will need to be kept under review and informed by the findings of the pre-construction surveys. The level of surveying will need to be sufficient to inform any derogation licensing which may be required. The need for derogation licensing will be determined by the ECoW prior to any works commencing, including site preparation works. The need for derogation licences will be kept under review by the ECoW as the works progress based on the findings of the pre-construction surveys completed.

10.5.2.12.1.2 Mitigation Measures for Dealing with Badger Setts

This section applies, should a badger sett(s) be discovered during pre-construction surveys.

No construction personnel or machinery will be used within 150 m of badger setts unless subject to the provisions of a derogation licence. The location of badger setts are to be confirmed during the pre-construction survey. During the pre-construction survey, badger setts located within the Proposed Scheme boundary or within 150 m of this boundary will be clearly identified to all personnel working in the vicinity of the sett. Temporary boundary tape fencing (or similar) can used at the discretion of the ECoW to identify such setts subject to such measures themselves not impacting on the use of the sett. Neither blasting nor pile-driving will be undertaken within 150 m of an active sett during the breeding season, unless subject to provisions of a derogation licence.

It is assumed that all active setts at the time of construction and within very close proximity to the Proposed Scheme boundary will need to be closed in accordance with a derogation licence. Currently, no setts have been identified within 150 m of the Proposed Scheme boundary, therefore, there is currently no need for a derogation licence with respect to badger. Should a derogation licence be required post pre-construction surveys, this licence could require this loss of sett(s) to be compensated through the construction of artificial sett(s).

In the event that setts are to be closed (wholly or partially), this will be completed in accordance with the necessary derogation licence and with reference to the Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (NRA, 2006). The need for further licencing is to be determined by the ECoW during pre-construction surveys and if any setts are encountered during vegetation clearance. The need for additional mitigation for derogation licensing purposes is to be reviewed and determined by the ECoW and relayed, as necessary to the local authority.

Where required, evacuation and destruction of setts will be carried out under the supervision of an appropriately qualified ecologist under licence from the NPWS. The locations of such setts will be determined by the ECoW in liaison with the Contractor and the requirement of any derogation licence.

10.5.2.12.1.3 Measures Regarding Loss and Disturbance of Badger Habitat

As badger are most active at night, night-time works (including dawn and dusk) will be avoided in areas where badger are most likely to be active such as along the Brusna and Tullyegan.

10.5.2.12.1.4 Measures to Protect Against Mortality

A watching brief during vegetation clearance as detailed in **Section 10.5.1.7** will help protect against mortality of badger.

Any excavations greater in depth than 30cm which are left open overnight will either be temporarily covered over or a temporary ramp (e.g. scaffold board at suitable angle) will be inserted. This to prevent the entrapment of badger within the excavations and/or to enable their escape from the excavation.

10.5.2.13 Bats – Commuting and Foraging

A number of different bat species (soprano pipistrelle, common pipistrelle, Daubenton's bat, Leisler's bat) were observed commuting and foraging along the main channel of the River Moy in the centre of Ballina town. Other sections of the Proposed Scheme (e.g. the Brusna, the Tullyegan) also have the potential to support roosting and foraging bats. The mitigation measures below are relevant to commuting and foraging bats.

10.5.2.13.1 Construction Phase

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts to commuting and foraging bats:

- Water Protection Measure (**Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)
- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)
- Mitigation Measures for Noise and Vibration (**Chapter 15: Noise and Vibration**)
- Planting measures for riparian woodland (**Section 10.5.2.7**)
- Planting measure for mixed broadleaved woodland (**Section 10.5.2.8**)
- Planting measures for hedgerows/treelines (**Section 10.5.2.9**)

In addition to the above mitigation measures, the following commuting and foraging bats specific mitigation measure described in the following sections will be implemented:

10.5.2.13.1.1 Lighting

To minimise disturbance to bats and other fauna that are active at night, construction operations during the hours of darkness will be kept to a minimum. If construction lighting is required during the bat activity period (April to September), lighting shall be directed away from all woodland and watercourse habitats. This can be achieved by using directional lighting (i.e. lighting which only shines on the proposed works and not nearby countryside) to prevent overspill. This shall be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.

Where the removal of bankside vegetation is likely to result in light spill on previously unlit sections of watercourses and other habitats likely to be used by commuting and foraging bats, an assessment of the adjacent lighting shall be carried out by a bat specialist prior to any vegetation removal. If they don't already, these light sources, e.g. street lamps should consist of LED luminaires with a warm white light source (2700 Kelvin or lower) with a peak wavelength higher than 550 nm as per guidelines (BCT & ILP, 2023) Column heights should minimise light spill and glare visibility and only luminaires with a negligible or zero Upward Light Ratio and with good optical control should be considered. Furthermore, luminaires should always be mounted horizontally, with no light output above 90° and/or no upward tilt. Where these light sources do not meet relevant guidelines, changing to light sources that do meet guidelines shall be required. This may be relevant along the Main channel of the River Moy at the boat yard where a section of riparian woodland is to be removed and also along the Brusna where section of mixed broadleaved woodland is to be removed. Re-planting of lost vegetation to recreate a buffer can help minimise light spill onto these areas and should be undertaken.

10.5.2.13.2 Operational and Maintenance Phase.

- Water Protection Measures (**Chapter 9: Aquatic Biodiversity**, **Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)

10.5.2.14 Breeding Birds

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts to breeding birds:

10.5.2.14.1 Construction Phase

- Pre-construction Surveys (**Section 10.5.1.4**)
- Water Protection Measures (**Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)
- Dust Suppression (**Chapter 13: Air**)
- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Watching Brief During Site Clearance (**Section 10.5.1.7**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)
- Noise and Vibration Measures (**Chapter 15: Noise and Vibration**)

In addition to the above mitigation measures, the following commuting and foraging bats specific mitigation measure described in the following sections will be implemented:

- Derogation Licence (**Section 10.5.2.14.1.1**)
- Measures to Protect Against Mortality (**Section 10.5.2.14.1.2**)
- Bird Boxes (**Section 10.5.2.14.1.3**)

10.5.2.14.1.1 Derogation Licence

Where nests are present, a buffer zone of at least 20 m will be cordoned off and the nests will either be left in-situ until the end of the bird nesting season or dealt with in accordance with the terms of a derogation licence sought from relevant bodies. Buffer zones will vary dependant on species in question and the exact buffer zone for a particular species when encountered must be discussed with a professional ornithologist who must be contacted within 24 hours of the discovery of an occupied nest.

10.5.2.14.1.2 Measure to Protect against Mortality

A watching brief during vegetation clearance as detailed in **Section 10.5.1.7** will help protect against mortality of breeding birds.

Additionally, all vegetation removal or demolition of structures will be completed outside the breeding bird season (March to August, inclusive) unless no breeding birds are confirmed present by the ECoW immediately prior to the vegetation/structure being removed.

10.5.2.14.1.3 Bird Boxes

To ensure no net loss of nesting habitat in addition to habitat enhancement, bird boxes will be erected at suitable locations across all sections of the Proposed Scheme. Ten no. bird boxes shall be erected along the Brusna, six no. bird boxes shall be erected along the River Moy, six no. bird boxes shall be erected along the Tullyegan, six no. bird boxes shall be erected along the Bunree and six no. bird boxes shall be erected along the Quignamanger. Suitable locations will be determined by the ECoW based on locations available to erect boxes and connectivity to foraging and commuting habitats. In the absence of suitable structures (e.g. trees, bridge structures, buildings etc.) to erect the boxes, they will be pole mounted in suitable locations. The bird-

boxes will be Schwegler-type (woodcrete) boxes (or similar) and a range of different type boxes (e.g. 1B, 2H, 2MR etc.) suitable for all species likely to be using the adjacent habitats.

10.5.2.14.2 Operational and Maintenance Phase

The mitigation measures listed below are measures which will avoid, minimise and mitigate operational and maintenance phase impacts to breeding birds including Red listed species (grey wagtail, meadow pipit), Amber listed species and Green listed species:

- Watching Brief During Site Clearance (**Section 10.5.1.7**)
- Measures to Protect Against Mortality (**Section 10.5.2.14.1.2**)
- Water Protection Measures (**Chapter 9: Aquatic Biodiversity**, **Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)

10.5.2.15 Overwintering Waterbirds

A number of different over-wintering waterbird species were observed adjacent to the Proposed Scheme areas along the River Moy main channel and Quignamanger proposed works areas. Therefore, the mitigation measures below are relevant to overwintering waterbirds.

10.5.2.15.1 Construction Phase

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts to overwintering waterbirds:

- Water Protection Measure (**Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)
- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)
- Noise and Vibration Measures (**Chapter 15: Noise and Vibration**)

10.5.2.15.2 Operational and Maintenance Phase

- Water Protection Measures (**Chapter 9: Aquatic Biodiversity**, **Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)

10.5.3 Overview of non-IEF Mitigation Measures

10.5.3.1 Bats – Roosting

A single bat was observed exiting the shed within the boat yard during dawn surveys. As only a single bat was observed roosting within the building, this building was not considered to be a major roost (i.e. not a maternity, hibernation, mating roost etc.) but instead was considered to be a temporary night roost. Therefore, roosting bats are not considered to be widespread throughout the Proposed Scheme area. Table 4 within the Bat Mitigation Guidelines for Ireland V2 (Marnell *et al*., 2022), states that the temporary disturbance of a night roost is a low impact development effect. Given the low scale of impact likely to arise from the temporary disturbance of a single roosting bat, roosting bats were not brought forwards as an IEF in this assessment.

Given the current baseline, the Proposed Scheme is not considered to effect roosting bats, however, as bat roosts can be ephemeral and circumstances can change between initial surveys and the commencement of construction, the mitigation measures listed below are provided here on a precautionary basis and are measures which will avoid, minimise and mitigate construction phase impacts on roosting bats. Pre-construction surveys will determine the extent of bat roosts within or adjacent to the Proposed Scheme and the required mitigation measures can be subsequently adjusted, if necessary.

10.5.3.1.1 Construction Phase

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts to roosting bats:

- Pre-construction Surveys (**Section 10.5.1.4**)
- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Watching Brief During Site Clearance (**Section 10.5.1.7**)
- Invasive Alien Plant Species Measurements (**Section 10.5.1.8**)
- Mitigation Measures for Noise and Vibration (**Chapter 15: Noise and Vibration**)

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

- Measures to Protect against Mortality (**Section 10.5.3.1.1.1**)
- Lighting (**Section 10.5.3.1.1.2**)
- Bat boxes (**Section 10.5.3.1.1.3**)

10.5.3.1.1.1 Measures to Protect Against Mortality

A watching brief during vegetation clearance as detailed in **Section 10.5.1.7** will help protect against mortality of roosting bats.

No demolition of structures or the removal of any trees with bat roost potential (potential to be determined by the ECoW) is to occur unless the ECoW has confirmed that the structures or trees do not support roosting bats (confirmed via survey) or unless the demolition/removal is completed under the provisions of a derogation licence. Following the pre-construction survey, bat roosts located within the proposed works boundary will be clearly identified to all personnel working in the vicinity of the roost. Temporary boundary tape fencing (or similar) can be used at the discretion of the ECoW to identify such roosts subject to such measures themselves not impacting on the use of the roost.

Where bats are recorded roosting in the trees scheduled for felling, the following mitigation will be required:

- **Timing**: tree-felling will occur in the period late September to late October, or early November, in order to avoid disturbance of any roosting bats as per NRA Guidelines (NRA 2006a; NRA, 2006b) and also to avoid the bird breeding seasons. During this period bats are still capable of flight having not entered hibernation and undertaking works in this period may reduce the risks associated with tree-felling if proper measures are undertaken. To carry out the works any later in the bat season creates an additional risk that bats may be in hibernation and thus unable to fly out from a tree that is being felled, although bats can be removed by hand by a licenced bat handler if required. Additionally, disturbance during winter may reduce the likelihood of survival as the bats' body temperature is too low and they may have to consume large quantities to restore sufficient body fat to survive. Tree felling will be completed by Mid-November at the latest as bats roosting in trees are very vulnerable to disturbance during their hibernation period (November - April). Trees with ivy-cover, once felled, will be left intact onsite for 24 hours prior to disposal to allow any bats beneath foliage to escape overnight.
  - In the unlikely event that roosting or stranded bats are encountered on the Proposed Scheme, works shall immediately cease in that area and the local NPWS Conservation Ranger shall be contacted. If present, bats shall only be removed under licence from the NPWS.
  - Trees to be felled under the supervision of the ECoW (i.e. trees identified as having Potential Roost Features (PRFs) during the pre-construction survey) will be examined and where bats are found, they will be translocated to an area where bat boxes will already be installed on appropriate trees within the Proposed Scheme area. The proposed process for felling the trees with PRFs is outlined below:
    - The ECoW will be present during the tree felling works.

- Tree(s) identified as having potential to support bats will be surveyed during the daytime for bats prior to felling, on the day the felling is due to take place. The bat specialist will inspect all potential bat roost features of the tree, including those above ground level. This will include visual inspection as well as use of an endoscope to inspect cavities/crevices.
- Any bats found in the trees will be removed by hand to a bat box and will then be relocated to the bat boxes installed in advance of works. Records of any such activities will be maintained.
- The tree and/or tree sections will be left on the ground for a minimum period of 24 hours to enable any unidentified bats residing in deeper crevices to make good their escape during night-time hours.
- These trees will also be 'soft' felled. Soft felling shall include the following measures:
  - Felling to be undertaken under the supervision of the ECoW.
  - Felling of entire tree from base, allowing the tree to fall (i.e. no introduced force).
  - The ECoW shall inspect the tree for further evidence of bat roosting. If evidence is found, all works on that tree shall be halted and the local NPWS Conservation Ranger shall be contacted. No works on that tree shall be permitted without agreement from the NPWS.
  - Tree to be left in place (uncut) for 24hrs, after which, sectioning, chipping, and removal can take place.

10.5.3.1.1.2 Lighting

To minimise potential disturbance to roosting bats, construction operations during the hours of darkness will be kept to a minimum. If construction lighting is required, lighting shall be directed away from all habitats where bats are potentially roosting. This can be achieved by using directional lighting (i.e. lighting which only shines on the proposed works and not nearby countryside) to prevent overspill. This shall be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.

10.5.3.1.1.3 Bat Boxes

By way of biodiversity enhancement, nine no. bat boxes shall be erected along the Brusna, six no. bat boxes shall be erected along the northern section of the River Moy (i.e. downstream of the Lower Bridge), six no. bat boxes shall be erected along the Tullyegan, six no. bat boxes shall be erected along the newly opened channel along the Bunree and six no. bat boxes shall be erected adjacent to the open channel of the Quignamanger. Each box shall be placed in groups of three bat box per structure arranged at the same height facing north, south-east and south-west to ensure a range of temperatures for roosting bats. Suitable locations will be determined by the ECoW based on suitable locations available to erect them, proximity to artificial lighting and connectivity to foraging and commuting habitats. In the absence of suitable structures (e.g. retained trees, bridge structures, buildings) to erect the boxes, they will be pole-mounted in suitable locations or mounted in suitable locations on built structures. These boxes shall be away from any felling or trimming to ensure that they are not accidentally damaged or removed. The bat boxes will be Schwegler-type (woodcrete) type boxes (or similar) and a range of different type boxes (e.g. 2F, 1FF, 3FF, 1FW, 1FE and 1FTH) will be used. These will be provided in addition to any mitigation required with respect to any derogation requirements which may be identified as a result of pre-commencement surveys.

10.5.3.2 Protected Terrestrial Mammals – Hedgehog, Pygmy Shrew, Irish Stoat

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts on hedgehog, pygmy shrew and Irish stoat:

10.5.3.2.1 Construction Phase

- Environmental Incidents and Accidents Measures (**Section 10.5.1.6**)
- Watching Brief during Site Clearance (**Section 10.5.1.7**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)
- Noise and Vibration Measures (**Chapter 15: Noise and Vibration**)

10.5.3.3 Amphibians and Reptiles

The mitigation measures listed below are measures which will avoid, minimise and mitigate construction phase impacts to amphibians and reptiles:

10.5.3.3.1 Construction Phase

- Water Protection Measure (**Chapter 9: Aquatic Biodiversity, Chapter 11: Land, Soils, Geology and Hydrology** and **Chapter 12: Water**)
- Environmental Incidents and Accidents (**Section 10.5.1.6**)
- Watching Brief during Site Clearance (**Section 10.5.1.7**)
- Invasive Alien Plant Species Measures (**Section 10.5.1.8**)

10.6 Noise and Vibration Measures (Chapter 15: Noise and Vibration) Residual Impacts

10.6.1 Construction Phase

Subject to the implementation of the mitigation measures outlined above, residual effects anticipated on IEFs during the construction phase of the Proposed Scheme has been reduced to levels that are not considered to be significant.

10.6.2 Operational and Maintenance Phase

Subject to the implementation of the mitigation measures outlined above, residual effects anticipated on IEFs during the operational and maintenance phase of the Proposed Scheme has been reduced to levels that are not considered to be significant.

10.7 Monitoring

Monitoring measures, and targets as appropriate have been recommended in relation to the Proposed Scheme for the construction and operational phases set out in the following sections.

10.7.1 Construction Phase

The required monitoring during the construction phase of the Proposed Scheme has been outlined above under various sections under the mitigation measures heading (**Section 10.5**) e.g. Watching Brief During Site Clearance, Invasive Alien Plant Species Management etc.

10.7.2 Operational and Maintenance Phase

The following monitoring will be implemented during the operational and maintenance phase of the Proposed Scheme:

- Ongoing monitoring and treatment of invasive alien plant species across the Proposed Scheme area will be maintained for 5 years (in the case of Japanese knotweed) and 2 years for every other IAPS from the initiation of treatment.
- The recovery of areas where floating river vegetation is disturbed during the proposed works will be monitored. This will be ongoing until such time as the habitat is considered to be fully recovered.
- The recovery of areas where tall herb swamp is disturbed during the proposed works will be monitored. This will be ongoing until such time as the habitat is considered to be fully recovered from disturbance.
- Habitat establishment of areas of compensatory planting will be monitored.

10.8 Interactions and Cumulative Effects

Inter-relationships are the impacts and associated effects of different aspects of the Proposed Scheme on the same receptor. The potential for cumulative effects has been considered for the construction and operation of the Proposed Scheme cumulatively with other projects. Please see **Chapter 20 Interactions and Cumulative Effects** for further details on the potential interactions and cumulative effects for human health.

10.9 Schedule of Environmental Commitments

Please see **Chapter 22 Schedule of Environmental Commitments** which sets out all the mitigation and monitoring commitments to minimise the potential impacts for human health during the construction and operational phase of the Proposed Scheme.

10.10 Chapter References

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