# Contents

# 6. BIODIVERSITY

## 6.1 INTRODUCTION

This section of the EIAR describes the potential impacts of the proposed Limerick City Greenway (UL to NTP) on biodiversity, flora and fauna and has been completed in accordance with the guidance set out by the Environmental Protection Agency in '*Guidelines on Information to be contained in Environmental Impact Statements*' (EPA, 2022), '*Advice Notes on Current Practice in the preparation of Environmental Impact Statements*' (EPA, Draft, 2015) and '*Guidelines for Ecological Impact Assessment in the UK and Ireland-Terrestrial, Freshwater, Coastal and Marine*' (CIEEM, 2018, V.1.2 2022).

This assessment is based on published literature and field visits that were made to the site by Ryan Hanley ecologists. Visits were made during 2020, 2021, 2022, 2023 and 2024 with a focus on habitats, mammals, bats, birds and freshwater aquatic ecology occurring within the environs of the proposed development (see Table 6.1 for a list of surveys conducted). The survey work was carried out by Ryan Hanley Ecologists as detailed in Chapter 1 of the EIAR. The ecology of the area surrounding the proposed development was first assessed in terms of habitats, flora, fauna and invasive species. The area over which the proposed development has the potential to result in effects to the Zone of Influence which is determined by careful scientific analysis as outlined in detail in Section 6.1.1 below. Following this, the chapter identifies the Key Ecological Receptors (KERs) within the Zone of Influence (ZoI) and accurately assesses the potential for effects thereon. KERs are features of the proposed development which are '*of sufficient value to be material in decision making and likely to be affected significantly*' (NRA, 2009). KERs are of local importance (Higher Value) or higher, as set out in detail in Section 6.2.1 below. Features of local importance (Lower Value) are not considered and are therefore excluded from impact assessment.

This chapter quantifies any potential direct and/or indirect significant effects relating to biodiversity and the identified KERs. It identifies the measures required to avoid, reduce and mitigate likely significant effects and assesses any residual effects that remain following implementation of mitigation. Identification of effects and prescribed mitigation has been derived following a collaborative approach working with a multi- disciplinary team of specialist consultants. The results of the ecological surveys were used to inform the ecological assessment which have been utilised to inform the design of the proposed development, thereby minimising potential effects on sensitive habitats and species of conservation interest.

Using the comprehensive assessment of the existing environment (baseline conditions), it has been possible to accurately predict the likely direct and indirect significant effects of the proposed development on the KERs and correctly assign an ecological significance to them.

Where detrimental effects have been identified, detailed and specific mitigations have been developed in accordance with the hierarchy of options suggested in the European Commission publication, '*Managing Natura 2000 Sites - The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*', 2000. The adopted approach was - avoid at source, reduce at source, abate on site and finally, abate at receptor. These measures have been incorporated into the proposed development as part of the avoidance and environmental protection strategy.

The information provided in this EIAR chapter accurately and comprehensively describes the baseline ecological environment; provides an accurate prediction of the likely ecological effects of the proposed development and prescribes mitigation as necessary. It then describes the residual ecological effects and any monitoring that is to be undertaken post consent. The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines as fully described in the methodology section below.

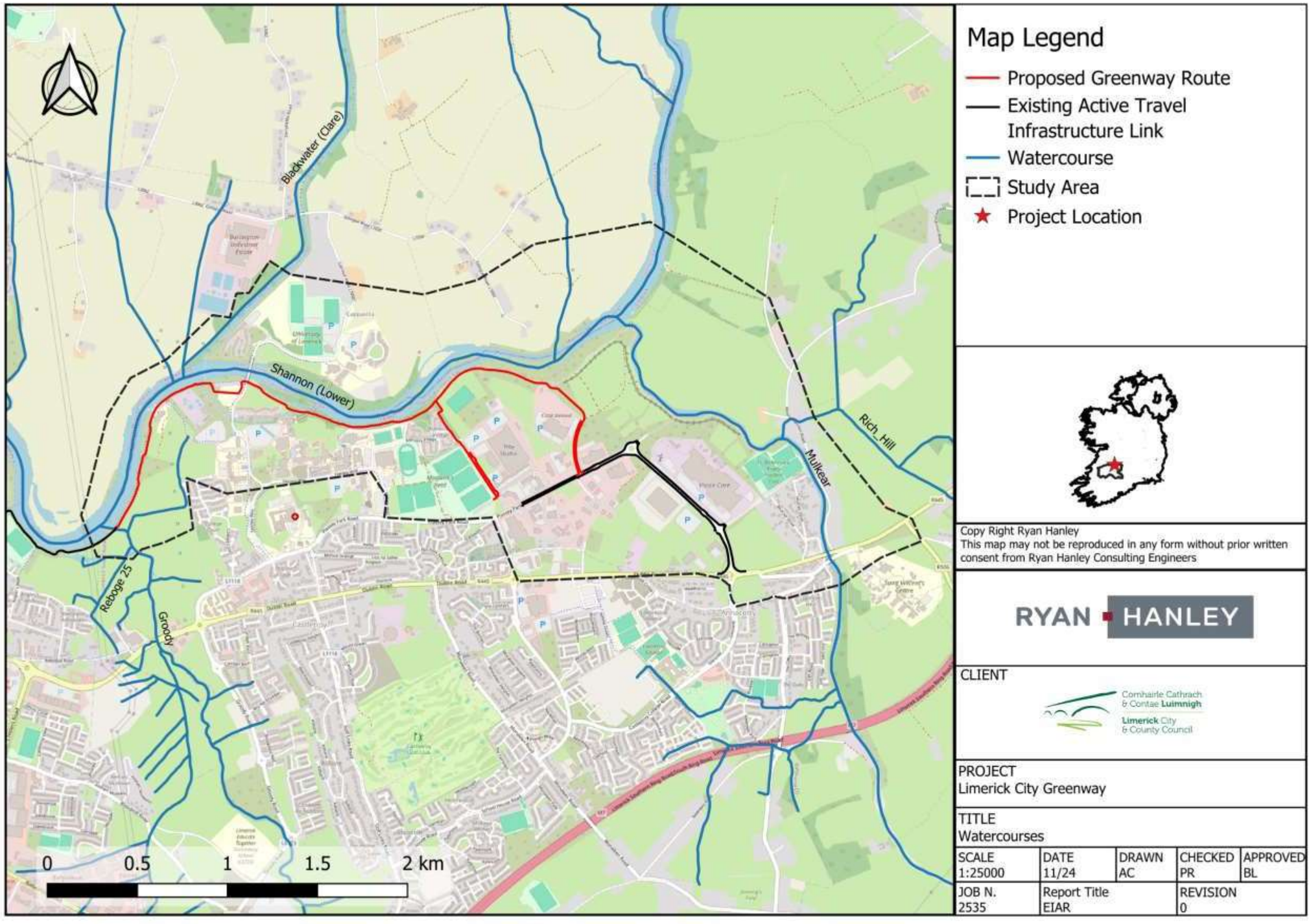


**Figure 6.1 Study Area of the Limerick City Greenway (UL to NTP)**

## 6.2 METHODOLOGY AND LIMITATIONS

An initial study area was determined as part of the Constraints Study and its outline is located along the banks of the River Shannon from the Groody River to the National Technology Park (NTP). The study area for the proposed Greenway is centred around the UL campus grounds and the National Technology Park (NTP) in Limerick. The area lies within the Lower Shannon Catchment, and it covers approximately 4.5km long and 3.5-4.0m wide shared path, 1.5-2.0m wide footpath, and 1.8-2.5m wide cycle lanes of design interfaces where the Greenway meets public paths and roads. The study area was selected based on ecological sensitivities, proximity to protected habitats and potential construction impact zones. The River Shannon is an EU designated site as Special Area of Conservation (SAC) with protected habitats and species. Accordingly, the study area was defined to encompass the proposed greenway alignment and a buffer area that goes beyond 150m from the riverbank, including any areas likely to be affected by access roads or any other ancillary construction activities. The study area also considered potential indirect impacts such as noise, lighting, and human disturbance on adjacent habitats, ensuring a comprehensive assessment of the potential impacts on biodiversity.

A preliminary walkover survey of the study area for was undertaken on the 04th & 05th November 2020 and follow-up surveys was conducted on the 14th and 15th May 2021 and 21st and 28th April 2022. These surveys were carried out in accordance with NRA Guidelines on '*Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes*' (NRA, 2009).

Habitat mapping was undertaken with regard to guidance set out in '*Best Practice Guidance for Habitat Survey and Mapping*' (Smith *et al.,* 2011). Plant nomenclature for vascular plants follows '*New Flora of the British Isles*' (Stace, 2010), while mosses and liverworts nomenclature follow '*Mosses and Liverworts of Britain and Ireland - a field guide*' (British Bryological Society, 2010).

The walkover surveys were designed to detect the presence, or likely presence, of a range of protected species.

During field surveys a survey for Badgers (*Meles meles*) was conducted adhering to best practice guidance (NRA, 2009) and was cognisant of '*Guidelines for the Treatment of Badger Prior to the Construction of National Roads Schemes*' (NRA, 2006) in order to determine the presence of badger signs along and adjacent to the proposed development within the study area. Whilst the best time for undertaking Badger surveys is between November and April, when vegetation cover is reduced, the Badger surveys conducted in May 2021 and April 2022 were not constrained by vegetation or season and a comprehensive survey was conducted. This survey was also repeated in July 2024 also. During these surveys no field sign of Badgers were recorded.

In addition, an Otter (*Lutra lutra*) survey was conducted adhering to the methodology of the '*Standard Otter Survey' method and outlined by the National Otter Survey publication (IWM76, Reid et al, 2013*)' in order to determine the presence of Otter signs along and adjacent to the proposed development within the study area. Whilst the best time for undertaking otter surveys is between November and April, when vegetation cover is reduced, the Otter surveys conducted in May 2021 and April 2022 were not constrained by vegetation or season and a comprehensive survey was conducted. This survey was also repeated in July 2024. During these surveys no field signs of Otters were recorded.

Habitats considered to be of ecological significance and in particular having the potential to correspond to those listed in Annex I of the EU Habitats Directive 92/43/EEC were identified and assessed.

During field surveys in November 2020, May 2021, April 2022, May 2023 and June 2024, searches for Invasive Alien Species listed under the Third Schedule of the European Communities (Birds and Natural

Habitats) Regulations 2011 (S.I. 477 of 2015) was conducted. Regulations 49 and 50 include legislative measures to deal with the dispersal and introduction of Invasive Alien Species. Regulation 50 has not yet been commenced. Invasive Alien Species are also addressed by EU Regulation 1143/2014 on the Prevention and Management of the Introduction and Spread of Invasive Alien Species, which seeks to address the problem of Invasive Alien Species in a comprehensive manner so as to protect native biodiversity and ecosystem services, as well as to minimise and mitigate the human health or economic impacts that these species can have.

The multi-disciplinary walkover surveys comprehensively covered the proposed Greenway. Seasonal factors that affect distribution patterns and habits of species were taken into account when conducting these surveys and the potential of the site to support certain populations (in particular those of conservation importance that may not have been recorded during the field survey due to their seasonal absence or cryptic nature) was assessed. **Table 6.1** summarises the field surveys completed to date in relation to the proposed development.

**Table 6.1 Field Surveys undertaken for the Limerick City Greenway (UL to NTP)**

| Survey Type | Dates of Survey | Survey Locations |
|---|---|---|
| Preliminary Multi-disciplinary Walkover Survey; | 04th November 2020<br>28th April 2022 | Walkover Survey along route of Greenway route |
| Ecology Habitat survey | 14th May 2021<br>28th April 2022 | Within study area of Greenway. |
| Badger survey | 15th May 2021<br>8th July 2024 | 25m buffer along the preferred Greenway |
| Bat Survey | 19th July 2021<br>9th - 21st September 2021<br>10th of January 2024<br>19th of June & 10th of July 2024 | 50m buffer along the preferred Greenway |
| Breeding Bird surveys | 2021, June<br>2022, April and June 2023, May and June | Line transect surveys, spot-counts, field scanning, river scanning and distribution mapping from varied vantage points affording good views. |
| Winter Bird Surveys | Field Surveys (5 no. visits; November 2021 – March 2022)<br>Field Surveys (6 no. visits; October 2023 – March 2024) | Line transect surveys, spot-counts, field scanning, river scanning and distribution mapping from varied vantage points affording good views. |
| Alien Invasive Species survey | 05th November 2020<br>14th May 2021<br>28th April 2022<br>3rd of May 2023<br>26th of June 2024 | Within the footprint of the preferred Greenway route. |
| Otter survey | 15th May 2021<br>8th July 2024 | 25m buffer along the preferred Greenway route |

| Survey Type | Dates of Survey | Survey Locations |
|---|---|---|
| Aquatic Ecological Appraisal survey | June 2021<br>November 2023 | Within study area of the Greenway and adjacent to the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. |
| RHAT Assessment | 8th July 2024 | Within the footprint of the preferred Greenway route. |
| Tree survey and Arboricultural Impact Assessment | 26th May and 22nd June 2021, 20th and 25th February 2024. | Walkover Survey along route of Greenway. |
| Cultural Heritage | February, March and December 2023 | Walkover Survey conducted |

### 6.2.1 Methodology for Determining the Zone of Influence

According to the Chartered Institute for Ecology and Environmental Management (CIEEM) Guideline (CIEEM, 2018, V.1.2, 2022), the Zone of Influence (ZoI) for a project is 'the area over which ecological features may be affected by the 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.'

Impact pathways can occur if there is a viable pathway between the proposed development and Key Ecological Receptors (KERs). Potential pathways for impact can occur via surface water, groundwater, air or land. Hydrological linkages (surface and groundwater) between a proposed development and KERs can occur over significant distances (several kilometres); however, the significance of the impact will be site specific depending on the receiving water environment and nature of the potential impact. Air and land linkages between the proposed development and KERs typically occur over shorter distances (hundreds of meters).

Given the location, nature and size of this proposed development and the proposed construction methodology it is considered for the purpose of this EIAR that the likely ZoI is the zone immediately around the construction site, and downstream catchment. Refer to Figure 6.1.

### 6.2.2 Methodology for Assessment of Effects

#### *6.2.2.1 Geographical Framework for Determining Importance of Ecological Receptors*

Guidance on Ecological Impact Assessment (CIEEM, 2018 updated in 2024) recommends categories of ornithological or nature conservation value that relate to a geographical framework (e.g., international to local level). This assessment utilises the geographical framework described in Chapter 3 of the '*Guidelines for Assessment of Ecological Impact of National Road Schemes*' (NRA, 2009). The guidelines provide a basis for determination of whether any particular receptor is of importance on the following scales:

- International;
- National;
- County;
- Local Importance (Higher Value); and
- Local Importance (Lower Value).

The Guidelines clearly set out the criteria by which each geographic level of importance can be assigned. Locally Important (Lower Value) receptors contain habitats and species that are widespread and of

relatively low ecological significance in a local context but may nonetheless provide links and continuity for the wider ecosystem. Internationally Important sites are designated for conservation as part of the Natura 2000 Network (SAC or SPA) or provide the best examples of habitats or internationally important populations of protected flora and fauna. Specific criteria for assigning each of the other levels of importance are set out in the guidelines and have been followed in this assessment. Where appropriate, the geographic frame of reference set out above was adapted to suit local circumstances. In addition, and where appropriate, the conservation status of habitats and species is considered when determining the significance of ecological receptors.

Any ecological receptors that are determined to be of Local Importance (Higher Value), County, National or International Importance following the criteria set out in NRA (2009) are considered to be KERs for the purpose of ecological impact assessment if there is a pathway for effects thereon. Any receptors that are determined to be of Local Importance (Lower Value) are not considered KERs.

#### *6.2.2.2 Characterizations of Impacts and Effects*

The proposed development will lead to impacts. These ecological impacts are described in accordance EPA guidelines (EPA, 2022) and EclA guidelines (CIEEM, 2018). The impact characterisations follow the headings outlined in the guidance document and are applied where relevant. A summary of the impact characteristics considered in the assessment is provided below:

- **Positive or Negative**: Evaluates whether the proposed development will have a positive or negative effect on the ecological receptor.
- **Extent**: Describes the spatial area over which the effect may occur.
- **Magnitude**: Considers the size, amount, intensity, and volume of the impact. This should be quantified whenever possible and expressed in absolute or relative terms, such as the amount of habitat lost, percentage change in habitat area, or percentage decline in a species population.
- **Duration**: Defined in relation to both ecological characteristics (such as the lifecycle of a species) and human timeframes. For example, five years may seem short-term from a human perspective but could span at least five generations of some invertebrate species.
- **Frequency and Timing**: Relates to the number of times an impact occurs and its frequency. Even a small-scale impact can have a significant effect if it is repeated frequently over a long period.
- **Reversibility**: Considers whether an effect is reversible within a 'reasonable' timescale. What is considered a reasonable timescale can vary between receptors and is justified where appropriate in the impact assessment section of this report.

The magnitude of the effects of the proposed development are determined following the precautionary principle and in accordance with the methodology set out in Section 5 of CIEEM (2018).

For the purpose of an ecological assessment for this proposed greenway, a 'significant effect' is one that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific, such as those for a designated site, broad, such as national or local nature conservation policies, or more wide-ranging, such as the enhancement of biodiversity. Effects can be considered significant at various scales, ranging from international to local.

When determining significance, consideration is given to whether:

- Any processes or key characteristics of key ecological receptors will be removed or changed.
- There will be an effect on the nature, extent, structure and function of important ecological feature.
- There is an effect on the average population size and viability of ecologically important species.

- There is an effect on the conservation status of important ecological habitats and species.

The terminology used in determining the magnitude and quality of effects follows the suggested language outlined in the EPA Guidelines (2022), as detailed in Section 1.6.2 of this EIAR.

Once the potential effects are characterized using the methodology outlined in Chapter 1 of this EIAR, the significance of these effects on the identified Key Ecological Receptors (KERs) will be determined following CIEEM Guidelines (2018).

#### *6.2.2.3 Mitigation*

The development has been designed to specifically avoid, reduce and minimise effects on all KERs. Where potential effects on KERs are predicted, mitigation has been prescribed to avoid, reduce and abate such effects, often by means of control and management measures.

Proposed best practice design and mitigation measures are specifically set out and are realistic in terms of cost and practicality. They have been subject to detailed design considerations and will address the likely effects on the identified KERs.

The potential effects of the proposed development were considered and assessed to ensure that all effects on KERs are adequately addressed, and no significant residual effects are likely to remain following the implementation of mitigation measures/best practice.

#### *6.2.2.4 Limitations*

The information provided in this EIAR chapter accurately and comprehensively describes the baseline ecological environment; provides an accurate prediction of the likely ecological effects of the proposed development; prescribes mitigation as necessary; and describes the residual ecological impacts. The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines. Regarding lands, assessment showed no significant limitations in scope, scale or context.

## 6.3 RECEIVING ENVIRONMENT

### *6.3.1* Desktop Study

A desk study was undertaken in order to collate available information on the existing local ecological environment and to inform the initial scope of the ecological surveys. The following sources of information were reviewed as part of this report:

- Ordnance Survey maps of the study area (www.osi.ie);
- Aerial photography of the Study Area;
- The National Parks and Wildlife Service (NPWS) site synopses and online database (www.npws.ie) of information on designated sites;
- A Guide to Habitats in Ireland (Fossitt, 2000);
- *New Atlas of the British & Irish Flora* (Preston *et al.*, 2002);
- Flora (Protection) Order 2022 Map Viewer: https://heritagedata.maps.arcgis.com/apps/webappviewer/index.html?id=a41ef4e10227499d8de17a8abe42bd1e
- Bat records from the Bat Conservation Ireland (BCI) databases (All-Ireland Daubenton's Bat Survey, Bat Monitoring Scheme BATLAS);

- The Bird Atlas 2007-2011, the British Ornithology Trust website www.bto.org/volunteer-surveys/birdatlas;
- The National Biodiversity Data Centre (NBDC) database www.biodiveristyireland.ie for records of rare, protected, threatened and invasive species;
- NPWS Rare and Protected Species Records;
- Environmental information/data from the Environmental Protection Agency (EPA) website http://www.epa.ie/rivermap/data;
- The Water Framework Directive website www.wfdireland.ie; and
- GeoHive online mapping http://map.geohive.ie/mapviewer.html.

### 6.3.2 Designated Sites

The potential for the proposed development to impact on sites that are designated for nature conservation was considered in this assessment.

Special Areas of Conservation (SACs) and Special Protection Areas for Birds (SPAs) are designated under the EU Habitats Directive and are collectively known as 'European Sites'. The potential effects on European Sites are fully considered in the Natura Impact Statement accompanying this application and are also discussed in this EIAR.

Natural Heritage Areas (NHAs) are designated under the Wildlife Act 1976, the Wildlife (Amendment) Act 2000, and all subsequent amending acts. Their management and protection are provided for by this legislation and planning policy. The potential effects on these designated sites are fully considered in this EIAR.

Proposed Natural Heritage Areas (pNHAs) were designated on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. Many pNHAs are protected under County Development Plan Objectives.

#### *6.3.2.1 European Sites*

The European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) requires the establishment and conservation of a network of sites that are to be termed 'European Sites' which are known as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

The locations of the European sites within the zone of influence of the Study Area are shown in **Figure 6. 2** with details of each site provided in **Table 6. 2.** In conclusion with reference to **Table 6. 2,** identified European Sites, with the exception of the Lower River Shannon SAC, can be screened out due to the significant distance from proposed site as no viable Source » Pathway » Receptor was identified.

A section of the proposed Greenway, is located within and adjacent to the Lower River Shannon SAC. The potential for the project to result in adverse effects on European sites, in particular the Lower River Shannon SAC, is considered low. However, in line with a precautionary approach, a Stage 2 Appropriate Assessment of the proposed development is considered necessary in respect of close proximity of the proposed Greenway, a hydrological link to the River Shannon as well as potential for runoff of construction phase materials to occur.

As per EPA draft Guidance 2022, "a biodiversity section of an EIAR should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement," but should "incorporate their key findings as available and appropriate." This section provides a summary of the key

assessment findings set out in the Natura Impact Statement regarding the relevant Special Areas of Conservation.

The potential for the proposed development to result in adverse effects on the Lower River Shannon SAC, without mitigation, could not be excluded in the assessment contained in the Appropriate Assessment Screening report, leading to the preparation of a Natura Impact Statement. The potential for the proposed development to result in adverse effects on the integrity of these sites was considered in view of the conservation objectives of the site and in combination with other plans and projects. The following conclusion was reached (based on the reasons set out in the NIS):

It can be excluded, on the basis of objective scientific information, that the project, on its own or in combination with other plans or projects, will not adversely affect the integrity of any European Site, having regard to their site conservation objectives.

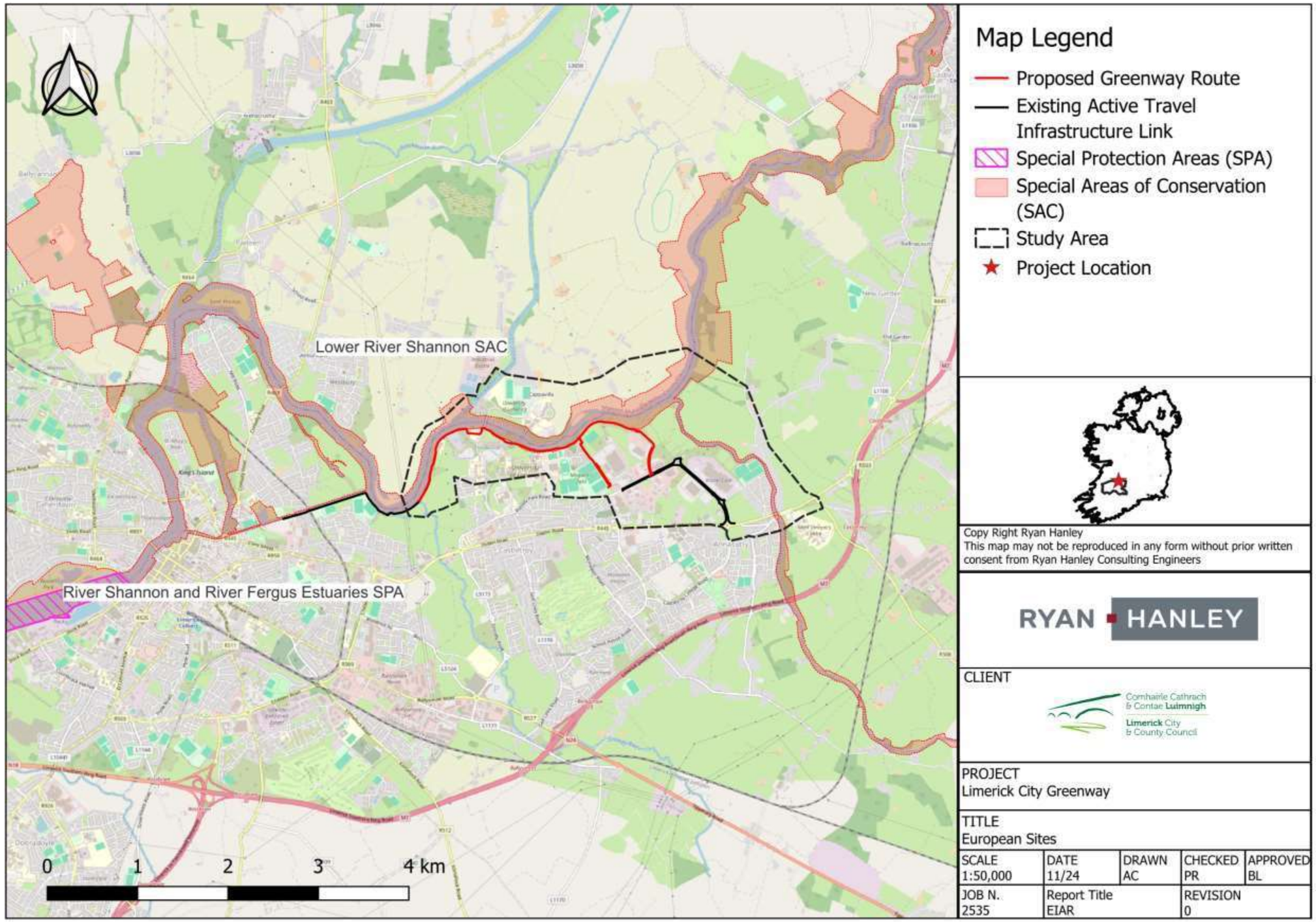


**Figure 6. 2 European Sites Identified within Zone of Influence of the Study Area**

**Table 6. 2 European Sites Identified within the Zone of Influence of the Study Area. (* denotes priority habitat).**

| Designated site and code | Distance from Scheme | Qualifying Interests (QI's) | Pathway for Effect |
|---|---|---|---|
| Lower River Shannon SAC [002165] | Greenway within boundary of this SAC and adjacent to at various locations | ▪ Sandbanks which are slightly covered by sea water all the time [1110];<br>▪ Estuaries [1130];<br>▪ Mudflats and sandflats not covered by seawater at low tide [1140];<br>▪ Coastal lagoons [1150]*;<br>▪ Large shallow inlets and bays [1160];<br>▪ Reefs [1170];<br>▪ Perennial vegetation of stony banks [1220];<br>▪ Vegetated sea cliffs of the Atlantic and Baltic coasts [1230];<br>▪ Salicornia and other annuals colonising mud and sand [1310];<br>▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330];<br>▪ Mediterranean salt meadows (*Juncetalia maritimi*) [1410];<br>▪ Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260];<br>▪ Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410];<br>▪ Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]*;<br>▪ Freshwater Pearl Mussel (*Margaritifera margaritifera*) [1029];<br>▪ Sea Lamprey (*Petromyzon marinus*) [1095];<br>▪ Brook Lamprey (*Lampetra planeri*) [1096];<br>▪ River Lamprey (*Lampetra fluviatilis*) [1099];<br>▪ Salmon (*Salmo salar*) [1106]; | Yes.<br><br>Land and air pathways were identified due to a section (along the banks of the River Shannon) of the proposed Greenway taking place within the boundary of the Lower River SAC.<br><br>Due to the close proximity of the proposed Greenway, a hydrological link to the River Shannon was identified, with the potential for runoff of construction phase materials to occur. However, risk of sediment or pollution is low and likely to be of short duration.<br><br>There is the potential for the spread of the Third Schedule Invasive Species Himalayan balsam (*Impatiens glandulifera)* and Giant hogweed (*Heracleum mantegazzianum)* throughout the SAC, adversely affecting some of the Qualifying Interests. |

| Designated site and code | Distance from Scheme | Qualifying Interests (QI's) | Pathway for Effect |
|---|---|---|---|
| | | ▪ Common Bottlenose Dolphin (*Tursiops truncatus*) [1349]; and<br>▪ Otter (*Lutra lutra*) [1355] | |
| Glenomra Wood SAC [001013] | 8.4km north | ▪ Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] | No.<br>The proposed development will result in no potential significant effects on this European Site as there were no hydrological or ecological pathways for impact identified. Glenomra Wood SAC is located at a significant distance of 8.4km north from the proposed Greenway. |
| Slievefelim to Silvermines Mountains SPA [004165] | 8.49km east | ▪ Hen Harrier (*Circus cyaneus*) [A082] | No.<br>The proposed Project will result in no potential significant effects on this European Site as there were no hydrological or ecological pathways for impact identified. Slievefelim to Silvermines Mountains SPA is located at a significant distance of 8.49km east from the proposed Greenway |
| Glenstal Wood SAC [001432] | 9.38km east | ▪ Killarney Fern (*Trichomanes speciosum*) [1421] | No.<br>The proposed development will result in no potential significant effects on this European Site as there were no hydrological or ecological pathways for impact identified. Glenstal Wood SAC is located at a significant distance of 9.38km east from the proposed Greenway. |
| Danes Hole, Poulnalecka SAC [000030] | 14.79km north-west | ▪ Caves not open to the public [8310];<br>▪ Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]; and<br>▪ Lesser Horseshoe Bat (*Rhinolophus hipposideros*) [1303] | No.<br>The proposed development will result in no potential significant effects on this European Site as there were no hydrological or ecological pathways for impact identified as Danes Hole, |

| Designated site and code | Distance from Scheme | Qualifying Interests (QI's) | Pathway for Effect |
|---|---|---|---|
| | | | Poulnalecka SAC is located at a significant distance of 14.79km north-west from the proposed Greenway. |
| Tory Hill SAC [000439] | 16km south | ▪ Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210];<br>▪ Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]*; and<br>▪ Alkaline fens [7230]. | No.<br><br>The proposed development will result in no potential significant effects on this European Site as there were no hydrological or ecological pathways for impact identified as Tory Hill SAC is located at a significant distance of 16km south from the proposed Greenway. |
| River Shannon and River Fergus Estuaries SPA [004077] | 5km southwest | ▪ Cormorant (*Phalacrocorax carbo*) [A017];<br>▪ Whooper Swan (*Cygnus cygnus*) [A038];<br>▪ Light-bellied Brent Goose (*Branta bernicla hrota*) [A046];<br>▪ Shelduck (*Tadorna tadorna*) [A048];<br>▪ Wigeon (*Anas penelope*) [A050];<br>▪ Teal (*Anas crecca*) [A052];<br>▪ Pintail (*Anas acuta*) [A054];<br>▪ Shoveler (*Anas clypeata*) [A056];<br>▪ Scaup (*Aythya marila*) [A062];<br>▪ Ringed Plover (*Charadrius hiaticula*) [A137];<br>▪ Golden Plover (*Pluvialis apricaria*) [A140];<br>▪ Grey Plover (*Pluvialis squatarola*) [A141];<br>▪ Lapwing (*Vanellus vanellus*) [A142];<br>▪ Knot (*Calidris canutus*) [A143];<br>▪ Dunlin (*Calidris alpina*) [A149];<br>▪ Black-tailed Godwit (*Limosa limosa*) [A156];<br>▪ Bar-tailed Godwit (*Limosa lapponica*) [A157];<br>▪ Curlew (*Numenius arquata*) [A160];<br>▪ Redshank (*Tringa totanus*) [A162];<br>▪ Greenshank (*Tringa nebularia*) [A164]; | No.<br><br>A hydrological connection exists between the proposed works and the European site (River Shannon and River Fergus Estuaries SPA), with portions of the works taking place on land adjoining the River Shannon. The SPA is located approximately 7.3 km downstream of the proposed works.<br><br>Typically, where there is hydrological connectivity, potential construction-stage impacts on SCI (Special Conservation Interest) bird species could arise from deterioration in water quality, which may reduce prey availability and negatively affect foraging efficiency. However, in this instance, such risks are considered negligible.<br><br>Between the proposed works and the designated site, the River Shannon receives input from several tributaries, including the SHANNON(LOWER)_060 and North Ballycannan_010, which contribute to significant dilution and dispersion of any potential contaminants. Additionally, the influence of tidal exchange within the estuarine environment further enhances dilution capacity. |

| | | | |
|---|---|---|---|
| | | | The distance of 7.3 km, in combination with this high dilution potential, means that any short-term construction-related runoff is unlikely to lead to significant changes in water quality at the SPA.<br><br>Furthermore, the area of proposed works (although located within potential foraging zone of some SCI bird species) is small in scale and situated in an urbanised setting, which does not provide high-value foraging or roosting habitat.<br><br>As such, there is no potential for significant effect on SCI bird species due to water quality, disturbance to SCI bird species, or for loss of significant habitat.<br><br>As well as the SCI bird species this site is also designated for the 'Wetlands (A999)' habitat, which has the conservation objective "to maintain the favourable conservation condition of the wetland habitat in the River Shannon and River Fergus Estuaries SPA as a resource for the regularly occurring migratory waterbirds that utilize it." Given the absence of any expected deterioration in water quality and considering the nature and scale of the project, there is no risk of significant effect on this habitat or its ability to achieve this conservation objective.<br><br>In relation to invasive species, surveys carried out by Ryan Hanley in 2024 identified the presence of giant hogweed (Heracleum mantegazzianum) and Himalayan balsam (Impatiens glandulifera) along the proposed greenway route. Without mitigation, there is potential for plant material (e.g. seeds or fragments) to enter adjacent watercourses and disperse downstream.<br><br>However, both species are widely documented as being generally intolerant of saline conditions and frequent tidal inundation (Global Invasive Species Database, 2024; U.S. Department of Agriculture, Forest Service, 2005). As such, the potential for successful establishment of either species within the estuarine habitats of the SPA is considered to be negligible. |

| | | | |
|---|---|---|---|
| | | | Therefore taking into account the separation distance, the dilution and tidal dispersion capacity of the waterbody, the limited scale and urban nature of the proposed works, and the low likelihood of invasive species establishment in estuarine conditions, it is concluded that the project will not result in any significant adverse effects on the qualifying interests or conservation objectives of the European site, either alone or in combination with other plans or projects |
| | | ▪ Black-headed Gull (*Chroicocephalus ridibundus*) [A179]; and<br>▪ Wetland and Waterbirds [A999]. | |
| Clare Glen SAC [000930] | 16km east | ▪ Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]; and<br>▪ *Trichomanes speciosum* (Killarney Fern) [1421]. | No.<br><br>The proposed development will result in no potential significant effects on this European Site as there were no hydrological or ecological pathways for impact identified. Clare Glen SAC is located at a significant distance of 16km east from the proposed Greenway. |
| Slieve Bernagh Bog SAC [002312] | 22km north | ▪ Northern Atlantic wet heaths with *Erica tetralix* [4010];<br>▪ European dry heaths [4030]; and<br>▪ Blanket bogs (* if active bog) [7130]. | No.<br><br>The proposed development will result in no potential significant effects on this European Site as there were no hydrological or ecological pathways for impact identified. Slieve Bernagh Bog SAC is located at a significant distance of 22km east from the proposed Greenway. |

#### *6.3.2.2 Natural Heritage Areas and Proposed Natural Heritage Areas*

Natural Heritage Areas (NHAs) are national heritage sites that are designated for the protection of flora, fauna, habitats, and geological sites deemed to be of national ecological importance and are afforded protection under Section 16 of the Wildlife (Amendment) Act 2000. Many NHA boundaries overlap with European sites. Proposed Natural Heritage Areas (pNHAs) have not been statutorily proposed or designated under the Act, however they do have some protection under schemes such as Agri-Environmental Schemes, Forest Service requirements, Licensing Authorities and County Development Plans. **Figure 6. 3** shows the NHA's and the proposed NHAs in proximity to the Project.

There are four NHA's and sixteen pNHA's within the zone of influence of the scheme. Where an NHA or pNHA overlaps with the boundary of a European designated site the potential for impacts have been considered under the European designation in Section 6.3.2.1 above. Nationally designated sites are listed in **Table 6.3**.

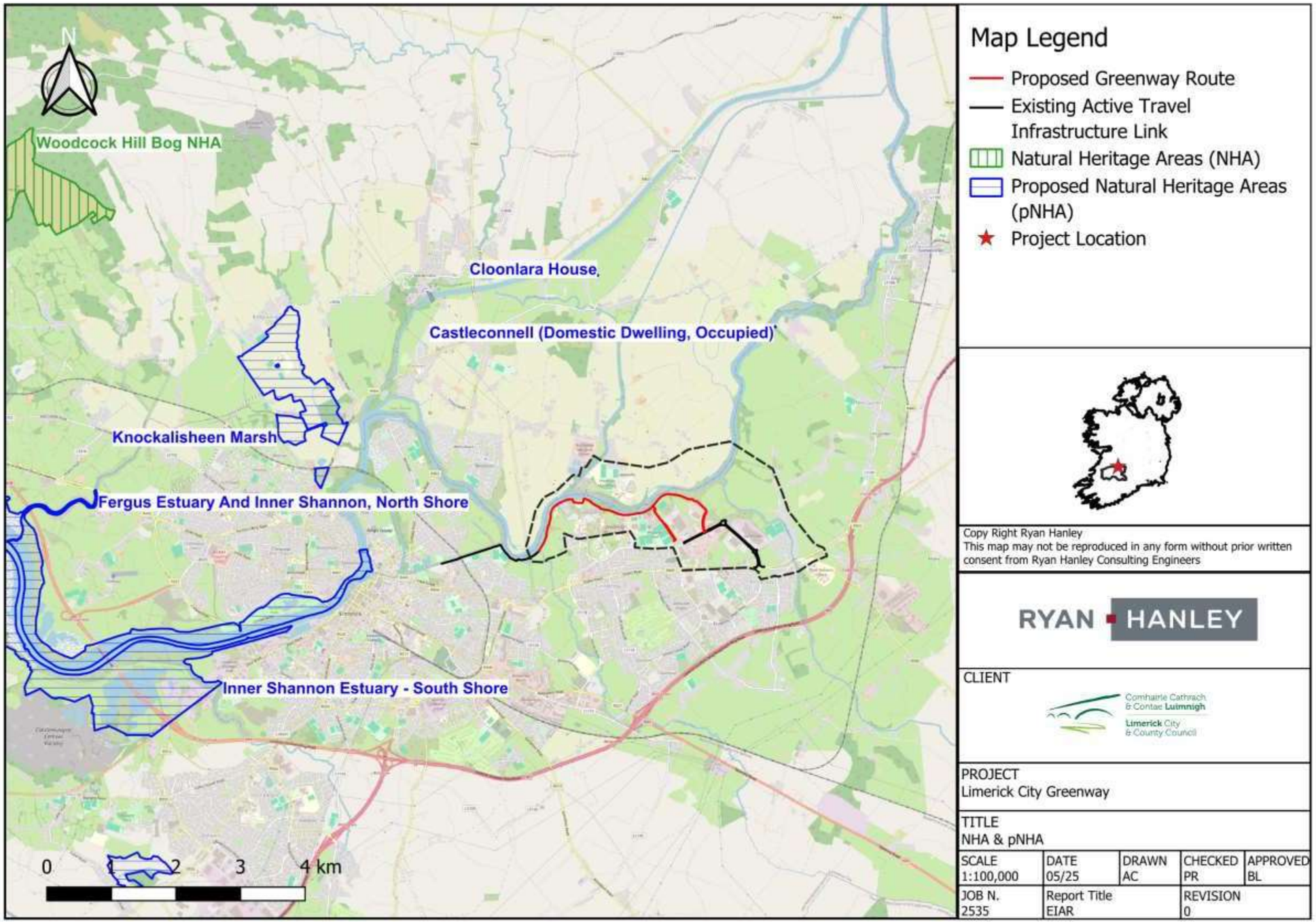


**Figure 6. 3 National Heritage Areas Identified within Zone of Influence of the Study Area**

**Table 6.3 Natural Heritage Areas (NHA) and Proposed Natural Heritage Areas (pNHA) Identified within the zone of influence of the Study Area.**

| Designated site and code | Distance from Scheme | Site Synopsis | Pathway for Effect |
|---|---|---|---|
| **Natural Heritage Areas (NHA)** | | | |
| Woodcock Hill Bog NHA [002402] | 8.17km north-west | Woodcock Hill Bog NHA is an area of upland blanket bog and heath situated approximately 8km north-west of Limerick City and 5 km south-east of Sixmilebridge in Co. Clare. The northern, eastern and western margins of the site are bounded by plantation forestry fringed by firebreaks.<br><br>Woodcock Hill Bog NHA is a site of considerable conservation significance comprising upland blanket bog and wet heath. Wet heath is dominated by Deergrass (*Scirpus cespitosus*) and Ling Heather (*Calluna vulgaris*). Other species occurring here include Cross-leaved Heath (*Erica tetralix*), Purple Moor-grass (*Molinia caerulea*), Carnation Sedge (*Carex panicea*), Tormentil (*Potentilla erecta*), Common Cottongrass (*Eriophorum angustifolium*), Hare's-tail Cottongrass (E. vaginatum) and Lousewort (*Pedicularis sylvatica*). Bog mosses (*Sphagnum spp.*) occur locally but rarely dominate. Lichens (*Cladonia spp.*) occur throughout the site. Hummocks of the moss *Racomitrium lanuginosum* occur on the summit.<br><br>The Qualifying Interest for this site is Peatlands [4]. | Woodcock Hill Bog NHA is located at a significant distance of 8.17km north-west from the proposed Study Area. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |
| Gortacullin Bog NHA [002401] | 12.7km north | Gortacullin Bog NHA contains a mosaic of upland blanket bog and wet heath and is located approximately 4 km south-west of Broadford, Co. Clare and approximately 9km northeast of Sixmilebridge, in Co. Clare. The northern margins of the site are bounded by enclosed agricultural land and the southern and eastern margins are bounded by commercial forestry plantation.<br><br>Blanket bog is confined to the lower slopes of the centre and eastern part of the site with wet heath occupying the drier areas on slightly higher ground. There is a | Gortacullin Bog NHA is located at a significant distance of 12.7km north-west from the proposed Study Area. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |

| Designated site and code | Distance from Scheme | Site Synopsis | Pathway for Effect |
|---|---|---|---|
| | | large flush in the north part of the site and regenerating cutover bog with scrub woodland occurs in the south-centre.<br><br>Much of the of the blanket bog vegetation consists of Deergrass (*Scirpus cespitosus*), Ling Heather (*Calluna vulgaris*), Cross-leaved Heath *(Erica tetralix*), Common Cottongrass (*Eriophorum angustifolium*), Hare's-tail Cottongrass (*Eriophorum vaginatum*), Bog Asphodel (*Narthecium ossifragum*), Purple Moor-grass (*Molinia caerulea*), Tormentil (*Potentilla erecta*) and Carnation Sedge (*Carex panicea*). Bog mosses (*Sphagnum spp.*) are present throughout the site and in the wetter areas are present as carpets. In the flushes, carpets of bog moss *S. recurvum* occur with Soft Rush (*Juncus effusus*) and the Common and Hare's-tail Cotton grasses. Wet heath habitat is found on the better drained slopes and is characterized by a higher cover of Ling Heather with Common Bent (*Agrostis capillaris*), Heath Rush (*Juncus squarrosus*), Bell Heather (*Erica cinerea*), Heath Milkwort (*Polygala serpyllifolia*), Heath Wood-rush (*Luzula multiflora*), Devil's-bit Scabious (*Succisa pratensis*), Bilberry (*Vaccinium myrtillus*) and Carnation Sedge. Old cutover is mainly dominated by Ling Heather. Birch (*Betula sp.*) and Willows (*Salix spp.*) also occur along drains in the centre of this cutover area<br><br>The Qualifying Interest for this site is Peatlands [4]. | |
| Grageen Fen & Bog NHA [002186] | 13.7km east | Grageen Fen and Bog NHA is an upland bog and alkaline fen located on the southern side of the Slievefelim Mountains, approximately 6km east of Moroe and 7km south-east of Newport, Co. Limerick. A mature conifer plantation forms the eastern boundary, while a young conifer plantation forms part of the western boundary. The southern boundary and remainder of the western boundary are defined by the transition from intact blanket bog to cutover bog habitat.<br><br>The blanket bog vegetation is typified by a tall, unburnt and ungrazed canopy of Ling Heather (*Calluna vulgaris*), Cottongrasses (*Eriophorum angustifolium, E. vaginatum*), Deergrass (*Scirpus cespitosus*) with occasional Purple Moor-grass | Grageen Fen and Bog NHA overlaps with Slievefelim to Silvermines Mountains SPA, located approximately 137.km east from the proposed Study Area. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |

| Designated site and code | Distance from Scheme | Site Synopsis | Pathway for Effect |
|---|---|---|---|
| | | (*Molinia caerulea*), Cross-leaved Heath (*Erica tetralix*) and scattered Bog Asphodel (*Narthecium ossifragum*). There is a well-developed moss ground flora with frequent hummocks of bog mosses (*Sphagnum capillifolium* and *S.* subnitens). The moss lawns and hummocks are frequently colonised by Crowberry (*Empetrum nigrum*) and Cranberry (*Vaccinium oxycoccos*).<br><br>The Qualifying Interest for this site is Peatlands [4]. | |
| Doon Lough NHA [000337] | 14.7km north | Doon Lough Bog NHA is situated approximately 3km north-east of Broadford, Co. Clare. The site comprises a raised bog, that includes both areas of high bog and cutover bog, woodlands, lakes, marsh, fen and wet meadows. The high bog is bounded by mineral ridges to the west and east and wet grassland to the south.<br><br>Much of the high bog has vegetation typical of a Western Raised Bog, with such species as Ling Heather (Calluna vulgaris), Common Cottongrass (*Eriophorum angustifolium*), White Beak-sedge (*Rhynchospora alba*), Bog Asphodel (*Narthecium ossifragum*), Deergrass (*Scirpus cespitosus*) and Cross-leaved Heath (*Erica tetralix*). Bog mosses present include the hummock-formers *Sphagnum imbricatum, S. fuscum, S. capillifolium and S. papillosum,* as well as *S. cuspidatum* which is found in hollows.<br><br>The site also includes a large lake system with a variety of fringing habitats, which include scrub, woodland, marsh, and wet grassland.<br><br>The Qualifying Interest for this site is Peatlands [4]. | Doon Lough Bog NHA is located at a significant distance of 14.7km north from the proposed Study Area, with the majority of this designated site sitting outside of the 15km buffer (Figure 6.3). No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |
| Bleanbeg Bog NHA [002450] | 14.7km east | Bleanbeg Bog NHA is a site of considerable conservation importance and consists primarily of upland blanket bog. It is located approximately 7 km east of Newport in south Tipperary. It incorporates a broad plateau of upland blanket bog habitat that grades into heath, upland grassland on peaty soil, and cutover bog. The vegetation in this extensive, rather flat expanse of upland blanket bog is dominated | Bleanbeg Bog NHA is located at a significant distance of 14.7km east from the proposed Study Area. No Source-Pathway-Receptor chain could be |

| Designated site and code | Distance from Scheme | Site Synopsis | Pathway for Effect |
|---|---|---|---|
| | | by Deergrass (*Scirpus cespitosus*) and cottongrasses (*Eriophorum angustifolium* and *E. vaginatum*) with frequent Purple Moor-grass (*Molinia caerulea*), low Ling Heather (*Calluna vulgaris*) and occasional Cross-leaved Heath (*Erica tetralix*), Bell Heather (*Erica cinerea*) and Bog Asphodel (*Narthecium ossifragum*).<br><br>Several Red Data Book species, including Red Grouse and Irish Hare, have been recorded on the site. A pair of Hen Harriers, also a Red Data Book species, nest within 1 km of the site and are known to forage over the site. Blanket bog habitat is a globally scarce resource and long-term survival of this habitat requires sensitive management.<br><br>The Qualifying Interest for this site is Peatlands [4]. | identified. Potential impacts are not considered. |
| **Proposed Natural Heritage Areas (pNHA)** | | | |
| Fergus Estuary and Inner Shannon, North Shore pNHA [002048] | 2.7 km west | This site is part of the River Shannon and River Fergus Estuaries SPA [004077] and Lower River Shannon SAC [002165]. The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries. This Lower River Shannon SAC is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three | Yes.<br><br>There is a hydrological link to this pNHA via the Shannon (Lower)_060 riverbody and Limerick Dock Transitional Waterbody, with the potential for runoff of construction phase materials to occur. Sections of the pNHA are located within the same groundwater body (Limerick City North) as the proposed works area. Risk of sediment or pollution is low as the pNHA is located approximately 7km downstream and works are likely to be of short duration. |

| Designated site and code | Distance from Scheme | Site Synopsis | Pathway for Effect |
|---|---|---|---|
| | | Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. | |
| Castleconnell (Domestic Dwelling Occupied) pNHA [000433] | 2.9km northeast | This is an occupied domestic dwelling in the village of Castleconnell on the banks of the River Shannon in Co. Limerick. | No. Castleconnell (Domestic Dwelling Occupied) pNHA is located c. 3km upstream of the Shannon (Lower)_060 north of the proposed Study Area. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |
| Knockalisheen Marsh pNHA [002001] | 3.5km northwest | Knockalisheen Marsh is part of the Lower River Shannon SAC (2165) and a proposed Natural Heritage Area (pNHA). The habitat is made up of marsh, and wetland areas, an open water area of marsh & willows and a riverside natural habitat. There is a second open water area fringed with bulrush south of the railline (NHA) and a third which is the largest area of open water with reedbeds, and unimproved damp grassland species with low intensity grazing. This area is north of the rail line and crosses into County Clare. | Yes, however effects are unlikely. Knockalisheen Marsh pNHA is located c. 3.9km downstream of the Shannon (Lower)_060 riverbody west of the proposed Study Area. There is the potential for runoff of construction phase materials to occur however the border of the pNHA is 274 meters from the river margin and the river is flowing past and away from the pNHA south to Limerick Dock. Sections of the pNHA are located within the same groundwater body (Limerick City North) as the proposed works area. |
| Cloonlara House pNHA [000028] | 3.5km north | This is a bat site which is located in a three-story domestic dwelling house and contains over 100 Leisler's Bats (*Nyctalus leisleri*) during the summer months. Ireland is likely to contain the largest population of this species in Europe. This site is one of the biggest nursery sites in Ireland and in Europe and is a site of international importance. | No. Cloonlara House pNHA is located upstream of the Shannon (Lower)_060 north of the proposed Study Area. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |

| Designated site and code | Distance from Scheme | Site Synopsis | Pathway for Effect |
|---|---|---|---|
| Inner Shannon Estuary South Shore pNHA [000435] | 4.1km west | This site is part of the River Shannon And River Fergus Estuaries SPA [004077] and Lower River Shannon SAC [002165]. The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries. This Lower River Shannon SAC is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. | Yes. There is a hydrological link to this pNHA via the Shannon (Lower)_060 riverbody and Limerick Dock Transitional Waterbody, with the potential for runoff of construction phase materials to occur. Risk of sediment or pollution is low as the pNHA is located approximately 7.8km downstream and works are likely to be of short duration. |
| Glenomra Wood pNHA [001013] | 8.6km north | Glenomra Wood is a good example of a deciduous semi-natural woodland and is of considerable conservation significance as it is of a type listed on Annex I of the E.U. Habitats Directive. The site is a Special Area of Conservation (SAC) selected for [91A0] Old Oak Woodlands. Further habitat diversity is created by the presence of streams within the woodland,<br><br>and also, by the presence of a small area with raised bog vegetation. Here bog mosses (*Sphagnum* spp.) and Heather (*Calluna vulgaris*), amongst other species, are found. Three Red Data Book mammals occur in the site: Badger, Pine Marten and Hare. A large population of Common Frog breeds in the south-west of the site. This amphibian is also listed in the Red Data Book. Pheasant, Woodcock and Snipe are also present in the site. | No. Glenomra Wood pNHA is located 8.6km north and upstream of the proposed Study Area. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |
| Glenstal Wood pNHA [001432] | 8.8km east | Glenstal Wood, which is associated with Glenstal Abbey, lies in the western foothills of the Slievefelim Mountains, about 8 km north-west of Cappamore, Co. Limerick. The site is an SAC and is of conservation importance for the presence of Killarney Fern (*Trichomanes speciosum*), a rare species that is listed on Annex II of the E.U. Habitats Directive and that is also protected under the Flora (Protection) Order, 1999. Oak (*Quercus* sp.) woodland remnants occur at the site which support a rich | No. Glenstal Wood pNHA is located 8.8km east of the proposed study site. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |

| Designated site and code | Distance from Scheme | Site Synopsis | Pathway for Effect |
|---|---|---|---|
| | | fern, bryophyte and lichen flora. The rare lichen, *Enterographa elabora*, a species known from only three other counties in Ireland, has been recorded at the site. | |
| Loughmore Common Turlough pNHA [000438] | 9.3km southwest | Loughmore Turlough lies in a shallow basin, elongated in an east-west direction and floods shallowly (30-40cm) in winter. A variety of plant communities occur, depending on the substrate type and degree of wetness. Greater Bird's-foot-trefoil (*Lotus uliginosus*) and Common Fleabane (*Pulicaria dysenterica*) are present and although relatively more common here than other regions have not been recorded in any other Irish Turlough. The rare plant species Opposite leaved pondweed (*Groenlandia densa*) and Meadow Barley (*Horedeum secalinum*) occur on site (Both protected under the Flora (Protection) order, 1999). The site provides suitable winter habitat for Lapwing and Golden Plover and is a breeding ground for Snipe. The sites southerly location, shallowness, proximity to the sea and some calcium enrichment cause the flora of Loughmore to have a unique element, enhancing the conservation value of the turlough. | No. Loughmore Common Turlough pNHA is located 9.3km southwest of the proposed study site. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |
| Clare Glen pNHA [000930] | 9.3km east | The woodland, although planted with many exotic trees, is mature and conforms to a type listed on Annex II of the E.U. Habitats Directive. The site is scenic and popular as an amenity area, and the presence of a number of rare and scarce species adds further to its importance. The site is a Special Area of Conservation (SAC) selected for [91A0] Old Oak Woodlands [1421] and Killarney Fern (*Trichomanes speciosum*). A rich bryophyte flora is associated with the river and the wet rocks around it, including the rare mosses *Amblystegium fluviatile, Fissidens exiguus* and *Pohlia campotrachela,* and the liverworts *Lejeunea holtii, Colura calyptrifolia* and *Dumortiera hirsuta*. The site is also notable for the presence of several rare species of Myxomycete fungus, namely *Fuligo muscorum, Stemonitopsis hyperopta* and *Licea testudinacea,* the last-named in one of only two known Irish sites. | No. Clare Glen pNHA is located 9.3km east of the proposed study site. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |
| Ballyvorheen Bog pNHA [001849] | 9.9km southeast | This site is part of the Lower River Shannon SAC and is a water-dependent raised bog habitat located northwest of Cappamore. It is a Cutaway raised bog bordered by woodland; dominant *Calluna vulgaris* (Heather), *Molinia caerulea* (Purple Moor-grass), and many self-sown *Pinus sylvestris* (Scots Pine); *Sphagnum* patches with abundant *Vaccinium oxycoccos* (Cranberry). | No. Ballyvorheen Bog pNHA is located 9.9km southeast of the proposed study site. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |

| Designated site and code | Distance from Scheme | Site Synopsis | Pathway for Effect |
|---|---|---|---|
| Garrannon Wood pNHA [001012] | 10.8km west | This small deciduous wood is located immediately east of Cratloe and less than 10km Limerick City. It is situated on a rocky knoll and is surrounded mostly by pasture fields. There have been signs of fox, badger, and pine marten in the wood. Some uncommon beetles have also been recorded from the site. The importance of this site is that it is a good example of a fairly intact and mature oak wood. It is likely that the site has been wooded for a long period. | No. Garrannon Wood pNHA is located 10.8km west of the proposed study site. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |
| Derrygareen Heath pNHA [000931] | 11.6 km east | This site is situated to the northwest of the Slievefelim Mountains, 4km southeast of Newport. The site is a rocky area of shallow peaty soils with vegetation of un-reclaimed healthland, dominated by Heather (*Calluna vulgaris*) with Cross-leaved Heath (*Erica tetralix*) and grasses such as Common Bent (*Agrostis capillaris*). Scrub species are widespread, most notably Eared Willow (*Salix aurita*) and Gorse (*Ulex europaeus*) with patches of Bracken (*Pteridium aquilinum*). Although the vegetation could be described as typical, it is atypical for such an area as to remain unfertilised, un-reclaimed and largely unplanted with conifers (Small conifer plantation to the east of the site). | No. Derrygareen Heath pNHA is located 11.6 km east of the proposed study site. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |
| Dromsallagh Bog pNHA [001850] | 12.2km southeast | Dromsallagh Bog is a small site of cutaway raised bog and its associated habitats. It is situated approximately 2km north-west of Cappamore. The bog is regenerating and supports a variety of acidophile communities. There is good *Sphagnum* regeneration, and the site supports tall Heather (*Calluna vulgaris*) dwarf shrubs. Several bog pools and cutaway pools occur at this site, adding to its biodiversity. The site is being invaded by Downy Birch (*Betula pubescens*) woodland with isolated Rhododendron (*Rhododendron ponticum*) seen in places. Species of note include Cranberry (*Vaccinium oxycoccos*) and White Sedge (*Carex curta*). The continuing loss of virgin peatland in Ireland, particularly raised bog, makes these regenerating cutaways of ever-increasing importance. | No. Dromsallagh Bog pNHA is located 12.2km southeast of the proposed study site. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |
| Skoolhill pNHA [001996] | 13km south | Skoolhill is situated in Grange in Co. Limerick. Two woodlands occur here, with a mixture of native tree species such as Ash *(Fraxinus excelsior)*, Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and oak (*Quercus* spp.) as well as exotics like Beech (*Fagus sylvatica*) and Sycamore (*Acer pseudoplatanus*). The ground vegetation in the woods is quite sparse, with Ivy (*Hedera helix*), Bramble (*Rubus fruticosus* agg.), ferns and Hogweed (*Heracleum sphondylium*) present. Rough grassland exists on the hill outside the woods, with quite natural vegetation present around the limestone rock outcrops. Plants such as Yarrow (*Achillea millefolium*), | No. Skoolhill pNHA is located 13 km south of the proposed study site. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |

| Designated site and code | Distance from Scheme | Site Synopsis | Pathway for Effect |
|---|---|---|---|
| | | Common Knapweed (*Centaurea nigra*) and Selfheal (*Prunella vulgaris*) are found here. The outstanding value of this site is as the only known location in Ireland of the grass Various leaved Fescue (*Festuca heterophylla*). This was discovered here in 1977 and has still not been recorded elsewhere in Ireland. | |
| Castle Lake pNHA [000239] | 14.7km northwest | This site contains a diversity of wetland and woodland habitats ranging from open water and reed-beds to lakeside wet deciduous woodland to ash/oak woodland and scrub to species-rich wet fields and marsh. This is a relatively small site but still retains substantial habitat diversity in the face of considerable reclamation work in the area over the years. The main habitat present within this site is open water including Castle Lake and Ballymulcashel Lough. MaCarthy's Island, in the middle of Castle Lake, is dominated by old willow trees (*Salix* spp.) and a large Cormorant colony breeds here. Two secondary habitats present within the site include Hazel scrub and ask/oak woodland. A number of wet fields on the southwest of the site are included and a marsh with rich bryophyte flora and many sedges (*Carex* spp.) occurs at the north end of the site. There are mixed woodlands at the southeast and southwest corners of the site. | No. Castle Lake pNHA is located 14.7km northwest of the proposed study site. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |
| Danes Hole, Poulnalecka pNHA [000030] | 14.8km northwest | This site consists of a small fossil cave in the banks of the Ahaclare River situated within a wood approximately 4 km west of Broadford, Co. Clare. It is a winter hibernation site and also a mating site of the Lesser Horseshoe Bat. A nearby summer roost for the bat and the commuting routes between the two are also included. The site is a Special Area of Conservation (SAC) (Danes Hole, Poulnalecka 000030) selected for [8310] Caves, [91A0] Old Oak Woodlands and [1303] Lesser Horseshoe Bat (*Rhinolophus hipposideros*). In November 1998, 250 Lesser Horseshoe Bats were counted at the cave, making the site one of international importance. In the national context this site is considered important because it is one of the most eastern points in the distribution of this bat in Ireland. | No. Danes Hole, Poulnalecka pNHA is located 14.8km northwest of the proposed study site. No Source-Pathway-Receptor chain could be identified. Potential impacts are not considered. |

### 6.3.3 Records of Protected, Rare and other Notable Species

The following sections describe the desk study sources consulted and results obtained during the assessment. Records of rare or protected flora and fauna within 10km of the proposed development were obtained from the National Parks and Wildlife Service (NPWS), National Biodiversity Data Centre (NBDC), Botanical Society for Britain and Ireland (BSBI) and Bat Conservation Ireland (BCI).

#### *6.3.3.1 New Flora Atlas & NBDC*

A search was made in the *New Atlas of the British & Irish Flora* (Preston *et al*. 2002) and the National Biodiversity Centre (NBDC) database to identify if any rare or protected plant species have been previously recorded from hectad R65 within which the proposed development is located. The search targeted vascular plants that are listed in Annex II of the EU Habitats Directive, the Flora (Protection) Order (FPO) of 2022, and those listed in *The Irish Red Data Book* (Jackson *et al*. 2016). There are sixteen records of species listed under the Flora Protection Order, Annex II or the Irish Red List within the 10 km grid square (**Table 6.4** below).

**Table 6.4 Plant (Vascular and Bryophytes) species of conservation concern recorded within Hectad R65.**

| Common Name | Scientific Name | Conservation Status |
|---|---|---|
| Opposite-leaved Pondweed | *Groenlandia densa* | Flora (Protection) Order 2022<br>Red Book Status: Near threatened, vulnerable. |
| Pyramidal Bugle | *Ajuga pyramidalis* | Red book status – Rare (R) - Vulnerable |
| Garden Yellow Archangel | *Lamiastrum galeobdolon subsp. argentatum* | Red book status – Rare (R) - Least Concern |
| Corncockle | *Agrostemma githago* | Red book status – Extinct -Waiting list |
| Cornflower | *Centaurea cyanus* | Red book status – Extinct -Waiting list |
| Corn marigold/ daisy | *Glebionis segetum* | Red book status: Near threatened |
| Slender Tufted-sedge | *Carex acuta* | Red book status: Near threatened |
| Tubular Water-dropwort | *Oenanthe fistulosa* | Red book status: Near threatened |
| Fringed Heartwort | *Ricciocarpos natans* | Red book status: Near threatened |
| Clustered Feather-moss | *Rhynchostegium confertum* | Red book status: Least concern |
| Common Feather-moss | *Eurhynchium praelongum* | Red book status: Least concern |
| Heart-leaved Spear-moss | *Calliergon cordifolium* | Red book status: Least concern |
| Rough-stalked Feather-moss | *Brachythecium rutabulum* | Red book status: Least concern |
| Sickle-leaved Hook-moss | *Sanionia uncinata* | Red book status: Least concern |
| Smaller Lattice-moss | *Cinclidotus fontinaloides* | Red book status: Least concern |

| Common Name | Scientific Name | Conservation Status |
|---|---|---|
| Upright Brown Grimmia | *Schistidium strictum* | Red book status: Near threatened |
| Wall Feather-moss | *Rhynchostegium murale* | Red book status: Least concern |
| Wall Thread-moss | *Bryum radiculosum* | Red book status: Least concern |
| Wedge-leaved Screw-moss | *Tortula cuneifolia* | Red Book Status: Critically Endangered |

#### *6.3.3.2 NPWS Records of Protected Species*

NPWS online records (Article 17 species data) were searched to see if any rare or protected species of flora or fauna have been recorded from hectad R65. An information request was also sent to the NPWS requesting records from the Rare and Protected Species Database (13th August 2021). An updated request was sent on the 25/01/2024. **Table 6. 5** lists rare and protected species records obtained from the data request and Article 17 species data.

**Table 6. 5 Rare and Protected Species Records for Hectad R65.**

| Common Name | Scientific Name | Source | Conservation Status |
|---|---|---|---|
| Atlantic Salmon | *Salmo salar* | NPWS Article 17 | EU Habitats Directive, Annex II & V |
| Brook Lamprey | *Lampetra planeri* | NPWS Article 17 | EU Habitats Directive, Annex II |
| Common Frog | *Rana temporaria* | NPWS request & Article 17 | EU Habitats Directive, Annex V & Wildlife Acts 1976 – 2017 |
| Common Kingfisher | *Alcedo atthis* | NPWS request | EU Birds Directive, Annex I, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Amber List |
| Common Lizard | *Zootoca vivipara* | NPWS request | Wildlife Acts 1976 – 2017 |
| Common Pipistrelle | *Pipistrellus pipistrellus* | NPWS Article 17 | EU Habitats Directive, Annex IV and Wildlife Acts 1976 – 2017 |
| Darnel | *Lolium temulentum* | NPWS request | Flora (Protection) Order, 2015. Endangered species – IUCN Red list |
| Daubenton's Bat | *Myotis daubentonii* | NPWS Article 17 | EU Habitats Directive, Annex IV & Wildlife Acts 1976 – 2017 |
| Eurasian Badger | *Meles meles* | NPWS request | Wildlife Acts 1976 – 2017 |
| European Otter | *Lutra lutra* | NPWS request & Article 17 | EU Habitats Directive, Annex II & IV and Wildlife Acts 1976 – 2017 |

| Common Name | Scientific Name | Source | Conservation Status |
|---|---|---|---|
| Freshwater White-clawed Crayfish | *Austropotamobius pallipes* | NPWS request & Article 17 | EU Birds Directive, Annex II and Wildlife Acts 1976 – 2017 |
| Irish (mountain) hare | *Lepus timidus* subsp. *hibernicusLepus timidus* | NPWS request & Article 17 | EU Habitats Directive, Annex V and Wildlife Acts 1976 – 2017 |
| Irish stoat | *Mustela erminea* | NPWS request | Wildlife Acts 1976 – 2017 |
| River Lamprey | *Lampetra fluviatilis* | NPWS request & Article 17 | EU Habitats Directive, Annex II & V |
| Lesser Horseshoe Bat | *Rhinolophus hipposideros* | NPWS request & Article 17 | EU Habitats Directive, Annex II & IV and Wildlife Acts 1976 – 2017 |
| Lesser Noctule/Leisler's Bat | *Nyctalus leisleri* | NPWS Article 17 | EU Habitats Directive, Annex IV and Wildlife Acts 1976 – 2017 |
| Opposite-leaved pondweed | *Groenlandia densa* | NPWS request | Flora (Protection) Order, 2015. Near threatened species - IUCN Red list |
| Pine Marten | *Martes martes* | NPWS Article 17 | EU Habitats Directive, Annex V and Wildlife Acts 1976 – 2017 |
| Sea Lamprey | *Petromyzon marinus* | NPWS request & Article 17 | EU Habitats Directive, Annex II |
| Smooth Newt | *Lissotriton vulgaris* | NPWS request | Wildlife Acts 1976 – 2017 |
| Soprano Pipistrelle | *Pipistrellus pygmaeus* | NPWS Article 17 | EU Habitats Directive, Annex IV, Wildlife Acts 1976 – 2017 |
| Spiked sedge | *Carex spicata* | NPWS request | Near threatened species - IUCN Red list |

#### 6.3.3.3 *NPWS Article 17 Datasets and Additional Habitat Databases*

A review of the NPWS Habitat Directive - Article 17 datasets, Irish Semi-Natural Grassland Survey datasets, National Survey of Native Woodland datasets and Ancient and Long-Established Woodland dataset was conducted on the 18th of November 2021. An updated review was completed on the 13/02/2024. The datasets were downloaded and overlain on the proposed development area.

No records of Irish Semi-Natural Grassland Survey, National Survey of Native Woodland datasets and Ancient and Long-Established Woodland data were present within the Study Area. Areas of Annex 1 habitats Residual Alluvial Forests (91E0), Hydrophilous tall herb (6430) and Floating river vegetation (3260) are reported within the study area along the banks (north and south) of the River Shannon. Limerick Dock (1130 Estuaries) (part of the Upper Shannon Estuary) is located 2.3km downstream.

#### 6.3.3.4 *National Biodiversity Data Centre Data*

A search of the National Biodiversity Data Centre (NBDC) website was conducted with a focus on records of protected fauna, macroinvertebrates and insects from hectad R65. The results of the database search are provided below in **Table 6. 6.**

**Table 6. 6 NBDC records for protected species records for Hectad R65.**

| Common Name | Scientific Name | Conservation Status |
|---|---|---|
| Barn Owl | *Tyto alba* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Red List |
| Barn Swallow | *Hirundo rustica* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Black-headed Gull | *Larus ridibundus* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Red List |
| Brown Long-eared Bat | *Plecotus auritus* | EU Habitats Directive, Annex IV & Wildlife Acts 1976 – 2017 |
| Common Coot | *Fulica atra* | EU Birds Directive, Annex II & III, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Amber List |
| Common Frog | *Rana temporaria* | EU Habitats Directive, Annex V & Wildlife Acts 1976 – 2017 |
| Common Grasshopper Warbler | *Locustella naevia* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Common Kestrel | *Falco tinnunculus* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Common Kingfisher | *Alcedo atthis* | EU Birds Directive, Annex I, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Amber List |
| Common Linnet | *Carduelis cannabina* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Common Lizard | *Zootoca vivipara* | Wildlife Acts 1976 – 2017 |
| Common Pheasant | *Phasianus colchicus* | EU Birds Directive, Annex II & III, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Amber List |
| Common Pipistrelle | *Pipistrellus pipistrellus* | EU Habitats Directive, Annex IV and Wildlife Acts 1976 – 2017 |
| Common Pochard | *Phasianus colchicus* | EU Birds Directive, Annex II & III, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Amber List |
| Common Sandpiper | *Actitis hypoleucos* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Common Snipe | *Gallinago gallinago* | EU Birds Directive, Annex II & III, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Amber List |
| Common Starling | *Sturnus vulgaris* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |

| Common Name | Scientific Name | Conservation Status |
|---|---|---|
| Common Swift | *Apus apus* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Common Wood Pigeon | *Columba palumbus* | EU Birds Directive, Annex II & III and Wildlife Acts 1976 – 2017. |
| Corn Crake | *Crex crex* | EU Birds Directive, Annex I, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Red List |
| Daubenton's Bat | *Myotis daubentonii* | EU Habitats Directive, Annex IV & Wildlife Acts 1976 – 2017 |
| Eurasian Badger | *Meles meles* | Wildlife Acts 1976 – 2017 |
| Eurasian Curlew | *Numenius arquata* | EU Birds Directive, Annex II, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Red List |
| Eurasian Pygmy Shrew | *Sorex minutus* | Wildlife Acts 1976 – 2017 |
| Eurasian Red Squirrel | *Sciurus vulgaris* | Wildlife Acts 1976 – 2017 |
| Eurasian Teal | *Anas crecca* | EU Birds Directive, Annex II & III, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Amber List |
| Eurasian Woodcock | *Scolopax rusticola* | EU Birds Directive, Annex II & III, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Amber List |
| European Golden Plover | *Pluvialis apricaria* | EU Birds Directive, Annex I, II & III, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Red List |
| European Otter | *Lutra lutra* | EU Habitats Directive, Annex II & IV and Wildlife Acts 1976 – 2017 |
| Fallow Deer | *Dama dama* | Invasive Species: Regulation S.I. 477, Wildlife Acts 1976 – 2017. |
| Freshwater White-clawed Crayfish | *Austropotamobius pallipes* | EU Birds Directive, Annex II and Wildlife Acts 1976 – 2017 |
| Great Black-backed Gull | *Larus marinus* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Great Cormorant | *Phalacrocorax carbo* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Greylag Goose | *Anser Anser* | Invasive Species: Regulation S.I. 477 (Ireland), Wildlife Acts 1976 – 2017, EU Birds Directive Annex II, Section I Bird Species, Annex III, Section II Bird Species, Threatened Species: Birds of Conservation Concern - Amber List |
| Herring Gull | *Larus argentatus* | Wildlife Acts 1976-2017. Threatened Species: Birds of Conservation Concern - Red List |
| House Martin | *Delichon urbicum* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |

| Common Name | Scientific Name | Conservation Status |
|---|---|---|
| House Sparrow | *Passer domesticus* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Irish (mountain) hare | *Irish Hare (Lepus timidus subsp. hibernicus)Lepus timidus* | EU Habitats Directive, Annex V and Wildlife Acts 1976 – 2017 |
| Irish Stoat | *Mustela erminea subsp. hibernica* | Protected Species: Wildlife Acts 1976 – 2017 |
| Jack Snipe | *Lymnocryptes minimus* | EU Birds Directive, Annex II & III and Wildlife Acts 1976 – 2017 |
| Lesser Black-backed Gull | *Larus fuscus* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Lesser Horseshoe Bat | *Rhinolophus hipposideros* | EU Habitats Directive, Annex II & IV and Wildlife Acts 1976 – 2017 |
| Lesser Noctule | *Nyctalus leisleri* | EU Habitats Directive, Annex IV and Wildlife Acts 1976 – 2017 |
| Little Egret | *Egretta garzetta* | EU Birds Directive, Annex I and Wildlife Acts 1976 – 2017 |
| Little Grebe | *Tachybaptus ruficollis* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Mallard | *Anas platyrhynchos* | EU Birds Directive, Annex II & III and Wildlife Acts 1976 – 2017 |
| Mew Gull | *Larus canus* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Mute Swan | *Cygnus olor* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Northern Lapwing | *Vanellus vanellus* | EU Birds Directive, Annex II, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Red List |
| Northern Wheatear | *Oenanthe oenanthe* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Pine Marten | *Martes martes* | EU Habitats Directive, Annex V and Wildlife Acts 1976 – 2017 |
| Rock Pigeon | *Columba livia* | EU Birds Directive, Annex II and Wildlife Acts 1976 – 2017 |
| Sand Martin | *Riparia riparia* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Sky Lark | *Alauda arvensis* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Smooth Newt | *Lissotriton vulgaris* | Wildlife Acts 1976 – 2017 |
| Soprano Pipistrelle | *Pipistrellus pygmaeus* | EU Habitats Directive, Annex IV and Wildlife Acts 1976 – 2017 |
| Spotted Flycatcher | *Muscicapa striata* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |

| Common Name | Scientific Name | Conservation Status |
|---|---|---|
| Stock Pigeon | *Columba oenas* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Amber List |
| Tufted Duck | *Aythya fuligula* | EU Birds Directive, Annex II & III, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Amber List |
| West European Hedgehog | *Erinaceus europaeus* | Wildlife Acts 1976 – 2017 |
| Whooper Swan | *Cygnus cygnus* | EU Birds Directive, Annex I, Wildlife Acts 1976 – 2017 & Threatened Species: Birds of Conservation Concern – Amber List |
| Yellowhammer | *Emberiza citrinella* | Wildlife Acts 1976 – 2017. Threatened Species: Birds of Conservation Concern – Red List |

#### 6.3.3.5 *Invasive Alien Species Records*

A search of the NBDC and LCCC invasives website was conducted with a particular focus on records of Invasive Alien Species recorded from the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) in hectad R65. The results of the database search are provided below in **Table 6. 7.**

**Table 6. 7 Third Schedule Invasive Alien Species records for hectad R65.**

| Common Name | Scientific Name | Conservation Status |
|---|---|---|
| Greylag Goose | *Anser anser* | Invasive Species: Regulation S.I. 477 (Ireland), Wildlife Acts 1976 – 2017, EU Birds Directive Annex II, Section I Bird Species, Annex III, Section II Bird Species, Threatened Species: Birds of Conservation Concern - Amber List |
| Dace | *Leuciscus leuciscus* | MI Invasive Species, Invasive Species Reg S.I. 477 |
| Water Fern | *Azolla filiculoides* | MI Invasive Species, Invasive Species Reg S.I. 477 |
| Canadian Waterweed | *Elodea canadensis* | HI Invasive Species, Invasive Species Reg S.I. 477 |
| Giant Hogweed | *Heracleum mantegazzianum* | HI Invasive Species, Invasive Species Reg S.I. 477 |
| Giant Knotweed | *Fallopia sachalinensis* | HI Invasive Species, Invasive Species Reg S.I. 477 |
| Indian Balsam | *Impatiens glandulifera* | HI Invasive Species, Invasive Species Reg S.I. 477 |
| Japanese Knotweed | *Fallopia japonica* | HI Invasive Species, Invasive Species Reg S.I. 477 |
| Nuttall's Waterweed | *Elodea nuttallii* | HI Invasive Species, Invasive Species Reg S.I. 477 |
| Brown Rat | *Rattus norvegicus* | HI Invasive Species, Invasive Species Reg S.I. 477 |
| Eastern Grey Squirrel | *Sciurus carolinensis* | HI Invasive Species, Invasive Species Reg S.I. 477 |
| Fallow Deer | *Dama dama* | HI Invasive Species, Invasive Species Reg S.I. 477. Protected Species, Wildlife Acts 1976-2017. |

| Common Name | Scientific Name | Conservation Status |
|---|---|---|
| Three-cornered garlic/leek | *Allium triquetrum* | MI Invasive Species, Invasive Species Reg S.I. 477 |
| Cherry Laurel | *Prunus laurocerasus* | HI Invasive Species |
| European Rabbit | *Oryctolagus cuniculus* | MI Invasive Species |
| Douglas Fir | *Pseudotsuga menziesii* | MI Invasive Species |
| Butterfly Bush | *Buddleja davidii* | MI Invasive Species |
| Japanese Rose | *Rosa rugosa* | MI Invasive Species |
| Least Duckweed | *Lemna minuta* | MI Invasive Species |
| Sycamore | *Acer pseudoplatanus* | MI Invasive Species |
| Common Garden Snail | *Cornu aspersum* | MI Invasive Species |
| Jenkins' Spire Snail | *Potamopyrgus antipodarum* | MI Invasive Species |
| Bank Vole | *Myodes glareolus* | MI Invasive Species |
| Greater White-toothed Shrew | *Crocidura russula* | MI Invasive Species |
| Winter Heliotrope | *Petasites fragrans* | LI Invasive Species |

**MI – Medium Impact, HI – High Impact, LI – Low Impact.*

#### 6.3.3.6 Bat Conservation Ireland Database

A search for records of bat activity and roosts within a 10km radius of the study area was conducted using the Bat Conservation Ireland (BCI) database, which is presented on the NBDC. A number of observations have been recorded within 10km of the proposed works (**Table 6. 8**). From the NBDC bat landscape suitability mapping, a Bat Landscape Suitability Index (Lundy *et al.*, 2011) score of 42.56 on the index (from 0-58.6) indicates that there are highly suitable habitats within the Study Area for bats.

**Table 6. 8 BCI and NBDC data at Hectad R65.**

| Survey Type | Location | Species Recorded | Survey | Conservation Status |
|---|---|---|---|---|
| - | R610580 | Brown Long-eared Bat (*Plecotus auratus*) | EIS and Road Surveys/ NBDC Database | Protected Species: EU Habitats Directive >> Annex IV \|\| Protected Species: Wildlife Acts |
| - | R601577 | Lesser Noctule (*Nyctalus leisleri*) | EIS surveys/ NBDC Database | Protected Species: EU Habitats Directive >> Annex IV \|\| Protected Species: Wildlife Acts |
| Transect | R643577 | Daubenton's Bat (*Myotis daubentonii*) | All Ireland Daubenton's Bat Waterways Survey/ NBDC Database | Protected Species: EU Habitats Directive >> Annex IV \|\| Protected Species: Wildlife Acts |

| | | | | |
|---|---|---|---|---|
| - | R679549 | Soprano Pipistrelle (*Pipistrellus pygmaeus*) | National Bat Database of Ireland (BATLAS 2010)/ NBDC Database | Protected Species: EU Habitats Directive >> Annex IV \|\| Protected Species: Wildlife Acts |
| - | - | Lesser Horseshoe Bat (*Rhinolophus hipposideros*) | NBDC Database | Protected Species: EU Habitats Directive >> Annex II >> Annex IV \|\| Protected Species: Wildlife Acts |
| - | - | Common Pipistrelle *(Pipistrellus pipistrellus sensu lato)* | NBDC Database | Protected Species: EU Habitats Directive >> Annex IV \|\| Protected Species: Wildlife Acts |

#### *6.3.3.7 Water Framework Directive Surveillance Monitoring Fish Stock Survey*

During the most recent Water Framework Directive surveillance monitoring fish stock surveys (2021) conducted in transitional waters (downstream of the proposed developed area) by staff from Inland Fisheries Ireland (IFI), species recorded included:

- Dab (Limanda limanda),
- Common goby (Pomatoschistus microps),
- Flounder (Platichthys flesus),
- Eel (Anguilla anguilla),
- Plaice (Pleuronectes platessa),
- Smelt (Osmerus eperlanus),
- Sprat (Sprattus sprattus), and
- Three-spined stickleback *(Gasterosteus aculeatus*)

The fish ecological status, classified for transitional waters using the 'EMFI' method (Harrison and Kelly, 2013) ranged between poor and good across the two sites within the Shannon Estuary (Lower Shannon SH_060_0300 and Limerick Dock SH_060_0900).

### *6.3.4 EPA Water Quality Data*

The proposed Greenway is situated on the banks of the Lower River Shannon_060 watercourse. The Mulkear (Limerick)_050 is located to the northeast of the study area, and the Blackwater (Clare)_020 situated in the north of the Study Area. The Study Area sits within the Lower Shannon (25D) Catchment which covers an area of 1,041 km² and includes the lower reaches of the River Shannon to Limerick City and the catchment of the Mulkear River. Both the Mulkear (Limerick)_050 River and Blackwater (Clare)_020 drain into the Lower River Shannon_060. The Lower River Shannon_060 drains into the transitional waterbody Limerick Dock. Limerick Dock drains into the Upper Shannon Estuary.

The Environmental Protection Agency (EPA) Maps were consulted regarding the water quality status of the watercourses within the Study Area. The Biotic Index of Water Quality (BIWQ) was developed in Ireland by the EPA. Q values are assigned using a combination of habitat characteristics and structure of the macro-invertebrate community within the waterbody. Individual macro-invertebrate families are classified according to their sensitivity to organic pollution and the Q-value is assessed based primarily on their relative

abundance within a sample. Sampling stations are present within each of the nearby Rivers (Lower Shannon, Mulkear, and Blackwater (Clare). The results from these sampling stations are shown in **Table 6. 9** below:

**Table 6. 9 Water Quality Sampling Stations within the Study Area.**

| Station Code | Station Location | Up or Downstream of proposed works site | Date of last Q Value | Q-Value Rating |
|---|---|---|---|---|
| RS25M040600 | MULKEAR (LIMERICK) - 1km d/s Annacotty Br (LHS) | Upstream | 1987 | 4-5 (High - unpolluted) |
| RS25M040590 | Annacotty Br d/s weir | Upstream | 2021 | 4 (Good - unpolluted) |
| RS25B060300 | BLACKWATER (CLARE) - Gilloge Bridge | Upstream | 1988 | 4 (Good – unpolluted) |
| RS25S012600 | Athlunkard Br (d/s LHS) | Downstream | | 3-4 (Moderate – Slightly polluted) |
| RS25G050300 | GROODY - Groody Br (G1) | Upstream | | 3 (Poor – Moderately polluted) |
| RS25M040500 | MULKEAR (LIMERICK) - Ford d/s Killeengarriff R | Upstream | | 4-5 (High - unpolluted) |

River Basin Management Plans (RBMPs) have been published for all River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive (WFD) and have been superseded by the National River Basin Management Plan 2018-2021 and draft River Basin Management Plan for Ireland 2022-2027. The online EPA Maps viewer provides access to water quality information at individual waterbody level and at Water Management Unit level for all the River Basin Districts in Ireland. Waterbodies can relate to surface waters (these include rivers, lakes, estuaries [transitional waters] and coastal waters) or to groundwater.

The ecological status of the waterbodies within the Study Area includes good ecological status for the Mulkear (Limerick) River_050, and moderate ecological status for Blackwater (Clare)_020 and The Lower River Shannon_060 waterbodies. With regards to each river body's ability to meet the WFD objectives by 2027, the Mulkear (Limerick) River_050 is "Not at risk", the Lower River Shannon_060 is "Under Review" and the Blackwater (Clare)_020 is "At Risk". Limerick Dock and the Upper Shannon Estuary are both classed as having "Poor" WFD status and are "At Risk".

The study area runs along the boundary of two groundwater bodies. Limerick City East which begins below the southern banks of the Lower Shannon river and Limerick City North which begins on the Northern banks of the same river. Limerick City North has a "Good" WFD status and is "Not at risk". Limerick City East has a "Good" WFD status but is currently "At Risk".

### *6.3.5* Birds

#### 6.3.5.1. *Bird Atlases*

The principal published sources of information regarding the distribution of breeding birds in Ireland are 'Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland' (Balmer *et al.*, 2013). This is the most recent comprehensive work on wintering and breeding birds in Ireland. The First Atlas of Breeding

Birds in Britain and Ireland: 1968-1972 (Sharrock, 1976), The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991 (Gibbons *et al.,* 1993) and The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84 (Lack, 1986) were also consulted.

The atlas' provides data for breeding and wintering birds respectively in individual 10km grid squares (also known as hectads). The Study Area lies within hectad R65. **Table 6. 10, Table 6. 11 and Table 6. 12** present a list of species found in hectad R65, which are recorded in each of the breeding and wintering bird atlases consulted and are also protected under the EU Birds Directive or listed on the Birds of Conservation Concern in Ireland (2013) (BoCCI) red list (Colhoun & Cummins, 2013). Birds listed under Annex I are offered special protection by the EU Birds Directive. Those listed on the BoCCI red list meet one or more of the following criteria:

- IUCN: Global conservation status (Critically Endangered (CE), Endangered I or Vulnerable (V), but not Near Threatened. These species are recognised as the highest priorities for action at a global scale and are thus priorities at an all-Ireland level;
- European conservation status. The conservation status of all European species was assessed most recently by Birdlife International (2004), one of the main changes in the revision being to include the IUCN criteria. These species are those of global conservation concern (including those classified as Near Threatened) and are Red-listed;
- The Irish breeding population has undergone significant historical decline since 1800;
- The Irish breeding population or range has declined by 50% or more in the thirteen years from 1998-2011 (BDp1) or the 25 years from 1980-2013 (BDp2);
- The Irish non-breeding population has undergone a significant decline of 50% in the last 25 years; and
- The Irish breeding range has undergone a decline of 70% or more in the last 25 years.

For the purposes of this desk study Meadow Pipit (*Anthus pratensis*) and Grey Wagtail (*Motacilla cinerea*) have not formed part of this assessment because both of these species (especially the former) are widespread and frequently encountered. They have recently (Colhoun and Cummins, 2013) been moved from the BoCCI green list (low conservation concern) to the red list (high conservation concern). These two species were placed on the red list because their breeding populations declined by 50% or more over the 13-year period from 1998-2011 (BDp1). However, recent data from the Countryside Bird Survey (CBS) indicate that both of these species have been in recovery since 2011 (Crowe *et al.,* 2014). It should be noted that the absence of a record does not necessarily imply that the species was absent from that square.

**Table 6. 10 Breeding Bird Atlas Data (1968-1972 & 1988-1991) (Hectad R65)**

| Name | Conservation Status | Name | Conservation Status |
|---|---|---|---|
| **Barn Owl (*Tyto alba*)** | Wildlife Acts, Birds of Conservation Concern Red List | **European Golden Plover (*Pluvialis apricaria*)** | Wildlife Acts, EU Birds Directive Annex I, Annex II, Section II, Annex III, Section III, Birds of Conservation Concern Red List |
| **Barn Swallow (*Hirundo rustica*)** | Wildlife Acts, Birds of Conservation Concern Amber List | **Great Black-backed Gull (*Larus marinus*)** | Wildlife Acts, Birds of Conservation Conce–n - Amber List |
| **Black headed gull (*Larus ridibundus*)** | Wildlife Acts, Birds of Conservation Concern Red List | **Great Cormorant *(Phalacrocorax carbo)*** | Wildlife Acts, Birds of Conservation Conce–n - Amber List |

| Name | Conservation Status | Name | Conservation Status |
|---|---|---|---|
| **Common coot (*Fulica atra*)** | Wildlife Acts, EU Birds Directive, Annex II, Section I, Annex III, Section II, Birds of Conservation Concern Amber List | **House Martin (*Delichon urbicum*)** | Wildlife Acts, Birds of Conservation Concern Amber List |
| **Common Grasshopper Warbler (*Locustella naevia*)** | Wildlife Acts, Birds of Conservation Concern Amber List | **House Sparrow (*Passer domesticus*)** | Wildlife Acts, Birds of Conservation Concern Amber List |
| **Common Kestrel (*Falco tinnunculus*)** | Wildlife Acts, Birds of Conservation Concern Amber List | **Little Grebe (*Tachybaptus ruficollis*)** | Wildlife Acts, Birds of Conservation Concern Amber List |
| **Common Kingfisher (*Alcedo atthis*)** | Wildlife Acts, EU Birds Directive, Annex I, Birds of Conservation Concern, Amber List | **Mallard (*Anas platyrhynchos*)** | Wildlife Acts, EU Birds Directive, Annex II, Section I, Annex III, Section I |
| **Common Linnet (*Carduelis cannabina*)** | Wildlife Acts, Birds of Conservation Concern Amber List | **Mew Gull (*Larus canus*)** | Wildlife Acts, Birds of Conservation Concern Amber List |
| **Common Pheasant (*Phasianus colchicus*)** | Wildlife Acts, EU Birds Directive, Annex II, Section I, Annex III, Section I | **Mute Swan (*Cygnus olor*)** | Wildlife Acts, Birds of Conservation Concern Amber List |
| **Common Pochard (*Aythya farina*)** | Wildlife Acts, EU Birds Directive, Annex II, Section I, Annex III, Section II, Birds of Conservation Concern, Amber List | **Northern Lapwing (*Vanellus vanellus*)** | Wildlife Acts, EU Birds Directive, Annex II, Section II, Birds of Conservation Concern, Red List |
| **Common Sandpiper (*Actitis hypoleucos*)** | Wildlife Acts, Birds of Conservation Concern Amber List | **Northern Wheatear (*Oenant6-37rquata6-37the*)** | Wildlife Acts, Birds of Conservation Concern Amber List |
| **Common Snipe (*Gallinago gallinago*)** | Wildlife Acts, EU Birds Directive, Annex II, Section I, Annex III, Section III, Birds of Conservation Concern Amber List | **Rock Pigeon (*Columba livia*)** | Wildlife Acts, EU Birds Directive, Annex II, Section I |
| **Common Starling (*Sturnus vulgaris*)** | Wildlife Acts, Birds of Conservation Concern Amber List | **Sand Martin (*Riparia riparia*)** | Wildlife Acts, Birds of Conservation Concern Amber List |
| **Common swift (*Apus apus*)** | Wildlife Acts, Birds of Conservation Concern Amber List | **Sky Lark (*Alauda arvensis*)** | Wildlife Acts, Birds of Conservation Concern Amber List |
| **Common wood pigeon** | Wildlife Acts, EU Birds Directive, Annex II, | **Spotted Flycatcher (*Muscicapa striata*)** | Wildlife Acts, Birds of Conservation Concern Amber List |

| Name | Conservation Status | Name | Conservation Status |
|---|---|---|---|
| (*Columba palumbus*) | Section I, Annex III, Section I | | |
| **Corn Crake** (*Crex crex*) | Wildlife Acts, EU Birds Directive, Annex I, Birds of Conservation Concern Red List | **Stock Pigeon** (*Columba oenas*) | Wildlife Acts, Birds of Conservation Concern Amber List |
| **Eurasian Curlew** (*Numenius Arquata*) | Wildlife, EU Birds Directive, Annex II, Section II, Birds of Conservation Concern Red List | **Turfted duck** (*Aythya fuligula*) | Wildlife Acts, EU Birds Directive, Annex II, Section I Bird Species, Annex III, Section II Bird Species, Birds of Conservation Concern Amber List |
| **Eurasian teal** (*Anas crecca*) | Wildlife Acts, EU Birds Directive, Annex II, Section I, Annex III, Section II, Birds of Conservation Concern Amber List | **Whooper swan** (*Cygnus cygnus*) | Wildlife Acts, EU Birds Directive, Annex I Bird Species, Birds of Conservation Concern Amber List |
| **Eurasian Woodcock** (*Scolopax rusticola*) | Wildlife Acts, EU Birds Directive, Annex II, Section I, Annex III, Section III, Threatened Species: Birds of Conservation Concern Amber List | **Yellowhammer** (*Emberiza citronella*) | Wildlife Acts, Birds of Conservation Concern Red List |

**Table 6. 11 Wintering Bird Atlas Data (1981/82-1983/84) (Hectad R65)**

| Name | Conservation Status | Name | Conservation Status |
|---|---|---|---|
| **Barn Owl** (*Tyto alba*) | Wildlife Acts, Birds of Conservation Conce–n - Red List | **Eurasian Teal** (*Anas crecca*) | Wildlife Acts, EU Birds Directive Annex II, Section I, Annex III, Section II, Birds of Conservation Conce–n - Amber List |
| **Black-headed Gull** (*Larus ridibundus*) | Wildlife Acts, Birds of Conservation Conce–n - Red List | **Eurasian Woodcock** (*Scolopax rusticola*) | Wildlife Acts, EU Birds Directive, Annex II, Section I, Annex III, Section III, Birds of Conservation Conce–n - Amber List |
| **Common Coot** (*Fulica atra*) | Wildlife Acts, EU Birds Directive Annex II, Section I, Annex III, Section II, Birds of Conservation Conce–n - Amber List | **European Golden Plover** (*Pluvialis apricaria*) | Wildlife Acts, EU Birds Directive, Annex I Bird Species, Annex II, Section II, Annex III, Section III, Birds of Conservation Conce–n - Red List |
| **Common Kestrel** (*Falco tinnunculus*) | Wildlife Acts, Birds of Conservation Conce–n - Amber List | **Great Black-backed Gull** (*Larus marinus*) | Wildlife Acts, Birds of Conservation Conce–n - Amber List |
| **Common Linnet** (*Carduelis cannabina*) | Wildlife Acts, Birds of Conservation Conce–n - Amber List | **House Sparrow** (*Passer domesticus*) | Wildlife Acts, Birds of Conservation Conce–n - Amber List |
| **Common Pheasant** | Wildlife Acts, EU Birds Directive Annex II, Section I, Annex III, Section I | **Little Grebe** (*Tachybaptus ruficollis*) | Wildlife Acts, Birds of Conservation Conce–n - Amber List |

| Name | Conservation Status | Name | Conservation Status |
|---|---|---|---|
| (*Phasianus colchicus*) | | | |
| **Common Pochard** (*Aythya ferina*) | Wildlife Acts, EU Birds Directive, Annex II, Section I, Annex III, Section II, Birds of Conservation Conce–n - Amber List | **Mallard** (*Anas platyrhynchos*) | Wildlife Acts, EU Birds Directive Annex II, Section I, Annex III, Section I |
| **Common Sandpiper** (*Actitis hypoleucos*) | Wildlife Acts, Birds of Conservation Conce–n - Amber List | **Mute Swan** (*Cygnus olor)* | Wildlife Acts, Birds of Conservation Conce–n - Amber List |
| **Common Snipe** (*Gallinago gallinago*) | Wildlife Acts, EU Birds Directive Annex II, Section I, Annex III, Section III, Birds of Conservation Conce–n - Amber List | **Northern Lapwing** (*Vanellus vanellus*) | Wildlife Acts, EU Birds Directive Annex II, Section II, Birds of Conservation Conce–n - Red List |
| **Common Starling** (*Sturnus vulgaris*) | Wildlife Acts, Birds of Conservation Conce–n - Amber List | **Tufted Duck** (*Aythya fuligula*) | Wildlife Acts, EU Birds Directive, Annex II, Section I, Annex III, Section II, Birds of Conservation Conce–n - Amber List |
| **Common Wood Pigeon** (*Columba palumbus*) | Wildlife Acts, EU Birds Directive, Annex II, Section I, Annex III, Section I Bird Species | **Whooper Swan** (*Cygnus cygnus*) | Wildlife Acts, EU Birds Directive, Annex I, Birds of Conservation Conce–n - Amber List |
| **Eurasian Curlew** (*Numenius arquata*) | Wildlife Acts, EU Birds Directive Annex II, Section II, Birds of Conservation Conce–n - Red List | | |

**Table 6. 12 Bird Atlas Data (2007 – 2011) (Hectad R65)**

| Name | Conservation Status | Name | Conservation Status |
|---|---|---|---|
| **Barn Owl** (*Tyto alba*)<br>**Breeding & Wintering** | Wildlife Acts, Birds of Conservation Concern - Red List | **Great Cormorant** *(Phalacrocorax carbo)*<br>**Wintering** | Wildlife Acts, Birds of Conservation Concern - Amber List |
| **Barn Swallow** (*Hirundo rustica*)<br>**Breeding** | Wildlife Acts, Birds of Conservation Concern Amber List | **Greylag Goose** (*Anser anser*)<br>**Breeding & Wintering** | Invasive Species: Regulation S.I. 477 (Ireland), Wildlife Acts, EU Birds Directive Annex II, Section I, Annex III, Section II, Birds of Conservation Concern - Amber List |
| **Black-headed Gull** (*Larus ridibundus*)<br>**Wintering** | Wildlife Acts, Birds of Conservation Concern - Red List | **House Martin** (*Delichon urbicum*)<br>**Breeding** | Wildlife Acts, Birds of Conservation Concern Amber List |
| **Common Coot** (*Fulica atra*)<br>**Wintering** | Wildlife Acts, EU Birds Directive Annex II, Section I, Annex III, Section II, Birds of Conservation Concern - Amber List | **House Sparrow** (*Passer domesticus*)<br>**Breeding & Wintering** | Wildlife Acts, Birds of Conservation Concern - Amber List |

| Name | Conservation Status | Name | Conservation Status |
|---|---|---|---|
| **Common Grasshopper Warbler (*Locustella naevia*)**<br>**Breeding** | Wildlife Acts, Birds of Conservation Concern Amber List | **Lesser Black-backed Gull (*Larus fuscus*)**<br>**Wintering** | Wildlife Acts, Birds of Conservation Concern - Amber List |
| **Common Kestrel (*Falco tinnunculus*)**<br>**Breeding & Wintering** | Wildlife Acts, Birds of Conservation Concern - Amber List | **Little Egret (*Egretta garzetta*)** | Wildlife Acts, EU Birds Directive, Annex I Bird Species |
| **Common Kingfisher (*Alcedo atthis*)**<br>**Breeding & Wintering** | Wildlife Acts, EU Birds Directive, Annex I, Birds of Conservation Concern, Amber List | **Little Grebe (*Tachybaptus ruficollis*)**<br>**Wintering** | Wildlife Acts, Birds of Conservation Concern - Amber List |
| **Common Linnet (*Carduelis cannabina*)**<br>**Breeding** | Wildlife Acts, Birds of Conservation Concern Amber List | **Mallard (*Anas platyrhynchos*)**<br>**Breeding & Wintering** | Wildlife Acts, EU Birds Directive Annex II, Section I, Annex III, Section I |
| **Common Pheasant (*Phasianus colchicus*) Breeding & Wintering** | Wildlife Acts, EU Birds Directive Annex II, Section I, Annex III, Section I | **Mew Gull (*Larus canus*)**<br>**Wintering** | Wildlife Acts, Birds of Conservation Concern Amber List |
| **Common Snipe (*Gallinago gallinago*)**<br>**Wintering** | Wildlife Acts, EU Birds Directive Annex II, Section I, Annex III, Section III, Birds of Conservation Concern - Amber List | **Mute Swan (*Cygnus olor)***<br>**Breeding & Wintering** | Wildlife Acts, Birds of Conservation Concern - Amber List |
| **Common Starling (*Sturnus vulgaris*)**<br>**Breeding & Wintering** | Wildlife Acts, Birds of Conservation Concern - Amber List | **Northern Lapwing (*Vanellus vanellus*)**<br>**Wintering** | Wildlife Acts, EU Birds Directive Annex II, Section II, Birds of Conservation Concern - Red List |
| **Common swift (*Apus apus*)**<br>**Breeding** | Wildlife Acts, Birds of Conservation Concern Amber List | **Rock Pigeon (*Columba livia*)**<br>**Breeding** | Wildlife Acts, EU Birds Directive, Annex II, Section I |
| **Common Wood Pigeon (*Columba palumbus*)**<br>**Breeding & Wintering** | Wildlife Acts, EU Birds Directive, Annex II, Section I, Annex III, Section I Bird Species | **Sand Martin (*Riparia riparia*)**<br>**Breeding** | Wildlife Acts, Birds of Conservation Concern Amber List |
| **Eurasian Curlew (*Numenius arquata*)**<br>**Wintering** | Wildlife Acts, EU Birds Directive Annex II, Section II, Birds of Conservation Concern - Red List | **Spotted Flycatcher (*Muscicapa striata*)**<br>**Breeding** | Wildlife Acts, Birds of Conservation Concern Amber List |

| Name | Conservation Status | Name | Conservation Status |
|---|---|---|---|
| **Eurasian Teal (*Anas crecca)***<br>**Wintering** | Wildlife Acts, EU Birds Directive Annex II, Section I, Annex III, Section II, Birds of Conservation Concern - Amber List | | |

### 6.3.6 Consultation

At the start of the design stage in 2021, an informal scoping pack was sent to a range of statutory and non-statutory consultees during the preparation of this EIAR as follows:

- Waterways Ireland
- Office of Public Works
- National Parks & Wildlife Service
- Inland Fisheries Ireland
- An Garda Siochana
- LCCC Heritage
- LCCC Archaeologist
- LCCC Architectural Conservation

No responses with particular reference to biodiversity were received.

In addition to the listed statutory and non-statutory consultees, the following state agencies and utilities were kept informed during the design of the proposed greenway:

- IDA Castletroy
- UL Facilities
- Environmental Protection Agency
- Dept. of Environment
- Dept. of Housing, Local Government and Heritage (Developments Applications Unit)
- An Taisce
- Failte Ireland
- ESB
- Uisce Eireann
- Eirgrid
- Enet
- Gas Networks Ireland

## 6.4 Field Surveys

### 6.4.1. Habitats and Flora

Habitat surveys of the Study Area were undertaken during 2020-2024. The habitats identified during these surveys are listed in

**Table 6.13** below. Habitat classifications and codes correspond to those described in '*A Guide to Habitats in Ireland*' (Fossitt, 2000). The habitats identified during site visits are shown on a habitat map to illustrate the habitats encountered during the field surveys, see **Figure 6. 4**. A detailed description of the region and its flora is also provided below.

**Table 6.13 Habitats recorded within the Study Area**

| No. | Habitat | Code |
|---|---|---|
| 1 | Earth banks | BL2 |
| 2 | Buildings & Artificial Surfaces | BL3 |
| 3 | Exposed sand, gravel or till | ED1 |
| 4 | Spoil and bare ground | ED2 |
| 5 | Recolonising bare ground | ED3 |
| 6 | Depositing/lowland Rivers | FW2 |
| 7 | Canals | FW3 |
| 8 | Drainage ditches | FW4 |
| 9 | Improved Agricultural grassland | GA1 |
| 10 | Amenity grassland (improved) | GA2 |
| 11 | Dry meadows and grassy verges | GS2 |
| 12 | Wet grassland | GS4 |
| 13 | (Mixed) broadleaved woodland | WD1 |
| 14 | Scattered trees and parklands | WD5 |
| 15 | Hedgerows | WL1 |
| 16 | Tree lines | WL2 |
| 17 | Riparian woodland | WN5 |
| 18 | Wet willow-alder-ash woodland | WN6 |
| 19 | Scrub | WS1 |

#### *6.4.1.1. Overview*

A large proportion of the habitats are within the Lower River Shannon SAC, which is of international conservation importance, with mostly grassland and riparian broadleaved woodland habitats outside of this designated site. The River Shannon forms the northern boundary of the study area and greatly influences the adjacent low-lying habitats. The Mulkear River confluence with the River Shannon carries a considerable silt load during floods. This sediment is deposited at and downstream the Mulkear/Shannon confluence due to the reduction in water velocity of the Mulkear when it enters the much larger and regulated Shannon channel.

Annex I habitat Residual alluvial forest with *Alnus glutinosa* and *Fraxinus excelsior* (91E0) is found within the Zone of Influence of the proposed works. This habitat can be found on flood plains in a range of situations from islands in river channels to low-lying wetlands alongside the channels. The habitat typically occurs on moderately base-rich, eutrophic soils subject to periodic inundation There are downstream Supratidal Annex 1 habitats which contain a diverse macro-invertebrate community, e.g. *Macoma-Scrobicularia-Nereis*, which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost area for the wintering birds.

Overall, there will be a small impact on this area of the Annex I habitat, given that the proposed works will result in individual tree felling of 5 trees within this habitat that were assessed by a specialist arborist as having a low value, and 7 trees adjacent to the habitat.

The dominant habitats within and adjacent to the proposed Greenway is buildings and artificial surfaces (BL3), depositing/lowland rivers (FW2), amenity grassland improved (GA2) and riparian woodland (WN5). Areas of tree lines (WL2), hedgerows (WL1), drainage ditches (FW4), mixed broadleaved woodland (WD1), scrub (WS1), dry meadows and grassy verges (GS2), spoil and bare ground (ED2), wetl grassland (GS4), scattered trees and parklands (WD5), and (GA1) improved agricultural grassland were also identified during the site walkover (.

**Earth banks (BL2)**

Most of this habitat is found upstream from the Mulkear River confluence with the River Shannon. It runs along the proposed Greenway for approximately 600 meters downstream along the River Shannon. The earth bank acts as a field boundary, constructed most likely to prevent flooding impacts in the developed areas.

Evaluation: Earth banks at the location mentioned above, are considered of local importance (lower value), presenting growth of different grass species but none of significant ecological importance.

**Buildings & Artificial Surfaces (BL3)**

Parts of the Greenway route are surfaced with tarmac which along with other artificial surfaces correspond to buildings and artificial surfaces habitat. Roads, car parks, pavements, yards, paths and driveways elsewhere in the study area are also categorised as buildings and artificial surfaces habitat.

Evaluation: Buildings and artificial habitat were evaluated as being of local importance (lower value) although they might provide habitats for bats.

**Exposed sand, gravel or till (ED1)**

The area known as Plassey Beach is an area where sand has been deposited and this is a pedestrian residential area. This anthropogenic impact is likely to support macroinvertebrates and wading birds. Pedestrians and dogs do impact on fauna.

Evaluation: This habitat is of low botanical importance in the Plassey Beach area as it is a manmade sandy beach for residential use. It does provide foraging habitat for some invertebrate and bird species.

**Spoil and bare ground (ED2)**

Parts of the proposed development corresponding to original unimproved pathways site that are currently used by pedestrians, cyclists and other users of the trail are categorised as areas of bare ground which are subject to ongoing trampling. This habitat is classified as spoil and bare ground (ED2).

Margins of the track comprises clay in parts, and supports a variety of ruderal (weed) species, as well as some hedgerow and grassland species, including knotgrass (*Polygonum aviculare*), redshank (*Polygonum Persicaria*), shepherd's purse (*Capsella bursa-pastoris*), white clover (*Trifolium repens*), greater plantain (*Plantago major*), creeping buttercup and creeping bent-grass.

Evaluation: Spoil, bare and recolonising ground habitat is evaluated as being **of local importance (lower value)** where it occurs outside of the SAC as it is a modified and disturbed habitat of little ecological significance but where it occurs within the SAC designation it is of **International Importance**.

**Recolonising bare ground (ED3)**

Upstream and along the Mulkear River there is an area where disturbed ground, adjacent to an artificial surface (Johnson & Johnson), has been covered with herbaceous vegetation, reaching over 50% of its total

surface. This area can be important for wildlife and supports a diverse flora with a high proportion of non-native species.

Evaluation: Recolonising ground habitat is evaluated as being of local importance (lower value) although needs to be monitored due to the high possibility of growing non-native species within the proposed works and being located within the SAC.

**Depositing/lowland rivers (FW2)**

The proposed Greenway runs along the River Shannon, where fine sediments are deposited on the riverbed. The river erodes its banks and meanders across floodplains creating depositing conditions where gradients are low and water flow is slow and sluggish.

Evaluation: The River Shannon provides spawning and nursery habitats for fish species, contributing to the wider River Shannon catchment. Its environmental and ecological condition has an influence on water quality locally therefore they have been assigned as **International Importance**.

**Canals (FW3)**

There is a canal in the area where the proposed works will take place (i.e. the Plassey Mill Race), that runs downstream from the east end of Kilmurray village, crossing the Living Bridge and diverting inland towards Drumroe Student Village after which it goes back towards the River Shannon.

Evaluation: Some freshwater species might choose this habitat as a refuge for reproduction. Furthermore, they can act as wildlife corridors, connecting diverse habitats and species. Canals can also contain a range of vegetation that create a foraging area for many insects. The canal found within the proximity of the proposed Greenway is considered of **Local Importance (Higher Value).**

**Drainage ditches (FW4)**

Several drainage ditches have been found running along LCC Waste Water Treatment Plant to UL Boathouse, covering a distance of approximately 450 meters. Ditches help control water flow and can support wetland vegetation. Although at the time water level was quite low and most of the drainage ditches were dry with very little vegetation.

Evaluation: The water level of drainage ditches may vary and so the density of the vegetation that grows in them. However, from an ecological point of view drainage ditches are part of the surface water network and a habitat for wetland flora and amphibians/invertebrate fauna and influence the quality of receiving water body, therefore of **Local Importance (Higher Value).**

**Amenity Grassland (improved) (GA2)**

This type of grassland is improved, or species-poor, and is managed for purposes other than grass production. It includes amenity, recreational or landscaped grassland. The amenity grassland found along the proposed Greenway is associated with lawns of various buildings and institutions, as well as sports fields.

Evaluation: The observed areas are species-poor, presenting mostly broadleaved herbs, resulting in a local importance (lower value) habitat.

**Dry meadows and grassy verges (GS2)**

This habitat is best represented by grassy verges on the side of the Greenway and on the margins of the river's embankment. Grassy verges support tall, coarse grasses but can also have smaller broadleaved herbs. Corresponds to the annexed habitat, 'lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) (6510). They provide some space for flowering plants on which insects can feed.

Evaluation: Plants can be scarce in these areas, resulting in a low ecological value. Therefore, it is assigned

as **local importance (lower value)** but it does provide foraging habitat for some fauna. Where it occurs within the SAC designation, it is of **International Importance**.

**Wet grassland (GS4)**

It occurs on wet or waterlogged mineral or organic soils that are poorly-drain, after the University Bridge and in the confluence area of the River Shannon and Mulkear River. Wet, nutrient-rich areas nearest the river experience the greatest variations in water level, and typically support species-poor but highly productive vegetation, dominated by tall vigorous grasses such as common reed and reed sweet-grass.

Evaluation: It appears in localised area associated with historical flooding, with many wet grassland species. Its ecological value is of **Local Importance (Higher Value).**

**Broadleaved woodland (mixed) (WD1)**

Several areas of broadleaved woodland habitat can be found within the works area of the proposed Greenway. This habitat includes native and non-native tree species. Diversity in the structure of the woodlands leads to biodiversity.

Evaluation: These broadleaved woodlands provide habitat for birds and mammals (including potential roost or foraging habitat and commuting routes for bats) in addition to providing connectivity in the landscape and habitat linkage, resulting in a habitat of **Local Importance (Higher Value).**

**Scattered trees and parklands (WD5)**

This habitat of scattered trees but with prominent visual, can be found at the north side of Kilmurry Village. The proportion of non-native trees in this area is usually high and can contain a diverse biodiversity adapted to these patched habitats.

Evaluation: This habitat is of low botanical importance. It does provide foraging habitat for some fauna as well as for vertebrates and arthropods, but is considered of local importance (lower value).

**Treeline (WL2)**

Treelines can be found in several areas along the proposed Greenway. Typically occurs along field or property boundaries, like the ones found at Troy Studios boundaries. Most treelines are planted and trees are often regularly spaced. They commonly comprise a high proportion of non-native species.

Evaluation: This habitat is considered of **Local Importance (Higher Value)**. Treelines provide habitat for birds and mammals (including potential roost or foraging habitat and commuting routes for bats) in addition to providing connectivity in the landscape and habitat linkage.

**Riparian Woodland (WN5)**

Riparian woodland habitat can be found along the whole length of the proposed Greenway. These areas are populated by wet woodlands on the River Shannon margins and are usually subject to frequent flooding.

Evaluation: Important features along the river margins within study area providing shade, bank stability, connectivity and allowing foraging for bird and mammal species, assigning this habitat as **Local Importance (Higher Value)**.

**Wet willow-alder-ash woodland (WN6)**

Includes woodlands of permanently waterlogged sites that are dominated by willows (*Salix spp.*), Alder (*Alnus glutinosa*) or Ash (*Fraxinus excelsior*). A small area of this habitat can be found a few meters upstream from the confluence between River Shannon and Mulkear River.

Evaluation: Waterlogged woods provide important habitats for biodiversity with an abundance of lichens, mosses, sedges, rushes and ferns and large numbers of invertebrates which support amphibians, mammals

and birds. They are of **Local Importance (Higher Value).**

**Scrub (WS1)**

Developed as a precursor to woodland and trees are included as components of scrub if their growth is stunted as a result of exposure, poor soils or waterlogging. Scrub occurs in small patches in the study area and occasionally along watercourses.

Evaluation: Scrub can provide habitat for birds and refuge for fauna, resulting in **Local Importance (Higher Value)** from an ecological point of view.

**Improved agricultural grassland (GA1)**

This category is used for intensively managed or highly modified agricultural grassland that has been reseeded and/or regularly fertilized and is now heavily grazed and/or used for silage making. It includes regularly reseeded monoculture grasslands and rye-grass leys that are planted as part of an arable rotation. These differ significantly from areas of permanent grassland. Improved agricultural grassland is typically species-poor. This habitat occurs near the eastern portions of the proposed development.

Evaluation: While the habitat can provide some foraging areas for certain fauna, the observed areas are species-poor resulting in a local importance (lower value) habitat.

**Hedgerows (WL1)**

This habitat describes linear strips of shrubs, often with occasional trees, that typically form field or property boundaries. Most hedgerows originate from planting, and many occur on raised banks of earth that are derived from the excavation of associated drainage ditches. The dimensions of hedgerows vary considerably, depending largely on management and composition, and are taken here as being mainly less than 5 m high and 4 m wide. This habitat occurs near the eastern portions of the proposed development mostly as field boundaries.

Evaluation: This habitat is considered of **Local Importance (Higher Value**). Hedgerows provide habitat for birds and mammals (including potential foraging habitat and commuting routes for bats) in addition to providing connectivity in the landscape and habitat linkage.

Plate 1 (a): Plassey Beach adjacent to the River Shannon Plate 2 (b): Plassey Beach embankment

Plate 3: Existing walking and cycling surface. Plate 4: Existing bridge over exiting stream

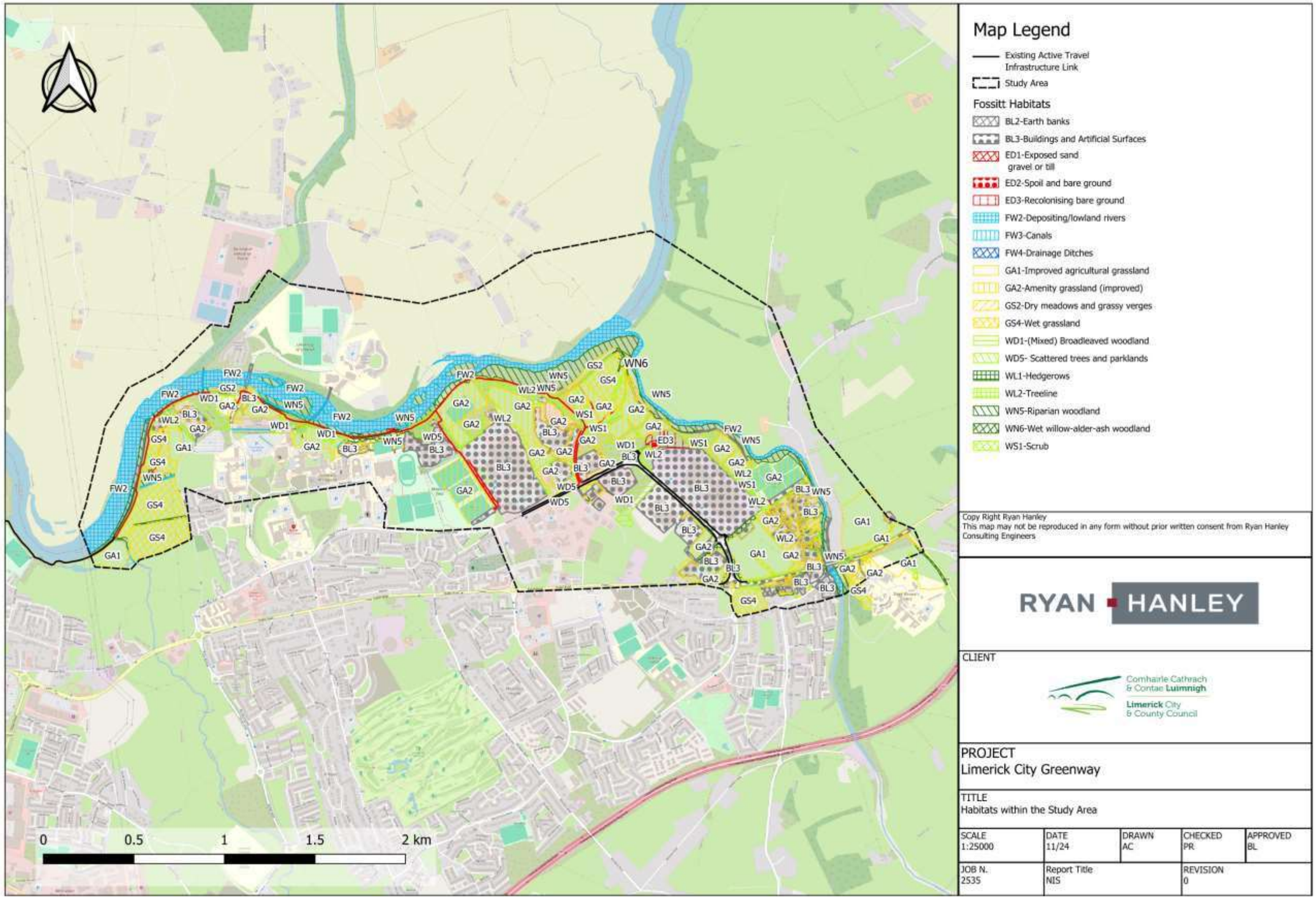


**Figure 6. 4 Habitat Classifications within the study area of the Limerick City Greenway (UL to NTP)**

#### *6.4.1.2. Botanical Species Present*

As outlined in Table 6.1 above, an extensive series of ecological field surveys were undertaken to inform the preparation of this report. Habitat surveys conducted on the 14th of May 2021 and the 28th of April 2022 included a detailed assessment of the entire study area for the presence of rare or protected flora listed on Annex II of the EU Habitats Directive, those protected under the Flora (Protection) Order, 2022, and species of conservation concern listed in the Irish Red Data Book.

No such species were recorded during these or any other ecological surveys carried out.

#### *6.4.1.3. Invasive Alien Plant Species*

During field surveys, observations of Invasive Alien Plant Species (IAPS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2011) were recorded. Walkover surveys were conducted on 5th November 2020, 14th May 2021, 28th April 2022, 3rd May 2023 and the 26th of June 2024. A number of invasive alien species (IAS) including Himalayan balsam (*Impatiens glandulifera*) and Giant hogweed (*Heracleum mategzzianum*) were recorded during these walkovers and documented growing within the Study Area of the proposed Greenway project (**Figure 6. 5 & Figure 6. 6**).

Stands of Giant Hogweed and Himalayan Balsam were identified within the study area of the proposed greenway route interspersed with one another within the Study Area. Giant Hogweed was identified at a total of 32 No. locations and Himalayan balsam identified at 37 No. locations during the 2021 survey. Both were reidentified and new stands were recorded during the 2022, 2023, and 2024 surveys (**Figure 6. 8**). Himalayan balsam was primarily concentrated on the banks and shoreline of the Lower River Shannon and Mulkear River. The location numbers do not indicate the number of plants at each location as the numbers of both invasive species were too large to record or estimate. No other species listed in the Third Schedule were identified within the Study Area during any of the field surveys. Additionally, the non-native species Winter Heliotrope (*Petasites fragrans*), Cherry laurel (*Prunus laurocerasus*), Butterfly bush (*Buddleja davidii*), Sycamore (*Acer pseudoplatanus*) and New Zealand flax (*Phormium tenax*) were recorded, however, these species are not listed on the Third Schedule and as such do not require specific measures for their control or disposal, therefore no further assessment for these species are required.

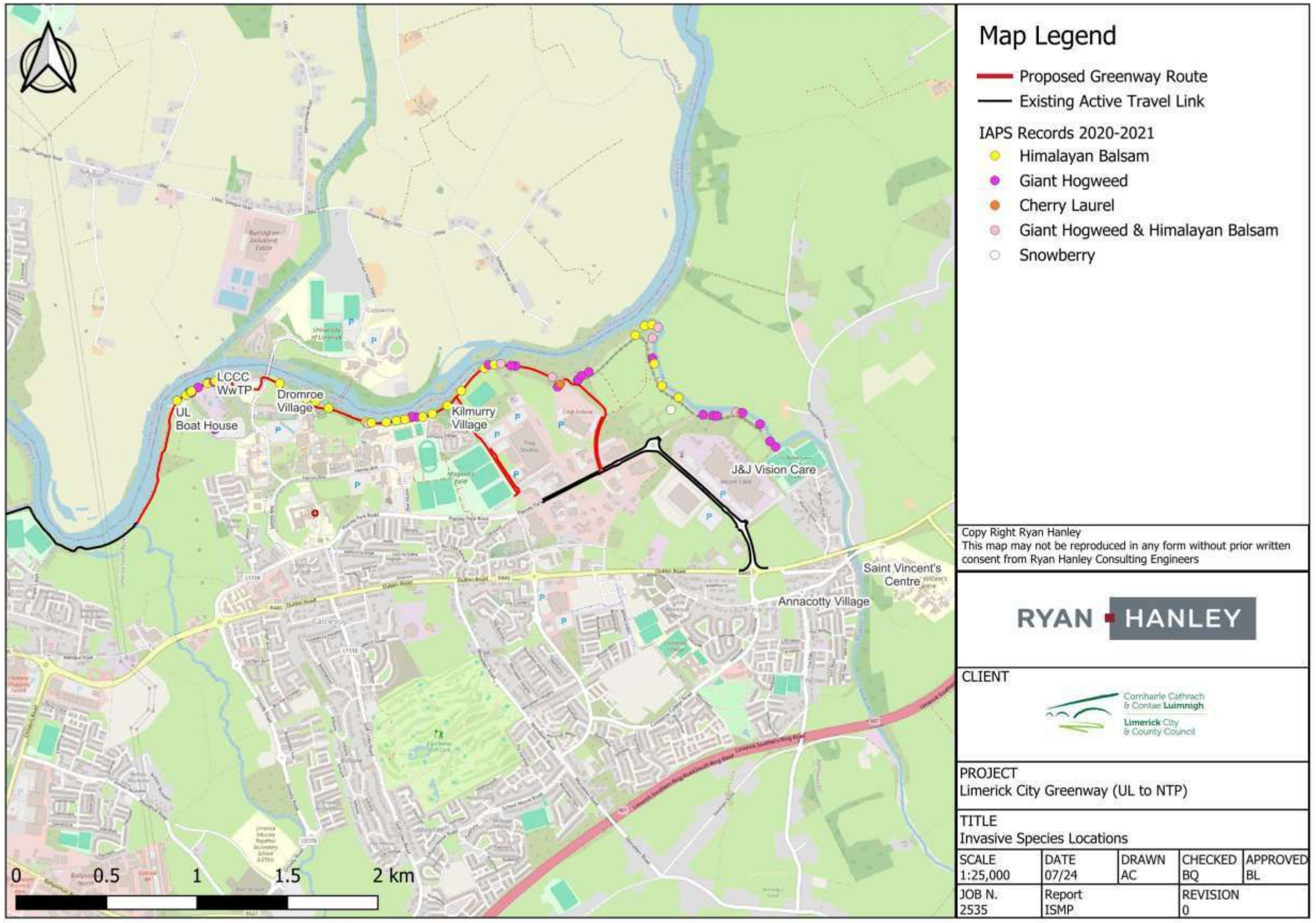


**Figure 6. 5 Invasive Species locations during walkover surveys**

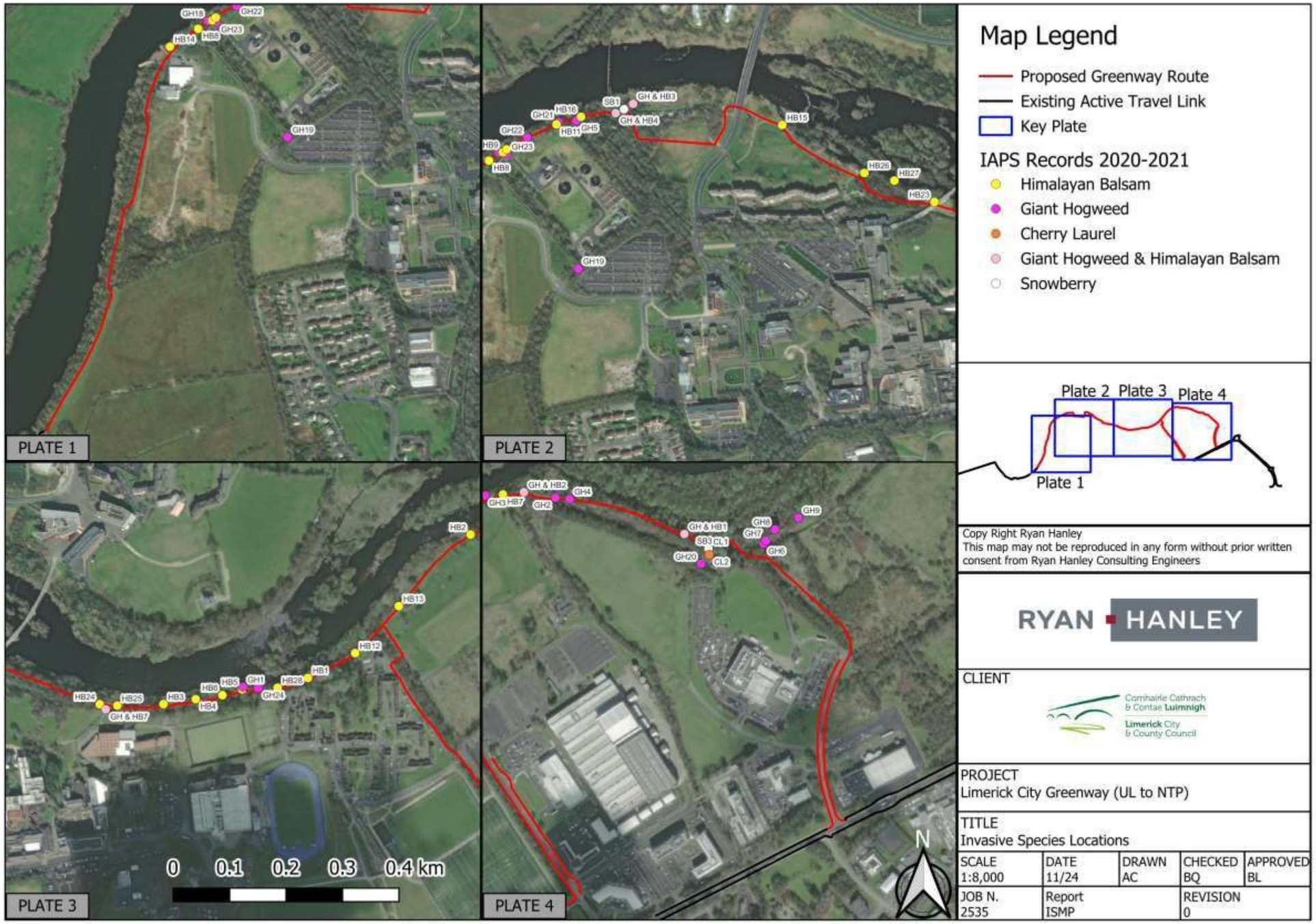


**Figure 6. 6 Invasive Species locations during walkover survey, 2020-2021.**

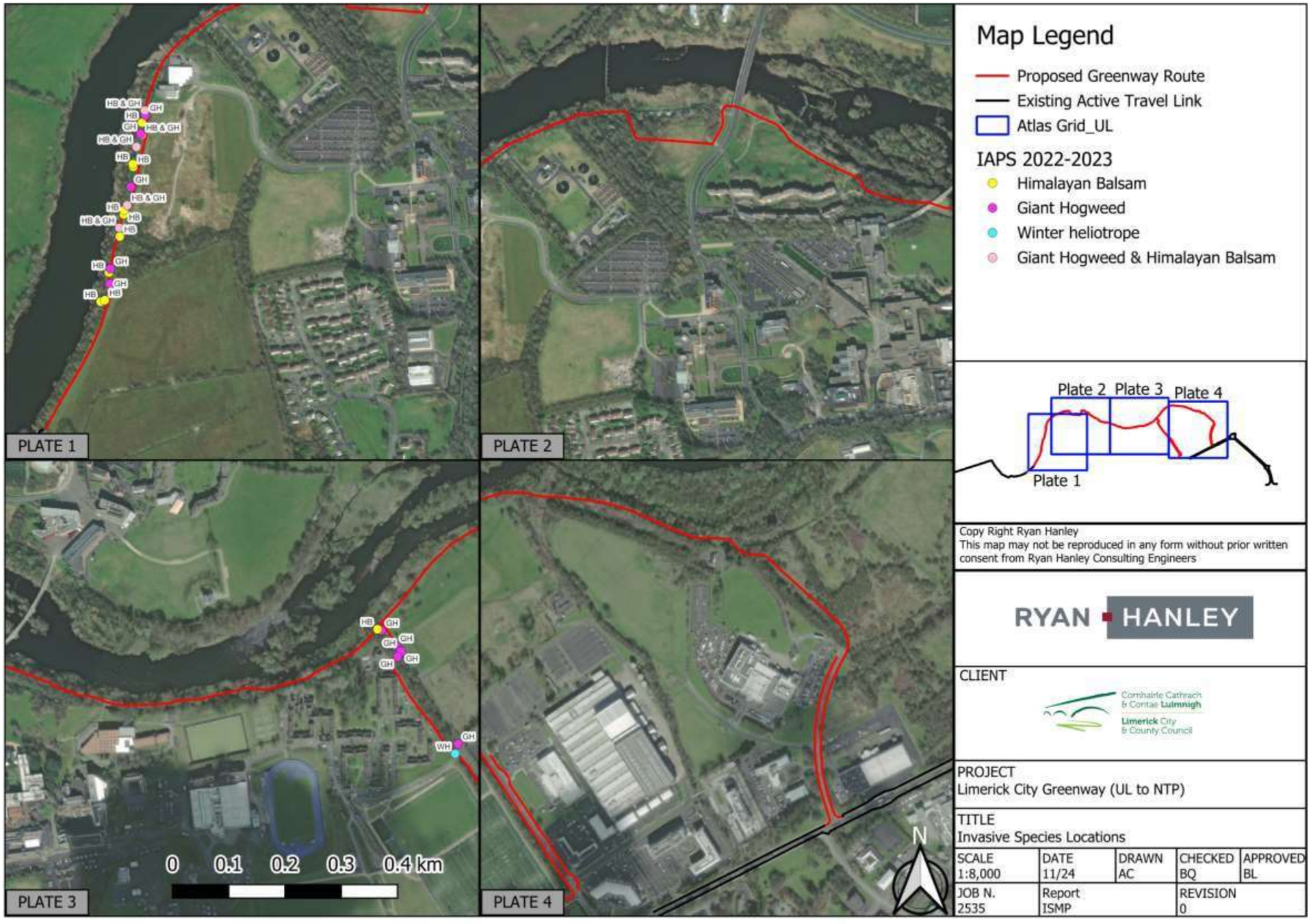


**Figure 6. 7Invasive Species locations during walkover survey, 2022-2023.**

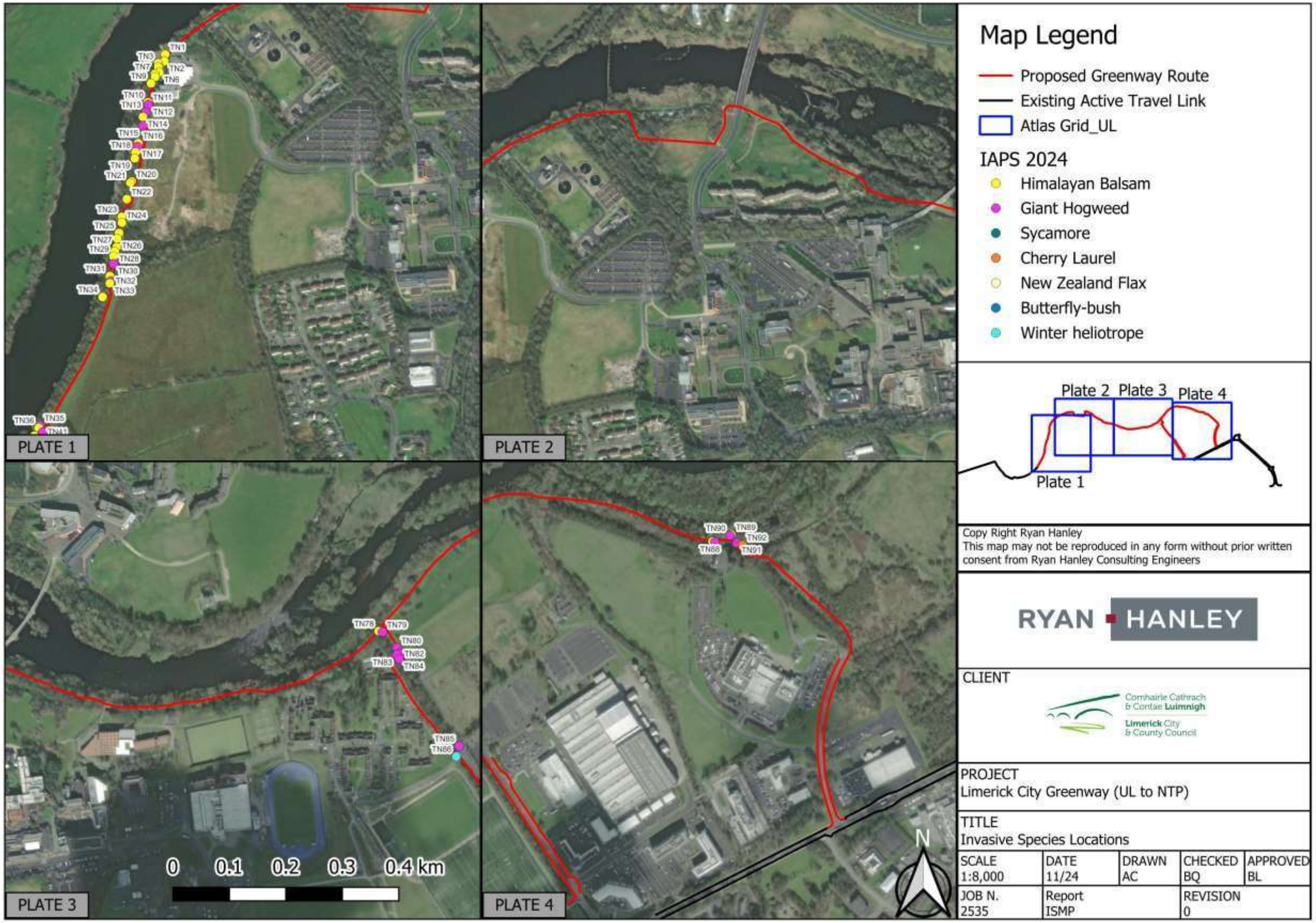


**Figure 6. 8 Invasive Species locations during walkover survey, 2024.**

*6.4.1.4. Significance of Habitats and Flora*

Annex I habitat (EU Habitats Directive) Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* is present within the Zone of Influence of the proposed works, within the Islands within the River Shannon and along the banks, specifically from Drumroe Student Village until Thomond College, reappearing from Troy studios up until the merge with the River Mulkear. This habitat is located on both east and west side of the bank although not in a continuous manner. This habitat is considered of **International Importance**.

Habitat type 3260 'Floating River Vegetation' is known to be present throughout most major rivers in the Lower Shannon River SAC and is therefore highly likely to be present in the vicinity of the proposed works[1].

Wet grassland woodlands, hedgerows, treelines and scrub within the study area were assigned **Local Importance (Higher Value)**. These features provide potential habitat for a range of protected fauna including bat species listed on IV of the EU Habitat Directive and those species protected under the Wildlife Acts 1976-2023 and provide semi-natural habitats with high biodiversity in a local context and provide connectivity to the wider area. These habitats in the study area are classified as Key Ecological Receptors.

The Study Area is situated where the River Shannon (Shannon (Lower) _060 river waterbody – IE_SH_25S012600) flows westwards towards Limerick city.

The WFD status of the waterbodies within the Study Area includes good status for the Mulkear (Limerick) River_050, and moderate status for the Lower River Shannon_060 waterbody. With regards to each river body's ability to meet the WFD objectives by 2027, the Mulkear (Limerick) River_050 is "Not at risk", the Lower River Shannon_060 is "Under Review". Limerick Dock and the Upper Shannon Estuary are both classed as having "Poor" WFD status and are "At Risk". The study area runs along the boundary of two groundwater bodies. Limerick City East which begins below the southern banks of the Lower Shannon River and Limerick City North which begins on the Northern banks of the same river. Limerick City North has a "Good" WFD status and is "Not at risk". Limerick City East has a "Good" WFD status but is currently "At Risk".

The River Shannon is classified as a Special Area of Conservation and includes various Annex I & II habitats and species and therefore has been assigned **International Importance**. The rest of the watercourses, canals and drainage ditches within the study area have been assigned **Local Importance (Higher Value)** as they have the potential to provide habitats for fish, amphibians, and other species.

Improved agricultural grassland, Amenity grassland (Improved) and Dry meadows/grassy verges have been assigned Local Importance (Lower Value) on the basis that these habitats are largely fragmented within the study area and are subject to regular anthropogenic disturbance and modification. The remaining habitats recorded included highly managed and built areas that were assigned Local Importance (Lower Value) and are not classified as Key Ecological Receptors.

Floral species of conservation concern were not recorded within the proposed works area. Non-native invasive species are not an ecological receptor that requires assessment of value; however, they are considered throughout this assessment in terms of management as a negative indicator for ecological receptors. Invasive species which are addressed in the Invasive Species Management Plan (ISMP) can spread easily and compete with native species. **Table 6.14** provides a summary of the habitat importance valuation and identifies the habitats classified as Key Ecological Receptors (KERs).

[1] APEM (2023) Limerick City Greenway Aquatic Ecological Appraisal – 2023 Update

**Table 6.14 Summary of Habitat Significance**

| Habitat Name | Habitat Code | Receptor Importance/Ecological Value | Key Ecological Receptor |
|---|---|---|---|
| Earth banks | BL2 | Local importance (lower value) | No.<br>This habitat is of limited botanical importance. |
| Buildings & Artificial Surfaces | BL3 | Local importance (lower value) | No.<br>This habitat is of limited botanical importance although building may provide habitat for bats. |
| Exposed sand, gravel or till | ED1 | Local importance (lower value) | No.<br>This habitat is of low botanical importance in the Plassey Beach area as it is a manmade sandy beach for residential use. It does provide foraging habitat for some invertebrate and bird species. |
| Spoil and bare ground | ED2 | International importance (within SAC)<br>Local importance (lower value) outside SAC | No.<br>This habitat is of low botanical importance; however, it does provide foraging habitat for some invertebrate and bird species |
| Recolonising bare ground | ED3 | Local importance (lower value) | No.<br>Recolonising ground habitat is evaluated as being of local importance (lower value) although needs to be monitored due to the high possibility of growing non-native species within the proposed works and being located within the SAC. |
| Depositing /lowland rivers | FW2 | Local importance (higher value) | Yes.<br>The River Shannon provides spawning and nursery habitats for fish species, contributing to the wider River Shannon catchment. Its environmental and ecological condition has an influence on water quality locally. |
| Canals | FW3 | Local importance (higher value) | Yes.<br>Some freshwater species might choose this habitat as a refuge for reproduction. Furthermore, they can act as wildlife corridors, connecting diverse habitats and species. Canals can also contain a range of vegetation that create a foraging area for many insects. |
| Drainage Ditches | FW4 | Local importance (higher value) | Yes.<br>Drainage ditches are part of the surface water network and a habitat for wetland flora and amphibians/invertebrate fauna and influence the quality of receiving water body. |
| Improved Agricultural Grassland | GA1 | Local importance (lower value) | No.<br>This habitat is of low botanical importance. It does provide foraging habitat for some fauna. |
| Amenity Grassland (improved) | GA2 | Local importance (lower value) | No.<br>This habitat is of low botanical importance. It does provide foraging habitat for some fauna. |
| Dry meadows and grassy verges | GS2 | International importance (within SAC)<br>Local importance (lower value) outside the SAC | No.<br>Lower value habitat but important to overall biodiversity, invertebrates and foraging as well as green image within campus. |
| Wet grassland | GS4 | Local importance (higher value) | Yes.<br>Localised area with many wet grassland species in proximity to the River Shannon and River Mulkear associated with historical flooding. |

| Habitat Name | Habitat Code | Receptor Importance/Ecological Value | Key Ecological Receptor |
|---|---|---|---|
| Broadleaved woodland (mixed) | WD1 | Local importance (higher value) | Yes.<br>An area of broadleaved woodland (mixed) which includes some native tree species provide habitat for birds and mammals (including potential roost or foraging habitat and commuting routes for bats) in addition to providing connectivity in the landscape and habitat linkage. |
| Scattered trees and parklands | WD5 | Local importance (lower value) | No.<br>This habitat is of low botanical importance. It does provide foraging habitat for some fauna. |
| Hedgerows | WL1 | Local importance (higher value) | Yes.<br>Hedgerows provide habitat for birds and mammals (including potential roost or foraging habitat and commuting routes for bats) in addition to providing connectivity in the landscape and habitat linkage. |
| Treeline | WL2 | Local importance (higher value) | Yes.<br>Treelines provide habitat for birds and mammals (including potential roost or foraging habitat and commuting routes for bats) in addition to providing connectivity in the landscape and habitat linkage. |
| Riparian woodland | WN5 | Local importance (higher value) | Yes.<br>Important feature along the river margins within study area providing shade, bank stability, connectivity and allowing foraging for bird and mammal species. |
| Wet willow-alder-ash woodland | WN6 | Local importance (higher value) | Yes.<br>Waterlogged woods provide important habitats for biodiversity with an abundance of lichens, mosses, sedges, rushes and ferns and large numbers of invertebrates which support amphibians, mammals and birds. |
| Scrub | WS1 | Local importance (higher value) | Yes.<br>Scrub occurs in small patches in the study area and occasionally along watercourses. Scrub can provide habitat for birds and refuge for fauna. |

### 6.4.2. Fauna

#### 6.4.2.1. *Breeding Birds*

Breeding Bird Surveys took place over 5 no. visits during each of the following time periods; June 2021, April and June 2022 and May and June 2023. Bird Survey methodology undertaken for the Limerick City Greenway (UL to NTP) included line transect surveys, spot-counts, field scanning, river scanning and distribution mapping from varied vantage points affording good views. Three belted transects (T1-T3) were surveyed in 2021/2022, while four transects (T1-T4) with all birds seen or heard recorded (Bibby *et al.*, 2000) and as per line transect methodologies presented in BirdWatch Ireland (2012). Birds were recorded in three distance bands from the observer: <25m, 25-100m and >100m.

**Table 6.15 Breeding Bird species recorded during the walkover surveys 2021/2022.**

| Species name[2] | Scientific name | Species name[1] | Scientific name |
|---|---|---|---|
| Mallard | Anas platyrhyncos | Pied Wagtail | Motacilla alba yarrelli |
| Mute Swan | Cygnus alor | Sand Martin | Riparia riparia |
| Cormorant | Phalacrocorax carbo | Swift | Apus apus |
| Greylag Goose | Anse anser | Swallow | Hirundo rustica |
| Herring Gull | Larus argentatus | Lesser Black-backed Gull | Larus fuscus |
| Grey Heron | Ardea cinerea | Mistle Thrush | Turdus viscivorus |
| Wren | Troglodytes troglodytes | Reed Bunting | Emberiza schoeniclus |
| Bullfinch | Phyrrula phyrrula | Cuckoo | Cuculus canorus |
| Robin | Erithacus rubecula | Pheasant | Phasianus colchicus |
| Song Thrush | Turdus philomelos | Grey Wagtail | Motacilla cinerea |
| Blackbird | Turdus merula | Collared Dove | Streptopelia decaocto |
| Blue Tit | Cyanistes caeruleus | Starling | Sturnus vulgaris |
| Great Tit | Parus major | Kingfisher | Alcedo atthis |
| Coal Tit | Periparus ater | | |
| Long-tailed Tit | Aegithalos caudatus | | |
| Goldfinch | Carduelis carduelis | | |
| Chaffinch | Fringilla coelebs | | |
| Chiffchaff | Phylloscopus collybita | | |
| Willow Warbler | Phylloscopus trochilus | | |
| Goldcrest | Regulus regulus | | |
| Blackcap | Sylvia atricapilla | | |
| Whitethroat | Sylvia communis | | |
| Jackdaw | Corvus monedula | | |
| Rook | Corvus frugilegus | | |
| Hooded Crow | Corvus corone | | |
| Magpie | Pica pica | | |
| Woodpigeon | Columba palumbus | | |
| Dunnock | Prunella modularis | | |

The visits were conducted during early and late breeding season, along line transect locations selected as a representative sample of the proposed greenway footprint and surrounding environs.

The surveys confirmed breeding for Mallard and Mute Swan and Greylag Goose, while Swallow and Sand Martin were seen to forage over the main channel of the river. Possible breeding evidence was displayed by Willow Warbler and Goldcrest in the wet woodland / scrub and broadleaved woodland habitats fringing the cycleway.

[2] Conservation status assigned by 'traffic light' system of colour coding, in accordance with the Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021).

The shaded riparian banks of the River Shannon and Mulkear River in the study area do provide suitable foraging and nesting habitat (vertical earthen banks) for the Annex I species Kingfisher (*Alcedo atthis*) and other protected species including Swift and Grey Wagtail.

The proposed Greenway footprint and environs do not provide a suitable habitat for ground nesting wading and wildfowl species, given the abundance of tree and scrub cover and the baseline levels of anthropogenic activity and associated baseline disturbances to ground nesting bird species.

**Table 6. 16 Breeding Bird species recorded during the walkover surveys 2024.**

| Species name | Scientific name | Species name | Scientific name |
|---|---|---|---|
| Mallard | Anas platyrhyncos | Willow warbler | Phylloscopus trochilus |
| Mute Swan | Cygnus alor | Swallow | Hirundo rustica |
| Cormorant | Phalacrocorax carbo | Goldcrest | Regulus regulus |
| Greylag Goose | Anse anser | House sparrow | Passer domesticus |
| Sand Martin | Riparia riparia | House martin | Delichon urbicum |
| Starling | Sturnus vulgaris | Grey Wagtail | Motacilla cinerea |
| Grey Heron | Ardea cinerea | | |
| Wren | Troglodytes troglodytes | | |
| Bullfinch | Phyrrula phyrrula | | |
| Robin | Erithacus rubecula | | |
| Song Thrush | Turdus philomelos | | |
| Blackbird | Turdus merula | | |
| Blue Tit | Cyanistes caeruleus | | |
| Great Tit | Parus major | | |
| Coal Tit | Periparus ater | | |
| Long-tailed Tit | Aegithalos caudatus | | |
| Goldfinch | Carduelis carduelis | | |
| Chaffinch | Fringilla coelebs | | |
| Chiffchaff | Phylloscopus collybita | | |
| Willow Warbler | Phylloscopus trochilus | | |
| Blackcap | Sylvia atricapilla | | |
| Jackdaw | Corvus monedula | | |
| Rook | Corvus frugilegus | | |
| Hooded Crow | Corvus corone | | |
| Magpie | Pica pica | | |
| Woodpigeon | Columba palumbus | | |
| Dunnock | Prunella modularis | | |
| Pied Wagtail | Motacilla alba yarrelli | | |
| Collared Dove | Streptopelia decaocto | | |

Amber listed species identified during the 2023 breeding bird survey included the Starling, Willow warbler, Goldcrest, Greylag goose, Mallard, Mute swan, House sparrow, Cormorant, Sand martin and Swallow. Kingfisher was not recorded during the 2023 breeding bird survey but had been recorded during the 2022 breeding bird survey and in the breeding season of 2024.

Grey wagtail, a Red listed species, was recorded during the 2023 breeding bird survey, within transect 1, near the UL pontoon.

Breeding Birds as an ecological receptor have been assigned as **Local Importance (Higher value)** on the basis of the potential for a population within the study area.

#### 6.4.2.2. *Wintering Birds*

Wintering Birds Surveys were carried out over 5 no. visits in November 2021 to March 2022 and 6 no. visits in October 2023 to March 2024. The surveys included line transect surveys, spot-counts, field scanning, river scanning and distribution mapping from varied vantage points affording good views. These were supplemented by walkover surveys of habitats and targeted survey areas.

**Table 6. 17 Wintering Bird species recorded during the walkover surveys 2021/2022**

| Species name[3] | Scientific name | Species name[3] | Scientific name |
|---|---|---|---|
| Mallard | *Anas platyrhyncos* | Mistle Thrush | *Turdus viscivorus* |
| Mute Swan | *Cygnus alor* | Grey Wagtail | *Motacilla cinerea* |
| Cormorant | *Phalacrocorax carbo* | Kingfisher (Ann. I) | *Alcedo atthis* |
| Greylag Goose | *Anse anser* | Moorhen | *Gallinula chloropus* |
| Grey Heron | *Ardea cinerea* | Coot | *Fullica atra* |
| Wren | *Troglodytes troglodytes* | Lapwing | *Vanellus vanellus* |
| Robin | *Erithacus rubecula* | Fieldfare | *Turdus pilaris* |
| Song Thrush | *Turdus philomelos* | Black-headed Gull | *Chroicocephalus ridibundus* |
| Blackbird | *Turdus merula* | Kestrel (Ann. I) | *Falco tinnunculus* |
| Blue Tit | *Cyanistes caeruleus* | Raven | *Corvus corax* |
| Great Tit | *Parus major* | Stonechat | *Saxicola torquatus* |
| Coal Tit | *Periparus ater* | Jay | *Garrulus glandarius* |
| Long-tailed Tit | *Aegithalos caudatus* | Mistle Thrush | *Turdus viscivorus* |
| Goldfinch | *Carduelis carduelis* | Treecreeper | *Certhia familiaris* |
| Chaffinch | *Fringilla coelebs* | Collared Dove | *Streptopelia decaocto* |
| Chiffchaff | *Phylloscopus collybita* | Buzzard | *Buteo buteo* |
| Willow Warbler | *Phylloscopus trochilus* | | |
| Goldcrest | *Regulus regulus* | | |
| Blackcap | *Sylvia atricapilla* | | |
| Rook | *Corvus frugilegus* | | |
| Hooded Crow | *Corvus corone* | | |
| Magpie | *Pica pica* | | |
| Woodpigeon | *Columba palumbus* | | |
| Dunnock | *Prunella modularis* | | |
| Pied Wagtail | *Motacilla alba yarrelli* | | |
| Redwing | *Turdus iliacus* | | |

The proposed Greenway footprint and the section of the River Shannon and Mulkear River support a small number and low diversity of over-wintering avifauna.

Kestrel was the only raptor species identified during the wintering bird surveys. Species such as Sparrowhawk, Peregrine and Buzzard may utilise the wider study area for foraging and hunting purposes.

[3] Conservation status assigned by 'traffic light' system of colour coding, in accordance with the Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021).

The proposed development footprint is not located within suitable Grey Wagtail wintering habitat. Golden Plover and Lapwing were identified along the margins of the Mulkear River, each on one occasion over the wintering period. It is likely that they utilise this area intermittently and opportunistically for foraging and roosting purposes. The proposed route does not interact with the Mulkear River.

**Table 6. 18 Wintering Bird species recorded during the Winter Bird Survey 2023/2024**

| Species name | Scientific name | Species name | Scientific name |
|---|---|---|---|
| Mallard | *Anas platyrhyncos* | Curlew | *Numenius arquata* |
| Mute Swan | *Cygnus alor* | Grey Wagtail | *Motacilla cinerea* |
| Cormorant | *Phalacrocorax carbo* | Kingfisher (Ann. I) | *Alcedo atthis* |
| Herring gull | *Larus argentatus* | Goldcrest | *Regulus regulus* |
| Black-headed Gull | *Chroicocephalus ridibundus* | | |
| Greylag Goose | *Anse anser* | | |
| Chaffinch | *Fringilla coelebs* | | |
| Blackbird | *Turdus merula* | | |
| Blue Tit | *Cyanistes caeruleus* | | |
| Great Tit | *Parus major* | | |
| Grey Heron | *Ardea cinerea* | | |
| Jackdaw | *Corvus monedula* | | |
| Long-tailed Tit | *Aegithalos caudatus* | | |
| Robin | *Erithacus rubecula* | | |
| Woodpigeon | *Columba palumbus* | | |
| Wren | *Troglodytes troglodytes* | | |
| Little egret (Ann. I) | *Egretta garzetta* | | |
| Rook | *Corvus frugilegus* | | |
| Song Thrush | *Turdus philomelos* | | |
| Treecreeper | *Certhia familiaris* | | |
| Coal Tit | *Periparus ater* | | |
| Pied Wagtail | *Motacilla alba yarrelli* | | |
| Water rail | *Rallus aquaticus* | | |
| Magpie | *Pica pica* | | |

Mute swan, Cormorant, Greylag geese, Mallard, Black-headed gulls and Grey herons were the most consistent wintering species recorded throughout the winter bird survey season 2023/2024.

Amber listed species identified during the winter bird surveys 2023/2024 included Mute swan, Mallard, Cormorant, Black-headed gull, Herring gull, Greylag goose, Goldcrest and Kingfisher.

Red listed species identified during the winter bird surveys included the Grey wagtail and Curlew. Grey wagtail was recorded in December 2023 and January 2024 within Transect 1, flying and foraging near the River Shannon. Curlew were identified along the River Shannon and its adjoining agricultural lands, on one occasion over the wintering period (January 2024). It is likely that they utilise this area intermittently and opportunistically for foraging and roosting purposes.

One American mink, Third Schedule Invasive Species, was recorded swimming in the River Shannon near the UL pontoon during the winter bird season 2023/2024.

Wintering Birds as an ecological receptor have been assigned as **International importance** considered some are part of the River Shannon and River Fergus Estuaries SPA that might use the wider areas for foraging, and some are listed as Annex I species of the Birds Directive (Directive 2009/147/EC). However, the species encountered within the study area of the proposed greenway, are considered low in numbers and diversity, compared to their usual populations in the SPA.

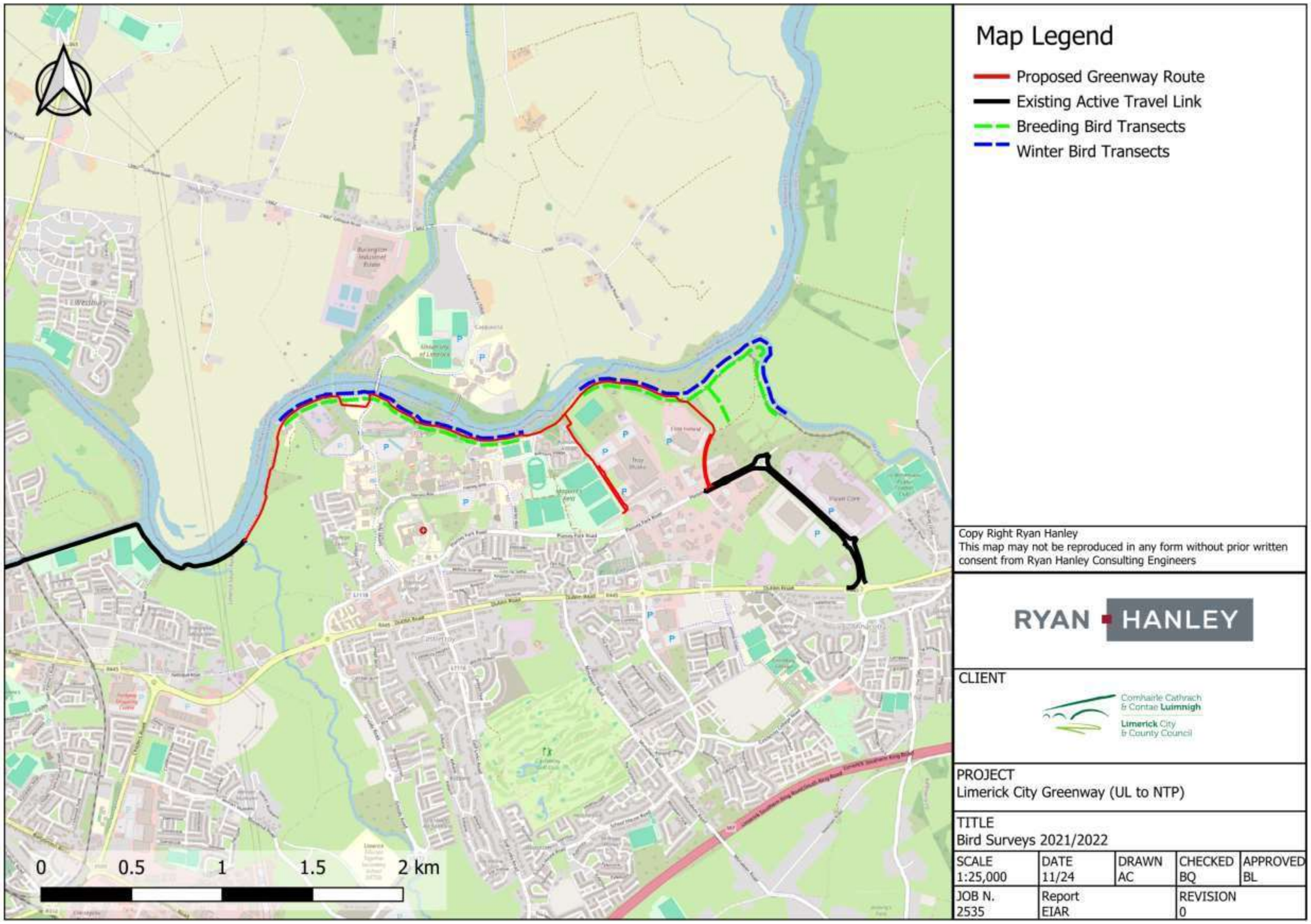


**Figure 6.9 Bird survey transects along the Greenway 2021/2022**

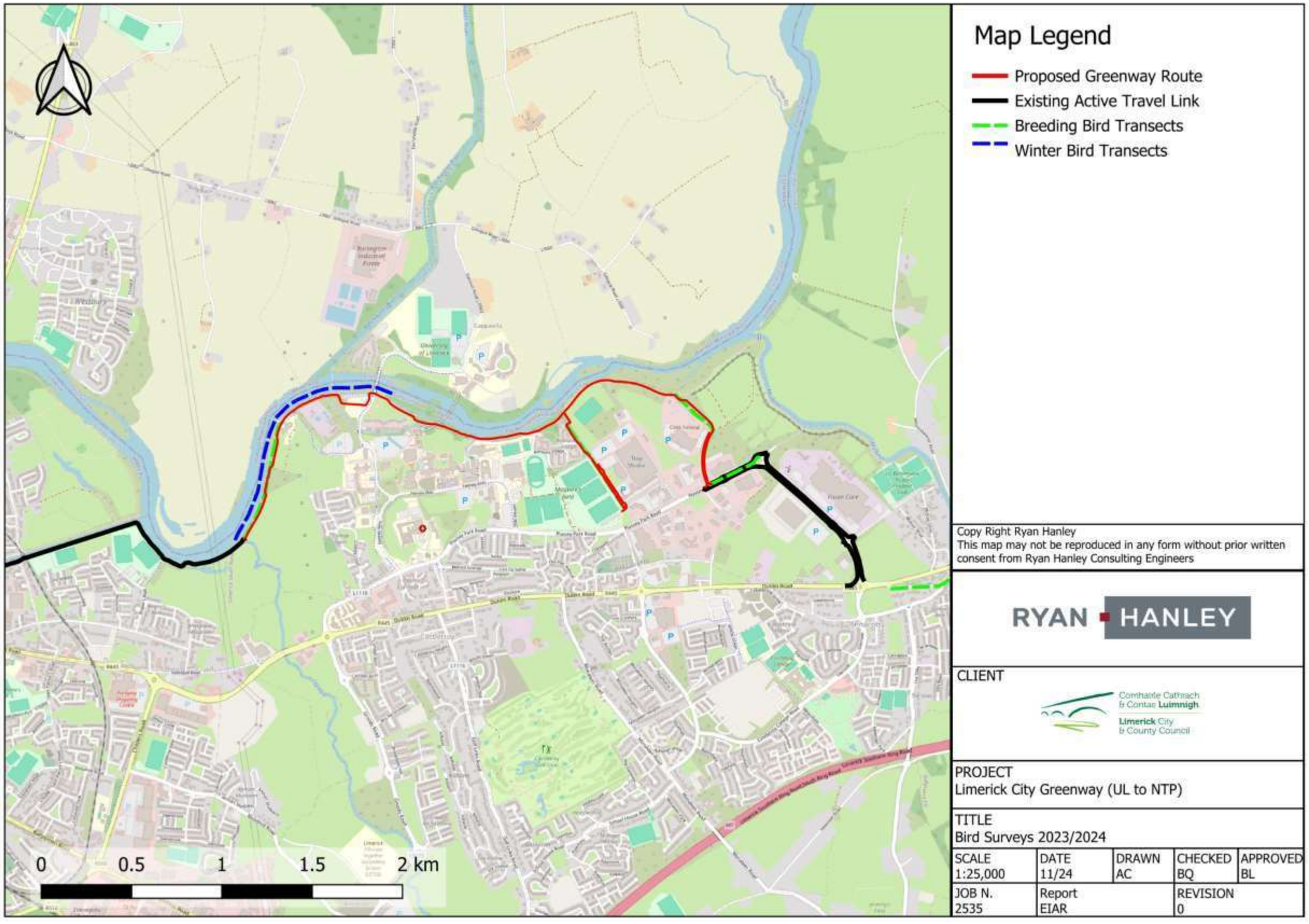


**Figure 6.10 Bird survey transects along the Greenway 2023/2024**

#### 6.4.2.3. *Mammals*

The Study Area was assessed for signs of mammal activity with particular interest in signs for Badger and Otter. Other species that are likely to occur in the area but were not recorded include Fox (*Vulpes vulpes*), Eurasian Pygmy Shrew (*Sorex minutus*), Red Squirrel (*Sciurus vulgaris*), European Hedgehog (*Erinaceus europaeus*), Rat (*Rattus norvegicus*) and Stoat (*Mustela erminea*). The recorded evidence does not suggest that the study area is utilized by populations of higher than local significance.

**Otter**

During the walkover surveys undertaken during November 2020, May 2021 and April 2022 the Study Area and watercourses were searched for signs of Otter. The Otter survey was undertaken along the route of the proposed Greenway, following the river Shannon's bank. There were no definitive sights for Otter, such as spraints, tracks, holt or couch sites but potential trails were observed. Some areas of the proposed Greenway were considered suitable for Otter. Otter require suitable bankside vegetation as cover for their holts. An updated Otter Survey was conducted during July 2024, which yielded the same results as previous surveys.

It should be noted that while no Otters or field signs of Otters were recorded along the River Shannon, it should be considered that habitats are suitable for Otter. The Precautionary Principle will be undertaken during construction in consideration for the potential of Otters to forage and/ or inhabit the area especially on the opposite banks to the construction works.

Otter as an ecological receptor have been assigned as **International importance** on the basis of suitable riparian habitats along the study area, and it is protected internationally and nationally.

**Badger**

Badger is protected under the Wildlife Acts 1976-2012. During the walkover surveys undertaken in 2020, 2021 and 2022 the Study Area was searched for signs of badger. The study area was checked for physical evidence of badgers including setts, latrines, and paths in-line with Best Practice methodologies.

A sett like structure was found along the proposed Greenway, between the Engineering Research Building and Thomond College, however it is more likely that the structure was more recently used as a possible fox hole as there were no fresh signs of badgers in the area.

An updated Badger survey was conducted during June 2024 where no signs of Badger were found.

No other badger setts or similar structures were identified along the Greenway route.

Badger as an ecological receptor has been assigned **Local Importance (Lower value)** on the basis on that the habitats within the study area are unlikely to support a badger population of Local Importance.

**Bats**

During the walkover surveys undertaken in 2021, the study area was searched in terms of landscape suitability for bat habitat.

Bat surveys were undertaken for this EIAR on the 19th of July 2021, between the 9th – 21st September 2021, on the 10th of January 2024 and on the 19th of June and 10th of July 2024. The surveys included visual roost survey and bat activity survey to determine the areas and habitats within the ZoI of the proposed works which are being used by bats; the diversity and relative abundance of bats present and if bat roosting is occurring or likely to occur in the zone of influence of the proposed works.

The visual roost survey was carried out to identify any bat roosting potential and it included a survey of structures during daytime to inspect Potential Roost Features (PRFs), as well as a survey of trees by ground-level roost assessment.

Bat activity was surveyed by transect survey at dusk and by using passive ultrasonic bat detectors, deployed at two locations along the proposed development. The purpose of the passive detector survey was to supplement information gathered during bat activity surveys.

The site contains some limited semi-natural habitat which mostly consists of riparian vegetation associated with the River Shannon as well as nearby areas of grassland. There are some bat roosting opportunities present in buildings and trees adjoining the proposed development.

A high level of bat activity and species diversity was recorded during the survey period. The study area provides a diversity of habitats and foraging opportunities for bats. Light pollution here is typically low and the area has good landscape connectivity with surrounding habitats.

The overall bat suitability index value (42.56) according to 'Model of Bat Landscapes for Ireland' (Lundy *et at*. 2011) suggests the landscape in which the proposed site is located is of high suitability for bats in general.

Further bat activity surveys were carried out on the 19th of June and the 10th of July 2024. The surveys included nighttime walkover (transect) surveys and passive acoustic surveys to determine the areas and habitats within the ZoI of the proposed works which are being used by bats; the diversity and relative abundance of bats present and if bat roosting is occurring or likely to occur in the zone of influence of the proposed works. Passive detectors were placed in two locations for a total of 7 days (Detector 1: 19th-25th of June 2024 Inclusive. Detector 2: 03rd to the 09th of July 2024). Eight species of bat were detected during these passive surveys: Soprano Pipistrelle; Brown Long-eared Bat; Common Pipistrelle. Leisler's Bat; Daubenton's Bat; Natterer's Bat; Whiskered Bat and Nathusius' Pipistrelle. Soprano Pipistrelles were the most frequently recorded species during both the active transect and passive surveys followed by Common Pipistrelle, Daubenton's Bat and Leisler's Bat.

Bats as an ecological receptor have been assigned as **County Importance** on the basis of the potential for a population within the study area.

#### 6.4.2.4. *Reptiles and Amphibians*

Common frog (*Rana temporaria*), and Smooth newt (*Lissotriton vulgaris*), while not recorded during site surveys, may occur within the study area. It is likely that common frog are present in areas of standing water, damp areas and vegetation in the proposed development area.

Viviparous lizard are known to occupy damp or wet areas with abundant grass tussocks in high densities and can be found on grassland, hedgerows and road embankments (Edgar *et al.,* 2010). The proposed development will not result in a significant loss of suitable habitat for reptiles and amphibians. Therefore, no further survey was deemed necessary.

Reptiles and Amphibians as ecological receptors have been assigned as **Local Importance (Lower value)** on the basis of the potential for a population within the study area.

#### 6.4.2.5. *Invertebrates*

Invertebrates were considered in the initial screening assessment of the site, including a desktop review of rare and protected invertebrates and searches made during the ecological field surveys.

Given its status as the only Irish insect species listed on Annex II of the EU Habitats Directive, particular attention

was paid to the Marsh Fritillary (Euphydryas aurinia) during ecological surveys. Survey efforts focused both on direct detection of the species and on the identification of potentially suitable habitat. The Marsh Fritillary is a weak flyer with a short flight period from May to June, adults therefore generally remain close to their emergence sites. Although the species may utilize a range of habitat types, its distribution is limited by the availability of its sole known larval foodplant in Ireland—Devil's-bit Scabious (Succisa pratensis).

No Marsh Fritillary were identified and no evidence of Marsh Fritillary were recorded during the ecological field surveys. Additionally, Succisa pratensis was not observed in notable abundance across the surveyed areas. A review of National Biodiversity Data Centre (NBDC) records for the grid squares overlapping the proposed development area found no existing records of the species.

An aquatic ecological appraisal was done by APEM in 2021 and 2023. No species on the list were considered to be protected or threatened in Ireland, with the exception of the Freshwater Pearl Mussel (Margaritifera margaritifera), however this species has not been reported or observed within the study area.

Invertebrates as ecological receptors have been assigned as Local Importance (Lower value) on the basis of the potential for a population within the study area.

#### 6.4.2.6. *Macroinvertebrates*

Macroinvertebrate data was obtained from NBDC (NBDC, 2021) and from the National River Macroinvertebrate Surveys Ireland, 2007-2018 (Feeley *et.al*, 2020). Data was available immediately upstream of the proposed Greenway, Shannon (Lower)_050 waterbody (Waterbody ID IE_SH_25S012500), as well as for Mulkear (Limerick)_050 waterbody. An aquatic ecological appraisal (consisting of a desk study and field walkover) was completed by APEM in 2021 and updated in 2023.

Table 6.19 shows data collected from the NBDC database. Although the greenway route no longer follows the Mulkear River, data from this waterbody was included as part of the desktop assessment for completeness.

**Table 6.19 Macroinvertebrate species obtained from NBDC/ National River Macroinvertebrate Surveys in Ireland 2007/2018.**

| Waterbody ID | Distance | Genus/species |
|---|---|---|
| Shannon (Lower)_50 | ~ 7 km | *Margaritifera margaritifera* |
| | | *Hellobdella sp.* |
| | | *Acari sp.* |
| | | *Corophium sp.* |
| | | *Gammarus sp.* |
| | | *Canis sp.* |
| | | *Serratella ignita* |
| | | *Heptagenia sp.* |
| | | *Ecnomus tenellus* |
| | | *Hydropsyche sp.* |
| | | *Polycentropus sp.* |
| | | *Draissena polymorpha* |
| | | *Valvata (Cincinna piscinalis)* |
| | | *Bithynia sp.* |
| | | *Potamopyrgus antipodarum* |
| | | *Thedoxus sp.* |
| | On site | *Acari sp.* |
| | | *Gammarus sp.* |
| | | *Elmis aenea* |
| | | *Limnius volckmari* |
| | | *Dicronota sp.* |
| | | *Alainites muticus* |
| | | *Baetis rhodani/atlanticus* |
| | | *Serratella ignita* |

| | | |
|---|---|---|
| | | *Ecdyonurus sp.* |
| | | *Heptagenia sp.* |
| | | *Leuctra sp.* |
| | | *Perla bipunctata* |
| | | *Hydropsyche sp.* |
| | | *Potamopyrgus antipodarum* |
| | | *Theodoxus sp.* |

Additionally, species from the family *Chironomidae* were observed in the River Shannon.

The proposed works are temporary and no long-term impacts on these species are anticipated. However, some Macroinvertebrate taxa that are sensitive to reductions in habitat and water quality may be present on site. Avoiding degradation, or further degradation, of these river habitats would therefore preferable considering future impacts on macroinvertebrate communities.

Macroinvertebrates as ecological receptors have been assigned as **Local Importance (Lower value)** on the basis of the potential for a population within the study area.

#### 6.4.2.7. *Fisheries Habitat*

Whilst electric fishing survey data were available for the Shannon River (IFI, 2022), these were from sites located over 100 km upstream from the proposed cycleway location and were therefore not considered relevant to this assessment. However, data was obtained from 2014, 2017, 2021 and 2023 surveys of transitional waters in the Shannon Estuary, Fergus Estuary and Limerick Docks (Kelly et al., 2015; Ryan et al., 2018; Corcoran et al., 2024) in conjunction with records from the NBDC, 2023.

According to the NBDC (2023) sea lamprey (*Petromyzon marinus*) can be found within the ZoI. Lamprey ammocoete habitat was recorded at numerous locations throughout the Aquatic Ecological Appraisal walkover at several locations in the Mill Race. Numerous other species which undertake migratory movements were found, including Brook lamprey (*Lampetra planeri*), Atlantic salmon (*Salmo salar*) and European eel (*Anguilla Anguilla*). The Atlantic salmon and river lamprey are protected under Annex II and V of the EU Habitats Directive, whilst brook lamprey and sea lamprey are protected under Annex II of the same legislation.

The fisheries habitat as an ecological receptor have been assigned as **Local Importance (Higher value)** on the basis of the potential for a population within the study area but not likely to be impacted by the temporary construction works as no works will take place within the main channel or the adjacent streams and rivers.

#### 6.4.2.8. *Significance of Fauna*

Fauna evaluation in this section was assessed in accordance with the receptor importance classification methodology outlined in NRA (2009); "*Guidelines for Assessment of Ecological Impacts of National Roads Schemes*".

Of the faunal species recorded or known to be present in the area, there are three species of **International Importance**:

1. Otter is listed under Annex II and Annex IV of the EU Habitats Directive and is also protected under the Wildlife Act (as amended);
2. Salmon is listed on Annex II of the EU Habitats Directive. Otter and Salmon are two of the qualifying interests (QI) present in the Lower Shannon SAC. However, it is not considered that these species will be significantly affected by the proposed development; and
3. Sea Lamprey *(Petromyzon marinus*) was recorded by the NBDC on site and it is a qualifying interest

of the Lower Shannon SAC and listed as Annex II of the EU Habitats Directive. No instream works are proposed as part of the works so it is not considered that this species will be significantly affected by the proposed development.

A high level of bat activity and species diversity was recorded during the survey period. The study area provides a diversity of habitats including treelines, hedgerows, and many foraging opportunities for bats. Light pollution here is typically low and the area has good landscape connectivity with surrounding habitats.

The suitability of the proposed development site for bats was considered and while the site is likely to be used by foraging and commuting bats the proposed development is unlikely to result in loss or damage to any significant roosting habitat as such bats are classified as **Local Importance (Higher value)**.

The other species recorded such as breeding bird species are classified as **Local Importance (Higher value)** in the context of the proposed development. These species are common and widespread in the local area and are not dependent on the site of the proposed works. Wintering bird species have been considered of **International importance** given the presence of Annex I species, which although were recorded in very low numbers, indicates that these species might use the surrounding areas for foraging.

The low-medium quality of habitats within the study area overall, coupled with the limited records of fauna species protected under the Wildlife Act (as amended) from both the desktop study and field walkovers, would suggest that no additional fauna species populations utilise the study area in higher than local significance. As such other fauna species are not considered key ecological receptors of potential impacts or threats from the proposed development and are not assessed further in this Chapter.

**Table 6.20 Summary of fauna significance**

| Species | Receptor Importance/Ecological Value | Key Ecological Receptor |
|---|---|---|
| Breeding birds | Local importance (higher value) | Yes.<br>Some species recorded were Red listed in the BOCCI record. The shaded riparian banks of the River Shannon and Mulkear River in the study area do provide suitable foraging and nesting habitat (vertical earthen banks) for the Annex I species Kingfisher (*Alcedo atthis*) and other protected species including Swift and Grey Wagtail. |
| Wintering Birds | International importance | Yes.<br>Some species recorded are listed in Annex I of the Birds Directive. Although in low numbers, the presence of these species suggests the area provides suitable foraging habitat. |
| Otters | International importance | Yes.<br>Suitable riparian habitats along the study area, and it is protected internationally and nationally. |
| Badger | Low importance (lower value | No.<br>Habitats within the study area are unlikely to support a badger population. |
| Bats | County importance (higher value) | Yes.<br>A high level of bat activity and species diversity was recorded during the survey period. The study area provides a diversity of habitats and foraging opportunities for bats. |
| Reptiles and Amphibians | Local importance (lower value) | No.<br>It is unlikely that the study area supports amphibian populations, and these were not recorded during the field surveys. |

| | | |
|---|---|---|
| Invertebrates | Local importance (lower value) | No.<br>No species recorded were considered to be protected or threatened in Ireland, with the exception of the Freshwater Pearl Mussel (*Margaritifera margaritifera*), however this species has not been reported or observed within the study area. |
| Macroinvertebrates | Local importance (lower value) | No.<br>On the basis of potential for a population within the study area, considering the desk study and survey findings. |
| Fisheries Habitat | Local importance (higher value) | Yes.<br>Considering potential populations of protected species within the ZoI of the proposed development. |

### 6.4.3. Identification of KERs

The sections above identified receptors and assigns them an ecological importance in accordance with the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009). It also provides the rationale for this determination and identifies the habitats and species that are considered Key Ecological Receptors.

## 6.5 ECOLOGICAL IMPACT ASSESSMENT

The following section presents the assessment of likely significant effects on biodiversity within the zone of influence of the proposed works. All elements of the proposed works have been considered in assessing effects on ecological receptors.

### 6.5.1. Do Nothing/Current Scenario

If the proposed Greenway for which this EIAR has been prepared were not to go ahead, it is likely that there would be no change to the existing situation. The continued use of the lands in their current state would remain. There would be no direct loss or change of habitat.

Without the proposed greenway the transition to greener transport modes would not be supported and the link between the city, the campus and the technology park would not be facilitated. Furthermore, if the proposed development were not to go ahead, it would not be in line with policies and objectives set out in national, regional and local plans related to greener transportation systems, greener infrastructure and climate resilience.

### 6.5.2. Effects on Designated Areas

Regarding European Sites (SACs & SPAs), an Appropriate Assessment Screening Report (amended), prepared by Ryan Hanley (July 2024), 'screened in' the potential for significant effects on one European Sites: Lower River Shannon SAC (002165). A Natura Impact Statement (NIS) was prepared for the proposed development. The NIS concluded that '*the development of the proposed Limerick City Greenway (UL to NTP) works will not adversely affect the integrity of the European site, either alone or in combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion*'.

### 6.5.3. Construction Phase Effects

The proposed Greenway route has been specifically designed to avoid, where possible, or otherwise minimize the loss or disturbance of ecologically sensitive habitats identified in the area, such as the River Shannon and the associated riparian corridor. A CEMP is attached in the 'EIAr Part 3_Appendices' of this EIAR. Section 4 of the CEMP details all measures related to environmental management measures to be applied for the construction works detailed in Section 2.3 of the CEMP document. Environmental Management

Plans include construction management plans (prevention of pollution measures, dust control, noise and vibration control, traffic management, water quality and soil, biodiversity, refueling and hazardous materials, cement-based products), invasive species, and waste management. Section 7 of the CEMP groups together all mitigation measures and monitoring proposals currently identified for the proposed development.

#### *6.5.3.1 Loss of Habitat, Fragmentation and Disturbance (Direct Effects)*

The proposed development will result in medium-term habitat loss, fragmentation and disturbance to habitats classified as of Local (lower) and Local (higher) importance. Construction activities and site clearance during the construction phase of the greenway can lead to direct loss of amenity lands as well as tree lines (riparian woodland), scrub and hedgerows. Construction works will also require the establishment of 4 No. temporary central base construction compounds for drop-off and storage of materials including fuel, site offices and other staff facilities which will be located within the study area on lands of little conservation value. Although impacts arising from disturbance to habitats will last longer than the construction period, it is likely to be reversible over time (7-15 years for hedges and 15-60 years for any trees) once construction ceases allowing habitats to recover or re-establish within the area of the proposed development, as addressed by the proposed mitigation.

Habitat loss resulting from the construction of the Greenway within areas of riparian habitat are assigned local importance (higher value). There will be both a permanent and temporary loss of habitats as a result of the project and a list, completed with the area to be lost are provided in the tables below, considering a 5m buffer corridor from the works along the proposed Greenway.

**Table 6.21 Temporary habitat loss associated to temporary working areas and compounds**

| Fossitt code | Description | Total area affected (ha) |
|---|---|---|
| WS1 | Scrub | 0.103 |
| ED2 | Spoil and bare ground | 0 |
| GA2 | Amenity grassland (improved) | 0.904 |
| WL2 | Treeline | 0.016 |
| BL3 | Buildings and artificial surfaces | 0.007 |
| WD1 | (Mixed) Broadleaved woodland | 0.03 |
| GS4 | Wet grassland | 0.08 |

**Table 6.22 Habitat loss along the proposed greenway route, considering a 5m buffer**

| Fossitt code | Description | Total area affected (ha) |
|---|---|---|
| BL3 | Buildings and artificial surfaces | 1.309 |
| GA2 | Amenity grassland (improved) | 0.749 |
| FW3 | Canals | 0.02 |
| FW4 | Drainage ditches | 0.089 |
| WD1 | (Mixed) Broadleaved woodland | 0.546 |
| WL2 | Treeline | 1.491 |
| WN5 | Riparian woodland | 0.641 |
| GS2 | Dry meadows and grassy verges | 0.03 |
| WD5 | Scattered trees and parkland | 0.055 |
| GS4 | Wet grassland | 0.04 |
| WS1 | Scrub | 0.097 |
| ED2 | Spoil and bare ground | 0.006 |
| FW2 | Depositing/lowland river | 0.006 |

**Loss of Amenity Grassland (GA2)**

Construction works for the proposed Greenway are predominantly in amenity grassland habitats. The majority of this land will be removed within the boundary of the works corridor in the central, western and eastern sections of the proposed Greenway. The amenity grassland within the footprint of the work is of low ecological value as they are modified from its natural state, subject to high levels of management, have reduced diversity and are widespread within the local area. The Project is assessed as having a **permanent/temporary neutral to slight negative effect** and as such, the loss of these habitats will not represent any significant loss of biodiversity and are not considered to be Key Ecological Receptors.

**Loss of Riparian Woodland (WN5)**

There are several regions of riparian woodland habitat, some of which are alluvial in nature, particularly to the central and eastern sections of the proposed Greenway. The greenway passes through an area with Annex I habitat Residual alluvial forest with *Alnus glutinosa* and *Fraxinus excelsior* (91E0) of International importance, although only a few individual trees of low value will be removed (5 No.), not affecting the integrity of the habitat or its ecological benefits. The riparian woodland is of high ecological value. The project is assessed as having a **permanent/temporary moderate negative** effect. The riparian woodland is an important feature along the river margins within the study area providing shade, bank stability, connectivity and allowing foraging for bird and mammal species and is considered to be Key Ecological Receptor.

**Loss of (Mixed) broadleaved woodland (WD1)**

There are small regions of (mixed) broadleaved woodland in the western section of the Greenway which will be lost during construction. The (mixed) broadleaved woodland is of high ecological value. The project is assessed as having a **permanent/temporary moderate negative** effect and is an area which includes some

native tree species provide habitat for birds and mammals (including potential roost or foraging habitat and commuting routes for bats) in addition to providing connectivity in the landscape and habitat linkage. A total of approximately 61 trees will be removed as part of the proposed works

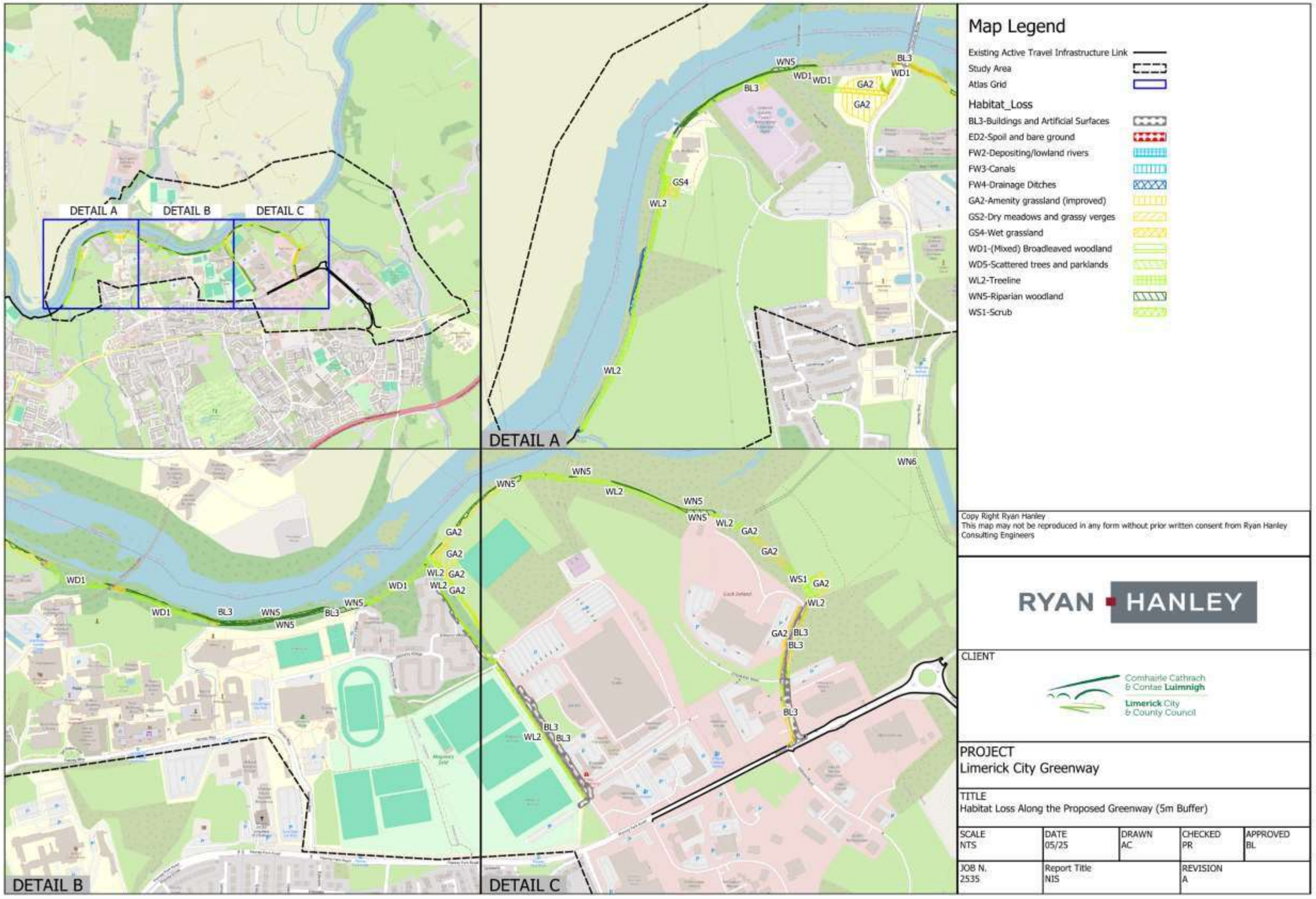


**Figure 6.11 Habitat Along the Proposed Greenway Route Within a 5m Buffer**

#### 6.5.3.2 *Effects on Watercourses and Aquatic Species*

The mobilisation of contaminants near the bankside or river sediments, in addition to physical impacts of sediment, can release nutrients or industrial waste into the water, with further impacts on local habitat and water quality. The River Shannon provides habitats for a number of Qualifying Interests (QIs) within the Lower River Shannon SAC [002165], including otters *(Lutrinae sp.)*, kingfishers *(Alcedinidae sp.)*, brook lamprey *(Lampetra planeri)*, river lamprey *(Lampetra fluviatilis)*, sea lamprey *(Petromyzon marinus)*, freshwater pearl mussel *(Margaritifera margaritifera)* and Atlantic salmon *(Salmo salar)*. Depending on the timing of the proposed works, different life stages of migratory fish species may be impacted by factors increased sediment ingress into the watercourse or other factors such as noise and disturbance associated with construction works.

Near-banks work (bridge upgrades, culvert replacement, clearance) may disturb nursery and spawning habitats of lamprey species. Construction activities can increase sediment run-off, resulting in an increase in siltation reducing water quality and indirectly affecting aquatic species. This can result in short term moderate effects on lamprey species.

The clearance and installation of the site compounds, use of construction equipment, during demolition, clearance, and construction of the greenway in the vicinity of the watercourse presents a risk of chemical discharges in the form of fuel spills. Many substances used and produced on construction sites have the potential to pollute both groundwater and surface water if not properly managed and treated (i.e. lubricants, cement, mortar, silt, soil, waste from site compound facilities, and other substances which arise during construction). The washing of construction vehicles and equipment also poses a pollution risk to watercourses. The spillage or leaking of fuel or oil from fuel tanks or construction vehicles has the potential to contaminate soils, groundwater and surface water. Such substances entering the receiving surface water and groundwater bodies could damage the habitat of local populations of fish which are qualifying species within the Lower River Shannon SAC. This can lead to temporary slight to moderate negative effects.

The proposed works will not alter flow of any of the smaller streams or the River Shannon, as there will be no instream works.

An analysis of the predicted impacts of the proposed greenway on biodiversity has been completed and include potential effects on local aquatic habitats and species during the construction phase. This will be temporary short term in nature and confined to the construction phase. Upon completion, aquatic habitat, flora and fauna within the affected lengths of the River Shannon channel (c. 3km) should recover and re-colonise from adjacent sources resulting in **a temporary/short-term slight-moderate negative effect.**

No long-term negative impacts on habitats, species and water quality are foreseen.

#### 6.5.3.3 *Disturbance to Fauna*

The proposed clearance, demolition and construction works for the Greenway has the potential to result in medium term loss of resting sites and disturbance to a range of faunal species such as small mammals and birds in the absence of mitigation where hedgerows, trees and scrub are to be trimmed back and unavoidably removed in some areas. There is potential for the Greenway to have some impact on ecological features used by fauna species in the study area permanently, through the removal of suitable habitats to facilitate the Greenway construction, or temporarily during the construction works in such a way that suitable habitats are not available for use by fauna species during the construction period due to disturbance and displacement. Visual and noise disturbance and presence of human beings throughout the construction phase have the potential to cause the greatest disturbance. It is considered that the proposed greenway will have

a potential **permanent/temporary moderate negative effect** related to the disturbance of local fauna. Fauna species that are subject to disturbance as identified in Section 6.4.3 and the effects on these species are considered further below.

#### *6.5.3.4 Effects on Badger*

A sett-like structure was found along the proposed greenway however it is more likely that the structure was more recently used as a possible fox hole as there were no fresh signs of badgers in the area. No badger signs were found during the updated survey undertaken in 2024. The proposed development will not result in the loss of any badger setts within the Study Area. There is low potential for temporary loss of foraging habitat during the construction of the proposed greenway.

Construction works during breading season (December to June) could lead to disturbance to badger setts in the area. Potential for disturbance, in the absence of mitigation, is considered a **potential indirect short-term slight/moderate negative effect** on badger populations in the area.

#### *6.5.3.5 Effects on Bats*

No bat roosts were confirmed within the proposed development area and no historic roosting was found. However, usage of trees and buildings by individual or small numbers of bats as temporary roosting sites cannot be ruled out. Some structures identified within the zone of influence had 'moderate' and 'low' suitability for roosting bats. No buildings or structures will be directly impacted by the proposed works.

The proposed development will involve other works in close proximity to a number of other trees with some suitability to host roosting bats. In the absence of mitigation, if any treelines and buildings had to be removed as a result of the construction works, there would be potential for bat mortality.

Semi-natural habitats which support insects provide an important food source for bats. Loss or degradation of commuting/foraging habitat has the potential to reduce feeding opportunities and/or displace bat populations but is not likely to be significant given the relatively small amount of habitat loss involved in the context of the overall landscape.

Artificial lighting associated with construction and operation of the proposed greenway has the potential to adversely affect bat populations, particularly in riparian zones along the River Shannon, which can support important commuting and foraging corridors. Excessive or poorly directed lighting can cause light spill which can reduce foraging efficiency.

Construction works of the proposed greenway can lead to ecological issues which do not occur during the operational phase of the development. Some of these issues include disturbance during construction works; disturbance to roosting sites; reduce foraging habitat; impaired ability to commute; and disturbance due to illumination.

The suitability of the proposed development site for bats was considered and while the site is likely to be used by foraging and commuting bats the proposed development is unlikely to result in loss or damage to any significant roosting habitat.

In most areas of the scheme the potential for loss of commuting and foraging habitat will be minor and short-term in nature.

Overall, the proposed greenway will result in a **permanent, 'not significant', negative effect** on bat ecology at a local scale.

### 6.5.3.6 *Effects on Birds*

All birds and nests are protected under the Wildlife Act 2000 as amended. If vegetation clearance is carried out during the breeding bird season (1st March to 21st August), there is the potential for significant negative impacts to local breeding bird populations. During the breeding season, noise, vibration and movement of construction vehicles associated with the construction phase of the proposed development has the potential to result in a disturbance to local breeding bird populations. This could result in reduced breeding success of birds in habitats adjacent to the construction zone. The construction of the proposed development will require the removal of some areas of scrub, hedgerows and treelines that have potential to provide breeding habitats which could result in disturbance and damage/destruction of nests.

Wintering birds were found in small numbers and diversity. Direct impacts of the proposed works on these species may result from disturbance by human and mechanical work activities, and related noise and vibration. Existing levels if human activity and background disturbance are moderate in the areas of the proposed works, considering the existing greenway route and adjacent university grounds, sports complex and technological park. The potential for the direct effect of disturbance impacts of the proposed construction works on bird distribution may be quantified using the assessment methodology applied in the Conservation Objectives Supporting Document for River Shannon and River Fergus Estuaries SPA (NPWS, 2012 v1).

**Figure 6.12 Scoring system for disturbance (NPWS, 2012 v1)**

| Frequency/ Duration | (A) Timing Score | Intensity | (B) Scope Score | Response | (C) Severity Score | TOTAL SCORE A + B + C |
|---|---|---|---|---|---|---|
| Continuous | 3 | Active, high-level | 3 | Most birds disturbed all of the time | 3 | 9 |
| Frequent | 2 | Medium level | 2 | Most birds displaced for short periods | 2 | 6 |
| Infrequent | 1 | Low-level | 1 | Most species tolerate disturbance | 1 | 3 |
| Rare | 0 | Very low-level | 0 | Most birds successfully habituate to the disturbance | 0 | 0 |

Scores 0 – 3 = Low
Scores 4 – 6 = Moderate
Scores 7 – 9 = High

Based on the consideration above, most wintering bird species within the proposed greenway area will be used to human activities related disturbance and therefore rarely and/or infrequently disturbed, resulting in a 'low' disturbance score overall.

Disturbance from the proposed works on bird species found and recorded within the study area are considered to have a **potential short-term slight-moderate negative effect.**

### 6.5.3.7 *Effects on Fish Species*

The River Shannon and Mulkear river (within the study area) are known to support good populations of salmonid species as well as providing key migratory corridors. The ecological status of the waterbodies within the Study Area includes good ecological status for the Mulkear (Limerick) River_050, and moderate ecological status for Blackwater (Clare)_020 and The Lower River Shannon_060 waterbodies. With regards to each river body's ability to meet the WFD objectives by 2027, the Mulkear (Limerick) River_050 is "Not at risk", the Lower River Shannon_060 is "Under Review" and the Blackwater (Clare)_020 is "At Risk". Limerick Dock and the Upper Shannon Estuary are both classed as having "Poor" WFD status and are "At Risk". Direct impacts on salmon or other aquatic species are not anticipated. As there will be no instream works there will be no loss of suitable spawning habitats within the study area as a result of construction of the greenway.

The proposed works are temporary, and no long-term impacts on these species are anticipated. However, these species may be present on site, and in-direct impacts on these species, such as deterioration in habitat quality due to sediment ingress and/or pollution incidents, can have effects on their populations. Other potential effects may include localised displacement of fish species resulting from deterioration in water quality as a result of pollution or suspended solids runoff. Significant displacement is not anticipated given the absence of instream works.

Loss of bank riparian cover as a result of construction works could result in increased light incidence and may encourage greater in-stream productivity i.e., increased algal growth and benthic macroinvertebrate density. A decrease in channel shading can also impact negatively on fish distribution. Riparian tree cover plays an important role in regulating stream ecology, e.g., stream temperature, carbon input, and in-stream vegetation cover.

It is considered these species would move back into the area once construction works cease resulting in a **potential short-term slight-moderate negative effect.**

#### *6.5.3.8 Effects on Otter*

During the desktop study a search for otter from the NBDC database indicated a presence within the R65 hectad and there is a confirmed sighting of a "live animal" on the campus near the living bridge. During the walkover surveys no otter holts, nor any other physical evidence of otter, was found but potential trails were observed and some areas of the proposed greenway were considered suitable for otter.

Although no active otter holts, couches, or significant foraging or commuting habitats were identified during field surveys or recorded by NPWS (GIS data) for the study area, riparian vegetation still offers potential for occasional passage or resting use, particularly given the species' wide-ranging and opportunistic behaviour. Clearance of bankside or riverside vegetation could result in the temporary disturbance of marginal habitats. Although this is unlikely to significantly otter populations in the Shannon (Lower), where the proposed works will take place.

Due to the suitability of the habitats to support otters, the Precautionary Approach will be taken to minimise the potential impact on otter populations if present in the Study Area and ZoI.

It is considered these species would move back into the area once construction works cease resulting in a **potential short-term slight-moderate negative effect.**

#### *6.5.3.9 Effects on Amphibians and Reptiles*

No amphibians or reptiles were observed in the proposed development study area during site surveys though it is possible that these species groups utilise the area. In the absence of mitigation, there could be a negative impact on these species through direct mortality during construction works by machinery in lands adjacent to the proposed development. Removal of vegetation also has the potential to result in direct mortality where these species may be sheltering/hibernating.

It is considered these species would move back into the area once construction works cease resulting in a potential **short-term 'not-significant' negative effect.**

#### *6.5.3.10 Spread of Invasive Species*

Two invasive plant species listed on the Third schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011, as amended) were identified within the study area of the proposed development during the walkover surveys, Himalayan balsam (*Impatiens glandulifera*) and Giant hogweed (*Heracleum mantegazzianum*).

Invasive species can be introduced into a location or spread from a location by contaminated vehicles and equipment, in particular tracked vehicles which have been used previously in locations that contain invasive alien plant species. They can also be spread to a location via vector materials such as soil. Therefore, construction works, have the potential to introduce invasive species into areas within the Study Area that were previously free of invasive species. In the absence of mitigation this could result in a **long term reversible moderate-significant negative impact.**

### 6.5.4. Operational Phase Effects

#### *6.5.4.1 Effects of Maintenance*

During the operational phase of the Greenway there will be considerably less site activity within the study area than during the construction phase. The Limerick City and County Council (LCCC) will be required to maintain the Greenway in proper repair and effective condition under a maintenance programme. Maintenance is required to ensure that the any quality facilities provided are maintained during the first year and subsequent years. A maintenance plan would include but no limited to:

- Servicing of waste bins;
- Litter picking and removal of any fly tipped waste;
- Maintaining of vegetation and/or low hanging branches; and
- Repair and maintenance of lighting.

Routine maintenance activities, such as vegetation management and habitat restoration, are expected to improve local biodiversity. The maintenance efforts aim to preserve and enhance the aesthetic value of the greenway, contributing positively to the local landscape and providing recreational opportunities for the community. These maintenance activities can **result in a long-term moderate positive effect** on the local environment.

It is envisaged that the maintenance requirements of the proposed Greenway will be monitored and reviewed on an annual basis by LCCC. It is envisaged that any maintenance works to be carried out will be subject to the relevant environmental and health & safety assessment requirements, including screening for Appropriate Assessment, to consider the environmental sensitivities around the maintenance required, and will be required to be carried out in line with current best practice at the time of maintenance.

#### *6.5.4.2 Effects on Designated Sites*

Significant effects are not anticipated during the operational phase of the greenway, as the route is currently being used by cyclists and pedestrians. Increased public usage can lead to informal access to the riverbanks which could disturb sensitive riparian zones and trample of bank vegetation, or cause disturbance to protected species in the area. However, the improvement of the greenway and installation of formalized boundaries and barriers along the route will minimise the indirect effects of increased public usage. Overall, the operational phase of the proposed greenway will result in **a long-term not significant neutral effect** on SAC.

#### *6.5.4.3 Effects on Habitats*

On completion of the Greenway, areas from which vegetation was removed will be replanted and landscaped with appropriate vegetation and a replanting programme. Significant effects are not anticipated during the operational phase of the Greenway as there will be no overall loss or fragmentation of habitats associated with the operation of the Greenway. The predicted human activity using the Greenway is anticipated to be medium-high, given that the upgraded route might attract more users and it might be

expected that at time anti-social activities might have **brief to temporary not significant negative effect** on vegetation/habitats.

During the operational phase of the greenway, the planting scheme (305 trees) will promote biodiversity in the area according to a dedicated Landscape Plan prepared for the proposed development (see ElAr Part 3_Appendices) , in line with the Biodiversity Plan and All Ireland Pollinator Plan. This will result in a **long-term/permanent slight to moderate positive effect** on biodiversity in the area.

#### *6.5.4.4 Effects on Birds*

Upon completion of the Greenway, operational impacts on bird populations are considered to be minimal. As there will be minimal clearance of vegetation, and consequently potential nesting habitat removed as part of the maintenance works, the effects on birds is assessed as **temporary imperceptible negative**. If these maintenance works require vegetation removal during breeding bird season (1st March to 31st August), although unlikely, they could have the potential for **temporary significant negative impacts** to local breeding bird populations. During breeding season, noise, vibration, increased human presence and movement of vehicles associated with the maintenance has the potential to result in a disturbance to local breeding bird populations. The construction works will aim to follow the ecological calendar for surveys and mitigation to minimise any potential impacts.

The operational phase can lead to increased levels of human activity, including walking, cycling, dog-walking and potential off-trail access to riverbank areas that may cause disturbance to feeding and roosting wintering birds. The disturbance will likely be very localized and species dependent. This could result in a potential **brief/temporary slight negative effect** on individuals of wintering bird species found within the greenway area.

#### *6.5.4.5 Effects on Otter*

Although no otter holts, couches, or key foraging or commuting habitats were recorded within the greenway footprint, the operational phase of the greenway may still result in low-level disturbance to otters due to increased human activity, including walkers, cyclists, and dog walkers along the river corridor.

The operational phase of the greenway might result in a **potential temporary not significant negative effect** on otters in the area.

#### *6.5.4.6 Effects on Badger*

As no badger activity was identified during surveys, it is not anticipated that the Greenway will result in any significant effects on any local badgers' populations during operation. There is no potential for the operation of the proposed development to result in significant effects on badger.

#### *6.5.4.7 Effects on Bats*

The operational phase is unlikely to affect any bat species using the habitats within the study area. During the operational phase there could be a **temporary 'not significant' negative impact** on bat roosts due to noise disturbances and traffic in areas adjacent to the greenway.

Increased artificial lighting may affect bat species particularly near bridges, woodland edges, or treelines, which could disrupt nocturnal foraging and commuting routes, especially for light sensitive species. This would result in a **brief/temporary not significant negative effect** on bats in the area.

#### *6.5.4.8 Effects on Fish Species*

There will be no habitat loss or fragmentation associated with the operational phase of the proposed development. No direct works will take place within the nearby waterbodies, the Lower River Shannon and

Mulkear river, with no direct/indirect effects because of the operational phase of the Greenway anticipated.

#### *6.5.4.9 Effects on Invasive Species*

The operational phase of the greenway may inadvertently facilitate the spread of invasive plant species through maintenance activities, machinery movement, or pedestrian dispersal if control and biosecurity measures are not implemented. This can lead to unlikely **temporary/short-term slight negative** impact as invasives can displace native vegetation along the greenway route or be introduced in areas where no invasive species are currently present.

#### *6.5.4.10 Effects on the Benefitting Lands*

The construction method proposed for the Greenway includes aspects that will benefit some areas within the Zone of Influence of the project.

A tree planting scheme will prevent long-term net loss by implementing a mitigation measure of an approximate ratio of 1:5, using replacement species with similar mature canopy spread, and maintaining contiguous stands to conserve habitat value.

Furthermore, the area in which the route diverges from the original pathway through the broadleaved woodland (WD1) habitat will create a benefit for not only the original pathway as there will be less impact from the current footprint of the users but it will also benefit bats by creating a new area of potential foraging habitat.

Overall it is considered that the operational phase of the greenway will have **a long-term moderate positive effect** on certain areas of land that are adjacent to the greenway, by reducing disturbance and enhancing biodiversity.

## 6.6 Mitigation Measures

This section describes the measures that are in place to mitigate any potentially harmful or negative effects associated with the proposed development and the identified Key Ecological Receptors as described in the preceding sections. General environmental management measures included within the design and construction methods of the Project are described first, with more specific measures to avoid, prevent or minimise effects on the individual receptors provided subsequently.

### 6.6.1 Mitigation through Best Practice

The design of the Project as described in Chapter 4 of this EIAR and related appendices set out clearly how the proposed Greenway will be constructed and operated in accordance with best industry practice to avoid significant effects within and outside the site including the prevention of impacts on watercourses.

Some of the key features of the environmental management strategy are provided below:

- A suitable qualified Ecological Clerk of Works (ECoW) shall be appointed for part time attendance for the full duration of the works and will supervise all aspects of the construction of the path.
- The ECoW will hold a minimum University degree in Environmental Science, (NFQ Level 8); preferably be a member of a relevant professional institute, minimum of 5 years' post-graduate experience in ecological assessment, appraisal techniques and mitigation monitoring;
- The ECoW will be responsible for biodiversity monitoring elements in particular for those key environmental receptors identified in this chapter, and providing toolbox talks;

- The ECoW should be present for works related to vegetation removal and any works that might have potential effects on sensitive habitats and/or species;
- The ECoW should oversee the implementation of the CEMP, particularly in relation to ecological and biodiversity related measures; and

The ECoW will be responsible for monitoring water quality throughout the works duration. Discrete monitoring (field and laboratory analysis) will be undertaken during all phases of the proposed works and frequency will be determined by the Water Quality Monitoring Plan to de developed before any works commence. It is essential to monitor indicator parameters that have the greatest potential to be impacted. The main concern in relation to the construction activity and water quality are potential increases in siltation and release of P and N. At least the following surface water parameters are to be tested/analysed in the field and/or in the laboratory: alkalinity (mg/l CaCO3), molybdate reactive phosphorus (mg/l P), ammonia (mg/l NH3), nitrate (mg/l N), nitrite (mg/l N), biochemical oxygen demand (mg/l), total suspended solids (mg/l), pH, temperature, dissolved oxygen, electrical conductivity, ammonium (NH4), turbidity. Sondes will be employed to measure turbidity in the main channel upstream and downstream of the works area during the construction stage. Sondes will be employed within the River Shannon to determine a baseline Nephelometric Turbidity Unit (NTU) value. During the construction period, alarms will trigger where there is a 20% difference between the NTU value recorded in the upstream and downstream Sondes when NTU is above its baseline value. All works will cease immediately until the source is identified and rectified (if caused by the construction works). The ECoW, project manager and contractor site manager should be contacted. If the increase is not attributed to the construction works, works will proceed.

- All personnel involved with the project shall be informed of the requirement for protection of designated habitats including the aquatic environment, i.e. Lower River Shannon SAC, and best practice methodologies to be employed via toolbox talks or formal presentation from the ECoW;
- The ECoW shall be onsite part time until all works have finished, and all machinery has been demobilised and has left the site;
- The access location to the proposed works shall be clearly marked out prior to the commencement of works. No works will be permitted outside of this works area;
- Appropriate fencing shall be installed and maintained for the duration of the works to prevent the public from entering the works site;
- Clearance of vegetation shall be undertaken as early as possible prior to the commencement of works and maintained until work commences to prevent bird nesting. In the event that vegetation clearance is not possible before the commencement of works, upon agreement by the NPWS, a check to confirm the absence of nesting birds should be carried out by a suitably experienced ecologist no more than 24 hours prior to works;
- Works shall only be carried out in dry, low flow conditions. Met Eireann five-day forecasts will be monitored on a daily basis prior to works commencing and no work will be carried out if more than 10mm of rainfall is predicted in a 24 hour period;
- Works shall only be carried between 08:00-18:00 during daytime hours or between dawn and dusk to minimize disturbance to nocturnal QI species;
- Excavated material shall not be stored beyond the working day, however in the event that this is not practical, appropriate precautions in relation to the material will be taken. These precautions will include appropriate storage and covering;
- Full method statements and Risk Assessments shall be provided and approved prior to the commencement of works. Approval will require coordination between the contractor, ECoW, project manager and local authorities;

- The proposed public lighting is designed to prevent light spill on to habitat features, such as the River Shannon and the Plassey Mill Race stream, and concentrate artificial light only where required. It will use best practice guidance notes "Bats and artificial lighting in the UK" as published by the Bat Conservation Trust, in respect of mitigation strategies, to minimise the impact of outdoor lighting upon bat populations. The LCCC Public Lighting standard has also been followed. Public lighting will be controlled by light sensors that will turn the lanterns on after dusk and off at 23:00 hours. Light emitting diodes (LEDs) type lanterns of the cool white type in accordance with the LCCC Public Lighting standard will be installed. They will have a Colour Temperature of 2,700°Kelvin, because it is considered least disruptive to the emergence of bats from roosts at dusk, and subsequent movement from habitats to foraging locations. LED lanterns do not emit any ultraviolet or infra-red radiation, this again being a desirable feature in relation to impact upon bats, in terms of causing spatial exclusion from artificially lit areas. Light levels have been kept as low as possible (P4 Class) by reference to levels specified in "Design of road lighting' - BS EN 5489-1: 2020, and these will be in accordance with the LCCC Public Lighting standard. Two Lanterns are proposed; one Lantern will be on a 5m high column approximately 35m apart mounted at 0o degree tilt and fully cut off type with no light output above the horizontal plane, while the other column will be 1.6m high with an integrated light in the column and they will be spaced approximately 5m apart. 5m high Lighting columns will not be placed within 15m of mature trees that have been identified by bat specialists as having roost potential and the 1.6m high columns shall be used if there are any signs of bats in an area. The 1.6m high columns will be used in the Annex 1 Alluvial forest area.
- Cable ducts for the public lighting will be installed by open trench to minimum 300mm cover in areas where no trees are present, and by Moling technique in areas of dense tree coverage. The moling will allow cable ducts to be installed to a minimum depth of 600mm where the cable ducts will pass under tree roots and protect them from damage.
- Construction works should take place during daylight hours only with no lighting on the site during the hours of darkness.
- Any temporary lighting required for health or safety reasons during construction shall be installed at a minimum of 10 metres from existing treelines and woodland habitats and directed away from such sensitive habitats.
- During construction, noise limits, noise control measures, hours of operation and selection of plant items will be considered in relation to disturbance of birds. Plant machinery will be turned off when not in use.
- A Biodiversity Management Plan and a Construction Environmental Management Plan have been prepared for this project and they are included as appendices to this NIS.

The following mitigation calendar will be applied and followed to ensure protection of habitats and species during construction and operational phases of the greenway. In general, the construction works should be planned during the 'green' periods in the calendar year, as long as appropriate mitigation measures are implemented. The exception to this is Fish (salmonoid spawning) because foreshore works (including preparatory work) beside all watercourses supporting salmonids shall be undertaken from May to October (inclusive) and in consultation with Inland Fisheries Ireland (IFI) to avoid accidental damage or siltation of spawning beds.

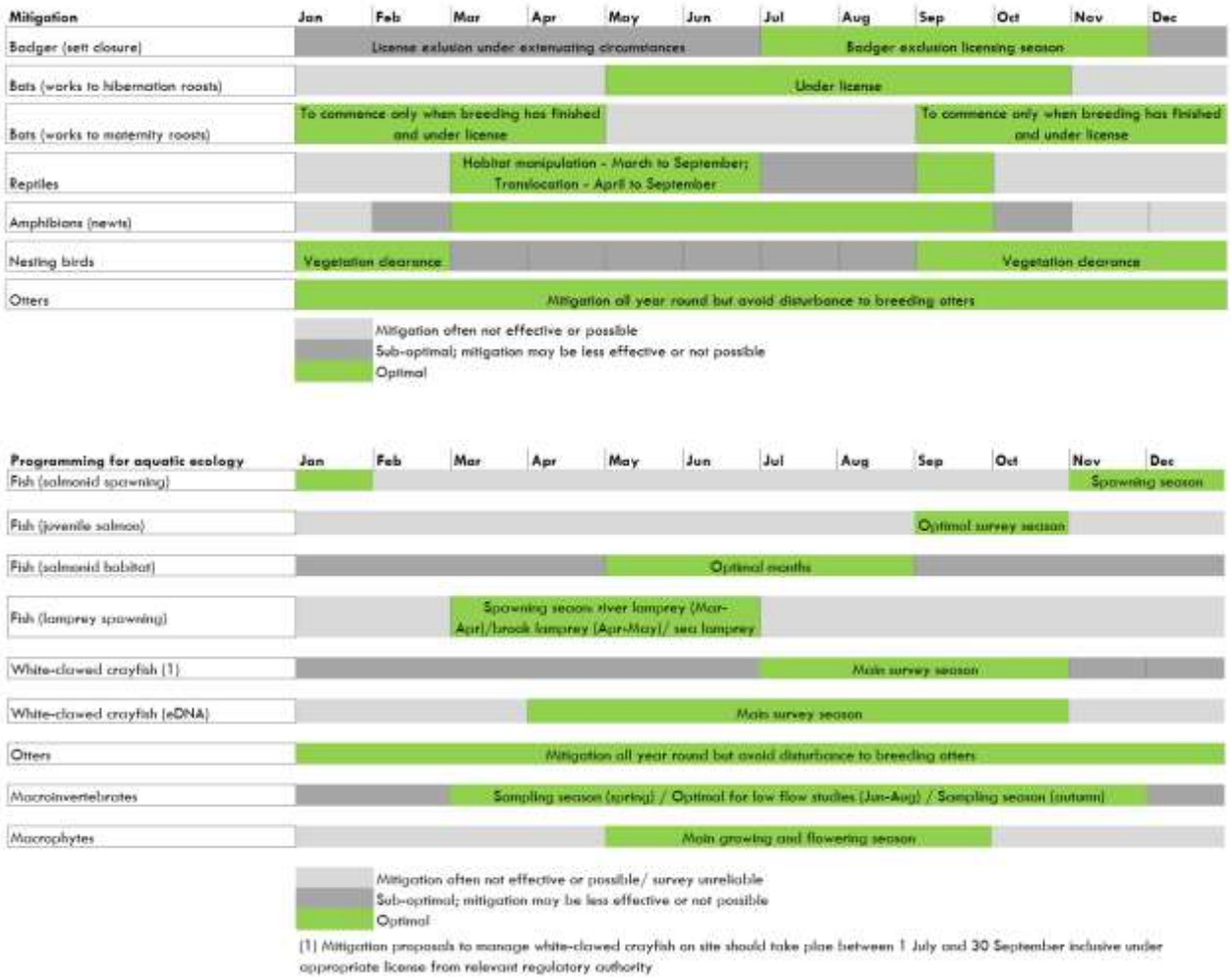


**Figure 6.13 Mitigation timing - ecological calendar**

### 6.6.2 Measures to protect the Aquatic Environment

The proposed development has been identified as potentially giving rise to negative effects on watercourses within the study area. The following measures should be adopted during construction works:

- No abstraction from any watercourses will be permitted to facilitate the works.
- A silt curtain will be floated in the River Shannon and the Plassey Mill Race ahead of, during and shortly after the construction works for the bridges, retaining wall, and ramp to protect aquatic species from soil and suspended material associated with the construction works.
- A water filled flood barrier will act as a barrier to prevent river water entering the proposed work sites for the bridges, retaining wall, and ramp but if water enters the work site a sump pump will pump water to a silt buster to remove contaminated material from water before it is returned to the River Shannon downstream.
- Sheet piles will be temporarily pushed into the riverbank and stream bank to facilitate construction of foundations and abutment walls for the bridges and retaining wall. They will be removed immediately after the bridge decks have been bolted into place. The sheet piles will act as a physical barrier between the worksite and the banks and prevent soil or other construction material runoff from the work site to the riverbank, stream bank, river or stream.
- Consumables and/or waste material will be removed from all water sampling locations and returned

to the site compound for disposal to a licenced waste facility.

- Alarm sondes will be triggered when there is a 20% difference between NTU value recorded in the upstream and downstream sondes.
- Machinery will be stored in purpose built temporary construction compounds which will be constructed in Flood Zone C areas only.
- There will be no storage of machinery in the temporary construction compounds (including drill rigs) fuel, samples, or chemicals (e.g. bentonite, drilling fluid) within 20m of any drain or watercourse.
- Fuel storage tanks will only be placed within temporary construction compounds. They shall have secondary containment provided by means of an above ground bund to capture any oil leakage irrespective of whether it arises from leakage of the tank itself or from associated equipment such as filling and off-take points, sighting gauges, etc., all of which should be located within the bund. Bund specification should conform to the current best practice for oil storage (Enterprise Ireland, BPGCS005).
- Oil booms and oil soakage pads shall be kept in the temporary construction compounds to enable a rapid and effective response to any accidental spillage or discharge. The site foreman shall be trained in the deployment of oil soakage pads in case of an emergency at the works sites.
- Waste oils and hydraulic fluids shall be collected in suitable leak-proof containers and transported from the temporary construction compounds for disposal or recycling;
- Machinery used on site shall be regularly inspected in the temporary construction compounds to ensure there is no leakage from them and to ensure the machinery shall not cause contamination of watercourses.
- Protection measures shall be put in place by the Contractor to ensure that all hydrocarbons used during the works are appropriately handled and stored within the temporary construction compounds and disposed off-site in a licenced facility in accordance with recognised standards as detailed by the Environmental Protection Agency.
- Guidelines for minimising impacts on water quality and fisheries in relation to Construction shall be implemented including, but not limited to, CIRIA C532 "Control of water pollution from construction sites - Guidance for consultants and contractors", Inland Fisheries Ireland guidelines and TII guidelines.
- It is recommended that target lamprey surveys should be undertaken within the Mill Race, prior to any site investigation or construction works that could disturb the stream.
- It is also recommended that white-clawed crayfish surveys are undertaken in the vicinity of any proposed riverbank works, prior to works commencing.

### 6.6.3 Effects on Badger

No badger activity was established within the study area however the activity status of this species could change in the intervening period between the site surveys and the commencement of construction of the scheme. The habitat is unlikely to support badgers but the Precautionary Approach will be implemented along with Best Practice to avoid badgers entering the site or spoil heaps. An additional badger survey should be undertaken prior to construction works commencing to identify any potential badger activity.

### 6.6.4 Effects on Bats

As no bats were identified as roosting within the study area no specific mitigation in relation to roost loss is

recommended. General protective measures are outlined below:

- Where possible, treelines and hedgerows shall be retained. Any trees requiring removal to facilitate construction works must be subject to a visual inspection to identify potential for bat roosts;
- The removal of linear features can result in the disconnection of commuting corridors such as hedgerows and treelines. Where possible, these linear features should be reconnected using native hedgerow or tree species to compensate for the loss of these features;
- Construction works should take place during daylight hours only with no lighting on the site during the hours of darkness. Any lighting required for health or safety reasons should be installed at a minimum of 10 metres from existing treelines and woodland habitats and directed away from such sensitive habitats.
- The proposed public lighting should be designed to minimise light spill on to habitat features, such as the River Shannon or the bat boxes present along the pathway, and concentrate artificial light only where required.
- Lighting will be avoided wherever possible. Any lighting required as part of the construction of the project will follow published best practice including BS EN 5489-1: 2020 to minimise the impact of outdoor lighting upon bat populations. Warm white LED lanterns are specified which are considered least disruptive to the emergence of bats from roosts at dusk, and subsequent movement from habitats to foraging locations.
- Generators or other sources of noise, vibration and emissions should not be located with 50m of the existing woodland habitat throughout the site. There should be avoidance of noise and vibration in so far as possible.
- Consultation with an arboriculturist should be sought to protect the trees to be retained during the proposed works. Root protection zones should be established prior to commencement of any works and there should be an appropriate barrier to prevent access by machinery.
- In line with Bat Conservation Trust Guidance, (2023), at least one bat survey should be undertaken during the appropriate bat survey season to assess potential use of the tree by bats in advance of any felling, and to assess the need for mitigation, if required.

Following the implementation of the avoidance and mitigation measures, the potential for temporary disturbance due to construction works is minimised. The potential for loss of minor potential roosting features is partially mitigated in the short and medium term by the provision of bat boxes in suitable locations.

- Bat boxes should be installed on mature trees, positioned to face south, southeast, or southwest and at heights no less than 4m above ground level to avoid predations and allow appropriate access and exit (Bat boxes are available from a variety of commercial outlets). Bat boxes can be positioned at any time of year, but they are more likely to be used during their first Summer if they are put up before the bats emerge from hibernation in late Spring. A suitably experienced Ecologist must oversee the installation of the boxes. All personnel should wear gloves to reduce transmission of human pheromones, which may reduce or delay uptake of boxes by bats.

As part of the mitigation measures, approximately 305 No. trees are proposed to be planted along the Greenway, guided by a dedicated Landscape Plan (EIAr Part 3_Appendices).

### 6.6.5 Effects on Birds

Breeding birds have been identified as KERs of the proposed works as there were significant populations

recorded as likely to be impacted by the proposed works. The proposed works will result in the loss of some habitat for breeding birds in the form of some scrub, vegetation and some individual trees.

To limit potential impacts of construction on breeding birds, woody vegetation removal, including treelines and any hedgerows, will not be permitted during the breeding bird season (1st of March to the 31st of August inclusive).

During construction, noise limits, noise control measures, hours of operation and selection of plant items will be considered in relation to disturbance of birds. Plant machinery will be turned off when not in use.

All plant and equipment for use will comply with *BS 5228-1: 2009: Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1: Noise*, as specified in Chapter 9- Air & Climate, Noise & Vibration.

### 6.6.6 Effects on Otter

Where possible, bank slopes should be protected along the River Shannon and Mulkear. This will ensure that riparian habitat is permanently available for otters, thus providing potential breeding and sheltering opportunities. Construction works may result in the temporary loss of some riparian vegetation adjacent to the new proposed Greenway, but this will re-establish quickly post construction. A careful approach will be taken to assure a significant distance from the river banks during the construction stage of the proposed development (a minimum 10-30m for the protection of riparian habitat, subject to be increased if presence of otter is detected).

Holts must be protected during construction with a minimum exclusion zone of 150m. It is important to note that no otter holts were found during the specialised survey within or near the works area, but the measure must be considered if holts are found pre-commencement of the works.

A pre-construction survey is recommended prior to any works being undertaken, to detect the presence of otter and/or otter holts within the proposed works area.

### 6.6.7 Biosecurity measures

The desktop study and site visits have identified a number of invasive species within the Greenway clearance area, including stands of Himalayan balsam and Giant hogweed. Invasive species have the potential to spread to other locations via machinery used on site or via the river itself if plant material is disturbed. The following biosecurity measures will be put in place to ensure no spread of invasive species:

- A pre-construction survey for invasive species will be conducted at the earliest stage possible to update and inform on the status of invasive plant species in or near the works area. Particular attention should be given to identifying those invasive species identified on the Third Schedule of the Birds and Natural Habitats Regulations 2011 (as amended). This survey should be undertaken during the appropriate botanical season (April to September);
- Continuous monitoring of work sites by an experienced and qualified Ecologist for invasive species growth shall be conducted.
- Biosecurity zones must be established on-site prior to site works commencing and will specify the area of the zones, the required actions that must be taken in each zone and who must carry out the actions. All staff will be educated on the health and safety and biosecurity measures that should be followed around each species;
- All plant machinery and construction related vehicles that will travel between the work site and the temporary construction compounds will be checked for the presence of plant material e.g. leaves roots and rhizomes from non-native invasive species. There shall be a bunded area in the temporary construction compound to wash down water from plant machinery and construction related vehicles,

particularly for plant machinery and construction related vehicles that are leaving the worksite and travelling elsewhere. The wash down water shall be pumped to a silt buster to remove contaminated material and soils before the water is returned downstream to the River Shannon;

- Delivery vehicles to the temporary construction compound shall be inspected for any plant material before entering or leaving the 'delivery' side of the compound and will be washed down in the bunded area. The wash down water shall be pumped to a silt buster to remove contaminated material and soils before the water is returned downstream to the River Shannon;
- Where there is potential for cross-contamination on site (machinery or personnel moving from one biosecurity zone to another or from the biosecurity zone to other areas on site), vehicles or machinery will be designating to specific sites to prevent spread of invasive species;

All staff will be trained by the ECoWs in the identification of invasive species and noxious weeds and the associated biosecurity measures required when working on site;

- Non-native invasive species will be managed or avoided where they occur throughout the works area, in line with the NRA Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Road Schemes (NRA, 2010), and any other best practice guidance which may be available in the interim;
- Any Himalayan balsam identified during the site survey will be hand-pulled prior to the commencement of the works. Hand pulling must only take place before the plant goes to seed around mid-June depending on the growing season. The stalks shall be left to wither where they are pulled and shall not be collected or moved off site;
- Giant hogweed shall be sprayed or injected with Glyphosate when actively growing, usually in April and May when the plants have grown to about 50cm in height with full leaves;
- Removal of Giant Hogweed flower heads in June/July prior to seed production will be carried out;
- If invasive species plants that spread by rhizomes (e.g. Japanese Knotweed) are encountered by site clearance crews, the plant will be removed in accordance with guidelines for managing invasive species, wrapped in plastic, and buried under topsoil and subsoil mounds so those invasive species plants cannot propagate;
- No invasive species will be moved to a different location within the works site or off site; and,
- A three to five year programme of invasive plant species control will be required to extend beyond the works period.

To prevent these species from spreading advanced treatment prior to the construction phase has been advised with an invasive species management plan (ISMP) produced outlining biosecurity and best practice measures.

Following the construction of the Greenway, it is important that the site is systematically re-surveyed to determine the success of control measures and to identify areas where invasive plants are reinvading. It is important to note that untreated Giant Hogweed and Himalayan balsam in the wider environment of Limerick, adjacent to or on the riverbanks of the Shannon and Mulkear upstream of the proposed greenway route are a risk to recolonise the study area after treatment. Work in partnership with neighbouring landowners to treat Giant hogweed and Himalayan balsam is encouraged. Establishing a good sward of grasses/ native riparian vegetation soon after treatment of these invasive species will help to reduce the rate of re-colonisation of the area by these species and help to prevent the slippage of banks. If invasive species are found, then they shall be treated as per the measures outlined in this plan and the species-specific guidelines above

### 6.6.8 Post construction works/Reinstatement

Following completion of the construction of the Greenway, construction area and sectors will be reinstated

as far as is practicable. The following measures are proposed:

- Where opportunity exists, enhancement measures may be employed. This will be carried out in liaison with the competent authority and the ECoW;
- Upon completion of the site works, all plant and machinery will be removed. The adjacent grasslands to the site will be left to regenerate naturally or reinstated to its original condition and site fencing will be removed;
- Any reinstatement of breaches in hedgerows and tree lines will be carried out in consultation with a suitably qualified ecologist. Local strains of native species shall be planted and hedge management shall reflect local traditional styles; and,
- A tree planting scheme will be implemented, with proposed planting of more than 300 trees, at a 5:1 ratio for trees that will be cut down. It will include native hedgerow, and tree species which promote biodiversity such as oak, willow, birch, etc.

### 6.6.9 Operational phase mitigation measures

The following mitigation measures are proposed to be implemented during the operational phase of the proposed greenway:

- Maintain native vegetation along the greenway corridor, including regular mowing and pruning, while ensuring that invasive species are controlled.
- Use pollinator-friendly plants along the greenway to support local pollinator populations.
- Where necessary, restore habitats, particularly along watercourses and riparian zones.
- Implement a maintenance programme for bridges and culverts to maintain habitat connectivity and reduce wildlife fragmentation. This will allow for safe movement of species.
- Install clear signage that creates awareness for users about wildlife and biodiversity conservation.
- Provide adequate waste disposal facilities and ensure regular cleaning and maintenance to prevent litter accumulation.
- Continue monitoring and treatment of invasive alien plant species along the greenway.
- Where appropriate, install fences or barriers to prevent wildlife from accessing dangerous areas such as roadways or areas with high human activity.
- Engage local communities, environmental groups, and stakeholders in the ongoing management of the greenway, raising awareness on protected species and their habitats.

## 6.7 RESIDUAL IMPACTS

Most residual impacts on biodiversity will be not significant after mitigation measures are applied, considering the assessment undertaken in Section 6.5 of this report.

The implementation of mitigations measures described in section 6.6 ensure that there is no net loss of habitat and that connectivity throughout the Study Area is retained. Residual impacts of habitat loss will depend on the scope and success of compensatory habitat restoration. If restoration works are not undertaken, residual impacts will remain moderate/significant negative.

This habitat loss is assessed as **Medium-term Moderate Negative Effect** that with the appropriate compensatory habitat restoration and design, the residual impacts could lead to a **Permanent Neutral Effect**.

**Table 6.23 Summary of residual impacts**

| Impact Source | Ecological Feature | Impact Significance | Mitigation | Residual Impact |
|---|---|---|---|---|
| **Construction phase** | Habitat loss | Moderate negative | Site management & rehabilitation | Slight negative |
| **Construction disturbance** | Fauna | Moderate negative | Best practice | Slight negative |
| **Invasive species** | Habitat, Flora | Significant negative | Invasive species management plan | Slight positive |
| **Operational phase** | Habitat loss | Not significant negative | Best practice | Slight positive |
| **Operational phase-disturbance** | Fauna | Slight negative | Monitoring | Imperceptible |
| **Lands** | Habitat, fauna, flora | Moderate positive | None required | Moderate positive |
| **Cumulative impacts** | Habitats, flora, fauna | Moderate negative | Project specific | Not significant negative |

## 6.8 Cumulative and In Combination Effects

### *6.8.1* In-Combination Effects

The interaction of the various elements of the proposed development was considered and assessed in this EIAR. The potential for each individual element of the proposed development on its own to result in significant effects on biodiversity was considered in the impact assessment. The entire project, including the interactions between all its elements, was also considered and assessed for its potential to result in significant effects on biodiversity in the impact assessment presented above. The complex interactions between the requirements for earthmoving and construction works adjacent to the Lower River Shannon to facilitate the project requirements was considered in-combination along with and the requirement to protect biodiversity within and downstream of the study area. Any potential in-combination impacts were taken into account and any significant impacts avoided through a series of mitigation measures that were fully described above in this chapter. The requirement to minimise disturbance on humans was considered and evaluated in-combination in the assessment, when considering the potential for disturbance to wildlife. The requirements to minimise impacts on the landscape were similarly considered when assessing the impact of the development on biodiversity. Following the in-combination assessment of the interactions between all aspects of the project, no additional effects were identified and a full and comprehensive cumulative assessment of the potential effects of the proposed development on biodiversity has been achieved.

### *6.8.2* Cumulative Effects

The potential for the proposed development to result in cumulative effects on biodiversity when considered cumulatively with a number of other relevant plans and projects was assessed. This includes a review of online Planning Registers and to identify past and future projects, their activities and their predicted environmental effects. This assessment is provided below and focuses on the potential for cumulative effects on key ecological receptors identified as part of the current assessment.

The Limerick Development Plan 2022-2028 has objectives relating to the protection, conservation management and restoration of European Sites. In its Land Use Zoning objectives related to semi natural and open spaces, it states that the plan will protect Natura 2000 designated sites, proposed sites and flood plains. With this objective it recognises the importance and need for protection of these areas for their protected species, habitats and ecosystems. It highlights that within these areas; development will be

prohibited in order to maintain the integrity of the site. The plan is accompanied by an Appropriate Assessment Natura Impact Statement (Volume 4 of the LDP, adopted June 2022)

https://www.limerick.ie/sites/default/files/media/documents/2022-07/Appropriate-Assessment-Natura-Impact-Statement.pdf

It concludes that "The risks to the qualifying interests, special conservation interests and conservation objectives of the Natura 2000 site have been addressed by the inclusion of mitigation measures, through policy measures such as non-encroachment of zoning on Natura 2000 sites in the case of zoning objectives and in relation to implementation of Article 6 elsewhere (…) taking into account mitigation measures that have already been integrated into the draft plan and the additional mitigation measures mentioned in this report, it is concluded that the proposed material alterations to the Limerick Draft Plan are not foreseen to have any significant effects on the integrity of any European site, alone or in combination with other plans or projects."

The review of the Limerick City & County Council planning register documented relevant general development planning applications in the vicinity of the proposed greenway, most of which relate to the provision and/or alteration of one-off housing and other structures. No potential for cumulative impacts on European Sites were identified when considered in conjunction with the current proposal.

The Castletroy WwTP Upgrade Project is an element of Irish Water's 2017-2021 Investment Plan, whereby 52 Wastewater 'Above Ground' (i.e., treatment) projects were identified. The planning application (permitted by An Bord Pleanála 12/10/2023, Case reference: PA91.316168) for the upgrade works at Castletroy WwTP will cater for the 10-year growth projections from 45,000 PE to 77,500 PE, which includes a future IDA load of 5,500 PE. There will be provision made in the infrastructural development of the plant (i.e. tank sizing and pipework) for 25-year population growth projection of 81,100PE. Procurement and Construction is scheduled between 2024-2026.

The IDA has proposed upgrade works to existing flood defences under a new planning application that has been submitted to Limerick City & County Council planning section, with Case reference: 25/60477. It was deemed invalid on 24th June 2025. The proposed works consist of the construction of 1.1m – 1.8m sheet pile wall to act as a flood barrier from the River Shannon and Mulkear River; associated drainage works including new drainage trenches, pipes and attenuation pond; construction of 11 no. mammal crossings comprising earth ramps filled to the top of the proposed sheet piles along the River Shannon and Mulkear River; Localised relocation of an existing boundary fence to the adjacent Johnson and Johnson facility to facilitate the proposed development; Removal of existing berm along the Mulkear River; All associated ancillary site development works.

The potential cumulative impacts with the Limerick City Greenway should be considered in the EIAR if the construction programmes overlap.

There are no known additional plans/projects on-going or proposed (at the time of this study) which in combination with the proposed project may give rise to any form of cumulative impact on the European Sites.

Table 6.24 provides a summary of the most relevant plans and projects considered for the assessment of potential cumulative effects when considered with the proposed greenway.

**Table 6.24 Summary of relevant plans and projects**

| Plans and Projects | Key Policies/Issues/Objectives Directly Related to European Sites in the Zone of Influence | Assessment of Potential Impact on European Sites |
|---|---|---|
| Limerick Development Plan 2022 – 2028. | ▪ The Draft Plan sets out two main strategic objectives relating to Biodiversity and protected species and habitats.<br>▪ Strategic objectives of the Draft Plan include:<br>▪ No. 8: Protect, enhance, and connect areas of natural heritage, green infrastructure, and open space for the benefits of quality of life, biodiversity, protected species and habitats, while having the potential to facilitate climate change adaptation and flood risk measures<br>▪ No. 9: Protect, conserve, and enhance the built and cultural heritage of Limerick, through promoting awareness, utilising relevant heritage legislation and ensuring good quality urban design principles are applied to all new developments. The principle that well planned and integrated development enhances the sustainability, attractiveness and quality of an area should be at the centre of any proposal<br>▪ All plans and projects with the potential to have significant effects on the Natura 2000 network will be subject to the Appropriate Assessment process. | The Development plan was comprehensively reviewed, no potential for cumulative impacts when considered in conjunction with the current proposal were identified. |
| Mid-West Area Strategic Plan 2012-2030 | ▪ T-BFF-01: The Strategy alone or in combination should not significantly impact on valuable ecological habitats and species including European Designated Sites (SACs and SPAs), Nationally Designated Sites (NHA's) other designated sites (e.g. sensitive waters, bathing waters) ecological corridors or local sites.<br>▪ T-BFF-02: To ensure compliance with Article 10 of the Habitats Directive and protect ecological connectivity between Natura 2000 sites.<br>▪ T-BFF-03: The Strategy alone or in combination should not impact the biological diversity within the study area and to ensure that invasive species do not impact significantly on the biodiversity of the region there is no significant loss of valuable habitats and species not protected as European Designated Sites. | The strategic plan was comprehensively reviewed, no potential for cumulative impacts when considered in conjunction with the current proposal were identified. |
| Project Ireland 2040 – National Planning Framework | ▪ National Policy Objective 59: Enhance the conservation status and improve the management of protected areas and protected species by: Implementing relevant EU Directives to protect Ireland's environment and wildlife; Integrating policies and objectives for the protection and restoration of biodiversity in statutory development plans; Developing and utilising licensing and consent systems to facilitate sustainable activities within Natura 2000 sites; Continued research, survey programmes and monitoring of habitats and species. | The plan was comprehensively reviewed, no potential for cumulative impacts when considered in conjunction with the current proposal were identified. |

| Plans and Projects | Key Policies/Issues/Objectives Directly Related to European Sites in the Zone of Influence | Assessment of Potential Impact on European Sites |
|---|---|---|
| Ireland's 4th National Biodiversity Action Plan Ireland's 4th National Biodiversity Action Plan 2023–2030 | ▪ Outcome 2A: The protection of existing designated areas and protected species is strengthened and conservation and restoration within the existing protected area network are enhanced.<br>▪ Outcome 2D: Biodiversity and ecosystem services in the marine and freshwater environment are conserved and restored.<br>▪ Outcome 2H: Invasive alien species (IAS) are controlled and managed on an all-island basis to reduce the harmful impact they have on biodiversity and measures are undertaken to tackle the introduction and spread of new IAS to the environment. | No.<br>The proposed development will not result in significant effects on protected areas, habitats and features of ecological importance, biodiversity and ecosystem services or increase the spread of invasive species. |
| Limerick City and County Council planning register. | The review of the Limerick City and County Council planning register documented relevant general development planning applications in the vicinity of the proposed Greenway, most of which relate to the construction of facilities within the university grounds, with domestic planning applications within the residential region near Mulkear River. These applications have also been taken account on describing the baseline environment and in the relevant assessments. | No potential for cumulative impacts when considered in conjunction with the current proposal were identified. |
| Other Cycle Paths/Ways. | In line with the Limerick/Shannon Metropolitan Area Transport Strategy 2040 additional travel/cycle networks/routes are proposed throughout the city including Corbally to Limerick City Centre, UL to City Centre along the River Shannon and Canal, Southill, Ballysimon, Monaleen and Castletroy to City Centre and Southill and Roxoboro Shopping Centre to City Centre. | No potential for cumulative impacts when considered in conjunction with the current proposal were identified. |

Further details on potential positive and negative cumulative effects of the proposed greenway project with other main national, regional and local projects, is detailed in Table 6.25.

**Table 6.25 Summary of potential cumulative effects of plans/projects with the proposed greenway**

| Plan/Project | Potential Positive Cumulative Effects | Potential Negative Cumulative Effects | Mitigation Measures |
|---|---|---|---|
| Mid West Area Strategic Plan 2012-2030 | Support strategic transport and green infrastructure corridors, reinforcing the greenway as an alternative and more sustainable transport mode | Increased land use due to regional development which could result in land use conflict near the greenway area | Implement land-use buffer areas and ensure all planning applications contain the appropriate mitigation measures for habitats and species, especially near SACs and SPAs |
| Project Ireland 2040: National Planning Framework | The framework supports compact growth and active travel, in line with the aim of the proposed greenway | Infrastructure priorities might constrain greenway routes and designs | Coordination between projects to ensure these complement each other and that they integrate the necessary measures to |

| Plan/Project | Potential Positive Cumulative Effects | Potential Negative Cumulative Effects | Mitigation Measures |
|---|---|---|---|
| | | | protect key environmental features |
| Limerick Shannon Metropolitan Area Transport (LSMATS) | Encourages a modal shift in transport to walking and cycling which is the aim of the proposed greenway | Potential construction programmes overlap, which may lead to temporary disruptions | Coordination so that phasing of works is carefully planned between projects and reduce any potential cumulative impacts |
| Limerick Development Plan 2022-2028 | Policies of the CDP support greenway infrastructures | Zoning changes might reduce available areas for greenway corridors | Create buffer areas for greenway routes to restrict development that might reduce the greenway area |
| Ireland's 4th National Biodiversity Action Plan Ireland's 4th National Biodiversity Action Plan 2023–2030 | Supports biodiversity protection, enhancement and integration with projects. The proposed greenway is designed to protect local environmental features, and proposes a planting scheme that supports habitat creation | Poor implementation can lead to potential negative effects on habitat and species | Mitigation measures proposed for all the phases of the project will ensure that any potential impacts on habitats and species are minimised and biodiversity net gain is achieved |

The proposed development was considered cumulatively with the above plans and projects and no significant additional effects or potential for cumulative/ in combination adverse effects on biodiversity were identified. Any potential negative cumulative effect is minimised by appropriate mitigation measures considered in each of the plans/projects to make sure no biodiversity features are impacted. The proposed development will not result in significant direct or indirect effects on any biodiversity when considered on its own and therefore cannot contribute to any additional, cumulative or in combination effects when considered alongside any other plans or projects.

## 6.9 Concluding Statement

The proposed Greenway project has been designed to achieve its aim of promoting cycling as a realistic choice as a mode of transport in the Limerick Metropolitan Area, providing a safe, clear and accessible network of cycle networks from UL to the National Technology Park and beyond. The identified impacts and potential direct and indirect significant effects of the Project on biodiversity have been fully identified, assessed, quantified and where necessary and appropriately mitigated. The design considered and allowed to the sensitivity to the existing key ecological receptors within the area.

The outcome of the assessment of the effects of the proposed Limerick City Greenway (UL to NTP) on biodiversity, is that there will be local moderate losses of amenity grassland and wooded habitat and in respect of key ecological receptors associated with the these and other habitats within the proposed development study area, prior to mitigation measures. Fauna species, including otter, badger, bats, birds, fish and amphibians were considered in the assessment and was determined that for some of these species, there is potential for moderate negative effects as a result of the construction activities. Invasive species have also been assessed, and if no mitigation measures are applied, this could result in a moderate negative effect on the surrounding area and native flora communities.

Based on the above, environmental management and design measures are proposed, chiefly to limit tree

and hedge clearance along the route, control and limit sediment and potential contaminant runoff, to protect watercourses against water quality deterioration, minimise disturbance to fauna in the area, and propose reinstatement and a planting scheme measures through a detailed Landscape Plan, that will minimise any potential impacts and/or effects from the construction and operational phases of the proposed greenway.

Furthermore, an assessment of the potential for significant effects on European sites downstream of the project was conducted in accordance with the requirements of the Habitats Directive, of which details are provided in the Natura Impact Statement prepared for the proposed greenway. This assessment concluded that the proposed Greenway, both in isolation and in combination with other plans or projects, is not likely to result in significant effects on any European Sites. Accordingly, no adverse effects on the integrity of these sites are anticipated.

**It has been concluded that the development of the proposed Limerick City Greenway (UL to NTP) works will not adversely affect key ecological receptors nor the European Sites, and there is no reasonable scientific doubt in relation to this conclusion.**

## References

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. and Fuller, R.J. (2013 Bird Atlas 2007-11: The breeding and wintering birds of Britan and Ireland. BTO Books, Thetford, UK.

British Biological Society (2010) Mosses and Liverworts of Britain and Ireland a field guide. British Biological Society.

Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) Guidance for Ecological Impact Assessment in the UK and Ireland- Terrestrial, Freshwater, Coastal and Marine.

Colhoun, K. and Cummins, S. (2013). Birds of Conservation Concern in Ireland 2014-2019. Irish Birds 9(4): 523-544.

Corcoran, W., Matson, R., McLoone, P., Bateman, A., Cierpial, D., Donovan, R., Gavin, A., Gordon, P., McCarthy, E., Robson, S., Wightman, G., Roche, W. and Kelly, F.L (2021) Sampling Fish for the Water Framework Directive - Summary Report 2020. National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

Corcoran, W., Matson, R., McLoone, P., Cierpial, D., Gordon, P., McCarthy, E., Robson, S., Wightman, G., Twomey, C., Roche, W. and Kelly, F.L (2024) Sampling Fish for the Water Framework Directive – Summary Report 2023. National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

Crowe, O., Coombes, R.H., O'Sullivan, O., Tierney, T.D., Walsh, A.J. & O'Halloran, J. (2014) Countryside Bird Survey Report 1998-2013. Birdwatch Ireland Wicklow.

Edgar, P., Foster, J. and Baker, j. (2010). Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.

Environmental Protection Agency (May, 2022): Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA, Wexford.

Environmental Protection Agency (September 2015): Draft – Advice Notes on Current Practice (in the preparation on Environmental Impact Statements). EPA, Wexford.

European Commission (2000) Managing Natura 2000 Sites - The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. European Commission.

European Union (Birds and Natural Habitats) Regulations 2011 to 2015.

Fossitt JA (2000) A Guide to Habitats in Ireland. The Heritage Council.

Global Invasive Species Database (GISD), 2024. Impatiens glandulifera.online] Invasive Species Specialist Group (ISSG). Available at: https://www.iucngisd.org/gisd/species.php?sc=942 [Accessed July 2025]

Habitats Directive (92/43/EEC).

Inland Fisheries Ireland (2022). Fish in Rivers Factsheet: SHIRBD River Shannon Catchment, July 2022.

Kelly, et.al. (2015) Sampling Fish for the Water Framework Directive - Summary Report 2014. Inland Fisheries Ireland, Citywest Business Campus, Dublin 24, Ireland.

Lundy MG, Aughney T, Montgomery WI, Roche N (2011) Landscape conservation for Irish bats & species specific roosting characteristics. Bat Conservation Ireland.

NPWS (2012) River Shannon and River Fergus Estuaries Special Protection Area. Conservation Objectives

National Biodiversity Data Centre (2023a) Accessed from: https://records.biodiversityireland.ie/stats/taxonstats?county_name=Limerick&date_range=2021-01-01%2000:00:00|2021-1231%2023:59:59

NRA (2006) Guidelines for the Treatment of Badger Prior to the Construction of National Roads Schemes. National Roads Authority.

NRA (2009) Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2). National Roads Authority.

NRA (2009) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority.

Preston et al. (2002) New Atlas of the British and Irish Flora: An Atlas of the Vascular Plants of Britain, Ireland, The Isle of Man and the Channel Islands.

Ryan, D. Coyne, J. Corcoran, W. Robson, S. and Roche, W. (2018). Fish Stock Survey of Transitional Waters in the Shannon International River Basin District – Limerick Dock, Shannon Upper, Shannon Lower, and Fergus Estuaries 2017. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland.

Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. & Montgomery, W.I. (2013) National Otter Survey of Ireland 2010/12. Irish Wildlife Manuals No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

SI 356/2015- Flora (Protection) Order, (2015).

SI 477/2011- European Communities (Birds and Natural Habitats) Regulations 2011.

Smith et. al. (2011) Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council.

Stace (2010) New Flora of the British Isles. Cambridge University Press.

U.S. Department of Agriculture, Forest Service, 2005. *Heracleum mantegazzianum*. Fire Effects Information System (FEIS). [online] Available at: https://www.fs.usda.gov/database/feis/plants/forb/herman/all.html [Accessed July 2025].