



Chapter 8 Biodiversity

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8. BIODIVERSITY

8.1 Introduction

This chapter assesses the impact of the proposed West Clare Railway Greenway Section 1: Kilrush to Kilkee ('the proposed development') on biodiversity during the construction and operation.

This chapter describes and assesses the likely direct and indirect significant impacts of the proposed development on biodiversity. The methods employed to establish the ecological baseline within and around the proposed development are described, together with the process followed to determine the nature conservation importance of the ecological features present.

The ways in which habitats, species and ecosystems are likely to be affected by the proposed development are described and the magnitude of the likely effects predicted, taking into account the conservation condition of the habitats and species under consideration¹. Mitigation measures are proposed, and any residual effects are assessed.

8.2 Legislation, Policy and Guidance

8.2.1 Legislation

The main legislation which provides for biodiversity and nature conservation in Ireland are the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended), SI No.477 of 2011 as amended, ("the Habitats Regulations" or "the Habitats Regulations 2011 to 2021" and the Wildlife Acts 1976 as amended².

The Habitats Regulations were inter alia amended by S.I. No. 290 of 2013; S.I. No. 499 of 2013; S.I. No. 355 of 2015; Planning, Heritage and Broadcasting (Amendment) Act 2021 (no.11 of 2021), Chapter 4; S.I. No. 293 of 2021, and S.I. No. 451/2025. The National Parks & Wildlife Service ('the NPWS') has issued the following guidance on the implementation of the Habitats Regulations:

- *Applications for Regulation 54 Derogations for Annex IV species. Guidance for Applicants.* (NPWS, 2025).
- *Guidance for Public authorities on the Application of Articles 12 and 16 of the EU Habitats Directive to development/works undertaken by or on behalf of a Public authority* (NPWS, 2021).
- *Guidance on the Strict Protection of Certain Animal and Plant Species under the Habitats Directive in Ireland* (NPWS, 2021).
- *Circular Letter NPWS 1/10; Circular Letter L8/08; Circular Letter NPWS 2/08; Circular Letter SEA 1/08 & NPWS 1/08; Circular Letter PD 2/07 & NPWS 1/07; Circular Letter NPWS 2-07 - Guidance on Compliance with Regulation 23.*

The European Communities (Birds and Natural Habitats) Regulations, 2011, as amended ('the Habitats Regulations'), transpose into Irish law Directive 2009/147/EC (the 'Birds Directive') and Council Directive 92/43/EEC (the 'Habitats Directive'), which list priority habitats and

¹ Based on the definitions of favourable conservation status in Article 1 of Council Directive 92/43/EEC (the Habitats Directive).

² Wildlife Act 1976 (No 39 of 1976); Wildlife (Amendment) Act 2000 (No 38 of 2000); Wildlife (Amendment) Act 2010 (No 19 of 2010); Wildlife (Amendment) Act 2012 (No 29 of 2012); Heritage Act 2018 (No. 15 of 2018), Part 3; Planning, Heritage and Broadcasting (Amendment) Act 2021 (No. 11 of 2021), Chapter 3; Wildlife (Amendment) Act 2023 (No 25 of 2023) as per National Parks & Wildlife Service.

species of international (European Union) conservation importance, which require protection. This protection is afforded in part through the designation of European sites – areas that represent significant occurrences of listed habitat types and populations of listed species within a European context. Areas designated for bird species are classed as Special Protection Areas (SPAs), while those designated for other protected species and/or habitats are classed as Special Areas of Conservation (SACs). Wild bird species in SPAs, and habitats and species listed on Annexes I and II (respectively) to the Habitats Directive that are contained in SACs, are legally protected.

Additionally, species listed on Annex IV to the Habitats Directive are strictly protected wherever they occur – whether inside or outside the Natura 2000 network. This protection is afforded to animal and plant species by Regulation 51 and 52, respectively, of the Habitats Regulations.

The Wildlife Act, 1976 (as amended) ('the Wildlife Acts'), is the principle legislative mechanism for the protection of wildlife in Ireland. A network of nationally protected Nature Reserves, which public bodies have a duty to protect, is established under the Wildlife Acts. Sites of national importance for nature conservation are afforded protection under planning policy and the Wildlife Acts. Natural Heritage Areas (NHAs) are sites that are designated under the Wildlife Acts for the protection of flora, fauna, habitats and geological features of interest. Proposed Natural Heritage Areas (pNHAs) are published sites identified as of similar conservation interest, but which have not been statutorily proposed or designated – but are nonetheless afforded some protection under planning policies and objectives.

The Wildlife Acts also protect species of conservation value from injury, disturbance and damage to individual entities or to their breeding and resting places. All species listed on the relevant Schedules to the Wildlife Acts must, therefore, be appropriately considered in the planning process.

Wild flora, i.e. vascular plants, mosses, liverworts, lichens and stoneworts that are listed in the Flora (Protection) Order, 2022, are protected under Section 21 of the Wildlife Act 1976, which makes it illegal to cut, uproot or damage listed species or to alter, damage or interfere with their habitats.

8.2.2 Policy

This section summaries National policy relevant to this report, including national policy documents and policies and objectives in the relevant county development plans.

Ireland's 4th National Biodiversity Action Plan (2023 – 2030) (National Parks & Wildlife Service, 2023), in accordance with the Convention on Biological Diversity, is a framework for the conservation and protection of Ireland's biodiversity, with an overall objective to secure the conservation, including, where possible, the enhancement and sustainable use, of biological diversity in Ireland and to contribute to collective efforts for conservation of biodiversity globally. Action 3C1 of the *National Biodiversity Action Plan* states that "*All Public Authorities and private sector bodies move towards no net loss of biodiversity through strategies, planning, mitigation measures, appropriate offsetting and/or investment in Blue-Green infrastructure*" (p. 99). This is particularly relevant to developments. The plan is implemented through legislation and statutory instruments concerned with nature conservation.

Ireland's 4th National Biodiversity Action Plan (NBAP) contains five overall Objectives:

1. Adopt a Whole-of-Government, Whole-of-Society Approach to Biodiversity.
2. Meet Urgent Conservation and Restoration Needs.

3. Secure Nature's Contribution to People.
4. Enhance the Evidence Base for Action on Biodiversity.
5. Strengthen Ireland's Contribution to International Biodiversity Initiatives

All-Ireland Pollinator Plan 2021 – 2025 (NBDC, 2021) seeks to halt the decline in pollinators through a range of objectives. This plan is supplemented by the guidance document, Pollinator Friendly Management of Transport Corridors (NBDC, 2019) and Councils: Actions to Help Pollinators (NBDC, 2016).

Clare County Development Plan 2023-2029 (CCC, 2023) sets out the policy objectives and the overall strategy for the proper planning and sustainable development of the county over the plan period. The plan provides for, and manages, the physical, economic, and social development of the county, in the interests of the overall common good, and in compliance with environmental legislation. The Clare County development plan includes the following overall goal for biodiversity:

Goal XV: A county that protects and enhances its unique natural heritage and biodiversity and recognises the potential for sustainable green infrastructure development, while promoting and developing its cultural, educational and eco-tourism potential in a sustainable manner.

The Development Plan Objectives for Biodiversity which are of relevance to the proposed development are presented below.

CDP15.1 Biodiversity

It is an objective of Clare County Council:

- a) To implement the National Biodiversity Action Plan 2017- 2021, the All Ireland Pollinator Plan 2021-2025, the EU A Farm to Fork Strategy 2020, the County Clare Heritage Plan 2017-2023 and the County Clare Biodiversity Plan 2017- 2023, or any subsequent plans, in partnership with all relevant stakeholders;
- b) To review the Clare County Heritage Plan 2017-2023 and to prepare a new plan, which will be set within the context of the National Heritage Plan "Heritage Ireland 2030", upon the expiry of the existing adopted Plan;
- c) To support National Biodiversity Week and events such as Bioblitz in order to increase awareness of biodiversity and its benefits to the community;
- d) To ensure that features of importance to local biodiversity are retained as part of developments and projects being undertaken in the County;
- e) To identify ecological buffer zones, where appropriate, in the Plan area; and
- f) To support current and future projects with the aim of restoration/rehabilitation of natural habitats and species.

CDP15.2 Natural Heritage, Biodiversity and Built Heritage Assets – not relevant to the proposed development.

CDP15.3 European Sites

It is an objective of Clare County Council:

- a) To afford the highest level of protection to all designated European sites in accordance with the relevant Directives and legislation on such matters;
- b) To require all planning applications for development that may have (or cannot rule out) likely significant effects on European Sites in view of the site's Conservation Objectives, either in isolation or in combination with other plans or projects, to submit a Natura Impact Statement

in accordance with the requirements of the EU Habitats Directive and the Planning and Development Act, 2000 (as amended); and

c) To recognise and afford appropriate protection to any new or modified SPAs or SACs that are identified during the lifetime of this Development Plan through the planning application process bearing in mind proposals for development outside of a European site may also have an indirect effect.

CDP15.4 Requirement for Appropriate Assessment

It is an objective of Clare County Council:

a) To implement Article 6(3) and where necessary 6(4) of the Habitats Directive and to ensure that Appropriate Assessment is carried out in relation to works, plans and projects likely to impact on European sites (SACs and SPAs), whether directly or indirectly or in combination with any other plan(s) or project(s); and

b) To have regard to Appropriate Assessment of Plans and Projects in Ireland – Guidelines for Planning Authorities 2009 or any updated version.

CDP15.5 Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs)

It is an objective of Clare County Council:

a) To actively promote the conservation and protection of areas designated as NHA's (including proposed sites) and to only consider proposals for development within or affecting an NHA where it can be clearly demonstrated that the proposed development will not have a significant adverse effect on the NHA or pNHA; and

b) To identify and afford appropriate protection to any new, proposed or modified NHA's identified during the lifetime of the Development Plan.

CDP15.6 County Geological Sites – not relevant to the proposed development.

CDP15 Burren National Park, Wildlife Sanctuaries and Nature Reserves – not relevant to the proposed development.

CDP15.8 Non-Designated Sites and Biodiversity

It is an objective of Clare County Council:

a) To ensure the protection and conservation of areas, sites, species and ecological networks/corridors of biodiversity value outside of designated sites throughout the County and to require an ecological assessment to accompany development proposals likely to impact on such areas or species;

b) To ensure that available habitat mapping is taken into consideration in any ecological assessment undertaken;

c) To complete the Habitat Mapping of the County (in accordance with A Guide to Habitats in Ireland - The Heritage Council 2000) in order to identify and record the natural habitats of the County at a detailed level and afford appropriate protection to areas of importance as required; and

d) To implement and monitor the actions as set out in the Clare Biodiversity Action Plan and the National Biodiversity Action Plan.

CDP 15.9 Natural Heritage and Infrastructure Schemes

It is an objective of Clare County Council: To be responsive to environmental challenges and to ensure the protection of natural heritage when considering proposed service infrastructure

and proposed road works (both realignments and new roads) located in, in close proximity to, or nearby protected species or sites of importance in terms of biodiversity.

CDP15.10 Environmental Impact Assessment

It is an objective of the Development Plan:

- a) To implement the EIA Directive, ensuring that all elements/stages or components of the project are included in one overall assessment and all reasonable alternatives are taken into consideration in choosing the option with the least environmental impact;
- b) To have regard to “Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessments” (2018) when considering proposals for which an EIA is required; and
- c) To ensure full compliance with the requirements of the EU Habitats Directive, SEA Directive and associated legislation/regulations, including the associated European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), European Communities (Environmental Assessment of Certain Plans and Programmes) regulations 2004-2011, and the European Communities (Environmental Impact Assessment) Regulations 1989 – 2011 (or any updated/superseding legislation).

CDP15.12 Biodiversity and Habitat Protection

It is an objective of Clare County Council:

- a) To protect and promote the sustainable management of the natural heritage, flora and fauna of the County both within protected areas and in the general landscape through the promotion of biodiversity, the conservation of natural habitats, the enhancement of new and existing habitats, and through the integration of Green Infrastructure (GI), Blue Infrastructure and ecosystem services including landscape, heritage, biodiversity and management of invasive and alien species into the Development Plan;
- b) To promote the conservation of biodiversity through the protection of sites of biodiversity importance and wildlife corridors, both within and between the designated sites and the wider Plan area;
- c) To support the implementation of the All Ireland Pollinator Plan, National Biodiversity Action Plan and National Raised Bog SAC Management Plan;
- d) To ensure there is no net loss of potential Lesser Horseshoe Bat feeding habitats, treelines and hedgerows within 2.5km of known roosts;
- e) To implement and monitor the actions as set out in the Clare County Biodiversity Plan; and
- f) To promote biodiversity net gain in any new plans/projects/policies to promote development that leaves biodiversity in a better state than before.

CDP15.13 Urban Ecology

It is an objective of Clare County Council:

- a) To encourage and, where appropriate, enhance the provision of biodiversity features in urban areas through the preparation of local areas plans/settlement plans, green infrastructure strategies, ecosystem services, and through the development management process;
- b) To support investment in the on-going maintenance and enhancement of facilities in existing green infrastructure and to support the provision of new public, parks, green space corridors and other public open spaces in tandem with projected population growth to create green, healthy settlements throughout the County;
- c) To ensure that plans for new public parks and associated facilities are informed by environmental assessment and green infrastructure objectives;

- d) To ensure that any new lighting proposals and upgrades to existing lighting infrastructure are designed in a manner which considers any sensitive species within the area, such as bats and their roosts; and
- e) To encourage (where appropriate) swift nesting areas in new or retrofitted urban buildings and to protect existing nesting locations.

CDP15.14 Habitat Fragmentation and Green Infrastructure Corridors

It is an objective of Clare County Council:

- a) To ensure that development proposals support and enhance the connectivity and integrity of habitats in the Plan area by incorporating natural features into the design of development proposals.
- b) To ensure that the potential impacts upon the migratory routes of fauna including birds and bats and the movement of species between European Sites are fully considered within the relevant ecological assessment. These assessments shall fully consider flight collision risks, habitat fragmentation and barrier risk as required.

CDP15.15 Biodiversity on Local Authority Lands

It is an objective of Clare County Council:

- a) To support the implementation of positive conservation management on lands which are owned or managed by Clare County Council;
- b) To protect and where possible enhance the biodiversity value of land owned and managed by Clare County Council;
- c) To support national policy to create new woodlands on public land and participate in the Creation of Woodlands on Public Lands Scheme and any subsequent schemes subject to the appropriate ecological assessments;
- d) To create new native woodlands on public lands which will be carried out in accordance with proper planning and sustainable development in order to ensure important habitats such as Wetlands (which are key carbon sequestration locations) are not lost due to their development; and
- e) To support the use of natural approaches to flood management and control on lands owned or managed by or on behalf of Clare County Council subject to the appropriate ecological assessments.

CDP15.16 Inland Waterways and River Corridors

It is an objective of Clare County Council:

- a) To work with all relevant stakeholders to protect from degradation and damage and manage inland waters, river corridors and their floodplains, turloughs, lakes, fens and other water bodies, and to recognise and promote them as natural assets and key elements in the green infrastructure network in the County;
- b) To protect riparian areas, where appropriate, in the Plan area;
- c) To ensure that, where development occurs within a riparian zone, it does not have a negative impact on associated habitats and species and to have regard for Inland Fisheries Ireland guidance 'Planning For Watercourses In The Urban Environment' and any updated versions;
- d) To work with all relevant stakeholders to protect and improve appropriate access to waterways and river corridors whilst ensuring their conservation and the protection of the resource and water quality;
- e) To encourage development proposals to I. Maintain an appropriate width for the riparian zone to be protected; II. Improve appropriate access and compatible leisure activities; III.

Maintain and enhance the fishing potential for both local interests and tourism by protecting the natural spawning beds of trout and salmon; and

f) To protect the County's valuable inland fishery resource and support its sustainable development through the protection of water quality and facilitation of ancillary infrastructure at appropriate locations.

CDP15.17 Freshwater Pearl Mussel

It is an objective of the Development Plan:

a) To have regard to the potential impacts of developments within or in close proximity to the Cloon River freshwater pearl mussel catchment including impacts arising downstream within the Shannon Estuary and Clonderalaw Bay;

b) To have regard to the Cloon Freshwater Pearl Mussel SubBasin Management Plan in the assessment of planning applications;

c) To ensure careful consideration is given to all proposed developments within the Doonbeg, Shannon – Graney/Scarriff and the Shannon – Woodford Freshwater Pearl Mussel sensitive areas; and

d) To ensure full compliance with Objective CDP3.3 in relation to any future developments in close proximity to a freshwater pearl mussel catchment or sensitive area.

CDP15.18 Peatlands

It is an objective of Clare County Council: To protect and enhance the valuable peatland resource in County Clare including protecting the heritage and environmental value of these peatland areas.

CDP15.19 Woodlands, Trees and Hedgerows

It is an objective of Clare County Council:

a) To preserve and conserve individual or groups of trees identified in Volume 2 of this Plan as 'Trees for Preservation' which will enhance the character and appearance of an area;

b) To carry out tree survey work during the lifetime of this Plan to identify future trees of importance in the County and facilitate their future protection;

c) To protect individual or groups of trees within the Plan area which are important for environmental, recreational, historical, biodiversity and/or aesthetic reasons or by reason of contribution to sense of place, including groups of trees which correspond with protected habitats, or which support protected species, under the Habitats Directive;

d) To work with landowners, local communities and other relevant groups to promote the retention and conservation of existing trees and hedgerows and encourage development proposals that enhance the landscape through positive management and additional planting/sensitive replanting of native tree species;

e) To protect woodlands and hedgerows from damage and/or degradation and to prevent disruption of the connectivity of woodlands and hedgerows of the County;

f) To ensure, where required, applications for development include proposals for planting / leave a suitable ecological buffer zone, between the development works and areas/features of ecological importance;

g) Where hedgerows are required to be removed in the interests of traffic safety or where breaches to hedgerows occur due to river drainage/maintenance works and flood repair, to require the applicant/developer to reinstate the hedgerows with a suitable replacement of native species to the satisfaction of the Council;

h) To require each green space in new residential developments to have at least one native oak tree, or other naturalised tree species of similar stature and lifespan, integrated into the agreed planting/landscaping scheme; and

i) To require, where possible, that all trees felled as a result of development proposals be replaced at a minimum ratio of 10 new native species per 1 tree felled.

CDP15.20 Natural Resources & Climate Change

It is an objective of Clare County Council:

- a) To develop a strategy to undertake and implement an active native tree planting programme in suitable and appropriate locations in the context of climate adaptation in conjunction with an awareness campaign that informs communities of the benefits of tree planting;
- b) To ensure that adverse risks from climate change are considered in the assessment of development proposals and measures are employed to appropriately address these risks; and
- c) To ensure that any tree planting scheme is subject to appropriate ecological assessments and to ensure that areas selected for tree planting are suitable, will provide enhancement and positive benefits for biodiversity and will not impact on European sites.

CDP15.22 Wetlands

It is an objective of the Development Plan: To manage, enhance and protect the wetlands in County Clare having regard to the County Clare Wetlands Survey (2008), the map of Irish Wetlands (www.wetlandsurveyireland.com), the Irish Wetland Types – An Identification Guide and Field Survey Manual, EPA 2018, the Planning and Development Regulations 2001 (as amended) and 'Drainage and Reclamation of Wetlands – Draft Guidelines for Planning Authorities, 2011' and any subsequent guidance documents.

CDP15.23 The Burren National Park – Not of relevance to the proposed development.

CDP15.24 Limestone Habitats – Not of relevance to the proposed development.

CDP15.25 Burren and Cliffs of Moher Geopark – Not of relevance to the proposed development.

CDP15.26 Heritage Status – Not of relevance to the proposed development.

CDP15.27 Development Proposals in Designated World Heritage Properties – Not of relevance to the proposed development.

CDP15.28 Dark Sky Reserve Designations – Not of relevance to the proposed development.

CDP15.29 Alien and Invasive Species

It is an objective of the Development Plan:

- a) To raise awareness of the threat of alien invasive species and how they can spread, and take all necessary steps to prevent the spread of non-native invasive species and noxious weeds in the Plan area, including requiring landowners, developers and boat operators to adhere to best practice guidance in relation to their control;
- b) To require all development proposals to address the presence of invasive alien species on the proposed development site and to require an Invasive Species Management Plan where such species are present;
- c) To carry out surveys of invasive species across the County;
- d) To implement the requirements of EU Regulations 1143/2014 on the Prevention and Management of the Introduction and Spread of Invasive Alien Species and to manage invasive hydrological connectivity issues to European Sites to prevent the spread of invasive species to sensitive sites; and

e) To facilitate the work of agencies addressing the issue of terrestrial and aquatic invasive alien species.

CDP15.30 Green Infrastructure and Climate Change

It is an objective of Clare County Council:

- a) To work to create an integrated and coherent green infrastructure network to enhance biodiversity and quality of life, to facilitate the movement of wildlife, to connect areas of high conservation value such as woodlands, hedgerows, earth banks, watercourses and wetlands, and to provide sustainable water management and a green setting for urban areas;
- b) To promote and facilitate the on-going development and improvement of green infrastructure, green corridors and ecosystem services in the Plan area, including green networks, green amenities and linked green corridors which ensure the provisions of recreational amenities, natural areas for the growth of wildlife and biodiversity, and a network of infrastructure which results in a better quality of life for visitors and inhabitants alike;
- c) To implement the adopted Green Infrastructure Plan for Shannon Town and its environs and any subsequent plan;
- d) To prepare a green infrastructure plan for Ennis and Kilrush during the lifetime of this Plan;
- e) To work with community groups to access funding for appropriate and beneficial green infrastructure projects including parks, woodlands, sports facilities, green areas, playground/play facilities, river corridors, walkways, cemeteries, churchyards, utility grounds, paths, seating and amenities;
- f) To require new amenity and/or recreational developments under the heading of green infrastructure to have regard to the recommendations as contained within the EU Biodiversity Strategy in the development of Green Infrastructure.
- g) To require the preparation and assessment of all planning applications associated with amenity and/or recreational uses under the heading of green infrastructure to have regard to the information, data and requirements of the Appropriate Assessment Natura Impact Report, SEA Environmental Report and Strategic Flood Risk Assessment Report contained in Volume 10 of this Plan;
- h) To require projects to be fully informed by ecological and environmental constraints at the earliest stage of project planning and that any necessary assessment be undertaken, including assessments of disturbance to species, where required; and
- i) To ensure compliance with all relevant legislation as outlined in Objective CDP3.3

County Clare Biodiversity Action Plan 2025 – 2031

The Clare County Biodiversity Action Plan 2025-2031 is underpinned by an overarching vision, five key pillars, five objectives and fifty-eight actions that will guide Clare County Council's Biodiversity Work Programme over the next six years. The pillars and objectives of the plan are set out below, along with the actions which are relevant to the proposed development.

Pillar 1: Developing and Researching the County's Ecological Network,

Objective 1: Support and strengthen our database to conserve, manage and enhance biodiversity within the county through data collection, mapping and research.

Actions: No actions which are relevant to the proposed development.

Pillar 2: Integrating Biodiversity into Our Work Practices,

Objective 2: Promote and integrate biodiversity conservation into decision-making processes and operations through policy, best practice and procedures.

Actions: 2.4 Retain natural features and promote and incorporate biodiversity enhancement in the design of new buildings, housing, public realm projects and other proposals as appropriate

(e.g. swift nest boxes/swift bricks, native tree planting, rain gardens (SuDS), enhancing streetscapes, pollinator- friendly measures).

2.5 Incorporate and promote Biodiversity Net Gain and nature-based solutions into practice and decision-making in CCC

2.6 Protect all designated European sites (SACs and SPAs) in accordance with the EU Habitats Directive; and separately NHA sites ensuring all proposed developments are subject to ecological assessment requirements.

2.7 Adopt 'bat- friendly' lighting for new public lighting proposals and upgrade/ retrofit existing lighting infrastructure wherever possible to strengthen dark corridors for bats and other nocturnal mammals.

2.8 Protect bat roosts sites and ensure development proposals are subject to appropriate ecological assessments; and identify biodiversity enhancement opportunities.

2.9 Align projects delivered under the Clare County Biodiversity Action Plan 2025-2031 with Sustainable Development Goals (SDGs) using the Accelerator Action Tool.

2.10 Engage with the Council led visitor attractions that Visitor Management Plans are completed which include the management of visitor impacts and reduction of threats such as disturbance and habitat degradation to sensitive ecological receptors.

Pillar 3: Restoring, Enhancing and Conserving our Biodiversity Assets

Objective 3: Deliver actions which aim to conserve, restore and enhance biodiversity and to reverse biodiversity loss at a county-wide level by 2031.

3.1 Identify potential biodiversity opportunities for tree planting and woodland creation.

3.5 Support and promote local organisations that develop and implement biodiversity initiatives working with farmers, landowners and local communities to establish native woodlands, native tree planting, traditional orchards, pond creation and other biodiversity enhancement measures.

3.6 Undertake a hedgerow and treeline audit at sites of ecological importance for the Lesser Horseshoe Bat and other species, working in partnership with key organisations

3.8 Support and work with landowners in the county to carry out restoration and biodiversity enhancement projects (e.g. peatlands and grassland conservation, Marsh Fritillary butterfly).

3.12 Support targeted surveys and eradication programmes for the treatment and control of invasive alien species in partnership with the relevant agencies and stakeholder groups.

Pillar 4: Raising Biodiversity Awareness and Education for Present and Future Generations

Objective 4: Raise awareness and appreciation of biodiversity within the county through education, training and outreach initiatives.

Actions: No actions which are relevant to the proposed development.

Pillar 5: Building Collaborative Partnerships for Nature

Objective 5: Enhance collaboration among all stakeholders adopting a whole-of-society approach to protect, conserve and enhance biodiversity within the county.

Actions: No actions which are relevant to the proposed development.

Transport Infrastructure Ireland's Biodiversity Plan (TII, 2023) will deliver on the following key policy areas while developing and maintaining a safe and reliable transport network for Ireland:

1. Biodiversity is fully integrated into all TII operations and processes.
2. TII transport corridors will promote habitat connectivity across the wider landscape and will contribute to the enhancement of wider ecosystem services.

3. New projects will be developed with no net loss of biodiversity and will strive for a net gain in biodiversity.
4. Legacy impacts to biodiversity from existing infrastructure will be identified and addressed.
5. All TII activities (e.g. plans, projects and programs) comply with relevant biodiversity legislation.

To achieve this, Objectives and actions were developed with cognisance of existing objectives and actions stipulated in national, sectoral and TII policy and action plan documents. Five overarching objectives to deliver on TII biodiversity plan are detailed below:

1. Increase biodiversity capacity, resources, collaboration and capability.
2. Develop and update biodiversity standard and technical documents.
3. Support research, monitoring and data sharing.
4. Embrace biodiversity accounting methodologies and strive for net gain.
5. Focus on the key biodiversity issues.

Kilkee Biodiversity Plan 2019 (Kilkee Biodiversity group, 2019) was developed with the following objectives set out below. It includes a number of locations and features of importance for biodiversity.

1. Protect existing biodiversity and promote further growth of biodiversity in the area.
2. Build community engagement with the environment, creating a sense of ownership for the biodiversity, from our own back gardens to the land and sea surrounding us.
3. Involve all age groups in our community as whole in the project

8.2.3 Guidance

- The process of identifying, quantifying and evaluating potential impacts of the proposed development on habitats, species and ecosystems was undertaken in accordance with CIEEM (2019) *Guidelines for Ecological Impact Assessment in the UK and Ireland*. (Updated 2024) with reference to the Transport Infrastructure Ireland (TII) *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (TII, 2009). In addition, reference to the following recognised guidance defined the scope and evaluation process:
- BCT (2023) *Bat Surveys for Professional Ecologists: Good Practice Guidelines 4th edition*
- CIEEM (2019) *Guidelines for Ecological Impact Assessment in the UK and Ireland*. (Version 1.3, updated 2024).
- CIEEM (2023) Briefing Paper: Biodiversity Enhancement for New Developments in Ireland. Chartered Institute of Ecology and Environmental Management, Ampfield.
- EPA (2002) *Guidelines on the Information to be Contained in Environmental Impact Statements*.
- EPA (2003) *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements*.
- EPA (2015) *Draft Advice Notes for preparing Environmental Impact Statements*.
- EPA (2022) *Guidelines on the information to be contained in Environmental Impact Assessment Reports*.
- Gilbert, G., Gibbons, D.W., & Evans, J. (1998) *Bird Monitoring Methods: A Manual of Techniques for UK Key Species*. The Royal Society for the protection of Birds, Sandy, Bedfordshire, England.

- Gilbert, G., Stanbury, A. and Lewis, L. (2021) Birds of Conservation Concern in Ireland 2020-2026. *Irish Birds* 9:523-544.
- Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries During Construction Works and Adjacent to Waters.
- Institution of Lighting Professionals (2023) *Guidance 8 Bats and Artificial Lighting*. Guidance Note 08/23. Institution of lighting professionals, Regent House, Regent Place, Rugby, Warwickshire, UK.
- Marnell, F. Kelleher, C & Mullen, E. (2022). *Bat Mitigation Guidelines for Ireland v2*. *Irish Wildlife Manuals, No. 134*. National Parks & Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.
- NBDC (2019) *Pollinator-friendly management of: Transport Corridors*. All-Ireland Pollinator Plan, Guidelines 9. National Biodiversity Data Centre Series No. 20, Waterford. Sept, 2019.
- NBDC (2021) *All Ireland Pollinator Plan 2021-2025*.
- TII (2006a) *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*. PE-ENV-01115.
- TII (2006b) *Guidelines for the Treatment of Bats during the Construction of National Road Schemes*. CC-ENV-01102.
- TII (2006c) *Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes*. CC-ENV-01103.
- TII (2006d) *Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post Construction of National Road Schemes*. GE-ENV-01110.
- TII (2008a) *Environmental Impact Assessment of National Road Schemes – A Practical Guide (Revision 1)*.
- TII (2008b) *Ecological Survey Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*. PE-ENV-01112.
- TII (2008c) *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes*. CC-ENV-01104.
- TII (2008d) *Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes*. CC-ENV-01101.
- TII (2009) *Guidelines for Assessment of Ecological Impacts of National Road Schemes*. PE-ENV-01112.
- TII (2020a) *The Management of Invasive Alien Plant Species on National Roads – Standard*. GE-ENV-01104.
- TII (2020b) *The Management of Invasive Alien Plant Species on National Roads – Technical Guidance*. GE-ENV-01105.
- TII (2023a) *Environmental Planning of National Road and Greenway Projects*. RE-ENV-07008. Transport Infrastructure Ireland.

8.3 Methodology

This section describes the methodologies that were followed in collecting information, in describing the baseline ecological conditions and in assessing the likely effects of the proposed development.

8.3.1 Establishing the Zone of Influence

The Zone of Influence (Zoi), or distance over which a likely significant effect may occur will differ across the Key Ecological Receptors, depending on the predicted impacts and the potential impact pathway(s) and sensitivities of ecological receptors.

The key variables to be taken into account when establishing the Zone of Influence for a proposed development are:

- The nature, scale, and location of the proposed development;
- The sensitivities of the ecological receptors within the receiving natural environment; and,
- The potential for cumulative effects.

For example, in the case of a proposed development connected to a river, it may be necessary to extend the Zone of Influence a significant distance upstream and/or downstream to capture all potential impacts on water-dependent ecological receptors.

Having regard to the above key variables, the Zone of Influence was defined as:

- The entire area within 550m of the proposed development.
- For water quality impacts, all watercourses crossed by the proposed development and downstream within the 'mouth of the Shannon' coastal waterbody as far downstream as the line across the narrow strait between Kilcredaun Point and Kilconly Point at the mouth of the Shannon Estuary and upstream to the line across from Ballynote West to Carrig Island to the east of Poulnasherry Bay. This includes the tidal sections of some watercourses where the water flows upstream on a rising tide, and a small watercourse that flows from the proposed development towards Kilkee and into Kilkee bay is also included.

The presence of humans in an area is unlikely to elicit a response by waterbirds beyond 300m (Cutts et al, 2009). The noise levels from typical construction activity are generally less than 100 dBA. Put into practice, this will mean that if the noise generated was 100 dBA at 1.0m from the source, this sound will be 70 dBA at 32m away. The threshold for noise to have an impact on waterbirds is 70 dBA at receptor (Cutts et al., 2013). Regular noise above this level is likely to elicit a response. This calculation does not take screening from hedgerows into account and therefore, in practice, the impacts from noise and visual disturbance will be less than in an open environment. A general precautionary terrestrial buffer for disturbance impacts was defined as 550m around the proposed development as this is the flushing disturbance distance for waterbirds, informed by the sensitivity of different species, the potential for visual and noise disturbance, and the baseline noise levels (Cutts et al., 2013). This distance also covers any potential impacts to habitats and species including mammals and breeding birds.

The waterbodies from the proposed development to the area downstream including the areas between Kilcredaun Point and Kilconly Point at the mouth of the Shannon Estuary, and Ballynote West to Carrig Island to the east of Poulnasherry Bay, watercourses as far as Kilkee Bay are also included is the precautionary distance to which hydrological impacts could potentially occur. This area was defined as the Zone of Influence and extends to the maximum distance at which potential adverse effects could occur including via hydrological connections i.e. groundwater, foul water, surface water pathways, given the assimilative capacity of Poulnasherry Bay and the mouth of the Shannon coastal waterbody.

The Zone of Influence is presented in Figure 8-1 and Figure 8-2.

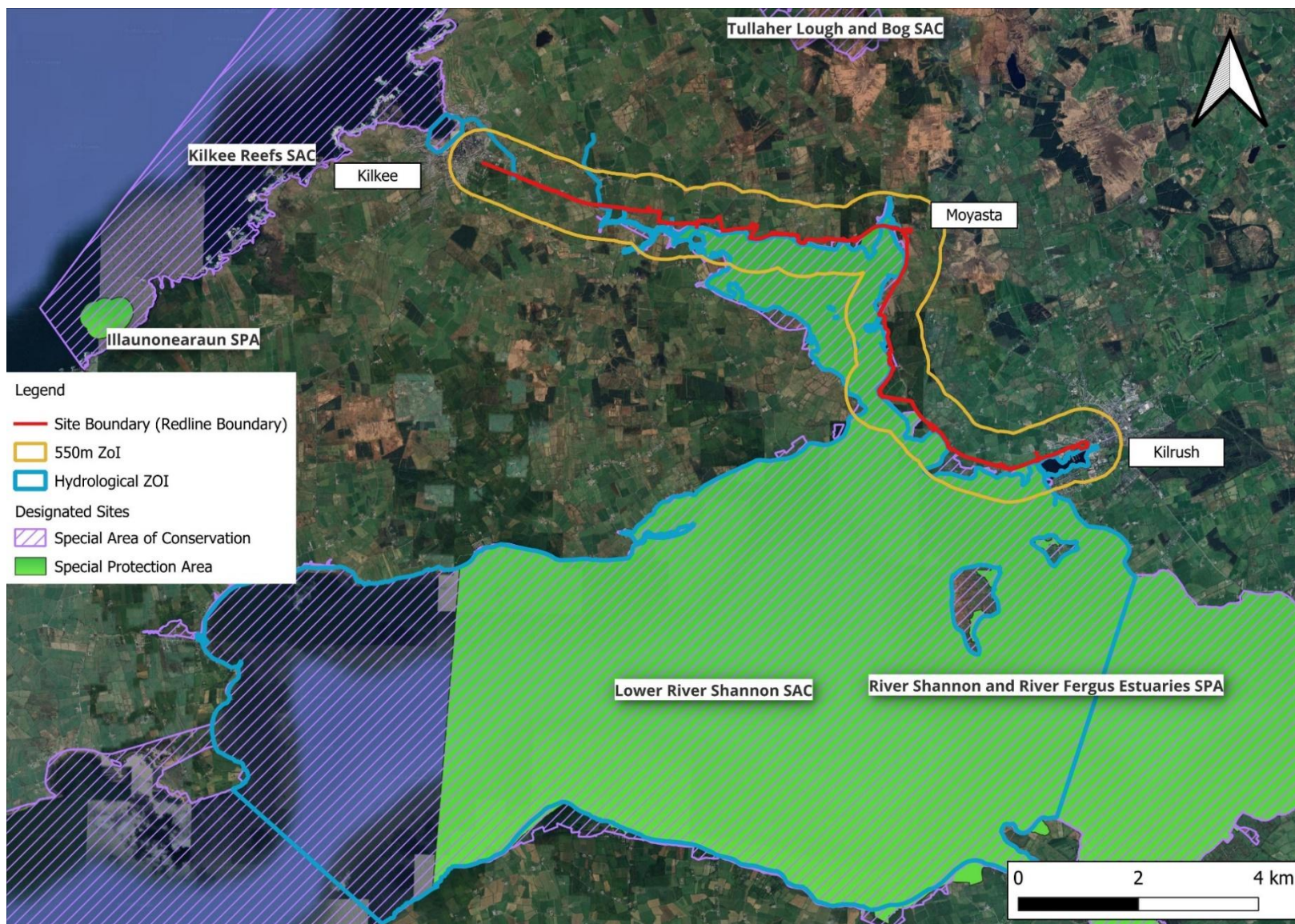


Figure 8-1 Location of European sites in relation to the Zone of Influence of the proposed development

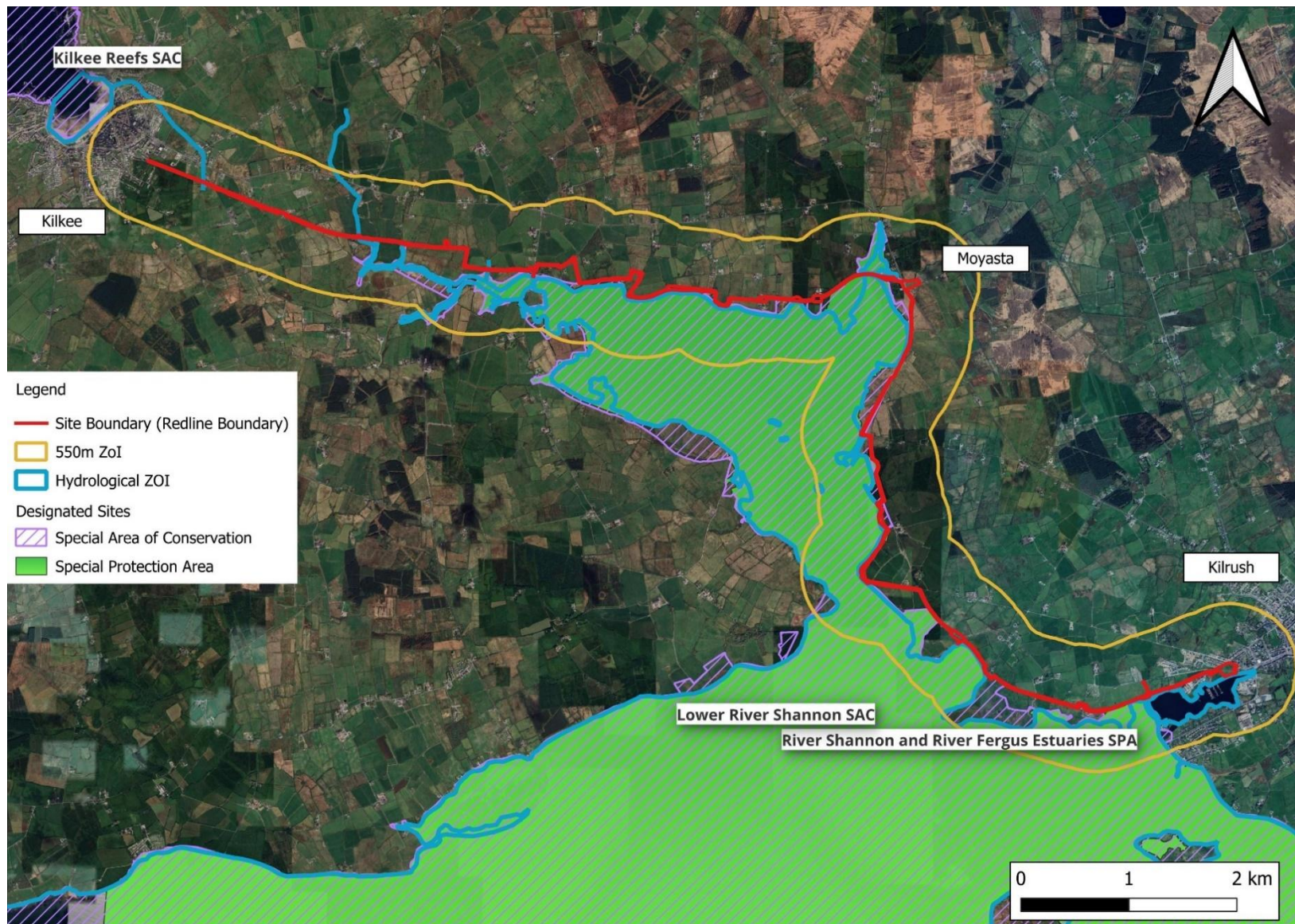


Figure 8-2 Location of the European sites in relation to the Zone of Influence of the proposed development (zoomed in)

8.3.2 Study Area

The desk study was carried out to collate information on the ecology of the Zone of Influence that could potentially be impacted by the proposed development. Information on species listed on Annexes II and IV to the Habitats Directive, the Wildlife Acts, the Flora (Protection) Order 2022, Annex I to the Birds Directive, Red- and Amber-listed Birds (Gilbert et al., 2021), and the Third Schedule to the Habitats Regulations were sourced from the statutory consultee, the NPWS, and the National Biodiversity Data Centre (NBDC). The NPWS online interactive map viewers provided information relating to designated sites of nature conservation importance within the Zone of Influence. The NBDC provided rare and protected species data from within the 10km grid squares which overlap with the proposed development (Q85, Q86, Q94, Q96 and R05) (accessed August 2025). Records were limited to those from the previous 10 years (since 2015). The desk study undertaken for this chapter included a review of available ecological data from the following sources:

- Environmental Protection Agency (EPA) Maps
- National Biodiversity Data Centre (NBDC) Biodiversity Maps.
- NPWS Designations Viewer.
- NPWS documents related to national and European protected sites within the Zone of Influence.

As with all desk studies, the data considered was only as good as the data supplied by the recorders and recording schemes. The recording schemes provide disclaimers in relation to the quality and quantity of the data they provide, and these were considered when examining outputs of the desk study.

The field study area was limited to the proposed development, plus a maximum distance of a 50m buffer surrounding the proposed development boundary, unless otherwise stated. The field study area was appropriate for the purposes of identifying all of the ecological features which could potentially be subject to direct impacts from the proposed development or act as pathways for indirect impacts or effects to other features in the Zone of Influence. Surveys were scoped during all stages of project from concept and feasibility to design and environmental evaluation.

8.3.3 Approach and Objectives to Ecological Impact Assessment

A 'habitat' is the environment in which an animal or plant lives and is generally defined in terms of vegetation and physical structures. Habitats and species of ecological significance occurring, or likely to occur within the defined Zone of Influence and Study Area of the proposed development are classified as Key Ecological Receptor (KERs).

In accordance with TII guidance '*Guidelines for Assessment of Ecological Impacts of National Roads Schemes*' (2009), an impact assessment is used to identify, estimate and evaluate the consequences of proposed actions on the natural environment. According to these guidelines, the Zone of Influence is the receiving environment for the activities associated with the project and the biophysical changes that are likely to result. The 'Key Ecological Receptors' are defined as features of sufficient value as to be material in the decision-making process for which potential impacts are likely. Their importance can be defined on a geographic scale, adapted for the particular circumstances of a project.

The assessment presented in this report does not consider any other type of environmental effects other than those on biological diversity (of flora and fauna). This report quantifies the potential effects on the identified Key Ecological Receptors and prescribes mitigation measures required to avoid and reduce any negative effects identified.

Determining the ecological issues to be addressed for the assessment was informed by early engagement with relevant stakeholders. During this scoping process, selected consultees were provided the opportunity to input into the proposed development through preliminary discussions on Key Ecological Receptors that could potentially be affected; strategies to avoid negative impacts; and possible compensation or enhancement measures. Further details of the consultation process, including a list of the statutory and non-statutory consultees, can be found in Section 8.3.6.

Where potential significant negative effects were identified, detailed and specific mitigation measures have been proposed in accordance with the hierarchy of options suggested in the European Commission 2021 report '*Assessment of plans and projects in relation to Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*'. Accordingly, the avoidance of effects at their source is the prioritised approach. Where this was not possible, the following approaches were adopted, in order of decreasing preference: reduce impacts at source, abate on site, and finally abate at receptor. These measures have been incorporated into the design of the proposed development.

The information provided in this chapter accurately and comprehensively describes the baseline ecological environment, provides an accurate prediction of the likely significant ecological effects of the proposed development, prescribes specific mitigation, as necessary, and describes the residual ecological effects.

8.3.4 Terminology

The evaluation of Key Ecological Receptors (KER's) and the criteria used to determine ecological value is in accordance with TII guidance *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (2009), and with consideration for the Chartered Institute of Ecology and Environmental Management's (CIEEM) *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2018). The description of effects is in accordance with the *EPA Guidelines Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2022).

8.3.5 Desk Study

In addition to the sources described above, the desk study, which was undertaken between August 2025 and March 2026, included a review of available ecological data from the following sources:

- AECOM (2020) West Clare Railway Multi-Modal Greenway Section 1 Kilrush to Kilkee Desktop Ecological Assessment and Constraints Study. Report prepared for Clare County Council, Ireland.
- Crushell, P. & Foss, P.J. (2008) *The County Clare Wetlands Survey Desk Survey & GIS Preparation*, Report prepared for Clare County Council, Ireland
- Crushell, P., Crowley, W., Vanmechelen, A., Overy, P. & Foss, P (2025). County Clare Wetlands Field Survey III 2025. Report prepared for Clare County Council.
- Foss, P.J., Vanmechelen, A., & Crushell, P. (2022). County Clare Wetlands Study. Report prepared for Clare County Council.
- INIS Environmental Consultants (2021) Habitat Assessment Report: Poulnasherry Bay, Co. Clare. Report prepared for Clare County Council.
- INIS Environmental Consultants (2022) The Poulnasherry Bay Waterbird survey 2021-2022. Marine Institute Poulnasherry Bay Waterbird Survey Winter 2021-22 Bird Survey Report.

- INVAS Biosecurity (2023). Invasive Alien Plant Species Survey of Selected Regional and Local Roads in West Clare from Loop Head to Kilkee and Kilrush. Report prepared for Clare County Council.
- Kavanagh, L.1 and Finney, K1. 2025. Survey of Breeding Red-billed Chough *Pyrrhocorax pyrrhocorax* on the West Clare Coastline (Kilkee to Loop Head) (April to June 2025). Unpublished Report BirdWatch Ireland prepared for Clare County Council.
- Lewis, L., Burke, B., & Crowe, O. (2016). A report commissioned by the by the SIFP Environmental Sub Group and prepared by BirdWatch Ireland
- Nelson, B., Cummins, S., Fay, L., Jeffrey, R., Kelly, S., Kingston, N., Lockhart, N., Marnell, F., Tierney, D. and Wyse Jackson, M. (2019) Checklists of protected and threatened species in Ireland. Irish Wildlife Manuals, No. 116. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. (Version 4.0, June 2025).

8.3.6 Consultation

The consultees listed in Table 8-1 were contacted and invited to submit observations in relation to ecology and nature conservation and to attend online and in-person meetings. Observations and items discussed at meeting that are relevant to this chapter are summarised in Table 8-1 below. Concerns raised by the consultees have been addressed as far as possible.

The purpose of the consultation was to:

- Identify any relevant information that consultees held, including the presence of data on protected species or species of conservation concern.
- Identify any concerns that consultees may have about the proposed development.
- Identify any issues that the consultees would like to see addressed during the ecological impact assessment process.

Table 8-1 Summary of Consultations

Statutory Consultee	Consultation Date	Details	Summary of Response / Discussions
Birdwatch Ireland	1st November 2018 Email sent to BWI requesting comments on the proposed developments.	5 th November 2018 Response received	The following points were made in the response received from Birdwatch Ireland: : <ul style="list-style-type: none"> • The importance of greenways as a way to reduce car use and for the benefits to health and the environment • International biodiversity loss since the 1970's • Highlighting the declining biodiversity in Ireland • The impacts of disturbance to roosting, foraging and breeding birds • Important considerations for planning applications: the level of usage by people, conservation status of ecological receptors, impact and disturbance assessment, mitigation measures, evidence to support

Statutory Consultee	Consultation Date	Details	Summary of Response / Discussions
			mitigation measures, quality of surveys carried out, consideration of case law.
Inland Fisheries Ireland (IFI)	22 nd September 2021 Pre-planning consultation	24 th September 2021	IFI request that any river crossings are clear-span in nature with minimal disturbance to the riparian habitat. IFI advised considering the IFI document 'Planning for Watercourses in the Urban Environment' during the design of the proposed development.
National Parks and Wildlife Service (NPWS)	22 nd September 2021 DAU pre-planning consultation	5 th November 2021 Response received	<p>A number of observations were made with the intention of assisting in relation to identifying potential impacts on European sites, other nature conservation sites, and biodiversity and environmental protection in general, in the context of route selection. The observations related to:</p> <ul style="list-style-type: none"> • Biodiversity Plans • Independent assessment of several sub-sections of a larger project in isolation • Consideration of alternative routes away from European sites • Regarding AA and the absence of lacunae • Impacts to SACs & SPA • Lower River Shannon SAC/SPA - Habitats • Lower River Shannon SAC/SPA - Otter • River Shannon and River Fergus Estuaries SPA • River Shannon and River Fergus Estuaries SPA - Bird data and distribution • River Shannon and River Fergus Estuaries SPA - Assessing impacts • Kilkee Reefs SAC • AA • Greenways constitute a class of road development • Considerations from 'Strategy for the Future Development of National and Regional Greenways' • Consider future developments • Impacts of lighting on wildlife • Threat of invasive species • Protection of mammals • Green infrastructure considerations

Statutory Consultee	Consultation Date	Details	Summary of Response / Discussions
			<ul style="list-style-type: none"> • Route should implement climate preparedness • Other ecological/natural heritage issues and constraints • No Net Loss • Annex 1 Habitat • Environmental Liability Regulations Derogation Licences
NPWS	18 th November 2021	Virtual Meeting	<p>No net loss of habitat should be targeted for the project.</p> <p>The importance of Poulnasherry and surrounding lands for birds was noted.</p> <p>Discussions regarding using screening as mitigation may provide perches for avian predators</p> <p>The issue was raised of the proximity of the emerging preferred route to designated sites and that if impacts cannot be avoided, consent for the project may not be possible.</p> <p>Further consultation will be carried out when detailed survey data has been gathered.</p>
NPWS	1 st March 2023	Virtual Meeting	<p>TII National Cycleway Network NIS states that its first preference is that no new construction should occur within 200m of a European Site. This will need to be considered and addressed in all assessment documentation for the scheme.</p> <p>Screening – not as much of a concern in terms of roosts since the sensitivity is wintering birds rather than breeding birds. Cormorant is the only breeding bird that is a Qualifying Interest. New hedgerows might however form a perch for sparrowhawk. A potential negative impact would be closing off roosting areas for wintering birds at high tide.</p> <p>The importance of monitoring of mitigation during construction and operation was highlighted.</p> <p>CCC / ROD invited NPWS suggestions for ecological enhancements along the route, which could be integrated in the overall project (not limited to Qualifying Interests of designated sites).</p>
NPWS	29 th January 2024	Virtual Meeting	<p>NPWS remains concerned about the potential for impact on wintering birds / European sites.</p> <p>Further bird surveys should be carried out to ensure survey currency for planning submission.</p>

Statutory Consultee	Consultation Date	Details	Summary of Response / Discussions
			<p>Vegetation along corridor should be assessed</p> <p>NPWS raised queries regarding the consideration of bird data during option selection.</p> <p>Query regarding if impacts cannot be adequately mitigated</p> <p>Further consultation is recommended when design has been further progressed</p>
NPWS	20 th January 2026	Virtual Meeting	<p>ROD provided a presentation of the proposed mitigation for the Greenway. This focussed on mitigation for bird disturbance (from visual stimuli, physical disturbance, and potential raptor predation). It also included mitigation for mammals, construction phase mitigation, operational phase mitigation and monitoring of mitigation measures.</p>
Birdwatch Ireland	24 th February 2026 Pre-planning consultation	Virtual Meeting	<p>Presentation provided on the proposed development, impacts and proposed mitigation.</p> <p>BWI stated that it would be preferable to avoid shoreline areas entirely.</p> <p>Discussions focussed on bird disturbance and the evidence of effectiveness of proposed mitigation, including, height of screening, noise disturbance from screened users, potential for disturbance from dogs. Other items discussed: cumulative impacts from other activities in the bay, use of IWeBS data sets, potential for bird hides, refusals of other greenways, lighting, ongoing monitoring and implications from monitoring findings, data from other sources which show before and after effects of greenways.</p>

8.3.7 Field Surveys

The surveys aimed to detect the presence, or likely presence, of rare/threatened, protected and invasive species, and to record the habitats present in the study area. The surveys provided baseline information regarding the existing ecology of the study area. Incidental records of plants, bird species and protected species were collected throughout the surveys. The results of the bird surveys are discussed in Section 8.4. Field surveys were conducted adhering to the following guidelines:

- *Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Edition)*. The Bat Conservation Trust, London (Collins, J. (Ed.), 2023);
- *Best Practice Guidance for Habitat Survey and Mapping* (Smith et al., 2011);
- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*. (TII, 2005a);
- *Bird Monitoring Methods: A Manual of Techniques for UK Key Species* (Gilbert, G., Gibbons, D.W., & Evans, J., 1998). The Royal Society for the protection of Birds, Sandy, Bedfordshire, England;
- *A Guide to Habitats in Ireland* (Fossitt, 2000);
- *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes PE-ENV-01112* (TII, 2009a);
- *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes CC-ENV-01104* (TII, 2006b);
- *Guidelines for the Treatment of Bats during the Construction of National Road Schemes CC-ENV-01102* (TII, 2005b);
- *Interpretation Manual of European Union Habitats* (EC, 2013).

8.3.8 Overview of Ecological Surveys

Specific ecological surveys were carried out with respect to the following:

- Habitats;
- Wintering birds;
- Breeding birds;
- Badger;
- Bats;
- Otter; and,
- Invasive Species.

Table 8-2 below lists the surveys, dates and personnel involved. The specific dates and survey conditions are included in Appendix 8.1, Survey Metadata. The methodologies applied during these surveys are outlined in the following paragraphs. The results of these surveys are presented in Section 8.4.

Table 8-2 Ecological Survey Dates

Survey	Date	Surveyor
Habitats and invasive alien species	September 2021 and 2022 July 2024	ROD
Otter	February 2023 and January/February 2026	ROD
Badger	February 2023 and January/February 2026	ROD
Bats (suitability assessment)	February 2023 and January/February 2026	ROD
Wintering Bird Surveys	November 2021 – March 2022	ROD
	October 2022 – March 2023	MKO
	February – March 2024	MKO
	October 2025 - March 2026	MKO
Breeding Bird Surveys	April – June 2024	MKO

8.3.8.1 Habitats

Habitats were classified in accordance with *A Guide to Habitats in Ireland* (Fossitt, 2000) and mapped following Smith et al. (2011). The proposed development plus a 50m buffer was systematically and thoroughly walked, and all habitats were classified and all habitats and mapped using QGIS. Any Fossitt habitats with links to Annex I habitats were examined further to determine if they corresponded to Annex I habitat. The presence of Annex I habitats, or otherwise, was confirmed using the *Interpretation Manual of European Union Habitats* (EC, 2013). The presence (or signs) of protected fauna, including birds, mammals, amphibians and reptiles were noted during the surveys. Habitat extents were recorded using a mobile mapping device with GPS.

8.3.8.2 Otter

The Otter survey aimed to identify the presence or likely presence of Otter (*Lutra lutra*) in the study area. An Otter survey was conducted, adhering to best practice guidelines (TII, 2008a & b). The route of the West Clare Railway Greenway - Section 1 plus a 50m buffer either side of the route was systematically and thoroughly walked, where accessible. It also included surveying 150m upstream and downstream of all watercourses to be crossed by the proposed development. The survey involved a search for signs of otter activity (prints, spraints, trails, holts, couches, slides, feeding remains etc.). Signs and locations were recorded using a mobile mapping device with GPS.

8.3.8.3 Badger

The Badger survey aimed to identify the presence or likely presence of Badger (*Meles meles*) in the study area. The Badger survey was conducted following best practice guidance (TII, 2008b; TII, 2006c) and involved a systematic search for physical evidence of Badgers, e.g. setts, latrines, and Badger paths, within 50m of the proposed development boundary. The optimal period for Badger surveys is during the seasonal peaks in territorial activity and when vegetation cover which may obscure signs is at a minimum (January to April and less pronounced peak in October). Survey findings were recorded using a mobile mapping device with GPS.

8.3.8.4 Wintering Birds

The shoreline survey methodology followed Gilbert et al. (1998) and the Irish Wetland Bird Survey (BirdWatch Ireland, 2022). Monthly wintering bird surveys were carried out between November 2021 and March 2022, October 2022 and March 2023, February 2023 and March 2024, and October 2025 to March 2026. This provides an extensive multi-annual record of baseline usage of the receiving environment by wintering birds.

Twenty shoreline subsites along the proposed development were surveyed from vantage points, vantage point locations are presented in Table 8 and Figure 8-3. Each month, each subsite was visited by a surveyor to record waterbirds for two hours either side of high or low tide. In 2020/2021 both high and low tide were surveyed each month, the other survey seasons the tidal state was alternated each month. The purpose of the survey was to record waterbird abundance, occurrence and activity in the study area. The survey was conducted concurrently by 2-3 surveyors to ensure all subsites were visited within the time period allowed. Survey effort, including details of survey duration, tidal state and weather conditions, is presented in Appendix 8.1, Survey Metadata.

For the purposes of these surveys, waterbirds comprised all species of the following taxa: swans, geese and ducks; cormorant, shag, divers and grebes; auks; seabirds; gulls, terns and skuas; herons, egrets and crane; rails and crakes; waders; and kingfisher. The surveyors visited each subsite during daylight hours, and recorded all waterbirds present from a suitable vantage point. Individual flocks of the same species were recorded as separate observations to provide high resolution to the data. However, where birds of the same species were distributed diffusely across the same site, these were recorded as one observation. Auditory records were also recorded with a best estimation of the location of the bird. For each observation, the date, time, site, species, number of birds, position, activity and any other notes of interest were recorded. 'Position' related to the bird's location regarding the coastline. The positions were 'intertidal', 'subtidal', 'supratidal', 'terrestrial' or 'terrestrial-aquatic'. Activity was either 'foraging' or 'roosting'. Roosting included all resting, preening and other maintenance behaviours aside from foraging. In addition, any waterbirds observed between subsites and any waterbirds travelling over but not using the subsite were recorded as incidental records. Any raptor observations were also recorded as incidental records.

Table 8-3 Vantage Point Locations

Subsite	Vantage Point	ITM X	ITM Y
Cappagh Pier	VP1	498538	654077
Outer Marina	VP2	498531	654326
Kilrush Marina	VP3	498976	654999
Marina Lock Gates	VP4	498218	654843
Leadmore West Railway Cottage	VP5	497607	654458
Baunmahard Point	VP6	496361	654505
Brews Bridge Beach	VP7	496730	654931
Cammoge Point	VP8	496084	655129
Carrowncalla South	VP9	495654	655971
Carrowncalla North	VP10	495573	657147
Moyasta Bridge	VP11	495716	658590
Moyasta	VP12	494616	658260
Baunmore	VP13	494174	658376

Subsite	Vantage Point	ITM X	ITM Y
Garraun	VP14	493414	658381
Blackweir Bridge	VP15	492539	658553
Lisdeen East	VP16	491322	658880
Lisdeen Recycling Centre	VP17	490815	658949
Lisdeen Road	VP18	490210	659125
Dough Road	VP19	489598	659381
Kilkee Beach	VP20	488557	660063



Figure 8-3 Vantage Point Locations

Inland surveys were conducted monthly from October 2022 to March 2023, and October 2025 to March 2026 within two hours of high tide. The study area for the inland surveys included the section of the proposed development around Poulnasherry Bay within 200m of the proposed development, or as far north as the N67, whichever was closer. The purpose of the survey was to record the abundance and occurrence of waterbirds in the fields adjacent to Poulnasherry Bay. Birds can be disturbed beyond 200m, depending on the source of the disturbance, the species and other factors, however 200m is considered more than sufficient given the nature of the development and the fact that hedgerows will screen the sources of disturbance from any birds beyond 200m.

The survey was conducted over two consecutive days to minimise changes in bird movements over the month. Survey effort, including details of survey duration, tidal state and weather conditions, is presented in Appendix 8.1, Survey Metadata. The surveyor visited all areas likely to support waterbirds (such as waterbodies and large open fields) during daylight hours and recorded all waterbirds present from a suitable vantage point.

For each observation, the date, time, site, species, number of birds, position, activity and any other notes of interest were recorded. The positions were 'on water', 'water's edge', 'wading', 'terrestrial' or 'perched'. Activity was either 'foraging' or 'roosting'. In addition, any waterbirds observed on the way to or from the survey were recorded as incidental records. Any raptor observations were also recorded as incidental records.

8.3.8.5 Breeding Birds

Breeding bird surveys were conducted in areas of potential breeding wader habitat at four locations, namely Leadmore West, Carrowncalla South, Carrowncalla North and Moyasta. The methodology followed O'Brien and Smith (1992) and Gilbert et al. (1998). Surveys were conducted once per month from April to June 2024 inclusive. During the surveys, transect routes were walked across the areas of suitable habitat and short point counts were used to target any inaccessible areas. Using binoculars, the surveyor scanned the surroundings of each transect/point for waders. Although waders were the primary focus, any other waterbirds, raptors, ground-nesting birds, Annex I or red listed species encountered were recorded. All target species were mapped, and breeding status was assigned following British Trust for Ornithology breeding status codes.

8.3.8.6 Invasive species

Invasive plants, including species listed on the Third Schedule to the Habitats Regulations, but also other species which can negatively impact biodiversity were recorded during the habitat surveys. Target notes were taken which detailed height, density, and any signs of previous management. Survey findings were recorded using a mobile mapping device with GPS.

8.3.8.7 Bats

Suitability assessment

The bat suitability assessment focussed on identifying built or natural features with potential for roosting bats within the footprint of the proposed development and a 50 m buffer. The bat suitability assessment was conducted adhering to best practice guidelines (TII, 2006a,b; Collins (ed.), 2023) and involved a visual assessment and categorisation of suitable features on trees and structures capable of supporting roosting bats. The locations of features on trees and structures with features that could provide moderate to high potential were recorded using a mobile mapping device with GPS.

Bat Emergence Surveys

No bat emergence surveys were carried out as there were not potential roost features for bats identified within 50m of the proposed development.

Bat Activity Surveys

No bat activity surveys were carried out for the proposed development. There is suitable foraging habitat at various locations along the proposed development, including along the railway corridor and the hedgerows and treelines. However, the presence of suitable foraging habitat does not in and of itself trigger activity surveys and activity surveys were scoped out.

Habitat loss will be limited to the greenway corridor. Where hedgerows are present on one of both side of the greenway, they will be retained. The only situation where linear habitats are being removed is where the greenway passed through linear features. This will involve the removal of c. 5m of the linear feature, a similar with to a field gate, which will not affect bat flight paths. There is no lighting along the greenway and no risk of collision as is the case for road schemes.

8.3.8.8 Other Mammals, Reptiles, Amphibians, Invertebrates and Protected Flora

During the ecological surveys, the potential for the study area to support other species protected under the Wildlife Acts, such as Irish Hare, Pygmy Shrew, deer species, Irish Stoat, Hedgehog and Common Lizard was assessed. Any natural and built features that could potentially support these species were searched thoroughly and any physical evidence, such as live sightings, feeding signs and droppings/scats. Habitats which could support Marsh Fritillary were recorded. Any flora species listed on the Flora Protection Order (2022) were also recorded. All waterbodies within the footprint of the proposed development and a 50m buffer were assessed for potential to support frogs and newts during the habitat survey. Any incidental evidence of any of these species observed during the other surveys was also recorded.

8.3.8.9 Aquatic Habitats

The proposed development will cross watercourses on existing bridges or new clear span bridges set back from the riverbanks. Culverts will be used to cross ditches. Therefore, aquatic surveys such as fisheries habitat surveys, macro-invertebrate survey and macrophyte surveys, were scoped out.

8.3.9 Limitations

Standard survey methods were followed, and any difficulties encountered during the completion of the ecological surveys are detailed here. However, any biases or limitations associated with these methods could potentially affect the results collected. While every effort was made to provide a full assessment and comprehensive description of the study area, ecological trends (e.g., population trends) may not be fully reflected due to the instantaneous / short-term nature of the field surveys. However, the data obtained from field surveys coupled with the desk study provides a robust representation of the baseline for the habitats and species within the Zone of Influence.

Land access was not permitted in the following areas:

- Ch. 2+000 – 2+400
- Ch. 0+950 – 1+150
- Ch. 3+250 – 3+950
- Ch 12+400 – 12+900
- Ch. 13+100 – 13+200

The habitats in these areas are typical of the habitats present along the route and based on aerial photography and views from adjacent lands where access was permitted, they do not contain rare or protected species or habitats. Pre-construction surveys will be undertaken in these areas and if required, mitigation will be implemented to minimise the effects of the proposed development on biodiversity. This is not considered to be a significant limitation for the assessment.

Private homes and gardens within the Study Area were not surveyed, therefore protected species could be present in these areas. However, this is not considered significant as these areas will not be directly impacted by the proposed development.

Wintering waterbird surveys carried out in winter 2021 – 2022 did not include all of the vantage point locations during the December survey. During the surveys from October 2022 to March 2023, some shoreline subsites were prone to sea mist during calm weather, sometimes resulting in restricted visibility for surveyors. Under these circumstances, subsites were surveyed as best possible from the vantage points with the best visibility.

However, due to the wintering bird surveys being undertaken over four seasons, and the abundance of data from other studies of Poulnasherry Bay, the figures for bird abundance and distribution are considered comprehensive and robust.

8.3.10 Assessment methodology

The ecological evaluation and impact assessment methodology within this chapter follows the methodology that is set out in *Guidelines for Assessment of Ecological Impacts of National Roads Schemes* (TII, 2009) and *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.3* (CIEEM, 2018).

8.3.11 Evaluation of Ecological Features

The criteria used for the ecological evaluation follow those set out in TII's guidelines (TII, 2009). The guidelines set out a list of features which should be considered for ecological evaluation such as designated sites, legally protected species, species on biodiversity lists, rare and red-listed species, and those which may play a key functional role in the ecosystem. These guidelines also set out that the importance of an ecological feature should be determined within a defined geographical context, with a hierarchy assigned in relation to the importance of any receptor. The scale below has been used to assign a level of geographic importance to each Key Ecological Receptor:

- International Importance.
- National Importance.
- County Importance.
- Local Importance (higher value).

Features of local importance (Lower Value) and features of no ecological value are not considered to be Key Ecological Receptors. The Guidelines set out the criteria by which each geographic level of importance can be assigned. For example, sites designated for conservation as part of the Natura 2000 network (SACs or SPAs) are assigned 'International Importance' as this reflects the geographic context for their designation. For legally protected species such as Otter which are protected under Annex II and Annex IV of the EU Habitats Directive, and nationally under the Wildlife Acts, the geographic context for importance should be assigned by considering the context of the population and conservation status. For example, if a group of Otter in a county are rare, they may be assigned 'County Importance' or if they are widespread, they may be assigned 'Local Importance (higher value)' but would not be considered a nationally important population.

All habitats and species within the Zone of Influence and study area were assigned a level of significance on the above basis, and Key Ecological Receptors were established and classified on this basis.

8.3.12 Characterisation of ecological impacts

The impact assessment uses the TII (2009) guidelines but also has regard to the EPA (2022) and CIEEM (2024) guidelines in relation to characterising the impact of the proposed development on the receiving environment. The parameters used to characterise ecological impacts are listed below. In the assessment, impacts are described in the relevant terms to the ecological feature being impacted and thus the relative significance can be determined. For example, the duration of a particular impact may vary depending on the life history of a species (short-lived vs long-lived species).

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

- Extent - the spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions;
- Magnitude - refers to size, amount, intensity and volume of an impact;
- Duration - defined in relation to ecological characteristics;
- Frequency and timing - The number of times an activity occurs will influence the resulting effect. The timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons;
- Reversibility - an irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. It is necessary to ensure that any assessment of impacts takes account of the construction and operational phases; direct, indirect and cumulative impacts; and impacts that are temporary, reversible and irreversible.

Definitions of terms used when quantifying duration and frequency of effects are defined below, as per EPA (2022):

- Momentary – seconds to minutes.
- Brief – less than a day.
- Temporary – up to 1 year.
- Short-term – 1 to 7 years.
- Medium-term – 7 to 15 years.
- Long-term – 15 to 60 years.
- Permanent – over 60 years.

It is necessary to ensure that any assessment of impacts takes account of the construction and operational phases; direct, indirect and cumulative impacts; and impacts that are temporary, reversible and irreversible.

8.3.13 Assessing the Significance of Effects

The significance of effects was determined following guidelines set out in CIEEM (2018), whereby effects are assigned significance based on the characterisation of impacts, irrespective of the value of the receptor. Significance is determined by effects on conservation status or integrity, regardless of geographical level at which these would be relevant.

The criteria for assessing Quality, which is one of the most relevant criteria for the assessment of effects on biodiversity are defined in EPA (2022). The criteria for assessing quality of effects on biodiversity is as follows (EPA, 2022):

- Positive: A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
- Neutral: No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
- Negative: A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

8.3.14 Mitigation, compensation and enhancement

The proposed development has been designed to specifically avoid, reduce and/or minimise impacts on all Key Ecological Receptor. The potential impacts of the proposed development have been considered and assessed to ensure that all impacts on Key Ecological Receptor are adequately addressed. Where potential significant impacts on Key Ecological Receptors are predicted, mitigation has been prescribed to ameliorate such impacts. Proposed best practice and mitigation measures are specifically set out in this chapter and are realistic in terms of cost and practicality. Mitigation measures follow best practice and have a high probability of success in terms of addressing the impacts on the identified Key Ecological Receptors.

The need for compensation and/or enhancement measures has also been considered. Compensatory measures are those which 'offset' significant residual (post-mitigation) impacts. Enhancement measures are those which "*seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation or compensation*" (CIEEM, 2019 p. 12).

8.4 Receiving Environment

This section presents the findings of the desk study and results of field surveys and provides an outline of how each ecological feature may be impacted by the proposed development. The desk study and field survey findings for each type of receptor are presented together. This section also identifies receptors which will be further considered in this assessment as Key Ecological Receptor.

8.4.1 General description and context: Overview

The proposed development is located in County Clare, commencing in Kilkee town at the western end, travelling eastwards through Moyasta towards Kilrush town. The proposed development is approximately 15.28km long and will predominantly follow the route of the former West Clare Railway corridor navigating between the towns of Kilrush and Kilkee. The route is generally surrounded by agricultural land, predominantly used for livestock grazing. The route also skirts Poulnasherry Bay which is a tidal bay connected to the Shannon Estuary.

8.4.2 Designated Sites

The NPWS online map viewer was consulted in order to identify the boundaries of designated sites within the Zone of Influence.

Three European sites occur within the Zone of Influence for the proposed development, namely the Lower River Shannon SAC [002165], the Kilkee Reefs SAC [002264], and, the River Shannon and River Fergus Estuaries SPA [004077]. Poulnasherry Bay Proposed Natural Heritage Area (pNHA) [000065] and Scatterry Island pNHA [001911] are the only nationally designated sites within the Zone of Influence.

Poulnasherry Bay is designated as an SAC, SPA and pNHA and is located directly adjacent to much of the length of the proposed development and is hydrologically connected to the proposed development. Scatterry Island is located near the mouth of the Shannon estuary.

There are no Ramsar Sites, Marine Protected Areas (MPAs), Ancient or Long-Established Woodland, or Wildfowl Sanctuaries located within the Zone of Influence.

These sites are presented below in Table 8-1.

Table 8-1 Designated sites within the Zone of Influence of the proposed development

Designated site [site code]	Distance from and potential connection to the proposed development
European Designated Sites	
Special Areas of Conservation (SAC)	
Lower River Shannon SAC [002165]	Part of the proposed development overlaps with the boundary of this SAC and the majority of the development is immediately adjacent to the SAC.
Kilkee Reefs SAC [002264]	The proposed development is located at least 660m northwest of this SAC and 1.2km upstream of this European site via the Dough Stream. Due to the crossing of this watercourse by the proposed development, there is a potential pathway for pollutants to be transported to this European site via water runoff.
Special Protection Areas (SPA)	
River Shannon and River Fergus Estuaries SPA [004077]	Part of the proposed development overlaps with the boundary of this SPA and the majority of the development is immediately adjacent to the SPA.
Nationally Designated Sites	
Poulnasherry Bay pNHA [000065]	Part of the proposed development overlaps with the boundary of this pNHA and the majority of the development is immediately adjacent to the pNHA. Poulnasherry Bay is situated near the mouth of the Shannon estuary, and about 4km west of Kilrush. It is a wide stoney estuary with abundant growths of brown seaweed (<i>Fucus</i> spp.) and green algae. Poulnasherry Bay is an important ornithological site, forming part of the Shannon and Fergus estuarine complex. This site is primarily of ornithological importance but is also a good example of an estuarine habitat.
Scattery Island pNHA [001911]	This site is about 1.7km from Scattery Island is located near the mouth of the Shannon estuary, about 3km from Kilrush. Much of the island is grassland, which is generally species rich. Some small areas of saltmarsh had Thrift (<i>Armeria maritima</i>) and a few patches of Cordgrass (<i>Spartina</i> spp). The saltmarsh at the south end of the island had reedbeds (<i>Phragmites australis</i>).

8.4.3 Site Descriptions

8.4.3.1 Lower River Shannon SAC

The description of the Lower River Shannon SAC provided here is based on the Site Synopsis (NPWS, 2013) and Site-specific Conservation Objectives (NPWS, 2012a) for the site.

Site Overview

This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head, a distance of some 120km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head.

The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon Estuary (considered to be a line across the narrow strait between Kilcredaun Point and Kilconly Point).

Within this main unit there are several tributaries with their own 'sub-estuaries' e.g. the Deel River, Mulkear River, and Mague River. To the west of Foynes, a number of small estuaries form indentations in the predominantly hard coastline, namely Poulnasherry Bay, Ballylongford Bay, Clonderalaw Bay and the Feale or Cashen River estuary. Both the Fergus and inner Shannon Estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. The smaller estuaries also feature mudflats, but have their own unique characteristics, e.g. Poulnasherry Bay is stony and unusually rich in species and biotopes.

Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified within the site, the most important of which are around the Fergus estuary and at Ringmoyle Quay. The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. Saltmarsh vegetation also occurs around a number of lagoons within the site, two of which have been surveyed as part of a National Inventory of Lagoons. Cloonconeen Pool (4-5 ha) is a natural sedimentary lagoon impounded by a low cobble barrier. Seawater enters by percolation through the barrier and by overwash.

This lagoon represents a type which may be unique to Ireland since the substrate is composed almost entirely of peat. The adjacent shore features one of the best examples of a drowned forest in Ireland.

Most of the site west of Kilcredaun Point/Kilconly Point is bounded by high rocky sea cliffs. The cliffs in the outer part of the site are sparsely vegetated with lichens, Red Fescue, Sea Beet (*Beta vulgaris* subsp. *maritima*), Sea Campion (*Silene vulgaris* subsp. *maritima*), Thrift and plantains (*Plantago* spp.). A rare endemic type of sea lavender, *Limonium recurvum* subsp. *pseudotranswallianum*, occurs on cliffs near Loop Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated, with swards of Red Fescue and species such as Kidney Vetch (*Anthyllis vulneraria*) and Common Bird's-foot-trefoil (*Lotus corniculatus*).

Semi-natural habitats, such as wet grassland, wet woodland and marsh occur by the rivers, but improved grassland is the most common habitat type. One grassland type of particular conservation significance, Molinia meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy.

The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well-developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of the Purple Sea Urchin *Paracentrotus lividus* are found.

Overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bar-Tailed Godwit (476; 1995/96). This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank.

A number of species listed on Annex I of the E.U. Birds Directive breed within the site. These include Peregrine Falcon (2-3 pairs), Sandwich Tern (34 pairs on Rat Island, 1995), Common Tern (15 pairs: 2 on Sturamus Island and 13 on Rat Island, 1995), Chough (14-41 pairs, 1992) and Kingfisher. Other breeding birds of note include Kittiwake (690 pairs at Loop Head, 1987) and Guillemot (4,010 individuals at Loop Head, 1987). There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary. This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. The population is estimated (in 2006) to be 140 ± 12 individuals. Otter, a species also listed on Annex II of this Directive, is commonly found on the site.

Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Twaite Shad (*Allosa fallax fallax*) and Salmon (*Salmo salar*). The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon, while the Mulkear catchment excels as a grilse fishery, though spring fish are caught on the actual Mulkear River. The Feale is important for both types. Twaite Shad is not thought to spawn within the site. There are few other river systems in Ireland which contain all three species of lamprey.

Freshwater Pearl Mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs abundantly in parts of the Cloon River.

There are a wide range of land uses within the site. The most common use of the terrestrial parts is grazing by cattle. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments (especially along the Fergus estuary). Further, reclamation continues to pose a threat, as do flood relief works (e.g. dredging of rivers). Gravel extraction poses a major threat on the Feale. Other uses of the site include commercial angling, oyster farming, boating (including dolphin-watching trips) and shooting, which pose disturbance threats to birds and marine mammals. This site 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.

Qualifying Interests of the Site

- [1110] Sandbanks which are slightly covered by sea water all the time
- [1130] Estuaries
- [1140] Mudflats and Sandflats not covered by seawater at low tide
- [1150] Coastal Lagoons
- [1160] Large Shallow Inlets and Bays
- [1170] Reefs
- [1220] Perennial Vegetation of Stony Banks
- [1230] Vegetated Sea Cliffs of the Atlantic and Baltic Coasts
- [1310] Salicornia and other Annuals Colonising Mud and Sand
- [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- [1410] Mediterranean salt meadows (*Juncetalia maritimi*)
- [3260] Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation
- [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

- [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)
- [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
- [1095] Sea Lamprey (*Petromyzon marinus*)
- [1096] Brook Lamprey (*Lampetra planeri*)
- [1099] River Lamprey (*Lampetra fluviatilis*)
- [1106] Atlantic Salmon (*Salmo salar*)
- [1349] Bottle-nosed Dolphin (*Tursiops truncatus*)
- [1355] Otter (*Lutra lutra*)

8.4.3.2 Kilkee Reefs SAC

The description of the Kilkee Reefs SAC provided here is based on the Site Synopsis (NPWS, 2014a) and Site-specific Conservation Objectives (NPWS, 2014b) for the site.

Site Overview

The Kilkee Reefs are situated north of the River Shannon Estuary on the Co. Clare coast. The site stretches for approximately 12km from Ballard Bay to Castle Point. The bedrock is Carboniferous millstone grit and flagstone. A few small islands are included, the largest being Bishop's Island.

The reefs are very exposed to wave action and support excellent examples of communities for this habitat, including one dominated by the mussel *Mytilus edulis*. Deep rock pools have the brown alga *Bifurcaria bifurcata*, whereas the shallower pools towards the low shore have the sea urchin *Paracentrotus lividus*. The low shore has communities characterised by the brown thong weed *Himantalia elongata* and *Alaria esculenta*. These communities, which are typical of western Ireland, are quite distinct from communities in similar habitats elsewhere in Ireland or north-west Europe. Sub-tidally there are good examples of a variety of reef communities. In shallow water the reefs are steeply sloping with kelp forests of algal species tolerant to sand scour. Communities with less dense kelp and red foliose algae occur and may be very species rich. In deeper water the gently sloping rock is characterised by good examples of the Axinellid sponge community with the sea-fan *Eunicella verucosa*. The sponge *Phakellia vermiculata* which is rare in shallow water is present. Vertical cliff faces are characterised by the jewel anemone *Corynactis viridis* in both shallow and deep water.

The site contains a number of submerged marine caves which have been formed due to the erosion of the sedimentary rock. These are known to occur in areas such as Donegal Point, George's Head and Biraghty Mor. The caves give shelter to a range of fauna species, including lobsters, crayfish, spider crabs and conger eels, and in summer may be visited by sunfish and triggerfish. Where light permits, soft corals, sponges, jewel anemones and colonial sea squirts crowd the walls.

This site is of conservation importance as it has excellent examples of reefs and includes examples of a shallow bay and marine caves, all habitats listed on Annex I of the E.U. Habitats Directive.

Qualifying Interests of the Site

- [1160] Large Shallow Inlets and Bays
- [1170] Reefs
- [8330] Submerged or partially submerged sea caves

8.4.3.3 River Shannon and River Fergus Estuaries SPA

The description of the River Shannon and River Fergus Estuaries SPA provided here is based on the Site Synopsis (NPWS, 2015a) and Site-specific Conservation Objectives (NPWS, 2012b) for the site.

Site Overview

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry. The site has vast expanses of intertidal flats which contain a diverse macroinvertebrate 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 areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Pintail, Shoveler, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank and Black-headed Gull. It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The site is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl (57,133 - five year mean for the period 1995/96 to 1999/2000), a concentration easily of international importance. The site has internationally important populations of Light-bellied Brent Goose (494), Dunlin (15,131), Black-tailed Godwit (2,035) and Redshank (2,645). A further 17 species have populations of national importance, i.e. Cormorant (245), Whooper Swan (118), Shelduck (1,025), Wigeon (3,761), Teal (2,260), Pintail (62), Shoveler (107), Scaup (102), Ringed Plover (223), Golden Plover (5,664), Grey Plover (558), Lapwing (15,126), Knot (2,015), Bar-tailed Godwit (460), Curlew (2,396), Greenshank (61) and Black-headed Gull (2,681) - figures are five year mean peak counts for the period 1995/96 to 1999/2000. The site is among the most important in the country for several of these species, notably Dunlin (13 % of national total), Lapwing (6% of national total) and Redshank (9% of national total). The site also supports a nationally important breeding population of Cormorant (93 pairs in 2010).

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.

Qualifying Interests of the Site

- [A017] Cormorant (*Phalacrocorax carbo*)
- [A038] Whooper Swan (*Cygnus cygnus*)
- [A046] Light-bellied Brent Goose (*Branta bernicla hrota*)
- [A048] Shelduck (*Tadorna tadorna*)
- [A050] Wigeon (*Anas Penelope*)

- [A052] Teal (*Anas crecca*)
- [A054] Pintail (*Anas acuta*)
- [A056] Shoveler (*Anas clypeata*)
- [A062] Scaup (*Aythya marila*)
- [A137] Ringed Plover (*Charadrius hiaticula*)
- [A140] Golden Plover (*Pluvialis apricaria*)
- [A141] Grey Plover (*Pluvialis squatarola*)
- [A142] Lapwing (*Vanellus vanellus*)
- [A143] Knot (*Calidris canutus*)
- [A149] Dunlin (*Calidris alpina*)
- [A156] Black-tailed Godwit (*Limosa limosa*)
- [A157] Bar-tailed Godwit (*Limosa lapponica*)
- [A160] Curlew (*Numenius Arquata*)
- [A162] Redshank (*Tringa tetanus*)
- [A164] Greenshank (*Tringa nebularia*)
- [A179] Black-headed Gull (*Chroicocephalus ridibundus*)
- [A999] Wetland and Waterbirds

8.4.1 EPA and WFD Watercourse Assessments

8.4.1.1 Desk Study

Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (the Water Framework Directive or 'WFD') requires that each Member State protect and improve water quality in all waters so that good ecological status is achieved. Additionally, proposed actions (within discrete River Basin Management Plans) are also required, to secure national natural water resources for the future. The EPA is the competent authority responsible for monitoring, protecting, and improving the water environment in the Republic of Ireland.

In accordance with WFD guidelines, water quality 'Status' is assigned using a variety of available data on aquatic flora and fauna (including fish), the availability of nutrients, and aspects like salinity, temperature and pollution by chemical pollutants. Morphological features, such as quantity, water flow, water depths and structures of the riverbeds, are also taken into account.

The EPA is responsible for monitoring the quality of all waterbodies in Ireland and these results are available online. The results of water quality monitoring are presented in Table 8-2.

The EPA's online map viewer provides access to information at individual waterbody level in Ireland. Waterbodies can relate to surface waters (these include rivers, lakes, estuaries [transitional waters], and coastal waters) or to groundwater.

Table 8-2 WFD Water Monitoring Results

WFD Waterbody	Waterbody name	WFD Status 2016-2021	Waterbody Risk
Kilkee_Lower_010	Dough	Moderate	Review
Termon_East_010	Lisluinaghan	Good	Review
Termon_East_010	Garraun	Good	Review
Moyasta_010	Lismuse	Moderate	Review
Mouth of the Shannon (coastal waterbody)	Mouth of the Shannon	Good	Not at risk
IE_SH_G_123 (Ground waterbody)	Kilrush	Good	Not at risk

8.4.2 Habitats

The following paragraphs describe the habitats present surrounding the proposed development. Detail is provided for those habitats which will be primarily impacted by the proposed development. Fossitt habitats which may correspond to Annex I habitats are also presented with an evaluation for whether the Annex I habitat is present. The habitat map is presented in Appendix 8.2.

8.4.2.1 Desk Study

The Poulnisherry Bay Habitat Assessment Report (INIS, 2021) was reviewed as part of the desk study. This report involved a survey of four coastal sites close to the proposed development. The survey sites are between Carrowncalla South and Leadmore West. The survey focussed on the Annex I habitats Perennial vegetation of shingle banks [1220] and Annual vegetation of drift lines [1210]. These habitats were confirmed at two of the sites and are Qualifying Interest habitats of the Lower River Shannon SAC. The closest site where Annex I habitat was confirmed was 50m to the south of the proposed development.

The County Clare Wetlands Study 2022, (Foss, et al., 2022), the County Clare Wetlands Survey Desk Survey & GIS Preparation (Crushell, & Foss, 2008) and the online Map of Irish Wetlands (Wetlands Survey Ireland, accessed August 2025). were reviewed as part of the desk study. Poulnisherry Bay is the only wetland crossed by the proposed development, this is designated as a pNHA and forms part of the Lower River Shannon SAC. Moanmore Lower Cutover Bog and Einagh Cutover are the next closest wetlands to the proposed development, which is >500m away and beyond the N67.

8.4.2.2 Field Survey

Buildings and artificial surfaces (BL3)

This habitat type includes the roads, driveway, car parking, buildings and paths. The proposed development will impact artificial surfaces, however such area are not considered to be of ecological value. This includes some sections of the former railway line which have been converted to hardstanding, as well as existing roads and driveways.

CB1 - Shingle and Gravel Banks

This habitat includes coastal areas where shingle (cobbles and pebbles) and gravel have accumulated to form elevated ridges or banks above the high tide mark. This habitat was present at several locations on the shores of Poulnisherry Bay. In general, this habitat was sparsely vegetated and was at the upper levels of cobble/pebble banks, at the seaward boundary of agricultural fields. Sea Mayweed (*Tripleurospermum maritimum*), Sea Beet (*Beta vulgaris*), Curled Dock (*Rumex crispus*), Creeping Saltbush (*Atriplex portulacoides*), Annual Seablite (*Suaeda maritima*), Sea Aster (*Tripolium pannonicum*), Sea Milkwort (*Glaux maritima*) and Sea Knotgrass (*Polygonum maritimum*).

CB1 habitat may correspond to the annexed habitat, 'perennial vegetation of stony banks (1220)'. However, the instances of CB1 recorded are not considered to be the annex I habitat due to the lack of positive indicator species present, as per (Martin *et al.*, 2017). No positive indicator species or notable species of 1220 habitat were recorded in any of these habitats.

CM (Salt Marshes) CM1 - Lower Salt Marsh and CM2- Upper Salt Marsh

Salt marshes are typically found between the upper limits of the neap and spring tides in protected bays, estuaries, and other sections of sheltered coastline. Lower salt marsh is subject to more prolonged submersion by sea water and is more strongly saline than upper salt marsh - CM2. This habitat was dominated by Common Saltmarsh Grass (*Puccinellia maritima*), with Sea Plantain (*Plantago maritima*), Glasswort Sp. (*Salicornia sp.*, and Sea Aster also present.

Upper salt marsh is subject to less frequent and less prolonged inundation by the sea and, as a result, is not as saline in character as lower salt marsh - CM1. Vegetation is typically dominated by rushes (particularly *Juncus maritimus* and *J. gerardii*) and Red Fescue (*Festuca rubra*). The exact boundaries between the upper and lower salt marsh habitats is difficult to define. The following is a list of plant species recorded in saltmarsh habitat: Red fescue, Salt Marsh Rush, Sea Club Rush (*Bolboschoenus maritimus*), Creeping Saltbush, Common Saltmarsh Grass, Scurvy grass (*Cochlearia officinalis*), Sea plantain, Sea milkwort, Saltmarsh rush (*Juncus gerardii*), Sea aster and Sea lavender (*Limonium vulgare*).

Areas mapped as upper and lower salt marsh correspond to the Annex I habitats Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330) and Mediterranean salt meadows (*Juncetalia maritimi*) (1410).

CW1 - Lagoons and Saline Lakes

This category includes all enclosed bodies of standing brackish water that are wholly or partially separated from the sea by banks of sand, shingle or rock, or by land barriers of rock or peat. There are three locations where this habitat occurs, all of which are in Carrowncalla South. The first is wholly enclosed by a band of shingle and rock, but only 17m from the bay and likely experiences inundation by the tide during spring high tides. The second is a small lagoon enclosed by the former West Clare Railway line, but has a culvert outlet that allows tidal flows in and out of the area. The third area is on the opposite side of the railway line to the above lagoon. It is partially enclosed by areas of saltmarsh but likely has regular inundation during high tides.

CW1 habitat may correspond to the priority annexed habitat, '*coastal lagoons (1150)'. These locations are assumed to be the annex 1 coastal lagoon habitat.

CW2 - Tidal Rivers

This habitat includes the lower reaches of rivers or streams and drainage ditches that are tidal and where there are regular fluctuations in salinity and turbidity, and in the rate and direction of water flow. This includes the sections of watercourses which flow into Poulmasherry Bay which are tidal and the section of the former canal that is affected by the tide.

Tidal rivers correspond approximately to the annexed habitat, 'estuaries (1130)'. The tidal rivers surrounding the proposed development are highly tidal, have significant saline influence and are estuarine in nature, therefore these areas correspond to the Annex 1 habitat 'estuaries' (1130).

ED3 - Recolonising Bare Ground

This category is used for any areas where bare or disturbed ground, derelict sites or artificial surfaces of tarmac, concrete or hard core have been invaded by herbaceous plants. This includes sections of the former railway line that contained disturbed ground with some recolonising vegetation and areas adjacent to the Kilrush wastewater treatment plant.

FS1 - Reed and Large Sedge Swamps

This category includes species-poor stands of herbaceous vegetation that are dominated by reeds and other large grasses or large, tussock-forming sedges. A small area of this habitat was present at Carroncalla North, adjacent to the former railway line in a waterlogged area. This habitat was species poor, dominated by Bulrush (*Typha latifolia*) and Common Reed (*Phragmites australis*).

GA1 - Improved Agricultural Grassland

This category is used for intensively managed or highly modified agricultural grassland that has been reseeded and/or regularly fertilised, and is now heavily grazed and/or used for silage making. This habitat included much of the farmland surrounding the proposed development.

GA2 - Amenity Grassland

This type of grassland is improved, or species-poor, and is managed for purposes other than grass production. It includes amenity, recreational or landscaped grasslands, but excludes farmland. It included fields used for silage making and livestock grazing.

GM1 - Marsh

Marsh is found on level ground near riverbanks, lakeshores, and in other places where mineral or shallow peaty soils are waterlogged, and where the water table is close to ground level for most of the year. This area was dominated by rushes (*Juncus* sp), Meadowsweet, Yellow Flag Iris and Bulrush.

GM1 Marsh habitat may correspond to the annexed habitat hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430). However, this area of marsh (located at chainage 14+600, outside of the redline boundary) is not considered to correspond to this habitat due to the low proportion of broadleaved herbs and dominance of rush species.

GS2 - Dry Meadows and Grassy Verges

Dry meadows that are rarely fertilised or grazed, and are mown only once or twice a year for hay are now rare in Ireland. This habitat was present on some sections of the former railway line which were vegetated by grasses and used as farm access tracks. The following species were present in the various sections of this habitat False Oat Grass (*Arrhenatherum elatius*), Common Knapweed (*Centaurea nigra*), Cocksfoot (*Dactylis glomerata*), Sweet Vernal Grass (*Anthoxanthum odoratum*), Glaucous Sedge (*Carex flacca*), Meadow Vetchling (*Lathyrus pratensis*), Red Clover (*Trifolium pratense*), Compact Rush (*Juncus conglomeratus*), Greater Bird's Foot Trefoil (*Lotus pedunculatus*), Bramble (*Rubus fruticosus* agg.), Yorkshire Fog (*Holcus lanatus*), Purple Moor Grass (*Molinia caerulea*), Silverweed (*Potentilla anserina*), Lesser Trefoil (*Trifolium dubium*), Ribwort Plantain (*Plantago lanceolata*), Yarrow (*Achillea millefolium*), Eyebright sp. (*Euphrasia* spp.) and Meadowsweet (*Filipendula ulmaria*).

GS2 habitat may correspond to the annexed habitats *Species-rich *Nardus* grasslands on siliceous substrates in mountain areas (and submountain areas in continental Europe) (6230) and Calaminarian grasslands of the *Violetalia calaminariae* (6130).

The former is a priority Annex I habitat. The areas of GS2 surrounding the proposed development are not considered to be examples of the either of these Annex I habitats. Nardus grasslands (6230) occur in the uplands on acidic soils, whereas examples of GS2 surrounding the proposed development are located on the former railway or immediately adjacent to it and not on acidic soils. The habitat 6130 is confined to the vicinity of old metal mines in Ireland (Callaghan & Hodd, 2024) and the proposed development is not close to any old mines.

GS4 - Wet Grassland

This type of grassland can be found on flat or sloping ground in upland and lowland areas. It occurs on wet or waterlogged mineral or organic soils that are poorly-drained or, in some cases, subjected to seasonal or periodic flooding. This habitat included much of the farmland surrounding the proposed development which contained a greater proportion of wet-tolerant species such as rushes. The species present in this habitat included Yorkshire Fog, Soft Rush, Compact Rush, Red Clover, Creeping Buttercup (*Ranunculus repens*), Meadow Buttercup (*Ranunculus acris*), Purple Moor Grass, Great Willowherb (*Epilobium hirsutum*), Silver Weed, Marsh Thistle (*Cirsium palustre*), Common Knapweed, Devils Bit Scabious (*Succisa pratensis*), Sweet Vernal Grass, Selfheal (*Prunella vulgaris*), Ribwort Plantain, Sharp Flowered Rush (*Juncus acutiflorus*), Greater Birdsfoot Trefoil, Docks (*Rumex sp.*), Yellow Flag Iris (*Iris pseudacorus*), Bramble, New Zealand Flax (*Phormium tenax*), Bracken (*Pteridium aquilinum*), False Oat, Tufted Vetch (*Vicia cracca*), Meadowsweet and Purple Loosestrife (*Lythrum salicaria*).

GS4 habitat may correspond to the annexed habitat Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (6410). However, areas of GS2 surrounding the proposed development are not considered to be examples of the 6410, due to the lack of indicator species or very small proportion of indicator species. The majority of wet grasslands surrounding the proposed development were dominated by rushes and generally species poor. The species identified above were present across all of the areas of wet grassland in the study area.

HD1 - Dense Bracken

This category is used for areas of open vegetation that are dominated by Bracken. There was a small area of dense bracken, adjacent to the former railway line which has been converted into an access road near the Kilrush wastewater treatment plant.

LS1 - Shingle and Gravel Shores

This category includes exposed or moderately exposed shores with accumulations of loose, coarse but usually rounded and mobile rocky material. This habitat is present at Brew's Bridge Beach and was unvegetated.

LS1 habitat may correspond to the annexed habitat annual vegetation of drift lines Littoral gravels and sands (1210). However, this area was unvegetated and therefore does not correspond to 1210.

MW2 - Sea Inlets and Bays

Estuaries are semi-enclosed coastal waterbodies which are usually sheltered and where the influence of freshwater is generally limited. Poulasherry Bay is an example of this habitat

This habitat corresponds to the Annex I habitat estuaries (1130).

WD1 - (Mixed) Broadleaved Woodland

This general category includes woodland areas with 75-100% cover of broadleaved trees, and 0-25% cover of conifers. The main woodland area was located near Blackweir Bridge. The woodland appeared to be planted and the understorey was dominated by dense bramble. Species present included Ash (*Fraxinus excelsior*), Pedunculate Oak (*Quercus robur*), Italian Alder (*Alnus cordata*), Sycamore (*Acer pseudoplatanus*), Hazel (*Corylus avellana*), Bramble, Soft Rush and Yellow Iris.

WS1 - Scrub

This broad category includes areas that are dominated by at least 50% cover of shrubs, stunted trees or brambles. There were numerous areas of scrub along the length of the proposed development, including scrub embankments to the railway line and sections where there has been no management of the railway line and scrub has developed. Several fields and field boundaries also included scrub-dominated sections. Areas of scrub were typically dominated by dense bramble, hawthorn and grey willow. Other species present included Ash, Common Spotted Orchid (*Dactylorhiza fuchsia*), Grey Willow (*Salix cinerea*), Hawthorn (*Crataegus monogyna*), Bramble, False Oat Grass, Angelica (*Angelica sylvestris*), Bracken, Bindweed, Marram, Meadowsweet, Rosebay Willowherb (*Chamerion angustifolium*), Cleavers (*Galium aparine*), Blackthorn (*Prunus spinosa*), Soft Rush, Purple Loosestrife.

WS1 habitat may correspond to the annexed habitat *Juniperus communis* formations on heaths or calcareous grasslands (5130). The scrub habitat surrounding the proposed development did not contain juniper species and therefore cannot correspond to the 5130.

FW4 - Drainage ditches

Drainage ditches are linear water bodies or wet channels that are entirely artificial in origin, and some sections of natural watercourses that have been excavated or modified to enhance drainage and control the flow of water. Drainage ditches are present within the study area, largely bordering agricultural fields. The proposed development will cross several drainage ditches. Several drainage ditches had a tidal influence and some sections contained salt tolerant species such as sea club rush. Those without saline influence contained Common Reed, False Fox Sedge (*Carex otrubae*) and Greater Plantain (*Plantago major*). Banks of drainage ditches were dominated by Bramble, and Creeping Thistle (*Cirsium arvense*).

WL1 - Hedgerows

Hedgerows are linear strips of shrubs, often with occasional trees, which typically form the boundaries of agricultural fields. Hedgerows occur throughout the study area and were typically consisted of either Hawthorn (*Crataegus monogyna*) or Grey Willow, and also contained Blackthorn and Bramble. Hedgerows in the study area are generally of low diversity and therefore lower ecological value, however they are essential in maintaining links and ecological corridors between features of higher ecological value.

WL2 - Treelines

Treelines are narrow rows or single lines of trees that are typically planted along roads and property boundaries. Treelines along the proposed development typically comprised the same species as the hedgerows but where they were greater than 5m in height these were classed as treelines. Other treelines also included sycamore, ash and conifer species.

8.4.3 Rare and protected species

The following sections lists the rare and protected species of flora and fauna identified in the desk study and findings of the field surveys. The desk study includes records obtained from the NBDC for rare, protected and invasive species from the 10x10km grid squares Q84, Q85, Q94 and Q95.

8.4.4 Wintering birds

8.4.4.1 Desk Study

The proposed development skirts the northern and eastern shores of Poulnasherry Bay. This wetland is designated as a pNHA and forms part of the larger River Shannon and River Fergus estuaries SPA and the Lower River Shannon SAC. The River Shannon and River Fergus estuaries SPA is designated for 21 Qualifying Interest species. These species are presented below in Table 8-3 with the British Trust for Ornithology (BTO) two-letter species code, current BoCCI (2021) list status and baseline SPA population.

Table 8-3 Qualifying Interest species of the River Shannon and River Fergus estuaries SPA and their current conservation condition and baseline SPA population.

Qualifying Interest Code	Common Name	Latin Name	BTO code	Current conservation condition ³	Baseline SPA population ⁴
[A017]	Cormorant	<i>Phalacrocorax carbo</i>	CA	Amber	93 (n)
[A038]	Whooper Swan*	<i>Cygnus cygnus</i>	WS	Amber	118 (n)
[A046]	Light-bellied Brent Goose	<i>Branta bernicla hrota</i>	PB	Amber	494 (i)
[A048]	Shelduck	<i>Tadorna tadorna</i>	SU	Amber	1025 (n)
[A050]	Wigeon	<i>Anas Penelope</i>	WN	Amber	3761 (n)
[A052]	Teal	<i>Anas crecca</i>	T.	Amber	2260 (n)
[A054]	Pintail	<i>Anas acuta</i>	PT	Amber	62 (n)
[A056]	Shoveler	<i>Anas clypeata</i>	SV	Red	107 (n)
[A062]	Scaup	<i>Aythya marila</i>	SP	Red	102 (n)
[A137]	Ringed Plover	<i>Charadrius hiaticula</i>	RP	Amber	223 (n)
[A140]	Golden Plover*	<i>Pluvialis apricaria</i>	GP	Red	5664 (n)
[A141]	Grey Plover	<i>Pluvialis squatarola</i>	GV	Red	558 (n)
[A142]	Lapwing	<i>Vanellus vanellus</i>	L.	Red	15,216 (n)
[A143]	Knot	<i>Calidris canutus</i>	KN	Red	2015 (n)
[A149]	Dunlin	<i>Calidris alpina</i>	DN	Red	15,131 (i)
[A156]	Black-tailed Godwit	<i>Limosa limosa</i>	BW	Red	2,035 (i)
[A157]	Bar-tailed Godwit*	<i>Limosa lapponica</i>	BA	Red	460 (n)
[A160]	Curlew	<i>Numenius Arquata</i>	CU	Red	2,296 (n)
[A162]	Redshank	<i>Tringa tetanus</i>	RK	Red	2,645 (i)
[A164]	Greenshank	<i>Tringa nebularia</i>	GK	Green	61 (n)
[A179]	Black-headed Gull	<i>Chroicocephalus ridibundus</i>	BH	Amber	2681 (n)

³ Source: IWM 116, accessed June 2025

⁴ Baseline data is from the period 1995/96 – 1999/00. (i) and (n) denote numbers of international and all-Ireland importance respectively

* Denotes Annex I species

Numerous waterbird studies have been carried out in the SPA area including Birdwatch Ireland Irish Wetland Birds Surveys (IWeBS), the NPWS 2010/2011 Waterbird Survey Programme, with various reports detailing and analysing the survey data, these are outlined in the following sections. Poulnasherry Bay is an IWeBS subsite and there is an abundance of historic data for this site from IWeBS and there are several additional studies of this subsite.

The IWeBs subsite Poulnasherry Bay has the ID no. of 0H498, and includes the entirety of Poulnasherry Bay including the opening into the Shannon coastal waterbody as far as Baurnahard Point (Figure 8-4). This subsite is sometimes split into two smaller subsites, namely Poulnasherry Bay Inner and Outer. The boundary of the subsites is at the narrowest point in Poulnasherry Bay, between Carrowncalla South on the eastern side and Moughna on the western side. The inner bay is the larger of the subsites.

The labelling of the subsites 0H519 and 0H520 is inconsistent across different studies. Both the NPWS and Birdwatch Ireland were consulted in 2025 in relation to the discrepancies and confirmed the correct labels for the subsites. The errors in the original sources have been corrected in this report. For avoidance of doubt, 0H520 is the inner bay, which is significant larger and more important for wintering birds than 0H519, which is the outer bay (Table 8-7).

Table 8-4 Labelling for subsites in Poulnasherry Bay.

Subsite Code	Subsite Name	SS Grid	Subsite area (ha) as per CO supporting doc ⁵
0H520	Poulnasherry inner bay	Q9450057300	675.72
0H519	Poulnasherry outer bay	Q9570055000	143.43

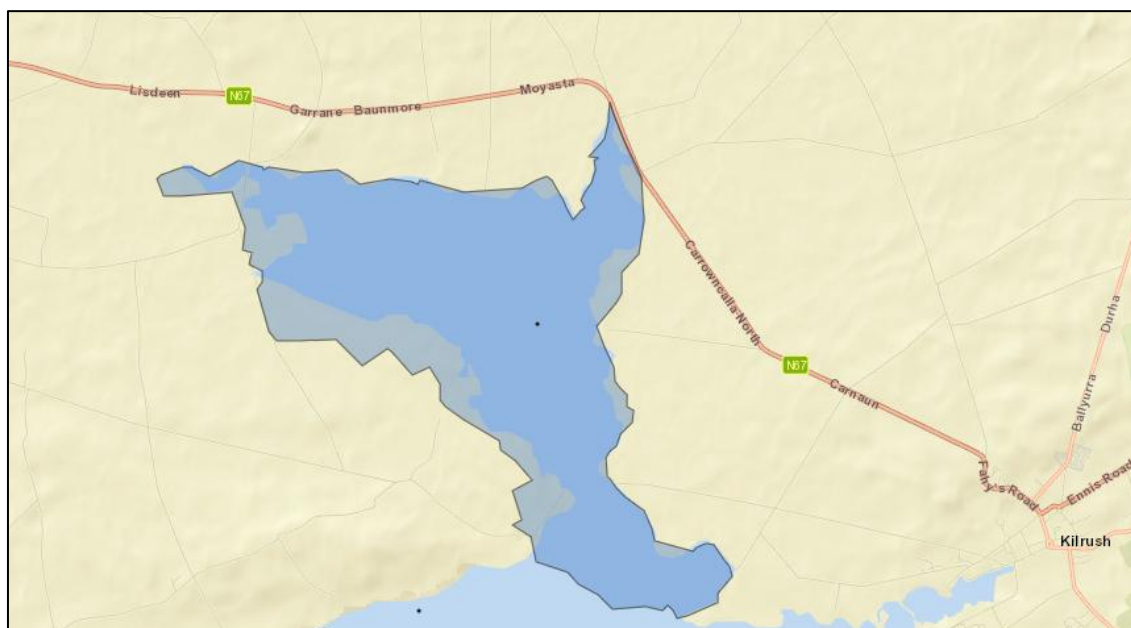


Figure 8-4 Poulnasherry Bay IWeBS subsite 0H498 boundary. Source: Irish Wetland Birds Survey.

⁵ Note: subsite 0H520 Poulnasherry inner bay is the larger of the two subsites, not 0H519 Poulnasherry outer bay as shown in Table 7-7. This is due to a reporting error in the Conservation Objectives (CO) supporting document as confirmed in consultation with NPWS in 2025.

A summary of the studies with data for Poulnasherry bay are presented in this section. These include the following:

- The Irish Wetlands bird survey (IWeBs) data and reporting (Burke et al, 2025)
- The 2010/11 waterbird survey programme: (Crowe et al., 2012)
- Review and Assessment of Waterbird Data from the Shannon-Fergus Estuary (Lewis et al 2016).
- The Poulnasherry Bay Waterbird survey 2021-2022 (Inis Environmental, 2022)
- Strategic Integrated Framework Plan for the Shannon Estuary (SIFP) final report 2019 (MKO, 2019)

Other regularly occurring waterbirds which are not Qualifying Interest's of the SPA are presented below in Table 8-5.

Table 8-5 Regularly occurring waterbirds in the SPA which are non-Qualifying Interest species. * Denotes Annex I species

Common Name	Latin Name	Peak Number (2005/06 – 2009/10) (I-WeBS)	BTO code	Current conservation condition ⁶
Mute Swan	<i>Cygnus olor</i>	135 (i)	MS	Amber
Greylag Goose	<i>Anser anser</i>	140	GJ	Amber
Mallard	<i>Anas platyrhynchos</i>	289	MA	Amber
Pochard	<i>Aythya ferina</i>	37	PO	Red
Tufted Duck	<i>Aythya fuligula</i>	93	TU	Amber
Goldeneye	<i>Bucephala clangula</i>	17	GN	Red
Red-breasted Merganser	<i>Mergus serrator</i>	7	RM	Amber
Great Northern Diver *	<i>Gavia immer</i>	8	ND	Amber
Little Grebe	<i>Tachybaptus ruficollis</i>	7	LG	Green
Great Crested Grebe	<i>Podiceps cristatus</i>	31	GG	Amber
Little Egret *	<i>Egretta garzetta</i>	29	ET	Green
Grey Heron	<i>Ardea cinerea</i>	23	H.	Green
Moorhen	<i>Gallinula chloropus</i>	33	MH	Green
Coot	<i>Fulica atra</i>	51	CO	Amber
Oystercatcher	<i>Haematopus ostralegus</i>	81	OY	Red
Snipe	<i>Gallinago gallinago</i>	115	SN	Red
Turnstone	<i>Arenaria interpres</i>	57	TT	Amber
Common Gull	<i>Larus canus</i>	83	CM	Amber
Lesser Black-backed Gull	<i>Larus fuscus</i>	16	LB	Amber
Herring Gull	<i>Larus argentatus</i>	8	HG	Amber

⁶ Irish Wildlife Manual 116, V4.0 June 2025

Common Name	Latin Name	Peak Number (2005/06 – 2009/10) (I-WeBS)	BTO code	Current conservation condition ⁶
Great Black-backed Gull	<i>Larus marinus</i>	8	GB	Green

Irish Wetland Bird Survey (IWeBS)

Birdwatch Ireland provided IWeBS data for the subsite 0H498 Poulnasherry Bay in August 2025. Some survey seasons report counts for the overall site, whereas others split the data between the two smaller subsites. In this data the labelling is as follows: Outer Bay (H519) and Inner Bay (0H520). The dataset for the overall subsite is incomplete for recent years. The most recent survey season is 2020/21 and during this season only the months November, December and January have count data. In the 2019/20 season, only January was counted. 2017/18 is the most recent survey period in which all months were surveyed, however this was for the Outer Bay subsite (0H519) only. During this season, numbers exceeding the 1% threshold for all-Ireland Importance were recorded for Shelduck, Knot, Dunlin and Curlew.

Population trend data from the Irish Wildlife Manual 162, The status and distribution of wintering waterbirds in Ireland (2025) was also utilised in this assessment.

Conservation Objectives supporting document (NPWS, 2012e)

The Conservation Objectives supporting document (NPWS 2012e) presents the conservation objectives for the SPA, Part Five of this document includes an examination of the 2010/11 Waterbird Survey Programme. Key findings of these reports for Poulnasherry Bay are summarised in the following sections.

The 2010/11 waterbird survey programme (Crowe et al., 2012)

The 2010/11 waterbird survey programme investigated how waterbirds are distributed across coastal wetland sites during the low tide. Specific information for the Shannon and Fergus estuary sites is provided in the Conservation Objectives Supporting Document (NPWS, 2012e).

The Waterbird Survey Programme split the IWeBS subsite 0H498 into the two smaller subsites into Poulnasherry Outer Bay (0H519) and Poulnasherry Inner Bay (0H520).

Poulnasherry inner bay (0H520) was ranked as the second most important subsite within the SPA for species richness. The site had a mean of 25 species and a peak of 31 species. The importance of the two subsites for each Qualifying Interest species relative to the other SPA subsites is presented below in Table 8-6. This data is extracted from Table 5.6 (a) of the Conservation Objectives Supporting Document (NPWS, 2012e).

Table 8-6 Importance of subsites for Qualifying Interest species in the River Shannon and River Fergus Estuaries SPA for low tide surveys across all habitats (Intertidal, Subtidal, intertidal/subtidal combined) and behaviours (foraging/ roosting/ other). L Low, M Moderate; H High V Very high. Blank indicates the species was not recorded in that subsite

Subsite	Species (BTO code)																				
	WS	PB	SU	WN	T	CA	RP	GP	GV	Li	KN	DN	BW	BA	CU	GK	RK	PT	SV	SP	BH
0H520 Inner	V	H	V	H	V	M	H	L	V	H	H	H	M		H	H	H	V	M	V	M
0H519 Outer		V				H								L	L		L				L

The inner bay (0H520) was ranked No. 1 for highest numbers of three species; Teal, Pintail and Shoveler, during high tide across all of the River Shannon and River Fergus Estuaries subsites during the surveys (Table 5.6 (f) of the CO supporting document (NPWS, 2012e)). Scaup was the least-widespread occurring species across the SPA but occurred mostly in Poulnasherry Inner Bay.

Appendix 11 of CO supporting document (NPWS, 2012e) details the types of disturbance to waterbirds which occurred during the surveys. Types of disturbance noted at subsites 0H519 and 0H520 included horse riding, hand-gathering molluscs, intertidal aquaculture. All these types of disturbance were assigned a moderate level of disturbance.

Review and Assessment of Waterbird Data from the Shannon-Fergus Estuary (Lewis et al., 2016).

The data relating to the overall IWeBS subsite Poulnasherry Bay (0H498) was reviewed. This study covered the overall subsite and does not split the data between the inner and outer bays. This subsite was surveyed 11 times in IWeBS to 2016. In this subsite 0H498 has recorded a total of 63 species throughout I-WeB surveys at the site.

It has supported internationally important numbers of the Qualifying Interest species Light-bellied Brent Goose, and numbers that exceed the all-Ireland threshold of 12 SCI species: Bar-tailed Godwit, Cormorant, Curlew, Dunlin, Greenshank, Golden Plover, Grey Plover, Knot, Lapwing, Pintail, Ringed Plover and Wigeon.

Strategic Integrated Framework Plan for the Shannon Estuary (SIFP) 2019

The surveys undertaken during 2017 and 2018 as part of the SIFP aimed to record bird usage across the entire Shannon and Fergus estuary and to allow for comparison of data between subsites. Area K in this study corresponds to the IWeBS subsites 0H519 and 0H520. This area was highly important for a number of Qualifying Interest species as it contained high percentages of the total counts for species across the entire estuary. These were 62% for Brent Goose, 38% for Bar-tailed Godwit and Knot, 20% for Shelduck and 19% for Ringed Plover. The rest of the Qualifying Interest species were below 10%.

The **Poulnasherry Bay Waterbird survey 2021-2022**⁷ (Inis Environmental, 2022) carried out waterbird surveys of Poulnasherry Bay during the 2021/2022 winter season. This survey followed the methodology of the NPWS waterbird survey programme. Subsite 0H498 was split into Poulnasherry outer bay (0H519), and, Poulnasherry inner bay (0H520) for the surveys. It drew on survey data gathered in the previous winter seasons to 2018. The report compared the data gathered to baseline survey data from 1995/1996 and 2010/2011. A comparison of peak species counts showed that population trends 16 of the 21 Qualifying Interest species were in decline since the baseline period. Teal was the only species to show an increase in population since the baseline period. The remaining species populations were assessed as stable/variable as no trend could be determined. The subsite 0H520, Poulnasherry Inner Bay was found to be the most important subsite in the survey area. It was noted that the inner parts of the subsite, areas near freshwater flows and salt marshes were important for high tide roosting.

8.4.4.2 Field Survey

This section summarises the findings of the wintering bird surveys carried out for the proposed development. All of the Qualifying Interest species of the SPA were recorded during the surveys apart from Whooper Swan and Scaup, which were not recorded during any of the surveys for the proposed development. The numbers of Qualifying Interest species recorded within Poulnasherry Bay during the survey periods exceeded 1% thresholds of the SPA baseline population during at least one survey period for all Qualifying Interest species recorded, excluding Black-tailed Godwit. Table 8-7 lists the bird species identified across all of the wintering bird surveys carried out for the proposed development since 2021. The peak count for each survey season is also presented, and it is indicated where the peak counts exceeded 1% of the SPA baseline population.

Table 8-7 Peak counts of wintering bird species identified during shoreline surveys. Peak count is the month where the highest number of that species were recorded across all VPs. Numbers in bold indicate where the numbers recorded exceeded 1% of the overall SPA population.

Common Name	SPA Baseline Population	2021 / 2022	2022 / 2023	2024	2025 / 2026
Bar-tailed Godwit	460	0	63	57	21
Black-headed Gull	2681	580	164	15	334
Black-tailed Godwit	2035	4	7	1	4
Brent Goose	494	205	101	165	182
Common Gull	N/A	125	17	2	114
Cormorant	93	4	117	5	25
Curlew	2296	120	322	135	258
Dunlin	15131	100	861	750	1030
Eider	N/A	20	0	0	0
Golden Plover	5664	2	130	1055	1352
Great Black-backed Gull	N/A	0	6	6	10
Great Crested Grebe	N/A	0	10	4	3
Great Northern Diver	N/A	3	6	8	7

⁷ This study notes the confusion of the subsite labelling in the site's conservation objectives documents. This study has reported the data correctly as per the confirmation received from NPWS in October 2025, with the inner bay being the more important of the two subsites.

Common Name	SPA Baseline Population	2021 / 2022	2022 / 2023	2024	2025 / 2026
Greenshank	61	8	12	15	8
Grey Heron	N/A	10	9	3	6
Grey Plover	558	0	92	5	0
Herring Gull	N/A	48	143	83	296
Lapwing	15,216	329	388	0	1190
Lesser Black-backed Gull	N/A	3	35	7	12
Little Egret	N/A	14	33	22	31
Little Grebe	N/A	0	2	0	6
Mallard	N/A	38	68	22	32
Oystercatcher	N/A	44	84	27	137
Pintail	62	2	30	0	0
Red Knot	2015	0	45	0	130
Red-breasted Merganser	N/A	0	3	1	0
Redshank	2,645	76	102	145	180
Ringed Plover	223	74	30	7	96
Sanderling	N/A	0	55	0	51
Shag	N/A	0	1	1	0
Shelduck	1025	181	289	124	84
Shoveler	107	3	5	0	70
Snipe	N/A	14	55	9	19
Teal	2260	280	440	260	324
Turnstone	N/A	25	49	2	283
Wigeon	3761	306	702	84	728

The following species were recorded occasionally and have been excluded from the table above. These are presented below in Table 8-8, with the peak count and the survey period they were recorded. These species are considered to not be regularly occurring in Poulnasherry Bay.

Table 8-8 Irregularly occurring species (single observation).

Species	Count	Observation details
Tufted Duck	8	2022/23 – single observation. <i>Note: Tufted Duck are reported to be a regularly occurring species within the wider area of the SPA but were not regularly recorded within the survey area.</i>
Common Sandpiper	1	2022/23 – recorded at several vantage points on more than one date.
Curlew Sandpiper	2	2024 – single observation.
Black Guillemot	3	2022/23 – recorded at several vantage points on one date.
Stone-curlew	3	2024 – single observation.
Whimbrel	9	2025 – single observation.

Nine locations along the proposed development were identified as sensitive bird areas. The sensitive bird areas are around Poulmasherry Bay where the proposed development is close to the coast and where there is no existing screening or, incomplete screening, and therefore could be impacted by the proposed development. Important areas for birds which are not close to the greenway are excluded. The sensitive bird areas are presented below in Figure 8-5, Table 8-9 and are further detailed in Appendix 8.3. Merchant's Quay in Kilrush and Brew's Bridge beach are not included as a sensitive bird area due to the existing high level of disturbance, anthropogenic activity and habituation.

Table 8-9 Sensitive bird areas

Ref	Chainage	Description
1	5+300 – 5+800	This section follows the coast for 370m. There is a low embankment with vegetation between the proposed development and the coast. There are some gaps in the vegetation.
2	6+100 – 6+750	This section includes a field where the greenway follows the coast and where there is no screening for 120m. The route then travels inland and follows the line of the railway east. There is a thick hedgerow on the seaward side of the proposed greenway for 270m. Birds have been recorded within fields adjacent to the proposed greenway at this location.
3	7+000 – 7+250	This section is on the former railway line which is immediately adjacent to a small inlet of the Bay and SPA, the adjacent habitat is dominated by saltmarsh habitat. There is no screening on the seaward side of the railway line.
4	7+750 – 8+200	This section includes Moyasta Bridge and causeway where the former railway crosses part of Poulmasherry Bay and SPA. Exposed mudflats and salt marsh are present adjacent to both sides of the proposed development.
5	8+450 – 9+250	The proposed development is on the former railway line. This section is bordered by fields on the east side with no existing screening to the bay.
6	9+600 – 9+800	This section includes an area where the greenway will be on an existing road and no works will be carried out. This is adjacent to an area where workers access the intertidal area.
7	9+950 – 10+400	Carrownacalla North, includes a section with no existing screening, apart from c.120m where the route of the proposed development cuts inland to avoid intertidal habitats.

Ref	Chainage	Description
8	10+550 – 11+550	Carrowncalla North – to South, this section is within agricultural fields adjacent to the Poulnasherry Bay with no existing screening or minimal screening.
9	14+150 – 14+850	West of Kilrush Marina, the proposed development is along the coast within the railway corridor. There is existing screening along this section.

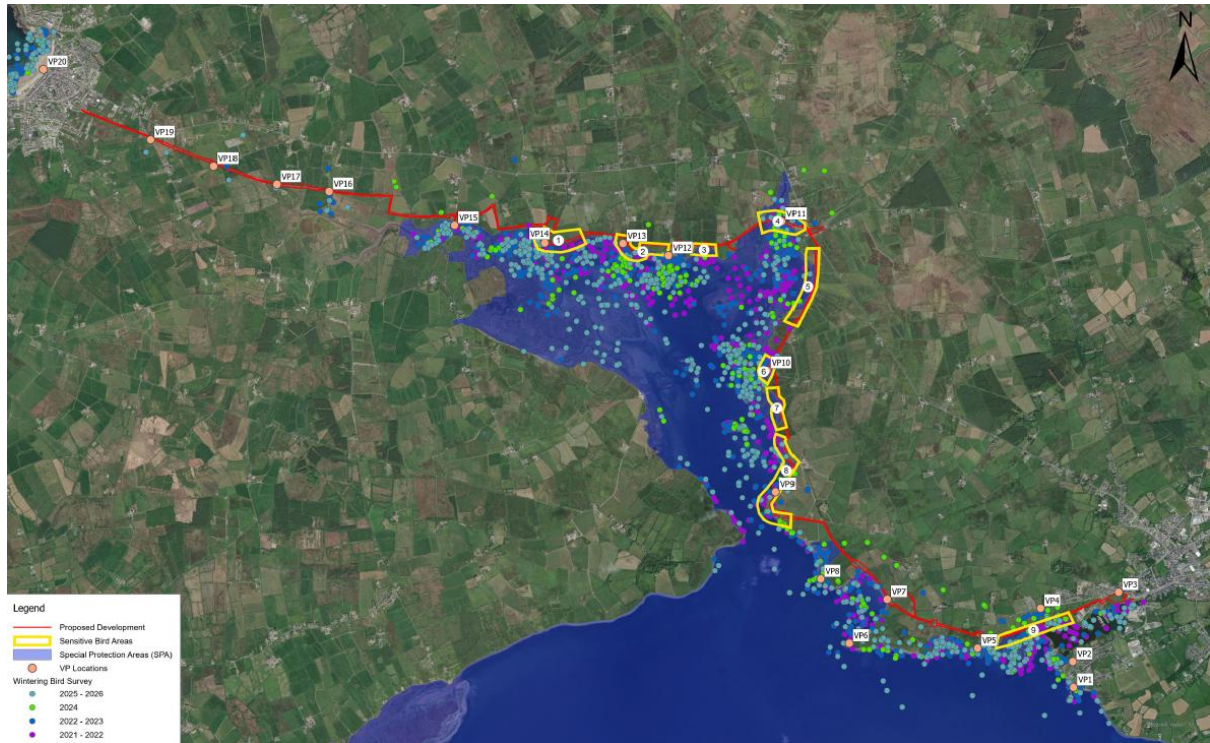


Figure 8-5 Sensitive Bird Areas

At Moyasta Bridge (Sensitive Bird Area No.4), the proposed route is elevated and there is no existing screening to the surrounding mudflats. Large numbers of wintering birds were recorded in the surrounding mudflats, including nationally important numbers (>1% of the national population) of Pintail and Wigeon were recorded within 500m of Moyasta Bridge. The peak counts recorded within 500m of Moyasta Bridge correspond to 42% of the SPA population of Pintail, 15% for Wigeon, 11.5% for Greenshank and 10.7% for Teal. The following species were recorded within 500m of Moyasta Bridge in numbers between 1-10% of the SPA population: Bar-tailed Godwit, Brent Goose, Cormorant, Curlew, Golden Plover, Redshank, Shelduck and Shoveler. Table 8-10 sets out the frequency that significant numbers of QI species were recorded at Moyasta within 500m of the bridge.

Table 8-10: Frequency that QI species were recorded in significant numbers at Moyasta bridge.

Species	No. of surveys recorded at VP 11 (of 18 total surveys)	Count >1% of National population	1% SPA Population	No. Counts >1% SPA Population	Sensitivity
Bar-tailed Godwit	5	No	4.6	2	Moderate
Brent Goose	6	No	4.94	4	High
Cormorant	6	No	0.93	6	Moderate
Curlew	16	No	22.96	7	High
Greenshank	10	No	0.61	10	High
Pintail	7	Yes	0.62	7	Moderate
Teal	14	No	22.6	10	Moderate
Wigeon	15	Yes	37.61	10	High

8.4.5 Breeding birds

8.4.5.1 Desk study

Table 8-11 lists the bird species records obtained from the NBDC within the following hectads which are in the study area for the proposed development: Q85, Q86, Q95, Q96 and R05.

Table 8-11 Records for bird species (wintering and breeding) along with their BOCCI status. Source: NBDC (August, 2025). * Denotes Annex I species

Common Name	Scientific Name
Red	
Balearic Shearwater	<i>Puffinus mauretanicus</i>
Barn Owl	<i>Tyto alba</i>
Bar-tailed Godwit *	<i>Limosa lapponica</i>
Black-headed Gull	<i>Larus ridibundus</i>
Black-legged Kittiwake	<i>Rissa tridactyla</i>
Curlew	<i>Numenius arquata</i>
Dunlin *	<i>Calidris alpina</i>
Eider *	<i>Somateria mollissima</i>
Golden Plover	<i>Pluvialis apricaria</i>
Grey Plover	<i>Pluvialis squatarola</i>
Herring Gull	<i>Larus argentatus</i>
Knot	<i>Calidris canutus</i>
Lapwing	<i>Vanellus vanellus</i>

Common Name	Scientific Name
Meadow Pipit	<i>Anthus pratensis</i>
Oystercatcher	<i>Haematopus ostralegus</i>
Purple Sandpiper	<i>Calidris maritima</i>
Redwing	<i>Turdus iliacus</i>
Redshank	<i>Tringa totanus</i>
Snipe	<i>Gallinago gallinago</i>
Swift	<i>Apus apus</i>
Shoveler	<i>Anas clypeata</i>
Woodcock	<i>Scolopax rusticola</i>
Amber	
Barn Swallow	<i>Hirundo rustica</i>
Barnacle Goose	<i>Branta leucopsis</i>
Brent Goose	<i>Branta bernicla</i>
Chough *	<i>Pyrrhocorax pyrrhocorax</i>
Fulmar	<i>Fulmarus glacialis</i>
Gannet	<i>Morus bassanus</i>
Great Black-backed Gull	<i>Larus marinus</i>
Great Cormorant	<i>Phalacrocorax carbo</i>
Great Northern Diver *	<i>Gavia immer</i>
Greenfinch	<i>Chloris chloris</i>
Greenshank	<i>Tringa nebularia</i>
Hen Harrier *	<i>Circus cyaneus</i>
House Martin	<i>Delichon urbicum</i>
House Sparrow	<i>Passer domesticus</i>
Kestrel	<i>Falco tinnunculus</i>
Kingfisher *	<i>Alcedo atthis</i>
Lesser Black-backed Gull	<i>Larus fuscus</i>
Linnet	<i>Carduelis cannabina</i>
Mallard	<i>Anas platyrhynchos</i>
Manx Shearwater	<i>Puffinus puffinus</i>
Mediterranean Gull *	<i>Larus melanocephalus</i>
Mute Swan	<i>Cygnus olor</i>
Pintail	<i>Anas acuta</i>
Red-throated Diver *	<i>Gavia stellata</i>
Ringed Plover	<i>Charadrius hiaticula</i>
Shag	<i>Phalacrocorax aristotelis</i>
Shelduck	<i>Tadorna tadorna</i>

Common Name	Scientific Name
Starling	<i>Sturnus vulgaris</i>
Sandwich Tern *	<i>Sterna sandvicensis</i>
Short-eared Owl *	<i>Asio flammeus</i>
Sky Lark	<i>Alauda arvensis</i>
Spotted Flycatcher	<i>Muscicapa striata</i>
Teal	<i>Anas crecca</i>
Turtle Dove	<i>Streptopelia turtur</i>
Turnstone	<i>Arenaria interpres</i>
Tree Sparrow	<i>Passer montanus</i>
Wigeon	<i>Anas penelope</i>
Wheatear	<i>Oenanthe oenanthe</i>
Green	
Little Egret*	<i>Egretta garzetta</i>
Peregrine Falcon*	<i>Falco peregrinus</i>
Rock Dove	<i>Columba livia</i>
Woodpigeon	<i>Columba palumbus</i>

8.4.5.2 Field surveys

Breeding bird surveys were conducted in April, May and June 2024. All birds observed were assigned a BTO breeding status. Table 8-12 lists the bird species identified on the breeding bird survey for observations of possible, probable and confirmed breeding birds. Any non-breeding observations have been excluded.

Table 8-12 Confirmed, probable and possible breeding records.

Common Name	Number	Date, Location	Details	BoCCI Status (2020 – 2026)
Confirmed Breeding				
Ringed Plover	3	02/07/2024 vp5	fledged young; confirmed breeding. possibly two recently fledged young. was pretty big could run/fly about	Amber
Probable Breeding				
Shelduck	4	26/04/2024 vp5	pair; probable breeding. 2 pairs	Amber
Mallard	4	26/04/2024 vp5	pair; probable breeding	Amber
Mallard	5	26/04/2024 vp8	pair; probable breeding	Amber
Ringed Plover	2	02/07/2024 vp8	agitated behaviour; probable breeding. mobbing common gull, made alarm calls when surveyor walked past	Amber

Common Name	Number	Date, Location	Details	BoCCI Status (2020 – 2026)
Grey Wagtail	2	02/07/2024 vp11	pair; probable breeding	Red
Possible Breeding				
Oystercatcher	5	26/04/2024 vp5	suitable nesting habitat; possible breeder	Red
Shelduck	25	26/04/2024 vp9	suitable nesting habitat; possible breeder	Amber
Shelduck	1	31/05/2024 vp5	suitable nesting habitat; possible breeder	Amber
Herring Gull	2	31/05/2024 vp5	suitable nesting habitat; possible breeder	Amber
Oystercatcher	17	31/05/2024 vp5	suitable nesting habitat; possible breeder	Amber
Dunlin	2	31/05/2024 vp5	suitable nesting habitat; possible breeder	Red
Ringed Plover	1	31/05/2024 vp5	suitable nesting habitat; possible breeder	Amber
Ringed Plover	1	31/05/2024 vp9	suitable nesting habitat; possible breeder. flushed, on a stoney beach but unlikely to be breeding	Amber
Shelduck	2	31/05/2024 vp10	suitable nesting habitat; possible breeder	Amber
Black-headed Gull	2	02/07/2024 vp7	suitable nesting habitat; possible breeder	Amber
Herring Gull	4	02/07/2024 vp7	suitable nesting habitat; possible breeder	Amber
Common Gull	1	02/07/2024 vp8	suitable nesting habitat; possible breeder	Amber
Shelduck	1	02/07/2024 vp8	suitable nesting habitat; possible breeder	Amber
Oystercatcher	3	02/07/2024 VP8	suitable nesting habitat; possible breeder	Amber
Grey Heron	1	02/07/2024 vp9	suitable nesting habitat; possible breeder	Green
Little Egret	2	02/07/2024 vp10	suitable nesting habitat; possible breeder	Green
Shelduck	1	02/07/2024 vp10	suitable nesting habitat; possible breeder	Amber
Little Egret	7	02/07/2024 vp11	suitable nesting habitat; possible breeder	Green
Teal	10	02/07/2024 vp11	suitable nesting habitat; possible breeder	Amber

8.4.6 Incidental recordings

During all bird surveys incidental recordings were made of species of note. These included the following non-waterbird species as set out in the table below.

Table 8-13 Incidental records of birds of prey and kingfisher

Species	Survey*	No. sightings	Observations	Designations (Habitats Directive, BOCCI)
Kestrel <i>Falco tinnunculus</i>	WB 2025/26	8	Sighted over improved agricultural grasslands and wet grasslands – hunting and travelling	N/A, Red
	WB 2024	3	Sighted over improved agricultural grasslands – mobbed, perched, with prey	
	BB 2024	2	improved agricultural grassland; carrying prey improved agricultural grassland; hunting, male	
	WB 2022/23	2	improved agricultural grassland; hunting wet grassland; perched	
	WB 2021	1	In flight	
Hen Harrier <i>Circus cyaneus</i>	WB 2024	1	Improved agricultural grassland; hunting, male	EU HD Annex I, Amber
	WB 2022/23	2	Improved agricultural grassland, mixed sediment shores and open marine water; hunting, male. Improved agricultural grassland; travelling, male, VP12.	
	WB 2021	1	In flight, along coast at Moyasta Bridge.	
	WB 2025/26	3	Various habitats, female.	
Peregrine Falcon <i>Falco peregrinus</i>	WB 2024	1	Improved agricultural grassland and wet grassland; travelling.	EU HD Annex I, Green
	BB 2024	1	Estuaries, sheltered rocky shores and improved agricultural grassland; hunting, adult.	
	WB 2022/23	1	Marsh; travelling, juvenile.	
Sparrowhawk <i>Accipiter nisus</i>	WB 2025/26	2	Improved agricultural grassland; travelling, mobbed, mobbed by passerines.	N/A, Green
	BB 2024	1	Improved agricultural grassland and conifer plantation; carrying prey.	
	WB 2022/23	1	Improved agricultural grassland; travelling.	
Kingfisher <i>Alcedo atthis</i>	WB 2022/23	1	Watercourses; travelling, flew up channel (VP11).	EU HD Annex I,

Species	Survey*	No. sightings	Observations	Designations (Habitats Directive, BOCCI)
				Amber
Merlin <i>Falco columbarius</i>	WB 2025/26	1	Wet grassland; travelling.	EU HD Annex I, Amber
	WB 2022/23	1	Improved grassland; hunting.	
White-Tailed Sea Eagle	WB 2025/26	1	Improved agricultural grassland and sea inlets and bays; flying, mobbed, juvenile.	N/A, Red

*WB – wintering bird survey; BB – Breeding bird survey

8.4.7 Badger

8.4.7.1 Desk study

The NBDC returned numerous records for Badger throughout the study area, with the most recent record being from 2016.

8.4.7.2 Field survey

Badger prints were found within the proposed development boundary at Kilkee in 2023. No latrines or setts were recorded during the surveys. No signs of badger were recorded in 2026. A Badger sett may be present in the wider area. Given the evidence of badger activity within the proposed development boundary, the proposed development has the potential to sever a badger territory. Therefore, Badger has been included as a Key Ecological Receptor.

8.4.8 Bats

8.4.8.1 Desk study

Table 8-14 lists the bat species records obtained from the NBDC within the following hectads which are in the study area for the proposed development: Q85, Q86, Q95, Q96 and R05. In addition, Lesser Horseshoe bat activity was recorded in Vandeleur Gardens, Kilrush in 2019/2020, which is c. 1.2km from the closest point of the proposed development, however this is not a roost.

Table 8-14 NBDC records for bat species within the study area.

Common name	Scientific name	Designations
Daubenton's Bat	<i>Myotis daubentonii</i>	WA, HD IV
Leisler's Bat	<i>Nyctalus leisleri</i>	WA, HD IV
Common Pipistrelle	<i>Pipistrellus pipistrellus sensu lato</i>	WA, HD IV
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	WA, HD IV
Nathusius's Pipistrelle	<i>Pipistrellus nathusii</i>	WA, HD IV
Lesser Horseshoe Bat	<i>Rhinolophus hipposideros</i>	WA, HD IV, II
Brown Long-eared Bat	<i>Plecotus auritus</i>	WA, HD IV

8.4.8.2 Field surveys

A bat suitability survey was carried out which aimed to identify potential bat roosts in the survey area. No potential roost features in trees or structures were identified.

Bat species are assumed to be present and forage and commute within the study area, therefore 'Bats' have been included as a Key Ecological Receptor.

8.4.9 Otter

8.4.9.1 Desk study

The NBDC returned several records of Otter (*Lutra lutra*) in the study area. Otter are listed under Annex II and Annex IV of the European Habitats Directive and are also protected under the Irish Wildlife Acts. As per the NPWS Article 17 Reporting, the range, population, habitat and future prospects for this species in Ireland have been assessed as favourable (NPWS, 2019b).

Otter is found throughout Ireland in a wide variety of freshwater and coastal habitats, both in urban and rural environments. The species has two basic requirements: aquatic prey and safe refuges where they can rest. Otter maintains territories and can have a home range of up to 35km (NIEA, 2011: NPWS 2009). They may also travel several hundred meters outside of these territories to exploit novel prey opportunities (such as nearby pods and marshes). In general, however, this species will exploit a narrow strip of habitat at the aquatic-terrestrial interface (NPWS, 2009).

8.4.9.2 Field survey

The mammal survey recorded evidence of otters, including prints and spraint. Otter prints were recorded at three locations in the survey area. One at the mouth of Poulnasherry Bay, one 145m east of the crossing of the proposed development by the Garraun watercourse and close to the shoreline at Carrowncalla South. Two otters were sighted along a shingle and gravel bank on the east side of Poulnasherry Bay, north of Carrowncalla South. Otter spraint was recorded in the same area the otters were seen. No otter holts were recorded in the study area.

Otter was also recorded incidentally during the wintering bird surveys in October 2022 and January 2023, where the surveyor observed otter in the estuary and salt marshes.

As Otter were recorded regularly within the study area, 'Otter' has been included as a Key Ecological Receptor.

8.4.10 Marine Mammals

8.4.10.1 Desk Study

There are no records in the past 12 months in Co. Clare for marine mammals from the Irish Whale and Dolphin Group portal (Accessed May 2026). NBDC returned records for marine mammals in the last 10 years as presented below in Table 8- 8-18.

Table 8-18: Marine Mammals. Source: NBDC (2025).

Common name	Scientific name
Bottle-nosed Dolphin	<i>Tursiops truncatus</i>
Common Dolphin	<i>Delphinus delphis</i>
Common Porpoise	<i>Phocoena phocoena</i>
Cuvier's Beaked Whale	<i>Ziphius cavirostris</i>

Common name	Scientific name
Fin Whale	<i>Balaenoptera physalus</i>
Grey Seal	<i>Halichoerus grypus</i>
Harbour Seal	<i>Phoca vitulina</i>
Humpback Whale	<i>Megaptera novaeangliae</i>
Killer Whale	<i>Orcinus orca</i>
Long-finned Pilot Whale	<i>Globicephala melas</i>
Minke Whale	<i>Balaenoptera acutorostrata</i>
Striped Dolphin	<i>Stenella coeruleoalba</i>

8.4.11 Other Mammals

8.4.11.1 Desk study

The NBDC returned records for mammal species protected under the Wildlife Act 1976 (as amended). There are records of Pine Marten (*Martes martes*), Irish Hare (*Lepus timidus subsp. hibernicus*), Irish Stoat (*Mustela erminea subsp. hibernica*) and Hedgehog (*Erinaceus europaeus*) in the study area.

8.4.11.2 Field surveys

No signs of these protected mammals were recorded within the study area. Natural and semi-natural habitats in the study area such as scrub, woodlands, hedgerows and treelines provide habitat for these species. Habitats lost under the footprint of the proposed development, which could result in the loss and fragmentation of mammal habitat. The potential impact to mammals is considered under the Key Ecological Receptor 'Wildlife corridors'.

8.4.12 Reptiles and Amphibians

8.4.12.1 Desk study

The NBDC returned records for Common Frog (*Rana temporaria*), Smooth Newt (*Lissotriton vulgaris*), Common Lizard (*Zootoca vivipara*), Leatherback Turtle (*Dermochelys coriacea*) in the search area. These species are all protected under the Wildlife Acts, while leatherback Turtle area also listed on Annex IV of the Habitats Directive.

Frogs are common and widespread and may utilise the drainage ditches found in the study area. They are assumed to be present in the study area. There is no suitable habitat for newts, such as ponds or standing freshwater, newts are not assumed to be present in the study area.

A number of drainage ditches were identified within the study area, however these habitats were generally of poor quality and/or had a saline influence and are therefore not suitable for amphibians.

There is suitable habitat for Common Lizard to occur in the surroundings of the proposed development, given that this species can utilise a wide variety of habitats including grasslands, wetlands, hedgerows and stone walls, which are present surrounding the proposed development.

Leatherback Turtle generally occur in open marine waters and would most likely be present in the waters near Kilrush and Kilkee but could also occur in Poulnasherry Bay. Given that this species occurs in small numbers in late summer on the Irish Coast, and that it is not vulnerable to impacts arising from the proposed development, Leatherback Turtle has not been considered further.

Common Frog and Common Lizard have been considered under the Key Ecological Receptor 'Wildlife corridors'.

8.4.13 Aquatic Species

8.4.13.1 Desk study

Brook Lamprey (*Lampetra planeri*), Sea Lamprey (*Petromyzon marinus*), River Lamprey (*Lampetra fluviatilis*) and Atlantic Salmon (*Salmo salar*) have all been recorded spawning in the Lower Shannon and its tributaries (NPWS, 2013). The NBDC returned no records of these aquatic species in the study area of the proposed development (NBDC, 2025). However, migratory species such as Sea Lamprey, River Lamprey and Atlantic Salmon migrate through the mouth of the Shannon Coastal Waterbody to reach spawning grounds in the Shannon system, therefore, these species may also occur in Poulnasherry Bay.

As lamprey species and Salmon could be present in waterbodies downstream of the proposed development, impacts to these species have been considered under the Key Ecological Receptor 'Poulnasherry Bay'.

8.4.14 Terrestrial Invertebrates

8.4.14.1 Desk study

The NBDC returned two records for Marsh Fritillary butterfly (*Euphydryas aurinia*). This species is protected under Annex II of the Habitats Directive. Marsh Fritillary is Ireland's only legally protected insect.

8.4.14.2 Field surveys

Devil's-bit Scabious (*Succisa pratensis*), the host plant for this species, was recorded in one wet grassland in the area of Carrowncalla north. The plant was recorded as 'frequent' on the DAFOR scale. This area was within of the footprint of the proposed development in an area where the route is not within the former railway corridor. This area was assessed to be poor suitability for Marsh Fritillary as the area of habitat was small and the density of Devil's Bit Scabious was low. This species requires very high density of the obligate food source to sustain populations and to survive natural changes of habitat. Given the lack of suitable habitat for this species, this species is highly unlikely to be present in the receiving environment. Therefore, terrestrial invertebrates have not been considered further.

8.4.15 Flora

8.4.15.1 Desk study

The NBDC returned no records for plant species listed in the Flora Protection Order (2022) in the study area. Records were returned for one plant species listed as near threatened on the Irish Red List (Wyse Jackson *et al.*, 2016), namely Marsh-mallow (*Althaea officinalis*), the closest of these records to the proposed development is located over 7km away.

8.4.15.2 Field survey

No species listed on the Flora Protection Order (2022) or Red List were identified in the survey area.

Therefore, rare flora species have not been considered further.

8.4.16 Invasive species

8.4.16.1 Desk study

Table 8-19 below lists the invasive plant species records obtained from the NBDC within the search area. Records for species which are listed on the Third Schedule of the European Communities (EC) (Birds and Natural Habitats) Regulations, 2011 (S.I. No.477/2011)) are presented.

Table 8-19 Invasive species. Source: NBDC (2025).

Common name ⁸	Scientific name
High Impact Species	
Giant Rhubarb	<i>Gunnera tinctoria</i>
Common Cord-grass	<i>Spartina anglica</i>
Japanese Knotweed	<i>Reynoutria japonica</i>
Rhododendron	<i>Rhododendron ponticum</i>
Medium Impact Species	
Himalayan Knotweed	<i>Persicaria wallichii</i>
Three-cornered Garlic	<i>Allium triquetrum</i>

8.4.16.2 Field surveys

Japanese knotweed (*Reynoutria japonica*) was recorded at several locations surrounding the proposed development, during the field surveys. Details of the areas of infestation presented below in Table 8-20 and shown in Figure 8-6.

Table 8-20 Japanese Knotweed recorded during the field surveys.

Reference	ITM X	ITM Y	Location	Description
1	497796	654556	Kilrush, former railway line adjacent to Kilrush Wastewater Treatment Plant.	3x3m stand in an area of scrub along a path.
2	498685	654869	Kilrush, former railway line to rear of houses between Merchant's Quay and Shankyle Road.	Two very large dense stands, 5x20m and 5x10m.
3	498710	654880		
4	498829	654920	Kilrush, two stands open green area between Merchant's Quay and Shankyle Road at the location of the proposed trail head.	Two small stands recorded in 2023 but had been treated and was absent in 2024.
5	498879	654925		
6	489048	659616	Kilkee, on former railway line which meets Gurrane.	3x8m stand.
7	489494	659428	Kilkee, near Meadow View Court	5m long parallel to route, outside of red line boundary

⁸ * denotes Regulation S.I. 477 (Ireland) – Invasive Species listed on Third Schedule of the European Communities (EC) (Birds and Natural Habitats) Regulations, 2011.

All of these locations of Japanese Knotweed are within the red line boundary of the proposed development. The construction of the proposed development could cause invasive species to be spread within and outside the site. 'Invasive species' has been included as a Key Ecological Receptor.

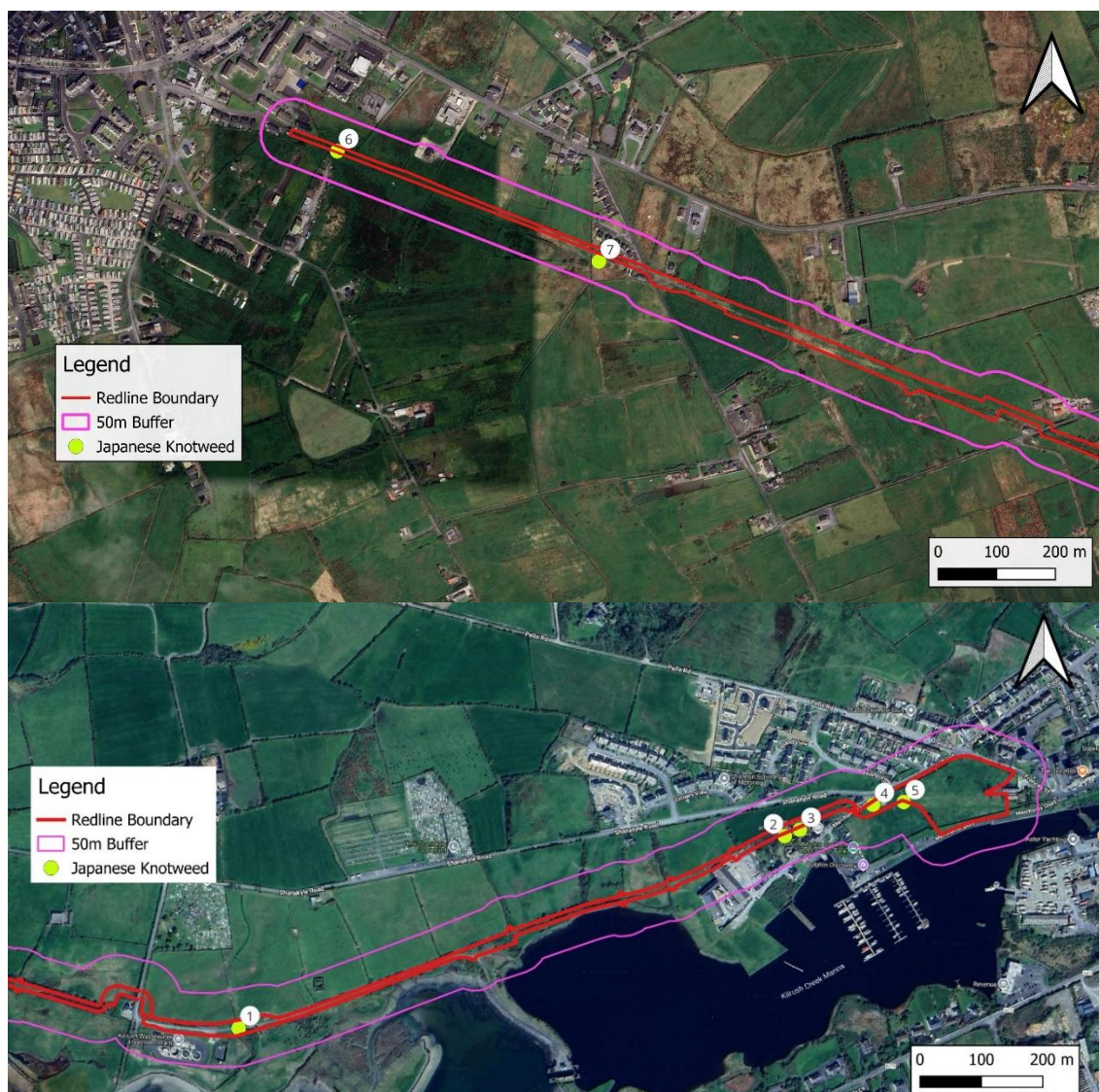


Figure 8-6 Locations of Japanese Knotweed along the proposed development in Kilkee (top) and Kilrush (bottom)

8.4.17 Marine Mammals

8.4.17.1 Desk Study

There are no records in the past 12 months in Co. Clare for marine mammals from the Irish Whale and Dolphin Group portal (Accessed May 2026). NBDC returned records for marine mammals in the last 10 years as presented below in Table 8-. As marine mammals will not be present in the shallow waters surrounding the proposed development, they are not vulnerable to the types of impact from the proposed development and have not been considered further as ecological receptors.

Table 8-21: Marine Mammals. Source: NBDC (2025).

Common name	Scientific name
Bottle-nosed Dolphin	<i>Tursiops truncatus</i>
Common Dolphin	<i>Delphinus delphis</i>
Common Porpoise	<i>Phocoena phocoena</i>
Cuvier's Beaked Whale	<i>Ziphius cavirostris</i>
Fin Whale	<i>Balaenoptera physalus</i>
Grey Seal	<i>Halichoerus grypus</i>
Harbour Seal	<i>Phoca vitulina</i>
Humpback Whale	<i>Megaptera novaeangliae</i>
Killer Whale	<i>Orcinus orca</i>
Long-finned Pilot Whale	<i>Globicephala melas</i>
Minke Whale	<i>Balaenoptera acutorostrata</i>
Striped Dolphin	<i>Stenella coeruleoalba</i>

8.5 Key Ecological Receptors

This section provides details of the Key Ecological Receptors that were identified during the desk study and field surveys. KERs have been identified based on specific habitats and species of ecological significance, whether they exist in or as part of a designated site or not. Impacts to the receptors will be the same regardless of their designation, although the highest level of importance was given where there are species or habitats of higher importance that will be impacted by the proposed development. This approach was used to be as practical as possible and to avoid unnecessary repetition during this assessment. Habitats and species which are designated as part of European sites are assessed specifically in the NIS which accompanies this planning application.

Table 8-22 below presents a list, description, and evaluation of the Key Ecological Receptors.

Table 8-22 Evaluation of the Key Ecological Receptors for the Proposed Development

Key Ecological Receptor	Description	Evaluation of importance
KER 1 Poulnasherry Bay	Poulnasherry Bay is designated as part of an SAC and SPA. The bay and surrounding habitats contain several Annex I habitats and support numerous coastal, aquatic and semi-aquatic species.	National Importance as Poulnasherry Bay is part of an SAC and SPA and supports species listed in Annex II and/or IV of the Habitats Directive.
KER 2 Wintering birds	Wintering birds occur within Poulnasherry Bay in internationally important numbers, the site is very important for foraging and roosting habitat.	International Importance as the wintering bird species are Qualifying Interests of the SPA and occur in internationally and nationally important numbers.

Key Ecological Receptor	Description	Evaluation of importance
<p>KER 3 Breeding Waders</p>	<p>The surrounding habitats of the proposed development supports numerous bird species, including Red and Amber listed species and ground-nesting waders. Ringed Plover, an amber listed species was confirmed breeding nearby the proposed development.</p>	<p>National Importance as breeding wader populations are declining nationally, any occurrence of breeding waders would contribute a significant proportion of the national breeding population.</p>
<p>KER 4 Birds of prey and Kingfisher</p>	<p>Birds of prey which are rare, red-listed or Annex I species occur in the location of the proposed development.</p>	<p>Local Importance (higher value) as these species are nationally rare or listed on Annex I of the Birds Directive.</p>
<p>KER 5 Otter</p>	<p>No Otter holts were recorded within 150m of the proposed development. However otter are known to be active within Poulnasherry Bay. Otters were sighted several times and otter spraint and prints were recorded adjacent to the proposed development boundary.</p>	<p>County Importance as Otter are protected under Annex IV of the Habitats Directive and under the Wildlife Acts, and are a Qualifying Interest of the Lower River Shannon SAC. They are a regularly occurring population which is considered at the County Level.</p>
<p>KER 6 Bats</p>	<p>While no bat roosts were identified within the proposed development boundary, the habitats found within and adjacent to the study area provide commuting and foraging habitat for various bat species.</p>	<p>Local Importance (higher value) as all bat species are listed on Annex IV of the Habitats Directive and protected under the Wildlife Act, and the study area is suitable for commuting and foraging bats.</p>
<p>KER 7 Wildlife corridors</p>	<p>Wildlife corridors such as areas of scrub, woodlands hedgerows and treelines are important supporting habitat for numerous species. These corridors provide nesting habitat for birds (including red and amber-listed species), refuges and corridors for small mammals, reptiles and amphibians, provide a food source for birds, mammals and insects and support local biodiversity.</p>	<p>Local Importance (higher value) on the basis that these features support local biodiversity, maintain links and ecological corridors between features of ecological value. Hedgerows treelines and scrub and wildlife corridors are noted as important features in the Clare Biodiversity Action Plan and County Development Plan.</p> <p>Nesting birds are protected under the Wildlife Act and amber-listed species were confirmed to be breeding.</p> <p>Reptiles and amphibians are protected under the Wildlife Act and are assumed to be present.</p> <p>Numerous actions in the Clare BAP focus on the protection of local biodiversity including linear habitat features.</p>
<p>KER 8 Badger</p>	<p>Badger activity was previously recorded within the proposed development boundary and badger setts could be present within the surrounding area.</p>	<p>Local Importance (higher value) as Badger are protected under the Wildlife Act, and badger setts could be present within the surrounding area.</p>

Key Ecological Receptor	Description	Evaluation of importance
KER 9 Invasive species	The invasive species Japanese Knotweed is present at several locations within the footprint of the proposed development. This species can spread easily and smother native vegetation, destabilise riverbanks and degrade habitats used by local wildlife.	Japanese Knotweed is subject to restrictions under Regulation 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011. Invasive aquatic species have the potential to impact negatively on biodiversity through degrading habitats, alteration foraging resources for other wildlife. A valuation is not assigned to this KER as it has the potential to impact biodiversity negatively.

8.6 Do Nothing

If the proposed development does not proceed, there will be no loss of habitats. The baseline environment, as described, would continue in line with trends, and without the proposed development, impacts including habitat loss, human disturbance and habitat degradation would not occur.

8.7 Description of Potential Impacts (Unmitigated)

8.7.1 Effects on European Sites

Three European designated sites were identified in the Zone of Influence for the proposed development and pathways for impacts from the proposed development were identified for the three of these sites.

A Natura Impact Statement has been prepared for the proposed development. There is some overlap between this chapter of the EIAR and the NIS, including mitigation measures. However, both the EIAR and NIS for the proposed development are standalone documents which do not rely on each other. Impacts on the relevant European sites are dealt with under the following Key Ecological Receptors: KER 1 Poulnasherry Bay, KER 2 'Wintering Birds', KER 5 'Otter', and KER 9 'Invasive species'.

8.7.2 Impacts on Key Ecological Receptors

A number of elements of the proposed development are considered likely to give rise to environmental and ecological impacts. The sensitivity of Poulnasherry Bay for wintering birds is a key issue for the project, and for this reason the literature around disturbance to wintering birds is described in detail below.

8.7.2.1 Disturbance to wintering birds

An overview of the current understanding of waterbird disturbance is provided in the following sections.

8.7.2.1.1 *What is a Disturbance Response?*

The responses of birds to disturbance are categorised as weak, moderate or high in Lewis & Tierney (2014) and are described as follows:

- Weak response: waterbirds move slightly away from the source of the disturbance.
- Moderate response: waterbirds move away from the source of the disturbance to another part of your subsite; they may return to their original position once the activity ceases.

- High response: waterbirds fly away to areas outside of your subsite and do not return during the current count session.

These categories are useful but they are limited to the one-off response and do not consider the impact of the response. For example, responses alone do not consider the disturbance of a roost, which is a greater impact than the disturbance of birds feeding in open habitat (Lewis et al., 2019; Navedo & Herrera, 2012).

A study of disturbance responses of waterbirds from recreational activities on Bull Island, Dublin, found that a low number of disturbance events caused moderate to high disturbance responses from waterbirds (Lewis et al., 2019).

8.7.2.1.2 What are the Impacts of Disturbance?

The effects of disturbance and displacement on birds are summarised in Goodship and Furness (2022). Disturbance is the pressure/threat affecting the second highest numbers of wintering waterbird species numbers in Ireland by Burke et al (2025), second only to avian influenza. Disturbance to birds can alter their energy intake (feeding habits), energy expenditure (activity levels), alter their breeding success and ultimately impact their survival. Some of these changes include, but are not limited to, the following:

- Changes to breeding location, timing of breeding, breeding strategy and success
- Changes to foraging location, time spent foraging, food source, energy intake and daily energy budgets;
- Changes to roosting location and time spent at rest; and,
- Changes to migration routes, stop-over locations and seasonal energy expenditure.

The recently published and updated waterbird population estimates and trends for Ireland show that the majority of its wintering waterbird species have declining populations over the previous 23-year period; with the majority of wading bird species in decline over both the short- and long-term periods (Kennedy et al., 2023). Waterbird populations are under pressure from a range of factors, of which anthropogenic disturbance is just one.

human activity along the length of the route. Working hours for construction will be between 07:00 – 19:00, Monday – Friday. The construction period will be up to 24 months for the entire proposed development; however, any single area will be subjected to disturbance for much shorter duration.

Disturbance to wintering birds

The construction of the proposed development during winter has the potential to cause disturbance and displacement to birds, particularly around Poulnasherry Bay.

Varying sensitivity to disturbance

There is a high number of variables which can influence disturbance sensitivity and disturbance response. Variation in sensitivity to disturbance can be due to: interspecific variation (different species vary in sensitivity) and intraspecific variation (individuals of the same species vary in sensitivity), time of year, time of day, tidal state, weather conditions, levels of habituation, the type of disturbance, novelty of disturbance type, specific location and whether disturbance already exists or is absent (Goodship and Furness, 2022).

At what Distance can Disturbance Occur?

As noted above that disturbance sensitivity is influenced by a high number of variables. This means that disturbance response is also influenced by these variables. The disturbance response that can be observed is the bird moving away from the source of disturbance, the

distance from the source at which this occurs is the Flight Initiation Distance (FID). Goodship and Furness (2022) specifies that birds will also show alert responses which is cessation of normal sleeping, foraging or preening behaviour. The Alert Distance (AD) is the initial response and occurs prior to the FID. The Minimum Approach Distance (MAD) or buffer distance, is the minimum distance at which people should be separated from wildlife to avoid any disturbance response (Livezey *et al.*, 2016). Guidance on buffer zones are a range of distances that can be used to protect birds from human disturbance is provided by NatureScot (Goodship and Furness, 2022). However, it must be noted that buffer zones are not set distances but should consider the site-specific conditions, conservation status and importance of the population. Also, buffer zones are very difficult to define for specific species for specific sources of disturbance due to the high number of variables.

The species tables in Goodship and Furness (2022) were reviewed for the regularly occurring species in Poulmasherry Bay for each species sensitivity to disturbance, quality of information and buffer zone in the breeding and non-breeding season. In addition, other sources of disturbance distance were reviewed including Mayer *et al.* (2019) and Cutts *et al.* (2013). The lowest estimates for buffer zones are 100-200m for species of low sensitivity and the highest are 200-650m for species of high sensitivity, such as curlew.

Sources of disturbance

Pedestrians, dogs and outdoor recreational activities are well recorded as agents of disturbance to roosting and foraging waterbirds (Steven *et al.*, 2011). Dogs can have a disproportionate level of disturbance to roosting and foraging birds (Gómez-Serrano, 2021; Phalan & Nairn, 2007). Dogs may elicit a stronger disturbance response in birds compared to humans walking given that they are perceived as a greater threat, can be more wide-roaming (if unrestrained) and can move unpredictably (Weston and Stankowich, 2014). Dogs will generally follow the route of their owner; however, they will also roam rapidly into surrounding areas and have the potential to cause disturbance to a greater area (Thomas *et al.*, 2024). This disturbance caused by dogs can have negative effects on birds (Steven *et al.*, 2011). These negative effects are discussed in further detail below.

Most greenway users with dogs are likely to be local users rather than tourists, and dog owners will take their dogs on walks throughout the year. Therefore, dogs are likely to be present year-round along the proposed development and will be present during the wintering and breeding bird seasons. Dogs at coastal sites can cause an even higher disturbance stimulus as dogs are more likely to be let off lead and to enter water bodies at coastal sites (Gómez-Serrano, 2021).

The population trends for waterbird species in Ireland are outlined above. The declines are a result of a number of factors, including habitat loss, agricultural intensification, climate change, pollution, poor water quality, and disturbance.

8.7.2.1.3 Sensitivity to Disturbance and Disturbance Distances

There are several variables that can influence the disturbance sensitivity and the disturbance response of birds. The variation in sensitivity to disturbance can be due to interspecific variation (different species vary in sensitivity) and intraspecific variation (individuals of the same species vary in sensitivity), time of year, time of day, tidal state, weather conditions, levels of habituation, the type of disturbance, novelty of disturbance type, specific location and whether disturbance already exists or is absent (Goodship and Furness, 2022).

Similarly, the response to disturbance is also influenced by these variables. The weakest response will usually involve the cessation of normal sleeping, foraging or preening behaviour. The Alert Distance (AD) is the initial response and occurs prior to the FID.

The Minimum Approach Distance (MAD) or buffer distance is the minimum distance at which people should be separated from wildlife to avoid any disturbance response (Livezey *et al.*, 2016). Guidance on buffer zones are a range of distances that can be used to protect birds from human disturbance is provided by NatureScot (Goodship & Furness, 2022). However, it must be noted that buffer zones are not set distances but should consider the site-specific conditions, conservation status and importance of the population. Also, buffer zones are very difficult to define for specific species for specific sources of disturbance due to the high number of variables. The distance from the source at which birds take flight is the Flight Initiation Distance (FID).

The species tables in Goodship &Furness (2022) were reviewed for the regularly occurring species in Poulnasherry Bay. These are presented below in Table In addition, other sources of disturbance distance were reviewed including Mayer et al. (2019) and Cutts et al. (2013) where species were not included in the Goodship & Furness study. Buffer zones for each species to protect birds from human disturbance, are generalised for all activities and not specific to the types of disturbance which may arise from the proposed development. This assessment follows the precautionary principle and considers the higher buffer distance in the range. The lowest estimates for buffer zones are 100-200m for species of low sensitivity and the highest are 200-650m for species of high sensitivity, such as Curlew. Table 8-23 presents the buffer zones for each species. The table should be read in conjunction with the following notes:

- Mayer et al., (2019) reports Flight Initiation Distances (FID, the distance at which birds flee from an approaching threat) is often used to measure antipredator behaviour and establish buffer zones to reduce human impact on wildlife. This study found FIDs by approaching birds on a body of water using a boat, and therefore the land-based activities of the proposed development may have different FIDs.
- Cutts et al (2013) provides estimates for distances where mitigation would be required to avoid causing disturbance to various species, primarily from construction works.
- Laursen et al. 2005, assesses Escape Distance (ED) of waterbirds is defined as the shortest distance at which birds flush when a person or another disturbing stimulus approaches. EDs have been used to demonstrate relative susceptibility of waterbirds to different types of disturbance, e.g. the differences between a walking person, a car or a boat.

Table 8-23: Qualifying Interest Species Sensitivity to Disturbance

Common Name	Sensitivity	Buffer zone/ Disturbance distance	Source
Cormorant (<i>Phalacrocorax carbo</i>) [A017]	Moderate	152m (flight initiation distance)	Mayer (2019)
Whooper Swan (<i>Cygnus cygnus</i>) [A038] (species not recorded during any survey in Poulnasherry Bay)	Moderate	200-600m	Goodship & Furness (2022)
Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046]	High	400m	Cutts et al. (2013)
Shelduck (<i>Tadorna tadorna</i>) [A048]	High	100-400m	Goodship & Furness (2022)

Common Name	Sensitivity	Buffer zone/ Disturbance distance	Source
Wigeon (<i>Anas penelope</i>) [A050]	High	200-500m	Goodship & Furness (2022)*source quality considered low
Teal (<i>Anas crecca</i>) [A052]	High	168m (flight initiation distance)	Mayer (2019)
Pintail (<i>Anas acuta</i>) [A054]	Moderate	100-200m	Goodship & Furness (2022) *source quality considered low
Shoveler (<i>Anas clypeata</i>) [A056]	Moderate	100-200m	Goodship & Furness (2022)
Scaup (<i>Aythya marila</i>) [A062] (species not recorded during any survey in Poulnasherry Bay)	High	150-450m	Goodship & Furness (2022)
Ringed Plover (<i>Charadrius hiaticula</i>) [A137]	High	100-300m	Goodship & Furness (2022)
Golden Plover (<i>Pluvialis apricaria</i>) [A140]	Moderate	300m	Cutts et al. (2013)
Grey Plover (<i>Pluvialis squatarola</i>) [A141]	Moderate	150-300m	Goodship & Furness (2022)
Lapwing (<i>Vanellus vanellus</i>) [A142]	Moderate	200-500m	Goodship & Furness (2022)
Knot (<i>Calidris canutus</i>) [A143]	Moderate	100-300m	Goodship & Furness (2022)
Dunlin (<i>Calidris alpina</i>) [A149]	Moderate	150-300m	Goodship & Furness (2022)
Black-tailed Godwit (<i>Limosa limosa</i>) [A156]	Moderate	100-200m	Goodship & Furness (2022)
Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157]	Moderate	200-300m	Goodship & Furness (2022)
Curlew (<i>Numenius arquata</i>) [A160]	High	200-650m	Goodship & Furness (2022)
Redshank (<i>Tringa totanus</i>) [A162]	Moderate	200-300m	Goodship & Furness (2022)
Greenshank (<i>Tringa nebularia</i>) [A164]	High/ Moderate	300-500m	Goodship and Furness, 2022
Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179]	Unknown	50-450m	Laursen et al. (2005)

Disturbance due to the proposed development

Given the close proximity of the greenway to Poulnasherry Bay, the users of the greenway could cause disturbance to waterbirds. The locations which are currently open to the public, including Brew's Bridge, Carrowncalla South and the local roads which lead from the N67 to the coast, will remain open to the public as part of the proposed development.

All areas of the SPA are important for the SPA and the birds that use them, regardless of how frequently birds were recorded or the numbers that use them.

The locations along the proposed development route where disturbance to wintering birds is most likely to occur are those areas which are visible or partially visible from the intertidal areas. These areas have been identified as part of this assessment and are presented in Figure 8-5 and Appendix 8.3, and are described in Table 8-12. Moyasta Bridge is a particularly sensitive location due to the intertidal habitat present on both sides, and the fact that the bridge and causeways are elevated and exposed.

In general, the route of the proposed development does not have high baseline levels of human activity. The exceptions to this include Kilrush Marina, Brew's Bridge Beach, Carrowncalla and Blackweir Bridge. It is expected that birds in these areas have a higher tolerance to the presence of people than birds elsewhere.

Screening between greenway users and the bay is proposed as part of the design of the proposed development and is detailed within the mitigation section (Section 8.8). However, the impacts of disturbance here are considered in the absence of screening mitigation.

8.7.3 Construction Phase Disturbance

Construction of the proposed development will result in noise, vibration, lighting and increased human activity along the length of the route. The working hours for construction will be between 07:00 – 19:00, Monday – Friday and Saturday 08:00 to 16:30. No working will be permitted on Sunday and Bank Holidays. The construction period will be up to 24 months for the entire proposed development, however, any single area will be subjected to disturbance for much shorter duration.

The construction of the proposed development has the potential to cause disturbance to birds, particularly around Poulnasherry Bay. However, as set out later in Section 8.8 Mitigation; construction phase disturbance to wintering birds will be avoided as construction within sensitive bird areas will not be allowed in the wintering bird season. Construction in these sections will only be undertaken during the summer months (April – September inclusive), thereby avoid impacting on wintering birds. As such a detailed assessment of construction phase disturbance impacts on wintering birds has not been included here.

8.7.4 Operational Phase Disturbance

8.7.4.1.1 Disturbance to Wintering Birds from the Proposed development

The operation of the proposed development has the potential to cause disturbance to birds, in particular in the sensitive bird areas (presented in Figure 8-5 and described in Section 8.4.4.2). This section presents the potential sources of disturbance and disturbance impacts which are specific to the operational phase of the proposed development.

Greenway users including people and dogs have the potential to cause disturbance through their visible presence and by producing noise on the greenway itself, or by accessing wintering bird habitat outside of the greenway. Given the close proximity of the greenway to Poulnasherry Bay, the users of the greenway could cause disturbance to waterbirds in the intertidal area.

The locations which are currently open to the public, including Brew's Bridge, Carrowncalla South and the local roads which lead from the N67 to the coast, will remain open to the public during the operation of the proposed development.

All areas of the SPA are important, regardless of how frequently birds or how many birds were recorded during the surveys. The locations along the proposed development route where disturbance to wintering birds is most likely to occur are those areas which are visible or partially visible from the intertidal areas. These 'sensitive bird areas' have been identified as part of this assessment and are presented in Figure 8-5 and Appendix 8.3, and are described in Table 8-12. Moyasta Bridge is a particularly sensitive location due to the intertidal habitat present on both sides of the route, and the fact that the bridge and causeways are elevated and exposed.

Most of the route of the proposed development is undeveloped and relatively undisturbed. The existing sources of disturbance are associated with private dwellings and farms located in proximity to the shoreline. People in gardens, traffic, agricultural machinery, livestock, and intertidal aquaculture are all causes of disturbance to wintering birds, however, these are low levels and occasional in Poulnasherry Bay. There are several exceptions where the levels of human presence is high, including at Kilrush Marina, Brew's Bridge Beach and Blackweir Bridge. It is expected that birds in these areas have a higher tolerance to the presence of people than birds elsewhere.

8.7.5 Greenway Visitor Number Estimates

The predicted number of greenway users is described in Chapter 5 of this EIAR. A central, low and high growth scenario was calculated for both pedestrians and cyclists, Table 8-30 below presents scenario numbers for year one of the greenway.

Table 8-15 Predicted Greenway User Estimates

Low growth scenario	Central growth scenario	High growth scenario
605 / day	807 / day	1,009 / day
220,825 / year	294,555 / year	368,285 / year

In the low growth scenario, the number of visitors based on an even spread across the year and a 9-hour daylight day is 67 visitors per hour.

The main risk associated with greenway visitors is disturbance to wintering birds, therefore the following paragraphs deal with greenway visitors from October to March inclusive.

The average number of greenway user calculated based on winter counts from the 1st to the 7th of December 2025 on the Great Western Greenway, the Waterford Greenway, the Carlingford Lough Greenway, the Old Rail Trail, the South East Greenway and the Limerick Greenway is 430 visitors.

The populations in the three areas of the proposed development, Kilkee, the rural areas, and Kilrush are based on CSO census data from April, 2022. The number of tourists present has been extrapolated from the Clare County Development Plan in the case of Kilkee, and the estimated numbers of tourist beds available in Kilrush and the rural areas.

Table 8-25 presents the local winter populations at Kilkee, the rural areas, and Kilrush and the expected number of greenway visitors originating from each of these locations.

Table 8-25: Population estimates surrounding the proposed development

	Kilkee	Kilrush	Rural Areas	Total
Permanent Residents (Census 3 rd April 2022)	1214	2649	1106	4969
Tourist estimates (October-March)	25 ⁹	19 ¹⁰	19 ¹¹	63
Total population	1239	2668	1125	5032
% of total	25%	53%	22%	100%
Numbers of visitors per day based on 430/day	107	228	95	430

Table 8-25 shows that the daily number of visitors to the greenway between October and March is 430 people, with 107 people accessing the greenway from Kilkee, 95 from Moyasta and 228 from Kilrush. Based on this data, the potential for greenway users to reach the sensitive bird areas can be considered.

Publicly available data from the TII MOVE shows that 75% of people spend less than 90 minutes on greenways. The average dwell time is 75 minutes based on TII data. Table 8-26 presents the speed of each mode of transport and the distance that can be covered in 90 minutes.

Table 8-26: Modes of Transport on Greenway and Proportion of Users

Mode	Speed	Distance travelled in 45 minutes before turning back	Percentage of users engaging in each activity	Number of total daily users (n=430)
Walking	5 kmph	3.75 km	57 %	245
Cycling	17 kmph	12.75 km	36 %	154
Jogging	10 kmph	7.5 km	7 %	31

Table 8-27 presents the number of greenway user who would reach 'Sensitive Bird Area 1' which is 5km east of Kilkee.

⁹ The summer population of Kilkee is 10-15,000 (Clare CDP).

¹⁰ There are approximately 150 visitor beds in Kilrush. The assumption was made each bed was a double and the winter occupancy rate is 5%. This is 15 people per night. A 25% was added to this figure to account for a margin of error.

¹¹ The same number was applied to the Rural areas and Moyasta. An accommodation search revealed that the real number is likely to be much lower.

Table 8-27: Proportion of Users Reaching a Sensitive Bird Area, starting in Kilkee

Mode	Speed	Distance travelled for 45 mins before turning back	How long would it take to reach Sensitive Bird Area 1?
Walking	5kmph	3.75km	60 mins (120 mins return)
Cycling	17kmph	12.75km	18 mins (36 mins return)
Jogging	10kmph	7.5km	30 mins (60 mins return)

Walkers who remain on the greenway for at least two hours would reach Sensitive Bird Area 1. Given the average dwell time of 75 minutes on Greenway, it is expected that only a small percentage of walkers would reach Sensitive Bird Area 1. It is reasonable to assume that a high proportion of cyclists originating in Kilkee would reach Sensitive Bird Area 1. For joggers, the speed and time spent is very variable, however 60 minutes at 10kmph is considered at the upper end of the time and distance for recreational runners.

The access point at Moyasta is adjacent to Sensitive Birds Areas in both directions. All visitors accessing the greenway at this point are assumed to reach a Sensitive Bird Area.

From Kilrush, 'Sensitive Bird Area 9' is 400m west of the proposed trailhead. It is reasonable to assume that all greenway visitors would reach this area. This sensitive bird area is within Kilrush Harbour and is not influenced by the tide. The greenway would travel along the coast, where small numbers of birds were recorded. Travelling west 'Sensitive Bird Area 8' is 3.5km west of Kilrush at Carrowncalla South. Only visitors doing a round trip of over 7km would reach this point. This is assumed to be mainly cyclists.

The conclusions of this greenway user prediction exercise are:

1. The figure of 430 visitors per day equates to 3 people per kilometre per hour, based on 9.5 hours of daylight and the total greenway length of 15km. In reality, it is expected that greenway visitors will generally be concentrated around the trailheads at Kilkee, Moyasta and Kilrush.
2. The majority of daily greenway users will originate in Kilrush. This is due to the higher baseline population in the winter.
3. A majority of visitors originating in Kilkee will not reach a sensitive bird area.
4. Visitors entering at Kilrush will get to the sensitive bird area within Kilrush Harbour, 400m west of the trail head. This area does not have any intertidal habitat. Cyclists and joggers could reach Brew's Bridge in one hour or less. This area is open to the public already.
5. TII move data shows that 8.6% of greenway visitors are dog walkers. This translates to 37 dog walkers per day across the entire greenway during the winter months, which again, will be concentrated around the trailheads.
6. The dwell times are based on TII MOVE data and visitor behaviour trends on greenways around Ireland and do not reflect the fact that the individual dwell times walkers, joggers and cyclists are highly variable.
7. Mitigation is required to reduce the potential for disturbance in all sensitive bird areas, and this is addressed in the Mitigation Section.

8.7.6 Visual disturbance

Section 8.7.2.1.3 (sensitivity to disturbance) shows that birds can be disturbed up to 600m away from a perceived threat. This is relevant in open habitats, such as intertidal areas, where birds can see over a wide area. Human activity inland generally does not cause disturbance as it is not seen by birds or birds do not perceive it as a threat, as a person is typically behind a hedgerow or wall. Cutts et al. (2013) states that even construction works can be considered low level disturbance if it occurs out of sight of the birds, such as behind a flood embankment but only a short distance from the intertidal area. However, if a person were to suddenly appear on top of the flood bank, this can cause a high disturbance reaction.

In order for disturbance to occur, there must be either a temporal and spatial overlap between the birds and greenway users (Goss-Custard et al., 2019), i.e. birds and people need to be present in the same area at the same time. Greenway users would have an average daylight period of 9.5 hours between October and March. The locations of the birds will also change throughout the tidal cycle. As the tide recedes, feeding waders will often follow the tide to obtain more profitable prey or reach safer feeding areas (Cresswell, 1994).

Birds will be closest to the greenway during the high tide window, which is a four hour period comprising the two hours either side of high tide. There are two high tides in every 24 hour period, so on average, there will be one high tide per day during daylight hours. This is the period when disturbance is most likely to occur, as there is a peak in human activity and birds are pushed closer to the shore.

A total of 4.9km of the greenway is within a sensitive bird area. The total length of the greenway is 15.2km, therefore, 32% of greenway is in a sensitive bird area. This is a conservative assessment and slightly overstates the true figure as some of the sensitive bird areas contain partial screening from vegetation or are far inland so they are not fully visible to waterbirds. This is similar to the level of exposure in a study in the Exe Estuary (Goss-Custard, 2019a) where 35% of a 16.5km route was in direct line of sight of waterbirds. The Exe Estuary Trail follows the Exe Estuary in Southwest England from Dawlish to Exmouth, passing through the villages of Starcross, Topsham and Lympstone. The mid-point of the trail is the city of Exeter, with a population of 130,709 in the 2021 census. One third of this trail is within direct line of sight of waterbirds and has no barriers to prevent access to the shore, and people walking on the mudflats is so common it is considered one of the main sources of disturbance, rather than people walking on the trail itself. This study examined whether disturbance by people caused a significant effect on waterbirds and found that disturbance reduced daily foraging time by <1% in a tidal cycle and <0.05% in a 24hr period. It was concluded that such small amounts of lost foraging time and increased energy expenditure would not impact their survival.

Not all visual stimuli result in disturbance responses from birds and birds quickly become habituated to various levels of stimulus. Whilst habituation to human activity is widely known to occur (Nairn, 2005), this has not been considered in this assessment to lower the potential disturbance response, but it remains important to real-world scenarios. In the Exe Estuary, Goss-Custard, et al., (2020) stated that trains passing in close proximity to roosting waterbirds generally do not cause disturbance (Plate 1) and low-flying aircraft do not cause disturbance. This study demonstrated that disturbance was caused to waterbirds shortly after the trail was built however it reduced to almost no disturbance over time (Plate 2 shows the setting). There is also abundant anecdotal evidence from Bull Island, Co. Dublin, that waterbirds habituate to people walking, running and walking with dogs on the promenade even at high tide when birds are roosting. Phalan and Nairn (2007) note that waterbirds in Dublin Bay become accustomed to people and dogs walking along paths in a predictable way and do not show disturbance responses.



Plate 1: Train passing the Exe Estuary. Source: Goss-Custard et al., 2020. The trains are frequent and pass immediately adjacent to roosting waterbirds (which can be seen in the foreground).



Plate 2: The 'Goat Walk' on the Exe estuary. Source: Goss-Custard et al., 2020. There is no screening, the distance from the trail to the edge of the mudflats is 30-35m, where a high level of habituation has occurred and there is low-level disturbance, despite the lack of screening.

There are no studies which show the before and after effects of installation of visual screening around a wetland site or monitoring of human disturbance when management measures have been implemented. The lack of direct studies is likely due to acceptance that birds are not disturbed when they are unaware of the presence of people. This is demonstrated through bird hides, which are used around the world to allow people to view birds in their natural habitats without disturbing them. These rely on the concept that when the birds can't see or hear people, they are not disturbed.

A study on bird disturbance (Pease et al, 2005) noted that people in hides did not disturb birds nearby, and that where vegetation, embankments or screen were used to screen the hide access paths, birds were similarly not affected by the presence of people.

The effectiveness of visual screening is described in the waterbird disturbance mitigation toolkit (Cutts et al., 2013), which states that a person working behind a flood defence berm does not cause disturbance, but when this person stands on top of the berm and appears in the bird's view, the birds will likely show a disturbance response. In a 10-year study in the Exe Estuary, only areas which were visible to birds were considered in the disturbance assessment. Existing features which concealed people from birds such as behind embankments, hedges, trees, or buildings) were not considered to have a spatial overlap with birds, as without this spatial overlap there is no possibility for disturbance (Goss-Custard et al., 2019). Another study investigating the costs of human disturbance to wintering birds actively measured this by intentionally approaching birds on mudflats and record their responses (Collop et al., 2016).

It is generally accepted that a high level of disturbance responses can cause population-level impacts through lower fitness leading to lower survival rates and reduced reproductive success. However, very little is known about what level of disturbance can result in significant cost to birds. The point where the level of disturbance begins to affect bird demographic rates is known as the 'disturbance threshold' (Goss-Custard and Stillman, 2020). This threshold must be exceeded for significant impacts to occur to a population (Goss-Custard et al., 2019). Goss-Custard et al., (2019) provides a method for quantifying the cost of disturbance. The assessment methodology was developed for a walkway adjacent to an SPA which is applicable to Poulnasherry Bay. Figure 8-7 shows the pathway and variables for significant disturbance to occur to waterbirds. For the proposed greenway, the predicted level of each variable is presented in Table 8-28.

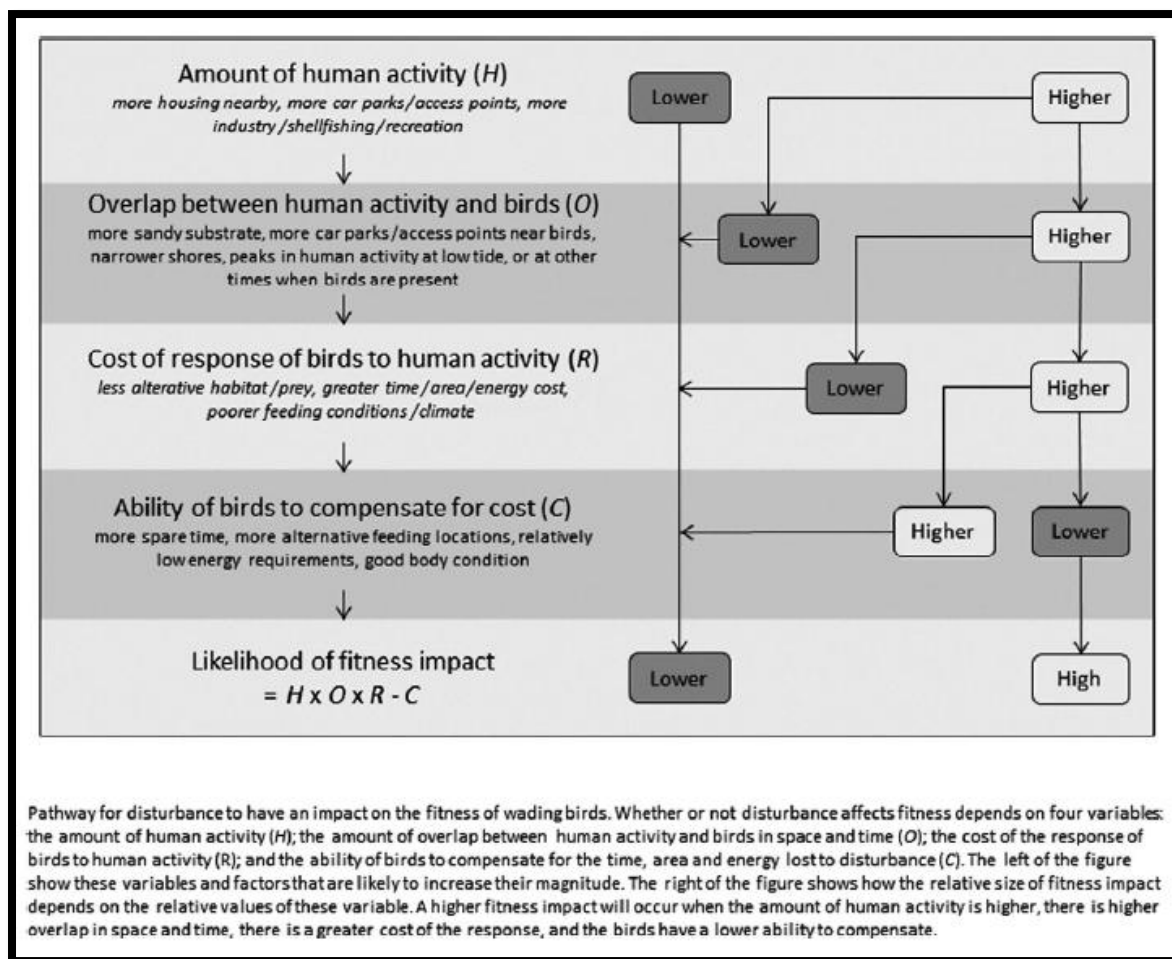


Figure 8-7: Pathway for disturbance to have an impact on wading birds. Extract from Goss-Custard et al., 2019.

Table 8-28 Pathway for disturbance impacts. Application and assessment of the proposed development.

Variable	Predicted level of variable for proposed development	Reasoning
H variable Amount of human activity	The number of expected users is expected to be <u>low</u> in the winter months	The amount of human activity will be low due to small local populations, low numbers of visitors in winter, small percentage who engage in walking / cycling, and poor weather in winter deterring outdoor activities. On average, 48 people per hour will be present on the greenway in winter, however these people will be spread across the greenway (c.15km) and not all will reach a sensitive bird area (see Section 8.7.5).
O variable Overlap between human	The amount of overlap between people and birds is expected to be <u>low</u> in the winter months	<u>Very low spatial overlap:</u> Other than areas where there is existing public access to the foreshore, the greenway will be fenced off. People will not be visible due to screening, and sound will attenuate to background levels within 20m. Surveys for the proposed development recorded 315 no.

<p>activity and birds</p>	<p>due to both low temporal and spatial overlap</p>	<p>birds within 20m of the proposed development over 19 months of winter surveys (<1% of all birds recorded). A total of 4.9km of the greenway is in a sensitive bird area, however the rest of the greenway is not in close proximity to the shoreline and the Shannon Fergus Estuary SPA contains >200km of coastline.</p> <p><u>Low temporal overlap:</u> during the high-tide period, birds are pushed into the 20m zone of the sensitive bird areas, there is an average of 9.5 hours of daily light over the winter (and therefore maximum one high tide period will occur during daylight hours in the winter). People will be present on the greenway during daylight hours and the peak of human activity is during the middle of the day. There is approximately a 4-hour window (two hours either side of high tide) each 24 hrs where birds will be pushed closer to the greenway and where people are likely to be present at the same time. This tidal window will some overlap with the peak of human activity max 14 days per month, but this includes all overlap periods, even 5/10mins. There are about 9 days per month where these two periods overlap by at least two hours.</p> <p>The greenway will have almost no users during the hours of darkness, as waterbirds also forage at night and there is no risk of disturbance during the hours of darkness.</p>
<p>R variable Cost of response of birds to human activity</p>	<p>Predicted to be <u>low</u></p>	<p>Based on the findings of Goss-Custard et al., (2019) which calculated that time costs from disturbance flights were equivalent to <0.1% of the available daylight foraging time of 9 h per tidal cycle and < 0.05% of the foraging time in a 24hr period. Energy costs were equally small, being equivalent to only 0.02% of the daily energy requirements of an individual bird These amounts of disturbance time, energy costs and thus fitness cost were described as 'trivial'. Collop et al (2016) also concluded that certain species can experience a 5-10% reduction in feeding time before they may be significantly affected.</p> <p>The bird densities of the Shannon Fergus Estuary SPA are much lower than the Exe Estuary SPA (see below). It follows that the disturbance costs would be even lower in the Shannon Fergus Estuary SPA as fewer birds will be disturbed and there is more alternative foraging habitat available (due to lower bird densities), and therefore more likely to be able to compensate for lost foraging time/increased energy demands. Such small amounts of lost foraging time/increased energy demands are most unlikely to affect winter mortality or spring migration (Goss-Custard et al., 2019).</p> <p>Site bird densities</p> <p>The Exe Estuary SPA is 23.5km² in area with 9.4km² of intertidal habitat, whilst the Shannon Fergus Estuary SPA has an area of 322.41km² of wetland habitat and 90km² of intertidal habitat (NPWS, 2012d). Per km² of intertidal habitat the Exe Estuary holds much higher densities of the QI species which are common between the two sites,</p>

		<p>using baseline populations for both sites. Even when total population of all QI species are assessed, the Exe Estuary still has higher bird density in intertidal habitats.</p> <p>Light-bellied Brent Goose: 97% higher density Grey Plover: 88% higher density Dunlin: 76% higher density Black-tailed Godwit: 62% higher density All QI species: 34% higher density</p>
<p>C variable Ability of birds to compensate for cost.</p>	Predicted to be <u>higher</u>	The birds in the Shannon Fergus Estuary SPA are at a lower density in the tidal habitats than the Exe Estuary, therefore there is a greater area for birds to forage to compensate for increased energy costs.
<p>Likelihood of fitness impact =H x O x R - C</p>	<p>Predicted to be <u>low</u>: H (low) x O (low) x R (low) – C (high) = low likelihood of fitness impact</p> <p>Human activity (low) x Overlap (low) x Cost of Response (low) x Compensation (high) = low likelihood of fitness impact</p>	<p>Based on the findings of Goss-Custard et al., (2019), which had a similar setting, but higher H and O variables: a walking trail of similar length, with similar percentage of trail exposed to waders (c. 33%), but closer to a much larger population centre (>150,000 people), and therefore more people using the trail (and greater potential for disturbance events), a smaller estuary (greater density of people across the estuary), and had greater spatial overlap due to the intertidal area being accessible to people, and lacked screening or fencing and had greater bird densities in the intertidal habitats. This study found that the cost of disturbance events to birds in this system was of 'trivial significance'. Given this finding and the much lower probability of disturbance occurring from the proposed development, and the highly precautionary approach taken, the likelihood of a fitness impact to QI species of the Shannon Fergus Estuary SPA is also low.</p>

Limitations and considerations of the above comparison:

- This study did not assess the disturbance impact of several QI species of the Shannon Fergus Estuary SPA which are not present in the Exe SPA, and the study focussed on waders but not wildfowl. The QI species of the Shannon Fergus Estuary SPA not assessed in the study are Cormorant, Whooper Swan, Brent Goose, Shelduck, Wigeon, Teal, Shoveler, Scaup, Golden Plover, Lapwing and Black-headed gull.
- Some of these species have high sensitivity to disturbance and therefore could have higher response rate and therefore higher R variable (cost of response to human activity). However, several species with high sensitivity to disturbance, most notably Curlew which has the highest estimates for disturbance buffers, was assessed in detail and the likelihood of fitness impact was also found to be low.
- There may be a higher level of habituation in the Exe Estuary than in Poulnasherry Bay, and therefore there may be relatively higher disturbance responses in Poulnasherry Bay than was recorded in the Exe Estuary, due to lower levels of habituation. The study in the Exe Estuary was carried out over 10 years, during which time a level of habituation is likely to have occurred.
- Other parts of the Shannon Fergus Estuary SPA may also have high frequency of disturbance which could act in combination to increase the overall level of disturbance in the SPA – likely areas include Shannon Town, Limerick City, Foynes Port and Aughinish Alumina aluminium refinery, Tarbert, and some small settlements along the coastline. The level of disturbance across the SPA is not known, however the vast majority of land bordering the shoreline is agricultural, not accessible to the public and

therefore has negligible levels of baseline disturbance. Therefore, the vast majority of the SPA is disturbance free.

Despite these limitations for the comparison and assessment of the costs impact to birds in the Shannon Fergus Estuary SPA from the proposed development are reliable and precautionary. A similar precautionary approach was taken by Goss-Custard et al., (2019) to estimate the time and energy costs. It was estimated that 43 times more disturbance would need to occur before the disturbance threshold was reached, which is also considered to be a low estimate. Millions of people visit the Exe Estuary yearly (Liley et al. 2014) and the estimate of disturbance is considered to be high compared to other SPAs (Stillman et al., 2012). Over time, birds will become habituated to people using the greenway and it is likely any disturbance response will decrease. Therefore, a long-term decline in population demographics is more unlikely when habituation is considered.

8.7.7 Dogs off lead / on lead

Dogs can have a disproportionate level of disturbance to roosting and foraging birds (Gómez-Serrano, 2021; Phalan & Nairn, 2007). Dogs may elicit a stronger disturbance response in birds compared to humans walking given that they are perceived as a greater threat, can be more wide-roaming (if unrestrained) and can move unpredictably (Weston and Stankowich, 2014). Dogs will generally follow the route of their owner; however, they will also roam rapidly into surrounding areas and have the potential to cause disturbance to a greater area (Thomas et al., 2024). This disturbance caused by dogs can have negative effects on birds (Steven et al., 2011). Unrestrained dogs (running off-lead) with access to intertidal areas have been recorded as the most prevalent source of disturbance to wintering waterbirds at some sites (Lewis et al., 2019, Adcock et al 2018, Nairn, 2007). However, in high disturbance areas such as Dublin Bay, waterbirds can become habituated to dogs moving predictably along paths, and cause little disturbance (Nairn, 2007), as these are not perceived as a threat by the birds. People and dogs do not necessarily cause disturbance to waterbirds and the vast majority of recreational users (even with dogs) do not cause disturbance (Nairn, 2007). Dogs off lead rapidly approaching high tide roosts or entering waterbodies are a clear source of disturbance (Gómez-Serrano, 2021). Most greenway users with dogs are likely to be local users rather than tourists, and dog owners will take their dogs on walks throughout the year. Therefore, dogs are likely to be present year-round along the proposed development.

8.7.8 Noise disturbance from greenway visitors

Cutts et al. (2013) focusses on disturbance from construction works for both visual and aural stimuli. Aural stimuli can have different effects depending on whether they are constant or sudden, for example a sudden noise >60dB (at the bird, not the source) could result in a high-level disturbance response, whilst a prolonged vibratory piling at 80dB would have a lower level of reaction. Aural stimuli can also differ in effect depending on whether they are in combination with visual stimuli or solely noise, with aural only stimuli eliciting a lower-level response.

Visitors to the Greenway will be a source of noise during operation. This includes people talking, shouting, and dogs barking. Loud or sudden noises can be a source of disturbance for waterbirds if above a particular threshold. This section considers disturbance effects from noise. The average noise levels for typical greenway users (taken from decibelpro.app) are as follows:

- People talking normally: 55 – 65 decibels (dB),
- People shouting: up to 85dB.
- The sound of a children's playground: approximately 80dB.
- A dog barking: up to 90-100dB (Sales et al, 1997).

The ambient noise levels along the route of the proposed development ranges from 36-56dB in quiet areas, and 56-71dB in busier areas (EIAR Chapter 14, Noise and Vibration). Noise attenuates with distance, with a reduction of 6dB per doubling of distance in air.

The noise from dogs barking was shown to increase vigilance in coot (Randler, 2006), however there is very little evidence to show that the sound of dog barking alone can cause significant disturbance effects to water birds when the dog is not visible and cannot access the area where there birds are. It is well documented that unleashed dogs accessing intertidal areas will cause significant disturbance (Weston & Stankowich 2014; Lafferty, 2001).

Cutts et al., (2013) provides guidance on the attenuation rate of noise from source to receptor, where the noise is construction plant/machinery and the receptor is the bird. As per the extract below (Figure 8-8) from Cutts et al., (2013), a sound level of 70 dB at the receptor is considered an acceptable noise level for wintering waterbirds, i.e. below the threshold for disturbance. Therefore, where a source is producing a higher level of noise but is at a distance from the bird, the noise is likely to only cause a disturbance response where the noise is still higher than the threshold level when it reaches the bird. The disturbance levels and threshold levels as per Cutts et al., (2013) are as follows:

- Acceptable noise levels are shaded green with dark green (<55dB) unlikely to have any disturbance effect, whilst the pale green might occasionally induce a low-level behavioural response such as a heads-up (55-69dB).
- Yellow to orange shading is where a response is likely but mitigation may be effective in reducing the disturbance risk (70-79dB)
- Pale red where mitigation is necessary and might be of value, but with a remaining risk of effect (80-85dB); dark red where a flight response is almost certain to occur and would be increasingly difficult to mitigate through simple screening etc and may require the cessation of works during high sensitivity periods (86-120+dB).

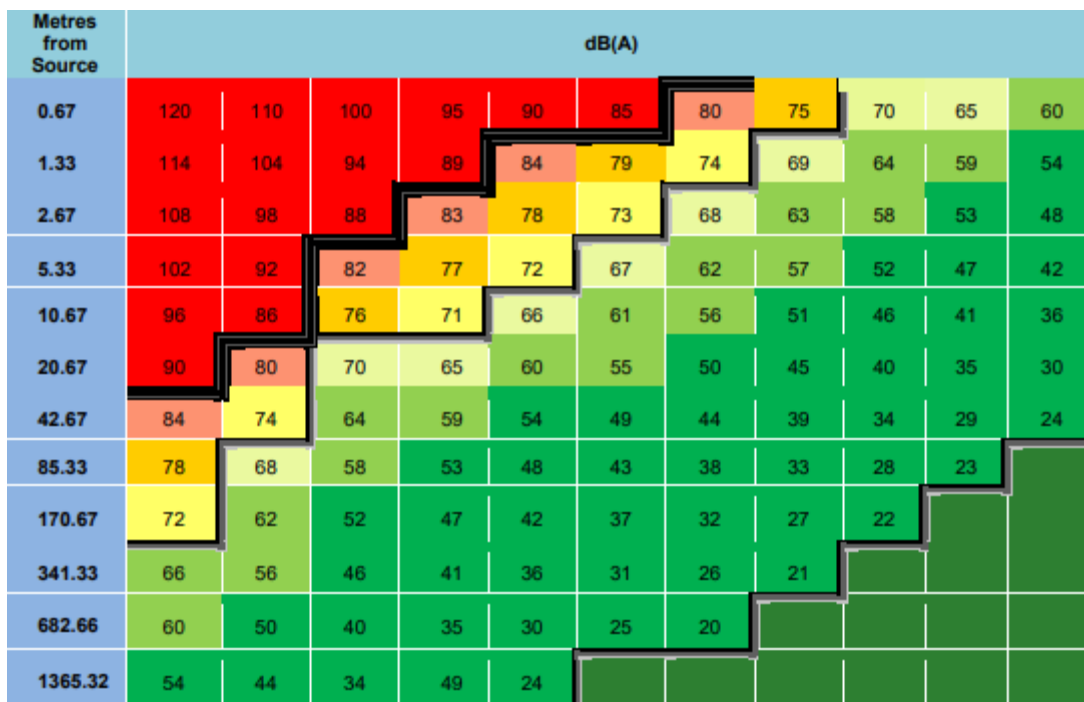


Figure 8-8: Extract from Cutts et al (2013), Waterbird mitigation toolkit. Noise levels, distance and disturbance thresholds.

The various sound levels from greenway users as outlined above are presented below in Table , using the distances and categories from Cutts et al., (2013). As shown below, a normal conversation is below the disturbance threshold of 70dB at the source, therefore, at any distance this is unlikely to cause any response. A normal decibel level is assumed for conversations due to the low-level ambient noise of the greenway surroundings i.e. people will not need to speak loudly to be heard as it is a quiet environment. A person shouting at 85dB, reduces to below 70 dB at 5.33m. A children's playground at 80dB reduces to below 70 dB at 2.67m. A dog barking at 100dB reduces to below 70 dB at 20.67m.

On the surveys undertaken between 2021 and 2026, 315 birds were recorded within 20m of the greenway. This is <1% of the 35,000 birds recorded over the course of the surveys. Birds within 20m of the greenway were recorded on 35 occasions in total, with 28 of the 35 records being of ten birds or less. 288 of the 315 birds recorded were inside the sensitive bird areas, and of these 263 are Qualifying Interests of the River Shannon and River Fergus Estuaries SPA. The highest records were one group of 52 Lapwing in 2021, groups of 42 and 37 Curlew spread out over mudflats in 2026, a group of 37 Wigeon in 2026, a group of 32 Black-Headed Gull in 2021 and a group of 17 Curlew in 2022. Therefore, 99% of birds occur at a distance beyond the area which could be impacted by noise above background levels. The distribution of birds in the sensitive bird areas is presented in Appendix 8.3.

Table 8-29 Application of the Waterbird Mitigation Toolkit for assessment of noise disturbance on waterbirds.

Distance from source (m)	Noise at source (dB)			
	Normal conversation	Children (playground)	Person shouting	Dog barking
0.67	60	80	85	100
1.33	54	74	79	94
2.67	48	68	73	88
5.33	42	62	67	82
10.67	Reduces to background levels of 36dB	56	61	76
20.67		51	55	70
42.67		45	49	64
83.33		39	43	58
170.67		Reduces to background levels of <36dB	37	52
314.33			Reduces to background levels of <36dB	46
682.67				40
1365.32				Reduces to background levels of <36dB

Potential Effects on the Shannon and Fergus Estuary SPA

The I-WeBS Trends Report 1994/95 to 2019/20 (Kennedy et al., 2023) presents the populations trends of a range of waterbirds at 97 sites around Ireland. Site-specific trends for the Shannon Estuary or Poulherry Bay are not included in the report, therefore the national trends were used to assess the population trends for the species present at the site. Long-term population trends for these species show that four of the species recorded and in large decline, two are in moderate decline, 10 are in intermediate decline, and 10 are stable or increasing. No national trend was available for Qualifying Interest Black-headed Gull (a Qualifying Interest species of the SPA), or any other gull species, Great Northern Diver, Shag or Snipe. Of those species recorded in large decline, Golden Plover, Grey Plover and Lapwing were recorded in the study area in numbers exceeding 1% of the SPA population, these species and others which exceeded 1% SPA thresholds are indicated in bold text in Table 8-16. Site-specific bird population trends are not available for the Shannon and Fergus Estuary. For the purposes of the assessment, a precautionary approach has been adopted, whereby each species recorded during the surveys is assumed to be part of a site-level declining population. Given the significant numbers of these species surrounding the

proposed development, their sensitivity to disturbance and long-term national population declines, there is high likelihood of the proposed development (in the absence of mitigation) causing significant levels of disturbance and therefore contributing to the declining populations trends of these species. This would be considered a direct impact to the Conservation Objectives for the Qualifying Interest species of the SPA, as a target for all species is that the population trend is 'stable or increasing'.

Additionally, if a disturbance event results in a significant number of wintering birds moving from one area to another within the SPA, this would be considered an adverse effect on the Conservation Objectives for the Qualifying Interest species for the attribute 'distribution' as the target for this attribute is 'there should be no significant decrease in the range, timing or intensity of use of areas by the waterbird species other than that occurring from natural patterns of variation'.

Table 8-16 IWeBS National Trends Report for Qualifying Interest and regularly occurring species of Poulnisherry Bay (percentage change). Species in bold/blue are those which were recorded in the study area in numbers exceeding 1% of the SPA baseline population.

Common Name	National - 5 Year	National - 12 Year	National - 23 Year	Long-term Trend
Scaup	-33.6	-82.9	-89.2	<i>Large Decline</i>
Lapwing	-6.5	-45.1	-63.9	
Grey Plover	-21.9	-42.8	-58.8	
Golden Plover	-17.5	-58	-54.1	
Dunlin	5.9	-21.2	-45.2	<i>Moderate Decline</i>
Curlew	-9.4	-23.7	-43.1	
Turnstone	-33.6	-46	-23.7	<i>Intermediate Decline</i>
Mallard	-11.3	-19.7	-19.1	
Wigeon	0.9	-17	-18.2	
Red-breasted Merganser	-12.9	5.2	-14.7	
Pintail	-0.8	-6	-13.7	
Great Crested Grebe	-39.5	-6.1	-10.8	
Shoveler	23	-21.3	-10.8	
Knot	0	-12.2	-9.8	
Bar-tailed Godwit	-32.6	-13.9	-5.1	
Ringed Plover	-4.3	-26.8	-1.1	
Grey Heron	1	-4.9	6.6	
Redshank	-14	-28.4	6.7	<i>Stable or increasing</i>
Shelduck	6.3	-0.8	9.3	
Oystercatcher	-17.5	-31.1	10.8	
Teal	1.8	5.7	19.4	
Greenshank	0.9	7.3	41	
Cormorant	38.5	8.4	42.9	
Black-tailed Godwit	22.5	25	92.3	

Common Name	National - 5 Year	National - 12 Year	National - 23 Year	Long-term Trend
Light-bellied Brent Goose	-11.2	1.2	93.3	
Little Egret	34.6	61.5	483.3	

As described in Table 8-12, at Moyasta - Sensitive Bird Area No.4, the proposed development is particularly at risk of causing disturbance to wintering birds as the railway line crosses the tidal estuary at this location. The railway line is elevated above the mudflats, lacks any existing screening and users would be visible to waterbirds in the adjacent habitats, and likely cause disturbance to birds in the surrounding habitats. Large numbers of wintering birds were recorded in the surrounding mudflats, including nationally important numbers (>1% of the national population) of Pintail and Wigeon. Relatively high numbers of other Qualifying Interest species were recorded here during at least one survey. The peak counts correspond to 42% of the SPA population of Pintail, 15% for Wigeon, 11.5% for Greenshank and 10.7% for Teal. The following species were recorded in numbers between 1-10% of the SPA population: Bar-tailed Godwit, Brent Goose, Cormorant, Curlew, Golden Plover, Redshank, Shelduck and Shoveler. Pintail, Wigeon, Teal and Greenshank were regularly recorded in significant numbers within 500m of Moyasta Bridge (>50% of surveys). Pintail and Wigeon both have nationally 'intermediate declining' populations, whilst Teal and Greenshank have stable or increasing populations. Pintail have moderate sensitivity to disturbance and Wigeon have high sensitivity (Goodship & Furness, 2022).

The operation of the proposed development has the potential to cause disturbance and displacement to birds, in particular in the sensitive bird areas presented in Appendix 8.3 and are described in Section 8.4.4. The bay is a resource for nationally and internationally important numbers of wintering waterbirds which rely on the bay as a foraging and roosting resource. This section presents the potential sources of disturbance and disturbance impacts which are specific to the operational phase of the proposed development. Greenway users including people and dogs have the potential to cause disturbance through their visible presence and by producing noise on the greenway itself, or by accessing wintering bird habitat outside of the greenway.

8.7.9 Other Potential Effects on the Natural Environment

8.7.9.1 Construction Phase

Habitat Loss

The proposed development is situated in an area dominated by agricultural grasslands (GA1), and wet grasslands which are used for livestock grazing. Much of the route is located on the disused railway corridor. The disused railway corridor varies in condition. Some sections are overgrown with scrub whereas other sections are clear and in use as farm tracks. The corridor is often delineated by hedgerows. In some areas, the disused railway corridor has been subsumed into the surrounding fields.

Habitat loss will occur under the direct footprint of the greenway, the 1m verges, and the footprint of the fencing and landscape planting outside the fence line, as well as at the trail heads at Moyasta and Kilrush. In general, the existing vegetation outside of the fence line but within the redline boundary will be retained. This will include hedgerows, treelines, scrub and woodland. The proposed development is entirely outside of saltmarsh habitat and no habitat loss of saltmarsh or other estuarine or intertidal habitats will occur.

A total of 4.2km of linear scrub and hedgerows will be cleared to facilitate construction over the total length of the proposed development (approximately 15km). This habitat is within the railway corridor or where the greenway will pass through hedgerows off the railway line.

Habitat Fragmentation and Barrier Effect

The proposed development includes fencing along the route which could inhibit the movement of species including otter across the greenway.

Habitat Degradation

The construction and operation of the proposed development could lead to habitat degradation. The potential impacts are discussed below.

Habitat degradation - Water quality impacts

Water quality impacts arising from the construction of the proposed development have the potential to affect habitats and species which are hydrologically connected to the proposed development. The proposed development will involve site clearance, the construction of the greenway and verges, water settlement areas and watercourse crossings. During the construction phase, surface water run-off or flood events could mobilise sediment or pollutants and carry them to downstream waterbodies. While standard measures to prevent pollution to watercourses (TII, 2008) will be utilised throughout the construction period, the use of concrete and machinery may result in accidental pollution events via cementitious materials and fuel entering the watercourses. Dust arising from construction works could lead to sedimentation in the watercourses. This could negatively impact aquatic species, aquatic vegetation, otter, waterbirds and terrestrial species which rely on the estuary.

Habitat degradation – Introduction or spread of invasive species

Construction activities could introduce or spread invasive species within the site, into the surrounding area and to further afield. Invasive species could be spread through the movement of equipment and contaminated soil to and from the site. Machinery or materials contaminated with invasive species from other locations could lead to the introduction of other invasive species to the location of the proposed development.

The spread of invasive species could lead to these species to becoming more prevalent in the surrounding area. Only one invasive species, Japanese Knotweed, has been recorded on the site. This species can form dense thickets which can shade and out-compete native vegetation and significantly reduce local biodiversity.

Habitat degradation - Lighting

Lighting will be utilised during the construction of the proposed development. The illumination of otherwise dark spaces can cause disturbance, alter foraging habits, increase the risk of predation and displace nocturnal animals from the area. This may impact nocturnal fauna including Otter, bats and other small mammals, as well as diurnal fauna such as roosting birds.

Direct Mortality

Direct mortality is possible as a result of site clearance and vegetation removal. Birds are particularly vulnerable during the nesting season (March-August inclusive) when vegetation clearance could lead to the loss of nests. Mammals such as Otter may be killed by construction machinery, although these will be slow moving and loud vehicles so the collision risk is very low.

8.7.9.2 Operational Phase

Disturbance to breeding birds

Several amber and red-listed bird species were recorded as 'possible' and 'probable' breeding species in the area surrounding the proposed development. Ringed Plover (amber listed) is the only confirmed breeding bird species in the study area. The amber listed and red listed species below were not confirmed as breeding but were recorded as either 'probable' or 'possible' breeders:

- Red: Oystercatcher, Dunlin, Grey Wagtail
- Amber: Shelduck, Herring Gull, Ringed Plover, Black-headed Gull, Common Gull, Teal

Breeding waders are a group of birds which have experienced some of the most dramatic population declines across the world, in Western Europe and in Ireland (Gibbons et al., 1993; Balmer et al., 2013; Suddaby et al., 2020) with declines of up to 91% of the population since 2009 (Dunlin), (Suddaby et al., 2020). The primary drivers of this decline are habitat loss through agricultural intensification and increased levels of predation (BirdLife International, 2004). There is suitable habitat for ground-nesting birds surrounding the proposed development, and therefore breeding birds could be present in this area.

Ringed Plover is an amber-listed species (BoCCI4 (Gilbert et al., 2021) due to its Irish wintering population representing 25% of the European wintering population. Breeding populations contribute directly to the wintering populations of waders, therefore any impact to breeding populations could also impact winter populations.

The presence of the greenway has the potential to displace nesting birds. Species that require open habitats for nesting may experience a greater risk and exposure to predation in fragmented habitats. Mammalian predators utilise vegetated habitats (woodland and hedgerows) for cover and therefore nests closer to the edges of these habitats are more exposed to predators and have higher levels of nest failure (Kaasiku et al., 2022). However, the proposed development is located entirely adjacent to existing boundaries such as hedgerows, the former railway line and existing roads, and therefore the proposed development will not result in fragmentation of existing open habitats in the surrounding area. The proposed development will not contribute to habitat fragmentation of breeding wader habitat or to increased predation effects because of the presence of the development. However, other sources of changes to predation risk are discussed below in Section 8.7.130.

Disturbance due to greenway users could cause ground-nesting birds to leave their nests. This can cause nest failure if incubating birds are forced to leave the nest for exposed periods or repeatedly and eggs are left exposed to inclement weather or predators. Chicks may also die if left exposed to inclement weather or predators.

The single confirmed breeding record of ringed plover was in the area of the Kilrush Wastewater Treatment Plant, at a distance of c.150m from the proposed development. At this location there is an existing road which is publicly accessible and there is vegetative screening lining this road. As this section will not be altered as a result of the proposed development it is already publicly accessible, there is no risk of causing disturbance to breeding waders at this location.

Direct Mortality

Direct mortality is possible as a result of site clearance and vegetation removal. Birds are particularly vulnerable during the nesting season (March-August inclusive) when vegetation clearance could lead to the loss of nests. Mammals may be killed by construction machinery, although these will be slow moving and loud vehicles, so the collision risk is very low.

Several small burrows were found in close proximity to the proposed development and Poulnasherry Bay, these burrows could be used as nesting sites by Shelduck. Site clearance for the proposed development could lead to loss of these nests

While bats are present in the study area, no potential bat roosts were identified. As no bat roosts will be lost due to the construction of the proposed development, there is no risk of mortality of bats.

As the proposed development is a greenway, collisions with wildlife by greenway users are very unlikely.

Collision Risk, Alteration to Flightlines and Barriers to Movement

Moyasta bridge and the crossing of Poulnasherry Bay is the only location where the greenway is elevated and across an intertidal area. The existing bridge deck and railway line is 4.4m above the mudflats below the bridge, with the top of the existing parapets at 4.9m high. The proposed parapets on the bridge are 1.4m above the greenway level and will bring the total height to 5.8m - an increase of 900mm. Birds are present on both sides of the bridge on the intertidal and salt marsh habitats. In theory, the additional height of the parapet could pose a collision risk to birds. However, the cross section of the bridge will not change meaningfully, and the new parapets are solid with a low permeability perforated section. Bird collisions with man-made structures are normally considered to be caused by 'invisibility', particularly at night; deception, caused by glazing in buildings; and confusion, caused by light refracted or reflected by mist. Structures that do not exhibit these features are rarely implicated in scientific literature as agents of bird mortality.

Moyasta bridge and the crossing of Poulnasherry Bay is the only location where an elevated barrier would be introduced to the routes of bird flight paths. Any obstacle, natural or man-made can alter a bird's flight path, including mountains, trees, buildings or other structures. Moving or hard to see obstacles such as wind turbines, glass buildings or powerlines pose the biggest risk to birds as they can deaths directly. The existing bridge deck and railway line is a height of 4.4m above the mudflat, and shown below in Plate 3. The proposed parapets and screening at 1.4m high will bring the total height of the structure to 5.8m. Wintering waterbirds forage within these mudflats immediately adjacent to the bridge and former railway line. Birds make regular movements across the railway line at this location. The additional height of the screening could alter bird movements and result in a reduction in birds utilising the habitats on either side of the railway line.

However, the increase in height by 900mm (4.9m to 5.8m) will not cause a barrier to movement. The raised level of the bridge will cause birds to alter their flight lines to gain sufficient height to pass over the new level. Flight at a higher level will require additional energy expenditure to achieve, however this will not be significant as this is likely to only affect small numbers of birds foraging close to the bridge. Wader species are agile and a difference of 900mm will not cause them to change their flight patterns. Flocks arriving at the site from greater distances are more likely to be flying at height and only minor adjustments will be required to avoid the new bridge parapet. The majority of studies of bird collision and obstacle avoidance focus on large structures such as wind turbines, in these cases impacts can be avoided through the use of smaller turbines c. 150m tall (SNH, 2020). Considering this, an increase of 900mm will not change the flight paths of birds.

The flight path beneath the bridge will not be altered. Larger birds such as ducks, geese and swans require larger take-off distances and are less likely to make regular flights across the bridge. These species would be more likely to swim underneath the bridge to access the north side.



Plate 3 Moyasta bridge and causeway at low tide

Alteration of foraging habits and predation risk

The proposed development will be fenced on both sides. Fencing is to be installed for a number of purposes, including to keep greenway users and dogs on the greenway and to prevent access to surrounding private lands and habitats, and to prevent disturbance to birds and other wildlife. However, the presence of fencing could result in indirect impacts to waders (both breeding and wintering), through increased predation risk or perceived predation risk.

Predation of eggs and chicks is a major source of nest failure of breeding waterbirds. Avian predators such as raptors and corvids contribute as one source of predation risk along with mammalian predators. Raptors can also be a prominent source of wader mortality at wintering sites (Whitfield, 2008; Cresswell and Whitfield, 1994). Raptors and corvids utilise man-made structures such as fence posts, signs, stone walls as a perch to search for prey. The use of elevated perches improve visibility for raptors and can increase predator hunting success (Andersson, 1978). Higher perches improve hunting success by raptors, and these are recommended to be at a height of at least 4.5m, in locations aiming to improve habitat quality for raptors (Kross et al 2024). However, raptors are also known to hunt successfully from lower height perches including those below 1m and that waders will avoid nesting in the vicinity of perches, even low perches of <1m (Andersson et al., 2009). The presence of perches near wader habitat can reduce the suitability of the habitat for breeding waders (Andersson et al., 2009; Wallander, 2006). Therefore, the fences proposed may increase the quality of the habitat for raptors and corvids by increasing their hunting success. This could result in waders altering foraging or nesting habits to avoid the perceived predation risk, or lead to an increase in wader mortality through improved hunting success for raptors or increase nest predation leading to negative impacts to waterbird populations.

The single confirmed breeding record of ringed plover was in the area of the Kilrush Wastewater Treatment Plant, at a distance of c.150m from the proposed development. At this location there is an existing road which is publicly accessible and there is vegetative screening lining this road. As the proposed development will not contribute elevated raptor perches and due to the presence of existing potential raptor perches associated with the existing vegetation at the wastewater treatment plant, there is no risk of introducing new raptor perches at this location.

In general, the proposed development is located along existing boundaries, which contain vegetation or fence posts which can provide elevated raptor perches. The surrounding environment is agricultural land comprises small fields with hedgerow / treeline / scrub boundaries. Many field boundaries contain fence lines. In some areas several lines of new and old fence lines exist together. Given this, the length of the proposed development contains existing raptor perches and the proposed planting and fencing will not increase significantly from the baseline. Therefore, there will be no significant increase in predation risk to wintering and breeding birds along the length of the proposed development, with the exception of at Moyasta Bridge.

Moyasta bridge is at an existing height of 4.4m above the surrounding mudflats and the existing parapet is at a height of 4.9m. The proposed parapet on the bridge will increase the total height to 5.8m. The increased height of the parapet could increase use of the bridge as a hunting perch. Wintering waterbirds forage and roost within the mudflats immediately adjacent to the bridge and former railway line. The presence of a new elevated perch will increase the exposure of the waterbirds to raptor predation during the operation of the proposed development.

Habitat degradation

Habitat degradation - Water quality impacts

Drainage will generally be over the edge, outfalling to existing watercourses via field drains. Pipes, culverts and headwalls will be provided as required where the greenway crosses existing field drains and to connect the larger surfaced areas at the trailheads to the drainage network.

Vehicles at the trailheads present a source of pollutants. There is a risk of pollutants entering watercourses and reaching Poulnasherry Bay and Kilrush Harbour. Pollutants could result in negative effects to aquatic habitats and species and to species which are dependent on these habitats.

The introduction and increase in the numbers of greenway users including people and dogs may lead to an increase in dog fouling and human waste along the proposed development. Responsible dog owners will clean up after their dogs, however, there will be a proportion that does not. Dog faeces contain high levels of nitrogen and phosphorous. Surface runoff from the greenway contaminated with dog faeces could increase nutrient levels and oxygen demand in receiving surface waterbodies, negatively impacting water quality. Given the dilution capacity of the coastal waterbodies and the extent of the buffer zones between the greenway and the receiving waterbodies the effects during the operational phase on the coastal waterbody are unlikely. The significance of the effects on the water quality of receiving waterbodies are assessed as being imperceptible and of temporary duration.

Toilets at the trailheads could also be a source of pollution to waterbodies, lack of appropriate maintenance or an incident of vandalism could result in human waste and chemicals entering the waterbodies. The input of nutrients to water courses and waterbodies via animal and human waste could result in negative effects to aquatic habitats and species and to species which are dependent on these habitats

Habitat degradation - Lighting

Public lighting will be installed at trail heads and the crossing of the N67 as part of the operational phase of the proposed development. Public lighting is not proposed along the greenway route. The illumination of otherwise dark spaces can cause disturbance, alter foraging habits, increase risk of predation and displace nocturnal animals from the area. This could impact fauna including Otter, bats and other small mammals.

Habitat degradation – Introduction of invasive species

As detailed above, construction phase activities, could result in the spread of invasive species to, from, and within the proposed development. These species could become established in new locations and lead to long term degradation of other habitats, and negatively impacting biodiversity during operation.

Habitat Fragmentation and Barrier Effect

The proposed development will result in some habitat fragmentation as it bisects certain areas of habitat including seven watercourse crossings, hedgerows and the railway corridor. The proposed development will include fencing where there is currently no boundary, which could act as a barrier to wildlife. The specification for Otter exclusion fencing (Natural England, 2026) states that otter can pass through gaps of 100mm. In this context, the proposed fencing is considered to balance habitat connectivity for Otter and restrict access for all but the smallest dogs.

8.7.10 Impacts on Key Ecological Receptors

Table 8-31 below provides an assessment of the likely impacts from the proposed development on each of the Key Ecological Receptors.

Table 8-17 Assessment of the likely impacts from the proposed development on each of the Key Ecological Receptor in the absence of Mitigation

Key Ecological Receptor (KER)	Construction phase impacts	Operational phase impacts	Ecological Significance in the absence of Mitigation
<p>KER 1 Poulnasherry Bay</p>	<p>Habitat degradation - water quality impacts (construction works) Habitat degradation - - introduction of invasive species Habitat fragmentation – barrier to movement</p>	<p>Habitat degradation - water quality impacts (dog fouling, vehicles)</p>	<p><u>Construction Phase</u> There is a risk of pollution to the watercourses crossed by the proposed development and to waterbodies downstream of the proposed development including Poulnasherry Bay. Habitat degradation due to pollution may present a long-term impact on the aquatic habitats in the surrounding environment. This is considered to be a long-term significant negative impact at the international level. The movement of machinery and personnel to and from the proposed development and works on watercourses creates the risk of the introduction of invasive plant materials and seeds to the habitats within the proposed development and beyond it. This is considered to be a permanent negative impact at the international level. Works to watercourse crossings could create a temporary barrier to the movement of aquatic species through the watercourses in the study area, and restrict access to spawning habitat. This is considered to be a temporary negative impact at the international level. <u>Operational phase</u> There is a risk of pollution to the watercourses crossed by the proposed development and to waterbodies downstream of the proposed development including Poulnasherry Bay. Vehicles at trail heads and human waste present sources of pollution to watercourses. Habitat degradation due to pollution may present long-term impacts on the aquatic habitats in the surrounding environment. This is considered to be a permanent significant negative impact to this KER at the international level.</p>
<p>KER 2 Wintering waterbirds</p>	<p>Noise disturbance Visual disturbance</p>	<p>Noise disturbance Visual disturbance</p>	<p><u>Construction Phase</u> Noise and visual disturbance could be caused to wintering birds in areas which are close to the bay or utilising inland roosting areas. These construction phase impacts could result in a decline in the populations of these species within the bay or alter the birds use of areas within the bay for the duration of construction. Such impacts could directly undermine the conservation objectives of the bay for wintering bird species. Therefore, this is considered to be a temporary significant negative impact to this KER at the international level.</p>

Key Ecological Receptor (KER)	Construction phase impacts	Operational phase impacts	Ecological Significance in the absence of Mitigation
			<p><u>Operational phase</u></p> <p>Noise and visual disturbance due to greenway users including humans and dogs (as detailed in Section 8.7.4.1.1). These operational phase impacts could result in a decline in the populations of these species within the bay or alter the birds' use of areas within the bay. Such impacts could directly undermine the conservation objectives of the bay for wintering bird species. Therefore, this is considered to be a long-term significant negative impact to this KER of international importance.</p> <p>The increased height of raptor perches at Moyasta Bridge could increase the risk of predation of wintering waterbirds (as detailed in Section 8.7.9.2). This could result in a decline in the populations of these species within the bay or alter the birds use of areas within the bay for the duration of construction. Such impacts cannot be quantified and could directly undermine the conservation objectives of the bay for wintering bird species. Therefore, this is considered to be a long-term significant negative impact to this KER of international importance.</p>
<p>KER 3 Breeding Waders and Waterbirds</p>	<p>Direct mortality Disturbance</p>	<p>Disturbance</p>	<p><u>Construction Phase</u></p> <p>Direct mortality may occur as a result of site clearance, particularly during the nesting season (March-August inclusive) when works could lead to the loss of nests including burrow nests. Any impact to breeding waterbirds is likely to be a significant portion of the national breeding population and thus, may also impact wintering populations, therefore direct mortality of breeding waders during construction clearance is considered to be a temporary significant negative impact at the national level.</p> <p>The construction phase of the proposed development will result in noise, light, and visual disturbance. Such disturbance could cause nest failure of wader nests. Any impact to breeding waders is likely to be a significant portion of the national breeding population and thus, may also impact wintering populations, therefore disturbance to breeding waders is considered to be a temporary significant negative impact at the national level.</p> <p><u>Operational phase</u></p> <p>There is potential for the operation of the proposed development to cause disturbance to breeding waders if breeding waders were nesting nearby. Waders are more likely to choose more suitable habitat to nest away from the source of disturbance or threat, which is what they already do. Any impact to breeding waders is likely to be a significant portion of the national breeding population and thus, may also impact wintering</p>

Key Ecological Receptor (KER)	Construction phase impacts	Operational phase impacts	Ecological Significance in the absence of Mitigation
			populations, therefore disturbance to breeding waders is considered to be a significant negative impact at the national level.
KER 4 Birds of prey and Kingfisher	Habitat loss Disturbance Habitat Degradation- water quality	Disturbance	<p>Construction Phase</p> <p>The construction phase of the proposed development will result in noise, light, and visual disturbance. Disturbance could cause birds of prey and kingfisher to avoid the area. However, the proposed development will not result in disturbance in any one place for very long and there is extensive similar habitat around the greenway. Therefore, this is considered to be a temporary neutral impact to this KER of local importance.</p> <p>There is a risk of pollution to the watercourses crossed by the proposed development and to waterbodies downstream of the proposed development. Habitat degradation due to pollution may present a long-term impact on the aquatic habitats in the surrounding environment. This is considered to be a temporary negative impact at the local level.</p> <p>Operational phase</p> <p>The human presence along the route and adjacent planted habitats may deter birds of prey from hunting small birds in these habitats. Given that overall prey populations for raptors will not be reduced, this is considered to be a long-term neutral impact to this KER of local importance.</p>
KER 5 Otter	Habitat Fragmentation Disturbance	Habitat Fragmentation Disturbance	<p>Construction Phase</p> <p>The installation of new watercourse crossings, as well as fencing, and site clearance could prevent Otter from utilising watercourses crossed by the proposed development and from accessing habitats in the wider area, and could potentially sever otter territory. This is considered to be a temporary significant negative impact to this KER of county importance.</p> <p>While standard measures to prevent pollution to watercourses (TII, 2008) will be utilised throughout the construction period, there is a risk of pollution to the watercourses in the study area during the construction phase. This may negatively impact the fish populations in the watercourses and downstream of them, resulting in a reduction in prey availability for Otter. Such impacts could directly undermine the conservation objectives of the SAC for Otter with regard to fish biomass available. This is considered to be a temporary significant negative impact to this KER of county importance.</p>

Key Ecological Receptor (KER)	Construction phase impacts	Operational phase impacts	Ecological Significance in the absence of Mitigation
			<p>Noise, light, and visual disturbance could result in Otter avoiding the area during construction, preventing them from accessing or utilising the habitats in the surrounding area. Such impacts could directly undermine the conservation objectives of the SAC for Otter with regard to barriers to connectivity. This is considered to be a temporary significant negative impact to this KER of county importance.</p> <p>Operation Phase</p> <p>Watercourses will remain accessible for otter during operation. However, fencing along the length of the proposed development could prevent Otter from accessing supporting terrestrial habitat. Such impacts could directly undermine the conservation objectives of the SAC for Otter with regard to barriers to connectivity. This is considered to be a long-term significant negative impact to this KER of county importance.</p> <p>Increased human activity and the presence of dogs along the greenway could cause disturbance to otter, which may alter foraging habits, commuting routes and habitat utilisation. Such impacts could directly undermine the conservation objectives of the SAC for Otter with regard to barriers to connectivity. This is considered to be a long-term significant negative impact to this KER of county importance.</p>
<p>KER 6 Bats</p>	<p>Habitat loss / fragmentation Habitat Degradation – lighting</p>	<p>Habitat loss / fragmentation Habitat Degradation – lighting</p>	<p>Construction Phase</p> <p>Vegetation clearance will result in the loss foraging habitat, however, there will be a net gain in linear habitat and only small sections of hedgerow will be removed where the greenway passes through them. The gaps in hedgerows will be to accommodate the width of the greenway which is 3m, this will not pose a significant gap to prevent bats using these features as foraging and commuting routes. This is considered to be a neutral impact on this KER.</p> <p>Lesser Horseshoe Bat activity was recorded in the Vandeleur Walled Gardens, Kilrush, however this was not confirmed to be a roost. The Clare County Development Plan includes an objective to ensure no net loss of potential Lesser Horseshoe Bat feeding habitats within 2.5km of known roosts. the proposed development is not functionally connected to the Vandeleur Walled Gardens due to the lack of continuous foraging habitat between the proposed development and this site. Gaps of 5m or more can prevent movement of this species through the landscape. The town of Kilrush and the Kilrush Marina form significant gaps in foraging habitat between the proposed development and the gardens. Therefore, it is unlikely that if a Lesser Horseshoe Bat roost were present in the gardens, that the proposed development area would form part of the core sustenance zone for this roost. Additionally, much of the vegetation</p>

Key Ecological Receptor (KER)	Construction phase impacts	Operational phase impacts	Ecological Significance in the absence of Mitigation
			<p>surrounding the proposed development will be retained and maintain connectivity with the network of hedgerows and treelines in neighbouring fields. Therefore, foraging habitat for Lesser Horseshoe Bat will not be impacted. This is considered to be a neutral impact on this KER.</p> <p>The construction phase of the proposed development will utilise lighting during construction (during construction hours) and at the site compounds. An increase in artificial lighting can cause bats to avoid lit areas, alter foraging habits and increase risk of predation. However, this will be restricted to the construction hours and to local active working areas which will be over a small area or areas at any given time, this will have minimal overlap with foraging bats. Lighting will be primarily required during winter hours of darkness, when bats are less active. During the active season, timing of lighting will have very minimal overlap with bats. This is considered to be a neutral impact on this KER.</p> <p>Operational phase</p> <p>The conversion of natural and semi-natural habitats to built areas may result in the fragmentation and loss of commuting and foraging habitat, however bats will not be prevented from accessing suitable habitat and there is an abundance of alternative foraging habitat within the network of hedgerows and treelines in the surrounding landscape in the neighbouring agricultural fields. The width of the greenway is 3m, thus large gaps will not be introduced in foraging habitat. This is considered to be a neutral impact on this KER.</p> <p>The operational phase of the proposed development will utilise public lighting at the locations of the trailheads. An increase in artificial lighting can cause bats to avoid lit areas, alter foraging habits and increase risk of predation. Habitat degradation during the operational phase as a result of lighting at trailhead locations is considered to be a permanent significant negative impact at the local level.</p>
<p>KER7 Wildlife Corridors</p>	<p>Direct mortality Habitat Loss Habitat degradation Habitat fragmentation</p>	<p>Habitat Fragmentation</p>	<p>Construction Phase</p> <p>Direct mortality may occur as a result of site clearance, particularly to nesting birds during the nesting season (March-August inclusive) when works could lead to the loss of nests. This is considered to be a temporary significant negative impact at the local level.</p> <p>The construction of the proposed development will require vegetation clearance and the removal of approximately 4.2km of hedgerows, treelines scrub habitat. The extent of vegetation removal is shown in Appendix 8.4. This will result in the fragmentation</p>

Key Ecological Receptor (KER)	Construction phase impacts	Operational phase impacts	Ecological Significance in the absence of Mitigation
			<p>and loss of habitat for mammal and bird species, as well as roosting and breeding habitat for birds. However, the width of the greenway is 3m and predominantly within the former railway corridor which is an existing gap in natural habitats and therefore will not form a barrier to movement across greenway. Additionally, local biodiversity policy includes objectives to retain and protect such habitats which support wildlife, therefore the loss of such habitat contravenes local biodiversity policy. This is considered to be a permanent significant negative impact at the local level.</p> <p><u>Operational phase</u></p> <p>Increased human activity and the presence of dogs along the greenway could cause disturbance to wildlife. This is considered to be a long-term significant negative impact to this KER at the local level.</p>
<p>KER 8 Badger</p>	<p>Disturbance Habitat fragmentation</p>	<p>Habitat fragmentation</p>	<p><u>No signs of badger were recorded within the study area in 2026, therefore the proposed development will not directly affect badgers, however badger setts and territories could be present in the wider area.</u></p> <p><u>Construction Phase</u></p> <p>Noise, light, and visual disturbance could result in badger avoiding the area during construction, or by severing a territory, or preventing them from accessing their sett or foraging the habitat in the surrounding area. This is considered to be a temporary significant negative impact to this KER of local importance.</p> <p>Vegetation clearance may result in the fragmentation and loss of foraging habitat, which may alter foraging habits if large amounts of habitat is removed however badger will not be prevented from accessing suitable habitat and there is an abundance of alternative foraging habitat within the surrounding landscape. This is considered to be a non-significant permanent negative impact at the local level.</p> <p><u>Operational phase</u></p> <p>Fencing along the length of the proposed development could prevent badger from crossing the greenway This is considered to be a long-term significant negative impact to this KER at the local level.</p> <p>Increased human activity and the presence of dogs along the greenway could cause disturbance to badger, which may alter foraging habits, commuting routes and habitat utilisation. However given that badger are primarily nocturnal and the greenway will have the lowest levels of users at night, significant levels of disturbance will not occur.</p>

Key Ecological Receptor (KER)	Construction phase impacts	Operational phase impacts	Ecological Significance in the absence of Mitigation
			<p>Therefore, this is considered to be a long-term non-significant impact to this KER of local importance.</p>
<p>KER 9 Invasive species</p>	<p>Habitat degradation – introduction or spread of invasive alien species</p>	<p>Habitat degradation – spread of invasive alien species</p>	<p><u>Construction Phase</u> Japanese Knotweed is subject to restrictions under Regulation 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011. Dispersal of this species or introduction of other invasive plant species could cause habitat degradation of natural habitats. The movement of machinery and personnel to and from the proposed development, may result in the spread of invasive species to, within, and from the proposed development to the surrounding habitats, and potentially to protected and ecologically sensitive sites. These species may become established in new locations and lead to long term degradation of other habitats, and negatively impacting local wildlife. This is considered to be a significant negative impact at the local level.</p> <p><u>Operational phase</u> If Japanese Knotweed is not eradicated from areas adjacent to the proposed development, it is likely to spread back into the proposed development area. Users may inadvertently cause the species to spread. These species may become established in new locations and lead to long term degradation of other habitats, and negatively impacting local wildlife. This is considered to be a significant negative impact at the local level.</p>

8.8 Mitigation

This section describes the measures that are in place to mitigate any potential harmful or negative impacts associated with the proposed development on the identified Key Ecological Receptors, as described in the preceding sections. Construction phase mitigation measures are described first, followed by general mitigation measures which will apply during the construction and operational phases. Lastly, mitigation measures which relates specifically to the Key Ecological Receptors is described.

The proposed development has been developed having regard to EU and Irish legislation and all relevant guidelines in relation to ecology and engineering best standard practice for planning and construction. These guidelines provide practical measures that can be incorporated into the design to avoid, reduce and minimise impacts and protect the receiving environment.

The design has followed the basic principles outlined above to avoid the potential for ecological impacts, where possible, and to reduce or minimise such impacts where total elimination is not possible. The design has followed the TII Publications (Standards) and the TII Environmental Assessment and Construction Guidelines.

8.8.1 General Construction Phase Mitigation

The following general mitigation measures will be employed to avoid, reduce or minimise potential significant negative effects on biodiversity which might arise during the construction of the proposed development.

- An Ecological Clerk of Works (ECoW) shall be appointed by Clare County Council prior to the commencement of works. It shall be their responsibility to supervise and provide recommendations on the execution of all works which have the potential to give rise to negative or positive effects on biodiversity. The ECoW will have NFQ Level 8 qualification or equivalent or other acceptable qualification in an ecological discipline and demonstrable appropriate practical experience as an ECoW in the protection of biodiversity.
- Prior to any site clearance, excavation, or construction, a Construction Environmental Management Plan (CEMP) will be produced by the successful contractor(s). The CEMP will set out the Contractor's overall management and administration of the construction phase. The CEMP will be developed by the Contractor during the pre-construction phase, to ensure commitments included in the statutory approvals are adhered to.
- The Contractor will prepare site-specific Method Statements detailing how the works will be carried out. Each Site Foreman shall read, sign and abide by each site-specific Method Statement. A 'toolbox talk' will be conducted to induct the Works Team on the ecological considerations listed in the site-specific Method Statement by the Site Foremen.
- The Contractor will appoint a Site Environmental Manager (SEM) prior to the commencement of works. This person shall be responsible for carrying out environmental monitoring of the works and ensuring that the mitigation measures proposed in this report (as well as the CEMP and site-specific Method Statements) are adhered to.
- Site clearance for the construction of the proposed development and tree and shrub maintenance during the operational phase will only take place outside the nesting bird season (1st March – 31st August inclusive).
- In the sensitive bird areas listed in Table 8-12, the removal of vegetation suitable for nesting will be programmed to take place in September which will avoid risks to nesting and wintering birds.

- If site clearance cannot be avoided during the nesting bird season, the area will be checked by a suitably qualified ecologist within 36 hours of the works. If nesting birds are found to be present, the site clearance works will cease until the chicks have fledged, or, until the NPWS has been consulted to determine the course of action.
- The construction envelopes for the compounds will be temporarily fenced off at the outset of the construction to avoid unnecessary loss of habitat outside of the construction footprint.
- The fencing for the compounds will be set so as to avoid existing hedgerow and treeline boundaries to avoid habitat loss. The set-back distance will be signed-off by the ECoW.
- The mitigation measures presented in other chapters of this EIAR (Volume 2), including, but not limited to Chapter 10 'Hydrology' and Chapter 15 'Landscape and Visual Amenity' will be implemented in full.
- Any excavations deeper than 1m will be either covered or have ramps fitted outside of working hours, which will allow Badgers and other wildlife to escape. Similarly, any temporarily exposed open pipe system will be capped to prevent species such as Otter from gaining access when contractors are off site.
- A pre-construction survey will be carried out by a suitably qualified ecologist two to three weeks prior to the commencement of any works to ensure that protected species such as Otter and Badger have not taken up residence within the construction envelope and to record invasive species extent and distribution.
- If previously unidentified resting or breeding places of Otter, Badger, or any other protected mammal species are found in the vicinity of the proposed development prior to or during construction, the works at this location will cease immediately. In the case of European protected species which includes Otter and bats, a licence will be required should any works be required that could disturb these species. In the case of species protected under the Wildlife Acts only, any works that could disturb these species will be carried out in accordance with the relevant TII guidance and under the supervision of the ECoW.
- Construction is limited to the hours of 07:00-19:00 thereby reducing noise, vibration and lighting during the hours when Otters or other nocturnal species are active.
- Construction phase lighting will only illuminate work areas when necessary and will avoid illuminating any areas outside of the works area. There will be no lighting outside of working hours (07:00 – 19:00). Construction works during hours of darkness will only occur during the winter months when works are restricted to outside of sensitive bird areas. The ECoW will ensure that lights are directed into the construction area and that there is minimal light spill into the surrounding habitat.
- Construction works (other than vegetation clearance works mentioned above) across Moyasta Bridge, approaching embankments and the other sensitive bird areas will only take place over the summer months (April – September inclusive) – to avoid impacting on wintering birds. The only works to take place during the winter months will be short term, minor disturbance works for the installation of planting required to screen the greenway.
- Japanese Knotweed treatment will be delivered in accordance with TII's IAPS standard and technical guidance.

8.8.2 Non-specific Mitigation Measures

8.8.2.1 Water Quality

All works in proximity to watercourses will follow best practice guidance, as per the following documents:

- *Guidelines for the Crossing of Watercourses During Construction of National Road Schemes* (TII, 2008);
- *Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites* (Eastern Regional Fisheries Board)
- *Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers.*
- *Guidelines on Protection of Fisheries during Construction Works in and adjacent to Waters* (IFI, 2016);
- *C532 Control of water pollution from construction sites: guidance for consultants and contractors* (CIRIA, 2001);
- *CIRIA C648 Control of water pollution from linear construction projects: technical guidance* (CIRIA, 2006); and,
- *Drainage Systems for National Roads* (TII, 2024).

Mitigation measures for the protection of water quality during construction and operation are detailed in Chapter 10 Hydrology.

8.8.2.2 Fencing and Landscaping

Fencing and landscape planting is proposed along the route of the proposed development to ensure greenway users and dogs stay on the greenway and to prevent damage and disturbance to areas outside the greenway.

The existing hedgerows and treelines that form the boundaries of the railway corridor and field boundaries will be retained. Vegetation clearance will be minimised along the length of the greenway itself and will only be undertaken within the footprint of the greenway, 1m verges and earthworks zones. The only work that will take place outside the fence line is the proposed landscape planting. All of the existing vegetation outside of the earthworks zone will be retained.

The greenway will have a continuous stock proof fence and hedgerow planting to segregate the proposed development from agricultural lands and the avian sensitivities at Poulmasherry Bay and along the coast. The purpose of the fence is to prevent access by people and dogs to sensitive areas outside the greenway. The fencing will include a continuous 100mm gap at ground level, designed to allow the movement of small mammals, including otter, while preventing access by dogs. The specification for Otter exclusion fencing (Natural England, 2026) states that otter can pass through gaps of 100mm. In this context, the proposed fencing is considered to balance habitat connectivity for Otter and small mammals while providing physical exclusion for all but the smallest dog breeds, and a strong behavioural deterrent for the remainder.

Mesh screening material (privacy netting) will be attached to the fencing in the sensitive bird areas no.'s 3, 4, 5, 6, 8, 9 and part of no. 2, where no existing screening is present. The purpose of the mesh netting is to increase the level of screening while the landscape planting becomes established. The mesh will be installed on the side of the fence that faces the prevailing wind.

The fencing on Moyasta Bridge will be a solid barrier of 1.1m high with an additional 0.3m section of low permeability perforated fence to a total height of 1.4m. The perforated section will be similar to that type used on the Dublin Port Greenway and shown in Plate 4 below.



Plate 4 Low permeability perforated screening on the Dublin Port Greenway.

Landscape planting and fencing on the bay-side of the sensitive bird areas will be the first works undertaken following site clearance. These planting works will take place over the winter following site clearance in September but are short duration and minor in nature so associated disturbance will be minimal. The works will be overseen by the ECoW. This will ensure that the planted screening for wintering birds has as much time as possible to established prior to opening of the greenway. The construction of the Greenway is anticipated to take 16-24 months.

Notwithstanding greenway users will be within the disturbance distance of most bird species, the landscape screening will conceal users from foraging birds' line of sight, thereby removing the visual stimulus. The literature does not provide a specified height for visual screening to be effective, as this must be established on a case-by-case basis. The average adult height in Ireland is 1.7m, which remains broadly the same for adults on bicycles. Therefore, only the head of an adult of average height will be visible to birds where a 1.4m barrier is present, obscuring the overall shape of users and reducing the disturbance response. In particular, dogs, which elicit a stronger disturbance response from birds, will be fully screened by the proposed landscaping.

Where no boundary is present, the standard planting proposal along the greenway will consist of a triple staggered row on each side of the greenway outside the fence. The hedge will include both evergreen and deciduous species planted to a density of nine plants per linear meter, with a 70:30 ratio of evergreen to deciduous species. The hedges will be made up of species that are fast growing and tolerant to exposure along the coast. During the wintering birds season, the hedges will be maintained at a minimum height of approx.. 1.4m where screening is required in the sensitive bird areas, as shown in Appendix 8.4.

In areas where some existing planting is present, such a hedge with gaps, supplementary fencing and planting will be undertaken to ensure that adequate screening and stock proofing is provided. The supplementary planting will use the same species and ratios as the general planting specification and achieve the same nine plants per linear meter density where gaps in the vegetation exist.

The species listed below are examples of the species that can be used for the hedges. These species are native, tolerant to exposure and mostly fast growing. The final specification can include other species depending on availability and will be signed off by the ECoW in advance of ordering the plants.

- Evergreen:
 - Holly - *Ilex aquifolium*
 - Gorse - *Ulex europaeus*
 - Wild privet - *Ligustrum vulgare*
- Deciduous
 - Hawthorn - *Crataegus monogyna*
 - Broom - *Cytisus scoparius*
 - European Spindle - *Euonymus europaeus*;
 - Burnet Rose - *Rosa spinosissima (R. pimpinellifolia)*
 - Dog rose - *Rosa canina*
 - Grey willow - *Salix cinerea*
 - Hazel - *Corylus avellana*
 - Elder - *Sambucus nigra*

8.8.2.3 Lighting

Public lighting will only be provided at the trailhead in Kilrush, and at the trailhead and the pedestrian crossing of the N67 at Moyasta. The public lighting installed will have the lowest low lux level permitted for health and safety and be a warm-white colour of 2700K or less. The lighting will use LED luminaires and will have no upward light spill and a sharp horizontal cut off. Where light spill cannot be avoided, louvres, cowls or shields will be fitted to luminaries.

Lighting will be in compliance with the Institute of Lighting Professionals ILP Guidance Notes 08, Bats and Artificial Lighting at Night (2023).

8.8.2.4 Signage

Signage will be included at trail heads and at regular intervals along the route. The subject matter of the signage and suggested locations are presented below in Table 8-. Signage will inform greenway users of the importance of the general area to wintering birds and request responsible behaviour for all those using the amenity.

To avoid an excessive amount of signage being installed and potentially ignored by users, the final locations of signs will be coordinated by Clare County Council.

Table 8-32 Subject Matter and suggested locations of proposed signage.

Subject	Locations
The importance of the bay for birds – it is an internationally important conservation area	At the trailheads. Both sides of the Moyasta Bridge causeway. the entrances to the greenway from the trailheads. Points where the public can access the coast including Brew’s Bridge, Carrowncalla, and the ends of the local roads leading from the N67 to the coast that the greenway crosses.
Dogs must be kept on leads at all times.	At the trailheads. The entrances to the greenway from the trailheads. Points where the public can access the coast including Brew’s Bridge, Carrowncalla, and the ends of the local roads leading from the N67 to the coast that the greenway crosses.
Leave no trace messaging, in particular cleaning up after dogs.	At regular intervals along the route.
No access to private lands	At field gates.

Signage can be effective alone or in combination with physical mitigation measures which can prevent the primary sources of disturbance – through visual and aural stimuli. Signage has been shown to reduce the level of disturbance in some settings (Allbrook & Quinn, 2020; Cutts et al., 2024). Signage is recommended as a mitigation measure by AEWA (2022). Signage has been demonstrated to effectively manage the negative impacts of recreation on wildlife. Herstine et al. (2006) concluded that signage can be an effective approach for passively managing human behaviour and tourism in natural resource settings. A study from Iceland (Marschall et al., 2017) on the impact of signage on visitor behaviour around seals showed that signage was effective, but in particular, 'teleological' signage which provided an explanation as well as a command was more effective. The signage shall be aesthetically engaging to encourage buy-in from visitors. However, in many cases signage can be ignored by visitors, (Braby et al., 2009), therefore physical mitigation measures have been specified in combination with signage.

8.8.3 Specific Mitigation Measures

8.8.3.1 Poulnasherry Bay (KER 1)

The construction phase and non-specific mitigation measures described above will avoid or minimise the potential effects of the proposed development of KER 1 Poulnasherry Bay. There are no other mitigation measures required for KER 1 Poulnasherry Bay.

8.8.3.2 Wintering waterbirds (KER 2)

In addition to the construction phase and non-specific mitigation measures described above, the following measures will be implemented with regards to KER 2 Wintering waterbirds:

- Unless signed off by the ECoW, no construction works are permitted in the sensitive bird areas during the wintering bird season (October – March inclusive). The sensitive bird areas are listed in Table 8-12 and shown in Appendix 8.3. The exception to this is landscape planting which must be carried out during the winter months when plants are dormant. The ECoW must sign off on any works in the sensitive birds areas in situations such as where they consider enough screening to be present for the type of work / tracking involved, or where access is required to reach areas where construction is permitted.
- A single or double strand of steel wire will be installed along the parapet tops of Moyasta Bridge to deter raptors from perching. All wire installations will be securely fixed and designed to withstand interference from members of the public.

8.8.3.3 Breeding Waders and Waterbirds (KER 3)

A minimum of 5 nest boxes suitable for breeding shelduck will be provided. The construction phase and non-specific mitigation measures described above will avoid or minimise the potential effects of the proposed development of KER 3 Breeding Waders. There are no other mitigation measures required for KER 3 Breeding Waders.

8.8.3.4 Birds of prey and Kingfisher (KER 4)

The construction phase and non-specific mitigation measures are described above will avoid or minimise the potential effects of the proposed development of KER 4 Birds of prey and Kingfisher. There are no other mitigation measures required for KER 4 Birds of prey and Kingfisher.

8.8.3.1 Otter (KER 5)

The construction phase and non-specific mitigation measures are described above will avoid or minimise the potential effects of the proposed development of KER 5 Otter. There are no other mitigation measures required for KER 5 Otter.

8.8.3.2 Bats (KER 6)

In addition to the construction phase and non-specific mitigation measures described above, the following measures will be implemented with regards to KER 6 Bats:

No potential roost features were identified during the surveys. The proposed development will result in the loss of the former railway line, agricultural grassland, scrub and hedgerows which do not have potential for bats to roost.

A pre-construction bat survey will be undertaken no more than 3 weeks prior to the works to confirm roost absence at the structures and trees. The preconstruction survey will adhere to Guidelines for the Treatment of Bats during the Construction of National Road Schemes (TII, 2006). Felling of trees and alterations to structures with bat potential will only take place in September and October to avoid maternity roosts and hibernating bats. Trees classified as having low suitability including the treelines at the depot will be soft felled in the presence of an Ecologist who will be licensed to handle bats. Should bats be found during the soft felling, the bats will be taken into care and released at dusk.

8.8.3.3 KER 7 - Wildlife Corridors

In addition to the construction phase and non-specific mitigation measures described above, the following measures will be implemented with regards to KER 7 Wildlife Corridors:

- A total of 4.2km of linear scrub and hedgerow habitat will be cleared to facilitate construction of the proposed development. A total of 16.4 km of linear habitats will be planted. The landscape design is presented in Chapter 15 of this EIAR.
- The 1m verges along the greenway will be allowed to revegetate naturally with locally occurring native species.

8.8.3.4 KER 8 - Badger

The construction phase and non-specific mitigation measures are described above will avoid or minimise the potential effects of the proposed development of KER 8 Badger. There are no other mitigation measures required for KER 8 Badger.

8.8.3.5 KER 9 - Invasive species

Japanese Knotweed was recorded at various locations along the route of the proposed development. The following measures will be implemented with regards to invasive species.

- The control and management procedures outlined in the Invasive Species Management Plan, presented in Appendix 8.5, will be adhered to during the construction of the proposed development.
- The Contractor shall prepare a detailed Biosecurity Protocol describing their proposed approach to ensuring that invasive species are not imported or spread during the construction of the proposed development. The Contractor's Biosecurity Protocol shall be in accordance with The Management of Invasive Alien Plant Species on National Roads – Standard (TII, 2020a) and The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020b). The Biosecurity Protocol shall include, as a minimum, the following measures to prevent the spread of invasive species:
 - Good construction site hygiene will be employed to prevent the introduction and spread of problematic IAPS (e.g., Japanese knotweed and Himalayan Balsam) by thoroughly washing vehicles prior to leaving any site.
 - All plant and equipment employed on the construction site (e.g., excavators, etc.) will be thoroughly cleaned down in designated areas only using a power washer unit prior to arrival on site to prevent the spread of IAPS.

- Any soil and topsoil required on the site will be sourced from a stock that has been screened for the presence of any IAPS and where it is confirmed that none are present.
- Landscaping of the proposed development shall use native species of plants unless in exceptional circumstances, and, insofar as possible, soil reused from on-site excavations. If soil/substrate needs to be imported to the site for the purposes of the proposed development, the Contractor shall ensure that the imported soil/substrate is free from invasive species.

The treatment of Japanese Knotweed will continue as per Clare County Council's current invasive species management plan. Clare County Council will continue treatment of Japanese Knotweed outside of the red line boundary, with the agreement of neighbouring landowners, to ensure that it is fully eradicated from the area and it does not spread back into the proposed development boundary from adjacent lands.

8.8.4 Monitoring and Adaptive Management

Monitoring and adaptive management will be undertaken to ensure that the mitigation measures are in place and to document their effectiveness.

Screening

The planted screening and privacy mesh in the sensitive birds areas will be monitored by the ECoW every September and January for three years following the opening of the Greenway. The purpose of the monitoring is to identify any damaged plants or privacy mesh. Any damaged or dead plants or damaged privacy mesh will be replaced by the Contractor within the three-year defects period which will be specified in the Contract, or alternatively, Clare County Council will assume responsibility for replacing any damage as part of the routine maintenance of the Greenway.

Disturbance monitoring

A qualified ecologist with relevant experience will be appointed to monitor birds and bird behaviour in the sensitive bird areas for two winter seasons following the opening of greenway to the public to demonstrate the effectiveness of the mitigation.

The response of birds to greenway users will be examined over three 3-hour surveys each season, which will be undertaken over the winter months for two years following the opening of the greenway to the public. The surveyor will position themselves so that they do not disturb the birds. The survey will commence at dawn to ensure birds have not been disturbed when the survey begins. The surveyor will record:

- The number and position of birds in the vicinity of each sensitive bird area.
- The details of the greenway users (number of people, dogs on/off lead, cyclist/ walkers etc.).
- Any behavioural change by birds, including no response. Notes on the response will be made in accordance with the disturbance categories in Section 8.7.2.1.1.
- Any activity which led to the disturbance such as shouting or waving.

Should the results show that greenway users are causing disturbance, the screening height will be raised locally to reduce the visibility of user to the intertidal areas. This data will be made available to other local authorities and interested parties by request to inform the approach on similar projects in sensitive environments.

In order to monitor disturbance, it is inappropriate to rely on numerical thresholds to determine where disturbance is significant or not. Variability can be explained by a number of factors including weather conditions, tidal state, disturbance in other areas of the site and the mobile nature of wintering birds. The assessment of the effectiveness of the mitigation measures will rely on qualitative and quantitative data.

The data from the 2020/2021 and the 2022/2023 seasons show that the total number of individual birds is split across the distance buffers is that a small proportion of the birds within 500m of proposed development occurs within 100m of the bridge (Table 8-18).

Table 8-18 Birds numbers within buffers at Moyasta Bridge (VP11)

Buffer	0-50m	50-100m	100-200m	200-500m
Total Number of birds	180	840	2413	4192
% of total	2%	11%	32%	55%

The bird surveys will follow the methodology used for the surveys to inform this assessment and include a high and low tide count each month. The parameters that will be examined are:

- The species diversity (min/ max, average).
- The total number of individuals (min/ max, average).
- The total numbers of each species (min/ max and average).

The total number of birds and total number of each species will be further split into buffers of 0-50m, 50m-100m, 100m-200m and 200m-500m and compared with the numbers recorded in the surveys to date.

The assessment of the effects of disturbance will be based on quantitative data and a qualitative evaluation, informed by expert ecological judgement. In interpreting the survey data, the natural variability in the patterns of usage of the site by wintering birds will be considered. This variability can be caused by the tidal state, weather, disturbance in other areas of Poulmasherry Bay, and the mobile nature of wintering birds. With this in mind, bird counts alone are not a reliable indicator of disturbance. Instead, the assessment will focus on whether there is any change in the pattern of habitat use relative to the baseline conditions coupled with survey information on the responses of birds to greenway users. This dual-parameter approach will ensure that the assessment is meaningful and that any effects of disturbance on birds is identified and can be remedied.

Should the surveys demonstrate that birds are being disturbed in a particular area at levels which would constitute a significant effect, notwithstanding the screening, the following adaptive management strategies can be implemented along with a further season of monitoring to confirm their effectiveness:

- Additional planting along the sensitive bird areas will be added locally using evergreen shrubs.
- The height of the screening on both sides of the greenway can be adjusted if it is concluded that users are causing disturbance in a particular area. This will be achieved by allowing the vegetation to grow to a greater height.
- Temporary mesh screens may be installed until the landscaping is sufficiently established.

These circumstances are not contemplated in the literature and considered to be highly unlikely to eventuate considering the screening and signage already provided for in the design.

Nevertheless, it is important to demonstrate the effectiveness of the mitigation and the absence of significant effects on wintering birds.

8.9 Residual Impacts

Table 8-33 below assess the significance of the residual impacts on the Key Ecological Receptor following the inclusion of the mitigation, compensation and enhancement measures described in Section 8.8.

Table 8-33 Assessment of significance of residual impacts, following CIEEM (2024)

Important Ecological Feature	Pre-mitigation impacts Construction	Pre-mitigation impacts Operation	Ecological significance following mitigation
<p>KER 1 Poulnasherry Bay</p>	<p>Habitat degradation - water quality impacts - Introduction of invasive species</p>	<p>Habitat degradation - water quality impacts (vehicles) Habitat degradation - water quality impacts (dog fouling)</p>	<p><u>Construction Phase</u> Following the implementation of mitigation measures in relation to water quality and invasive species, the construction of the proposed development will have a neutral impact on this KER.</p> <p><u>Operational phase</u> Following the implementation of mitigation measures in relation to water quality, signage and the provision of dog waste bags, the operation of the proposed development will have a neutral impact on this KER.</p>
<p>KER 2 Wintering waterbirds</p>	<p>Noise disturbance Visual disturbance</p>	<p>Noise disturbance Visual disturbance Predation risk</p>	<p><u>Construction Phase</u> No construction activities are permitted during the wintering or migratory periods within the sensitive bird areas. Therefore, the construction of the proposed development will have a neutral impact on this KER.</p> <p><u>Operational phase</u> The proposed mitigation, monitoring and adaptive management measures to reduce disturbance from greenway users will minimise disturbance to wintering birds for the vast majority of users across the entire greenway. However, it is possible that localised occasional disturbance may occur by a small number of disruptive individuals. Even with the mitigation measures in place, there is always a risk of people and dogs accessing the coastal areas where existing access is to be maintained, specifically at Brew's Bridge, Carrowncalla, and the two laneways leading from the N67 to the coast to the west of Moyasta Bridge. The sensitivity of birds to noise or the presence of people will also reduce over time as the birds become habituated. Therefore, following the implementation of mitigation measures in relation to water quality, landscaping, screening and fencing, the operation of the proposed development will have a neutral impact on this KER.</p> <p>Following the installation of steel wire on the Moyasta Bridge parapets, the risk of increased predation by raptors is reduced to a neutral impact on this KER.</p>
<p>KER 3</p>	<p>Direct mortality Disturbance</p>	<p>Disturbance</p>	<p><u>Construction Phase</u></p>

Important Ecological Feature	Pre-mitigation impacts Construction	Pre-mitigation impacts Operation	Ecological significance following mitigation
Breeding Waders			<p>Following the implementation of mitigation measures in relation to the timing of the works, water quality, landscaping, screening and fencing, the construction of the proposed development will have a neutral impact on this KER.</p> <p><u>Operational phase</u> Following the implementation of mitigation measures in relation to water quality, landscaping, screening and fencing, the construction of the proposed development will have a neutral impact on this KER.</p>
KER 4 Birds of prey and Kingfisher	Habitat loss Disturbance	Disturbance	<p><u>Construction Phase</u> Following the implementation of mitigation measures in relation to water quality, landscaping, screening and fencing, the construction of the proposed development will have a neutral impact on this KER.</p> <p><u>Operational phase</u> Following the implementation of mitigation measures in relation to water quality, landscaping, screening and fencing, the construction of the proposed development will have a neutral impact on this KER.</p>
KER 5 Otter	Habitat Fragmentation Disturbance	Habitat Fragmentation Disturbance	<p><u>Construction Phase</u> Following the implementation of mitigation measures in relation to water quality, landscaping, screening and fencing, the construction of the proposed development will have a neutral impact on this KER.</p> <p><u>Operational phase</u> Following the implementation of mitigation measures in relation to water quality, landscaping, screening and fencing, and the construction of watercourse crossings, the construction of the proposed development will have a neutral impact on this KER.</p>
KER 6 Bats	Habitat loss / fragmentation Habitat Degradation – lighting	Habitat loss / fragmentation Habitat Degradation – lighting	<p><u>Construction Phase</u> Following the implementation of mitigation measures in relation to the pre-construction survey, lighting and landscaping, the construction of the proposed development will have a neutral impact on this KER.</p> <p><u>Operational phase</u></p>

Important Ecological Feature	Pre-mitigation impacts Construction	Pre-mitigation impacts Operation	Ecological significance following mitigation
			Following the implementation of mitigation measures in relation to water quality, landscaping, and lighting, the construction of the proposed development will have a neutral impact on this KER.
KER 7 Wildlife Corridors	Direct mortality Temporary habitat loss Habitat degradation Habitat fragmentation	Permanent habitat loss Habitat Fragmentation Habitat net gain	<p><u>Construction Phase</u> Following the implementation of mitigation measures in relation to the timing of the works, water quality, landscaping, screening and fencing, the construction of the proposed development will have a short-term slight impact on this KER at the local level as a result of construction activity taking place on a previously undisturbed area.</p> <p><u>Operational phase</u> Following the implementation of mitigation measures in relation to water quality, landscaping, screening and fencing, the operation of the proposed development will have a medium-term slight impact on this KER at the local level. As the planting matures, this impact will be reduced to imperceptible levels.</p>
KER 8 Badger	Direct Mortality Disturbance Temporary habitat loss	Permanent habitat loss Habitat fragmentation	<p><u>Construction Phase</u> Following the implementation of mitigation measures in relation to the pre-construction survey, lighting and landscaping, the construction of the proposed development will have a neutral impact on this KER.</p> <p><u>Operational phase</u> Following the implementation of mitigation measures in relation to fencing, landscaping, and lighting, the construction of the proposed development will have a neutral impact on this KER.</p>
KER 9 Invasive species	Habitat degradation as a result of spread of invasive species	Habitat degradation as a result of spread of invasive species	<p><u>Construction Phase</u> The mitigation measures provided in relation to invasive species is considered that the proposed development will result in a permanent positive impact as invasive species will be eradicated from public lands.</p> <p><u>Operational phase</u> The mitigation measures provided in relation to invasive species is considered that the proposed development will result in a permanent positive impact as invasive species will be eradicated from public lands.</p>

8.10 Assessment of Cumulative Impacts

Cumulative effects are those which accrue to Key Ecological Receptor as a result of incremental changes caused by other existing or proposed plans or projects together those caused by the proposed development. For the purposes of this assessment, the cumulative impact assessment considers cumulative impacts on biodiversity which are:

- (a) Likely.
- (b) Significant.
- (c) Relating to a future event, reasonably foreseeable.

None of the developments identified during the cumulative assessment were determined to result in significant negative cumulative effects with regard to biodiversity.

It is noted that three further sections of the West Clare Railway Greenway are planned: Section 2 between Ennis and Ennistymon; Section 3 between Ennistymon and Miltown Malbay; and Section 4 between Miltown Malbay and Moyasta. The increase in greenways in Co. Clare is more likely to spread the visitors out than increase visitors to a particular area. Sections 2, 3 and 4 are separate projects and will be assessed on their own particulars, as well cumulatively with other plans and projects. Avoidance and mitigation measures will be provided for each project as required, depending on the potential ecological effects identified in each case. Section 2, 3 and 4 are in the early stages of design. Therefore, there is no potential for significant cumulative arising from the proposed development with any other sections of the West Clare Greenway.

8.11 Conclusion

The main area of concern with regards to biodiversity is the potential for disturbance to wintering birds during the operational phase of the proposed development. The assessment has drawn on the scientific literature as well as real world example of greenways that have been constructed close to areas used by wintering birds. The fencing and screening of the greenway is a key element of the mitigation to reduce the effects of people and dogs on wintering birds and other wildlife.

It is considered that, with the implementation of the mitigation measures and standard practice measures set out in this Chapter, the CEMP, the construction and operation of the proposed development will not have a significant negative impact on biodiversity in the Zone of Influence.

8.12 References

Allbrook D.L. & Quinn J.L. (2020) The effectiveness of regulatory signs in controlling human behaviour and Northern Gannet (*Morus bassanus*) disturbance during breeding: an experimental test. *Journal for Nature Conservation*, 58, 125915. <https://doi.org/10.1016/j.jnc.2020.125915>

Andersson, M. (1981a) On optimal predator search. *Theoretical Population Biology*, 19, 58–86.

Andersson, M., Wallander, J. and Isaksson, D. (2009), Predator perches: a visual search perspective. *Functional Ecology*, 23: 373-379. <https://doi.org/10.1111/j.1365-2435.2008.01512.x>

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

Bat Conservation Trust (2018) Bats and Lighting in the UK. Bat Conservation Trust, London.

BirdLife International (2004) Birds in Europe: population estimates, trends and conservation status (BirdLife Conservation Series No. 12). BirdLife International, Cambridge, UK.

BirdWatch Ireland (2022). IWeBs Counter Manual. Accessed November 2025. <https://birdwatchireland.ie/publications/i-webs-counter-manual/>

Borgmann, K.L. (2011). A Review of Human Disturbance Impacts on Waterbirds. Audubon California.

Braby J., Braby R.J., Braby N. & Simmons R.E. (2009) Protecting Damara Terns *Sterna balaenarum* from recreational disturbance in the Namib Desert increases breeding density and overall success. *Ostrich*, 80, 71–75. <https://doi.org/10.2989/OSTRICH.2009.80.2.1.828>

Burke, B., Kennedy, J., Gadd, R., Fitzgerald, N., Lynch, A., Caffrey, B., Walsh, A., Murray, T. & Kelly, S.B.A. (2025). *The status and distribution of wintering waterbirds in Ireland in 2023: results from the Irish Wetland Bird Survey (I-WeBS)*. Irish Wildlife Manuals, No. 162. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

Callaghan D.A. & Hodd, R.L. (2024). The state of Calaminarian grassland in Ireland, 2023. Irish Wildlife Manuals, No. 154. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

CIEEM (2022) *Guidelines for Ecological Impact Assessment in the UK and Ireland*. Chartered Institute of Ecology and Environmental Management, Winchester.

CIRIA (2001) C532 Control of water pollution from construction sites: guidance for consultants and contractors. Construction Industry Research and Information Association.

Collins (2023) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition)*. Bat Conservation Trust, London.

Collop, C., Stillman, R. A., Garbutt, A., Yates, M. G., Rispin, E. and Yates, T. (2016). *Variability in the area, energy and time costs of responding to disturbance for wintering waders*. *Ibis* 158(4):711-725.

Cresswell W, Whitfield DP (1994) The effects of raptor predation on wintering wader populations at the Tynninghame estuary, southeast Scotland.

Crowe, Olivia & Boland, Helen & Walsh, Alyn. (2012). Irish Wetland Bird Survey: results of waterbird monitoring in Ireland in 2010/11. *Irish Birds*. Volume 9. 397.

Crushell, P. & Foss, P.J. (2008) The County Clare Wetlands Survey Desk Survey & GIS Preparation, Report prepared for Clare County Council, Ireland TII (2006a) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes.

Cutts, N., Phelps, A., Spencer, J., & Hemmingway, K. (2013). Waterbird disturbance mitigation toolkit. Tide toolbox, Interreg IVB North Sea Region Programme.

Cutts V., Jackson M.V., Taylor N.G., Gaffi L., Hagemeyer W. & Sutherland W.J. (2024) Guidance on reducing disturbance for shorebirds. Conservation Guidance Series No. 14, v1.0. <https://doi.org/10.52201/CGS/JPZI7218>

EC (2013) *Interpretation Manual of European Union Habitats*. European Commission, Brussels.

EC (2021) *Assessment of plans and projects in relation to Natura 2000 sites: Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC*. European Commission, Brussels.

Enterprise Ireland. BPGCS005 Oil Storage Guidelines - Best Practice Guide.

EPA (2025) *Unified GIS Application* <<https://gis.epa.ie/EPAMaps>> [Accessed October 2025]. Environmental Protection Agency, Wexford.

Foss, P.J., Vanmechelen, A., & Crushell, P. (2022). County Clare Wetlands Study. Report prepared for Clare County Council.

Fossitt, J. (2000) *A Guide to Habitats in Ireland*. The Heritage Council, Kilkenny.

Gibbons, D.W., Reid, J.B. & Chapman, R.A. (1993) *The New Atlas of Breeding Birds in Britain and Ireland 1988– 1991*. T. & A.D. Poyser, London.

Gilbert, G., Gibbons, D.W., & Evans, J. (1998) *Bird Monitoring Methods: A Manual of Techniques for UK Key Species*. The Royal Society for the protection of Birds, Sandy, Bedfordshire, England.

Gilbert, G., Stanbury, A. and Lewis, L. (2021) *Birds of Conservation Concern in Ireland 2020-2026*. Irish Birds 9:523-544.

Gómez-Serrano, M.Á., 2021. Four-legged foes: dogs disturb nesting plovers more than people do on tourist beaches. *Ibis*, 163(2), pp.338-352.

Goodship, N.M. and Furness, R.W. (MacArthur Green) *Disturbance Distances Review: An updated literature review of disturbance distances of selected birdspecies*. NatureScot Research Report 1283.

Herstine, J., Hill, J. and Buerger, R. (2006) *Managing Human Activity and Tourism Impacts: A Case Study of Zeke's Island Reserve, North Carolina*. *Tourism in Marine Environments*, 3(2), pp. 163-172(10).

IFI (2016) *Guidelines on Protection of Fisheries during Construction Works in and adjacent to Waters*. Inland Fisheries Ireland, Dublin.

INIS Environmental Consultants (2021) *Habitat Assessment Report: Poulnasherry Bay, Co. Clare*. Report prepared for Clare County Council.

INIS Environmental Consultants (2022) *The Poulnasherry Bay Waterbird survey 2021-2022*. Marine Institute Poulnasherry Bay Waterbird Survey Winter 2021-22 Bird Survey Report.

Kaasiku, T., Rannap, R. and Männil, P. (2022), *Predation-mediated edge effects reduce survival of wader nests at a wet grassland-forest edge*. *Anim Conserv*, 25: 692-703
<https://doi.org/10.1111/acv.12774>

Kross S.M., Hardage S., Kelsey, T.R., Chapman, R., Martinez. A., Andrea Craig, A., 2024. *Testing the efficacy and durability of modifying fence posts to provide raptor perches, Rangelands, Volume 46, Issue 2, Pages 48-54, ISSN 0190-0528.*

Kennedy, J., Burke, B., Fitzgerald, N., Kelly, S.B.A., Walsh, A.J. & Lewis, L.J. 2023. *Irish Wetland Bird Survey: I-WeBS National and Site Trends Report 1994/95 – 2019/20*. BirdWatch Ireland Waterbird Report to the National Parks and Wildlife Service. BirdWatch Ireland, Wicklow. (https://birdwatchireland.ie/app/uploads/2023/08/iwebs_trends_report.html)

Lewis, L. J. & Tierney, T. D. (2014) *Low tide waterbird surveys: survey methods and guidance notes*. Irish Wildlife Manuals, No. 80. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Lewis, L., Burke, B., & Crowe, O. (2016). A report commissioned by the by the SIFP Environmental Sub Group and prepared by BirdWatch Ireland.

Lewis, L. J. (2019) *An assessment of the effects of recreational and other activities on the waterbirds using the Bull Island saltmarsh*. Final Report. Report commissioned by Dublin City & County Council and prepared by BirdWatch Ireland. April 2019.

Livezey, K. B., Fernández-Juricic, E. and Blumstein, D.T. 2016. Database and metadata of bird flight initiation distances worldwide to assist in estimating human disturbance effects and delineating buffer areas. *Journal of Fisheries and Wildlife Management* 082015–JFWM–078.

Ma, A.T., Ng, S.L., Cheung, L.T. and Lam, T.W., 2022. The effectiveness of bird hides in mitigating recreational disturbances of birdwatchers. *Journal for Nature Conservation*, 67, p.126181.

Marnell, F. Kelleher, C & Mullen, E. (2022). *Bat Mitigation Guidelines for Ireland V2*. Irish Wildlife Manuals, No. 134. National Parks & Wildlife Service, Department of Housing, Local Government and Heritage, Dublin.

Martin, J.R., Daly, O.H. and Devaney F.M. (2017) *Survey and assessment of vegetated shingle and associated habitats at 30 coastal sites in Ireland*. Irish Wildlife Manuals, No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Ireland.

Martin, N.A., Stephen's J., and Meijer, W. (2021). *The Impact of Dog Fouling on Bathing Water Quality in Dublin Bay*. Acclimatize.

Marschall S., Granquist S.M. and Burns G. L. (2017) *Interpretation in wildlife tourism: Assessing the effectiveness of signage on visitor behaviour at a seal watching site in Iceland*. *Journal of Outdoor Recreation and Tourism*, 17, pp. 11-19.

Mayer, Martin & Natusch, Daniel & Frank, Shane. (2019). *Water body type and group size affect the flight initiation distance of European waterbirds*. PLOS ONE. 14. e0219845. 10.1371/journal.pone.0219845.

MKO (2019). *Waterfowl numbers, usage and distribution on the River Shannon and River Fergus Estuaries - Final Survey Report*.

Nairn, ROGOW. (2005). The use of a high tide roost by waders during engineering work in Galway Bay, Ireland. *Irish Birds*, 7, 489-496.

Natural England (2026) Annex B of the Statutory guidance. Licence to capture and transport otters trapped in fisheries to prevent damage (CL36). Updated January 2026.

Navedo, J. G. & Herrera, A. G. 2012. Effects of recreational disturbance on tidal wetlands: supporting the importance of undisturbed roosting sites for waterbird conservation. *Journal of Coastal Conservation* 16, 373-381.

NBDC (2021) All Ireland Pollinator Plan 2021-2025. National Biodiversity Data Centre, Waterford.

NBDC (2025) Biodiversity Maps <<https://maps.biodiversityireland.ie>> [Accessed August 2025]. National Biodiversity Data Centre, Waterford.

NPWS (2012a) *Conservation Objectives: Lower River Shannon SAC [002165]. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012b). *Conservation Objectives: River Shannon and River Fergus Estuaries SPA [004077]. Version 1*. NPWS, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012c). *Lower River Shannon SAC [002165] Conservation Objectives Supporting Document – Water Courses. Version 1*. NPWS, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012d). *Lower River Shannon SAC [002165] Conservation Objectives Supporting Document – Coastal Habitats. Version 1*. NPWS, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012e). *River Shannon and River Fergus Estuaries SPA [004077] Conservation Objectives Supporting Document. Version 1*. NPWS, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013) *Site Synopsis Lower River Shannon SAC [002165]*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014a) *Conservation Objectives: Kilkee Reefs SAC [002264]. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014b). *Site Synopsis: Kilkee Reefs SAC [002264]*. NPWS, Department of Arts, Heritage and the Gaeltacht.

NPWS (2015a). *Site Synopsis: River Shannon and River Fergus Estuaries SPA [004077]*. NPWS, Department of Arts, Heritage and the Gaeltacht.

NPWS (2021) *Guidance for Public authorities on the Application of Articles 12 and 16 of the EU Habitats Directive to development/works undertaken by or on behalf of a Public authority. Series 2*. Department of Arts, Heritage and the Gaeltacht.

NPWS (2021) *Guidance on the Strict Protection of Certain Animal and Plant Species under the Habitats Directive in Ireland. Series 2*. Department of Arts, Heritage and the Gaeltacht.

NPWS (2025) *Applications for Regulation 54 Derogations for Annex IV species. Guidance for Applicants. Version 1. 1st July 2025*. Department of Arts, Heritage and the Gaeltacht.

Phalan, B. & Nairn, R. G. W. (2007) Disturbance to waterbirds in South Dublin Bay. *Irish Birds* 8, 223-230.

Reason, P.F. & Wray, S. (2023). *UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats*. Version 1.1. Chartered Institute of Ecology and Environmental Management, Ampfield.

Retif, E. (2013). *A Guide to Building Universally Accessible Bird Hides*. BirdLife South Africa.

Scott, P. and Matthews, G. V. T. (1976). Public access to wetlands: control and education. In *Proceedings of International Conference on the Conservation of Wetlands and Waterfowl*, Heiligenhafen 1974, pp. 370-375. Slimbridge, U.K.: IWRB.

Smith, G.F., O'Donoghue, P., O'Hora, K. and Delaney, E. (2011) *Best Practice Guidance for Habitat Survey and Mapping*. The Heritage Council, Kilkenny.

Steven R, Pickering C, Guy Castley J. A review of the impacts of nature based recreation on birds. *J Environ Manage.* 2011 Oct;92(10):2287-94. doi: 10.1016/j.jenvman.2011.05.005. Epub 2011 Jun 2. PMID: 21640470.

Suddaby, D., O'Brien, I., Breen, D. & Kelly, S. (2020) A survey of breeding waders on machair and other coastal grasslands in Counties Mayo and Galway. *Irish Wildlife Manuals*, No. 119. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

SNH 2020 Information note - The Effect of Aviation Obstruction Lighting on Birds at Wind Turbines, Communication Towers and Other Structures.

Stigner, M.G., Beyer, H.L., Klein, C.J. and Fuller, R.A. (2016), Reconciling recreational use and conservation values in a coastal protected area. *J Appl Ecol*, 53: 1206-1214.

Tarr, A. (2024) Cat and dog parasiticides and the environment. *Veterinary Journal Ireland*. <https://www.veterinaryirelandjournal.com/small-animal/359-cat-and-dog-parasiticides-and-the-environment>.

Thomas, R.L., Papworth, S.K. and Fellowes, M.D., 2024. Unleashed: Walking dogs off the lead greatly increases habitat disturbance in UK lowland heathlands. *Urban Ecosystems*, 27(6), pp.2037-2046.

TII (2005) *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes*. Transport Infrastructure Ireland, Dublin. CC-ENV-01103.

TII (2006a) *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*. Transport Infrastructure Ireland, Dublin. PE-ENV-01115.

TII (2006b) *Guidelines for the Treatment of Bats during the Construction of National Road Schemes*. Transport Infrastructure Ireland, Dublin. CC-ENV-01102.

TII (2006c) *Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post Construction of National Road Schemes*. Transport Infrastructure Ireland, Dublin. GE-ENV-01110.

TII (2008a) *Environmental Impact Assessment of National Road Schemes – A Practical Guide (Revision 1)*. Transport Infrastructure Ireland, Dublin. PE-ENV-01114.

TII (2008b) Ecological Survey Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. Transport Infrastructure Ireland, Dublin. PE-ENV-01113.

TII (2008c) Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes. Transport Infrastructure Ireland, Dublin. CC-ENV-01104.

TII (2008d) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes. Transport Infrastructure Ireland, Dublin. CC-ENV-01101.

TII (2009) Guidelines for Assessment of Ecological Impacts of National Road Schemes. Transport Infrastructure Ireland, Dublin. PE-ENV-01112.

TII (2020a) The Management of Invasive Alien Plant Species on National Roads – Standard. Transport Infrastructure Ireland, Dublin. GE-ENV-01104.

TII (2020b) The Management of Invasive Alien Plant Species on National Roads – Technical Guidance. Transport Infrastructure Ireland, Dublin. GE-ENV-01105.

TII (2023) Biodiversity Plan. Transport Infrastructure Ireland, Dublin.

Wallander, Johan & Isaksson, Daniel & Lenberg, Thomas. (2006). Wader nest distribution and predation in relation to man-made structures on coastal pastures. *Biological Conservation - BIOL CONSERV.* 132. 343-350. 10.1016/j.biocon.2006.04.026.

Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016) Ireland Red List No. 10: Vascular Plants. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.

Weston, M.A. and Stankowich, T., 2014. *Dogs as agents of disturbance* (pp. 94-116). Oxford, UK: Oxford University Press.

Whitfield, D. (2008). Raptor predation on wintering waders in southeast Scotland. *Ibis.* 127. 544 - 558. 10.1111/j.1474-919X.1985.tb04850.x.