MWP

Ecological Impact Assessment (EcIA)

Proposed Dinis Loop Walkway/Cycleway at Torc, Muckross, Killarney, County Kerry

National Parks and Wildlife Service (NPWS)

November 2024

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Project No.	Doc. No.	Rev.	Date	Prepared By	Checked By	Approved By	Status
23765	6005	A	November 2024	PD	DOB	HD	FINAL

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1. Introduction

Malachy and Walsh and Partners (MWP) Engineering and Environmental Consultants was commissioned by the Applicant to prepare this Ecological Impact Assessment report (EcIA) to accompany the planning application. The purpose of the EcIA is to assess the impacts of the proposed development on ecological features as well as impacts on any designated sites or protected species. A Natura Impact Statement (NIS) has also been prepared by MWP and will accompany the planning application.

1.1 Overview of the Proposed Development

A Planning Application is being lodged to Kerry County Council (KCC) by National Parks and Wildlife Services (NPWS) ('the Applicant') for a lake walkway/cycleway at Torc, Muckross, Killarney National Park, Killarney, County Kerry (hereafter referred to as the 'proposed development site'). Permission is being sought for construction of a raised platform walkway/cycleway from Dinis carpark to the Torc (Cardiac hill) carpark, located between the N71 roadway and the Muckross lake shore, inclusive of signage and ancillary siteworks. A Screening for Appropriate Assessment (AA) Report was also prepared by MWP ecologists to support the planning application submitted to KCC (Planning Reference No. 24/60025) in December 2023.

1.2 Scope of the Assessment

- Identify and document protected habitats and species in the study area through desktop studies.
- Undertake baseline ecological surveys at the site.
- Evaluate the nature conservation importance of the ecological resources identified using a scientifically robust and objective methodology based on current National and International best practice guidelines.
- Predict the potential direct, indirect and cumulative effects of the project on local biodiversity.
- Prescribe mitigation measures to minimise potential effects to biodiversity.
- Identify habitats and species within the study area that could benefit from ecological management for the purpose of local biodiversity enhancement.

1.3 Statement of Competency

This EcIA has been prepared by Petr Dobes, Assistant Ecologist with Malachy Walsh and Partners (MWP). Ecological field surveys were undertaken by Maureen Kelliher, Orla van der Noll, Ger Hayes, Rob Beer, Fiona McKenna, Salona Reddy, Jennifer Snook, Petr Dobes, Hazel Dalton, Deirdre O'Brien and Davey Farrar. Profiles of all ecologists are presented in **Appendix 1**.

Petr, a graduate of Kerry College's Ecology programme, has been a valuable member of MWP's Ecology team since May 2023. As a qualifying member of the Chartered Institute of Ecology and Environmental Management (CIEEM), he exhibits a deep commitment to environmental stewardship. Passionate about nature, Petr actively participates in Citizen Science projects, contributing to the monitoring of local wildlife and flora. He is a dedicated birdwatcher, conducting annual bird population surveys for both Birdwatch Ireland and the Irish Raptor Study Group. He has been formally trained in aquatic macroinvertebrates identification (Freshwater Biological Association), Biological Water quality Assessment by the Q-value method (Pascal Sweeney), surveying for white-clawed crayfish and Stage 1 & 2 freshwater pearl mussel surveying (Pascal Sweeney).

This report was reviewed by Hazel Dalton (BSc., BBus.). Hazel is a Senior Project Ecologist with over nine years' experience with MWP since graduating with a first-class Honours Degree in 'Wildlife Biology' from Munster Technological University (MTU) in 2015. Hazel is experienced in ecological surveying and impact assessment for

AA and EIAR. She has authored and contributed to numerous screening reports for AA, NIS and EcIA reports. Hazel is an experienced field ecologist with a diverse ecological survey profile including habitats and flora, mammals, bats, birds and terrestrial invertebrates. She has held/holds National Parks and Wildlife Service (NPWS) Licences for small mammal trapping, tape lure/endoscope bird surveys, Kerry slug (*Geomalacus maculosus*) surveys, disturbance of a bat roost to facilitate bridge works, photographing wild animals (badger and otter) at their resting/breeding places and undertaking bat surveys (DER/BAT 2024-51).

1.4 Consultation

An on-line meeting was held between MWP staff and NPWS staff in summer 2023. During this meeting, the proposed development and potential field survey scope were discussed.

A site meeting was subsequently held between MWP staff and NPWS staff on the 16th October 2023. During this site meeting, the proposal was further discussed. Informal consultation between MWP and NPWS has been on-going throughout the project. Informal consultation was also held with the biodiversity and Planning Departments of Kerry County Council.

2. Details of Proposed Development

2.1 Site Location and Context

The proposed development site is situated approximately 6.1 km south-west of the town of Killarney in County Kerry. The site is located in a rural setting, positioned between the southern shore of Muckross Lake and the N71 National Road (connecting Killarney with the town of Kenmare in south Kerry), characterised by a mosaic of woodland, scrub, boulders and rock outcroppings and the lake.

The proposed walkway/cycleway route will be constructed on a narrow strip of land located between the road and the lakeshore, travelling parallel to both. The site can be accessed from either the existing Dinis carpark, located at the western end of the proposed route, or the existing Torc (Cardiac hill) carpark, located at the eastern end of the proposed route.

The site is encompassed within Killarney National Park and comprises predominantly woodland which fringes the lakeshore to the immediate north. The surrounding area is characterised by woodland extending into the uplands of the MacGillycuddy's Reeks. See **Figure 1** below for location of the proposed development site.

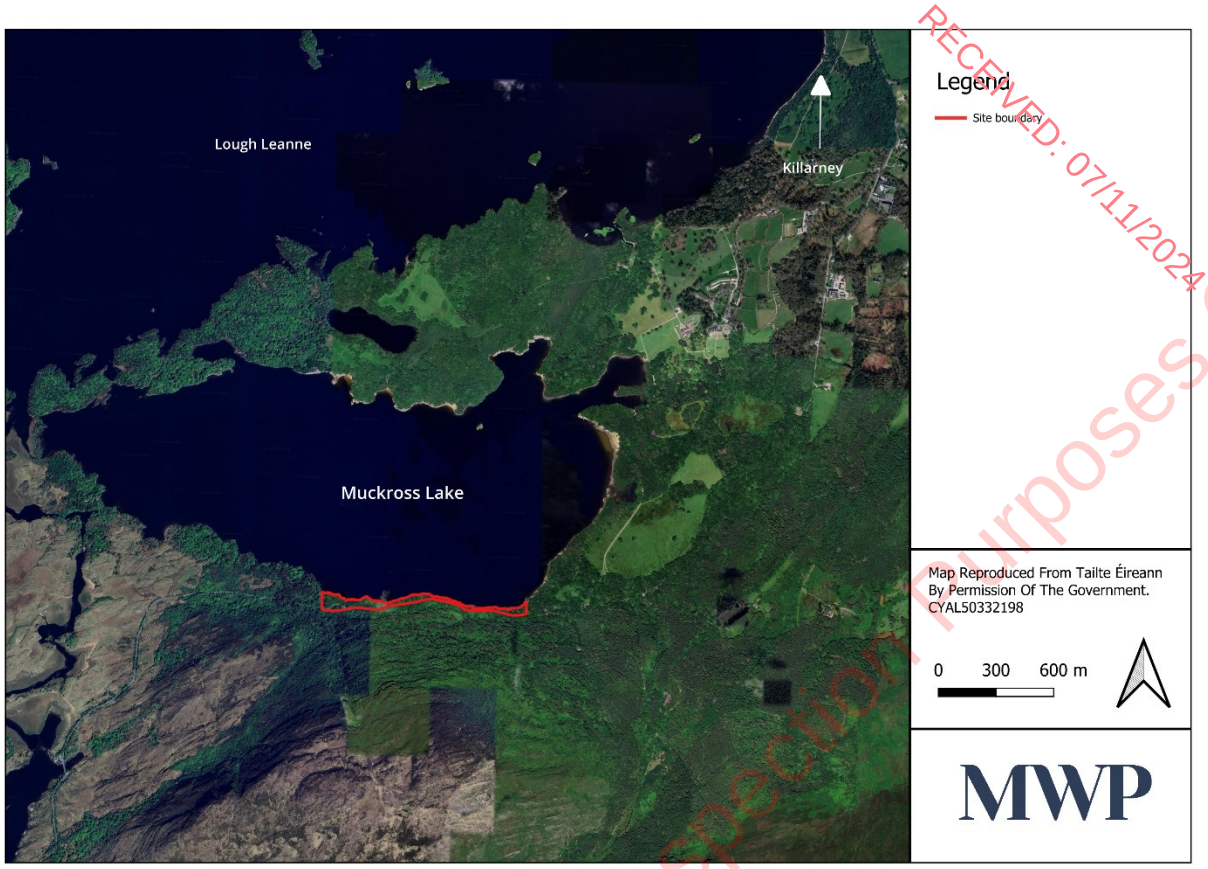

Figure 1: The proposed development site location

2.2 Characteristics of the Project

The proposal is described below and has been confirmed with the project engineer.

The proposed development site will cover an area of approximately 3.7 hectares, with a developable footprint of 0.35 hectares (3,500m²). The project includes constructing a 1020 m long x 3.4 m wide raised platform walkway, requiring the removal of some scrub, sapling trees and topsoil. The platform's design will include small concrete pad foundations anchored to the rock where it is close to the surface, with rock anchors used to minimize pad size. The main structure will consist of galvanized or corten steel on a 5.0 m structural grid, with prefabricated column supports and platform decks assembled on-site using bolted connections. The platform deck, primarily made from anti-slip precast concrete planks, will have 1.4 m guardrails on both sides, fabricated off-site and installed on-site. A small viewing area along the walkway will include a glazed balustrade. Dinis car park alterations will be made to improve circulation within the car park and improving the entrance and exit junctions from the car park.

Construction methodologies as follows:

1. Site Setup and compound

- Prefabricated construction minimizes environmental impact and reduces the need for extensive site work.
- Raised platform design preserves natural habitat below the platform footprint.

- Multiple small compounds located along the route between Dinis and Torc car parks. These will be positioned on level ground, clear of mature trees and near the N71 for easy access.
- Contractor office and welfare facilities would likely be set up in one or both car parks.
- Ground protection matting and silt fences installed as needed, with specifics finalized in the detailed design phase.
- Offsite compound anticipated within NPWS depot yard at Muckross due to limited onsite space.

2. Foundations

- Small concrete pad foundations, anchored to bedrock when close to the surface.
- Rock anchors reduce the size of the concrete pads, minimizing environmental footprint.
- Overburden soil excavated manually or with a 3-ton tracked excavator and reused over the foundations upon completion.
- Rock bolts or anchors drilled and grouted into bedrock to secure steel columns, with pneumatic handheld drilling equipment for manual placement.
- Workers harnessed on steep embankments for safe practice.

3. Steel frame structure

- Structure uses galvanized or corten steel, configured in a 5.0m structural grid for consistency.
- Column supports and deck prefabricated offsite and assembled on-site using bolted connections.
- Short columns installed manually; tracked telehandlers position deck beams and platform.
- Each completed bay of the structure serves as a working platform for the next section.
- Mobile crane and spider manlift used on challenging terrain, operating from the public roadway.

4. Walkway deck

- Precast concrete planks, cast in short sections, have an anti-slip finish for safety.
- Decking designed to manage construction loading, ensuring durability.
- Planks lifted into position by a small tracked swivel forklift.
- Each deck section used as access for installing the subsequent section.

5. Handrails and balustrading

- Tubular metal handrails with steel mesh panel infills installed along the walkway.
- Viewing area features a glazed balustrade for clear visibility.
- Entire system prefabricated offsite for efficient bolted assembly onsite.
- Fabricated in manageable lengths, facilitating ease of handling and installation onsite.

6. Carpark alternations

- Minor excavations of the mound between the car park and public roadway to allow a new parking lines alternations.

An approx. total of excavation volume is predicted at 530 m³. 250 m³ excavation for concrete pads to support steel columns and 280 m³ for car park alternations.

The total construction time frame is approximately 8 to 10 months and 10 – 15 employees are expected to be on site daily. All construction works will take place during daylight hours.

Materials required:

- Ready-mix concrete: 125 m³ (foundations)
- Structure steel (rebar): 2.5 tons
- Micropiles/rock anchors: 3 tons
- Clause 804 fill: 125 m³
- Glazing for viewing balustrade.
- Structure steel columns and deck framework: 230 tons
- Precast concrete decl slabs; 3,200 m²
- Fencing/signage
- Lighting standards
- Hoarding scaffolding, propping

Machinery used

- Mini excavators (3 tons)
- Trucks for stone fill and delivery of materials
- Mini piling rig, hydraulic power pac, crane
- Concrete mixers, cement trucks and delivery trucks
- General tools (saws, jack hammers, grinders, drills)
- Mobile toilets, portacabins, lighting standards and generators

An integrated Waste Management Plan (WMP) will be implemented, with waste streams identified and separated for disposal. Waste will be removed by an approved Licensed Waste Contractor and disposed of in authorised facilities, as per KCC guidelines. Recycling materials will be directed to recycling centres where feasible.

Waste materials include:

- Spoil (topsoil, concrete waste, timber, reinforcing steel) some topsoil will be reused where practical.
- Miscellaneous waste (pallets, plastics, packaging).
- Domestic waste.
- Wastewater (from handbasins and portable toilets).

Fuel storage and refuelling will be contained within bunded areas to prevent contamination. See **Figure 2** below for location of the proposed development site.

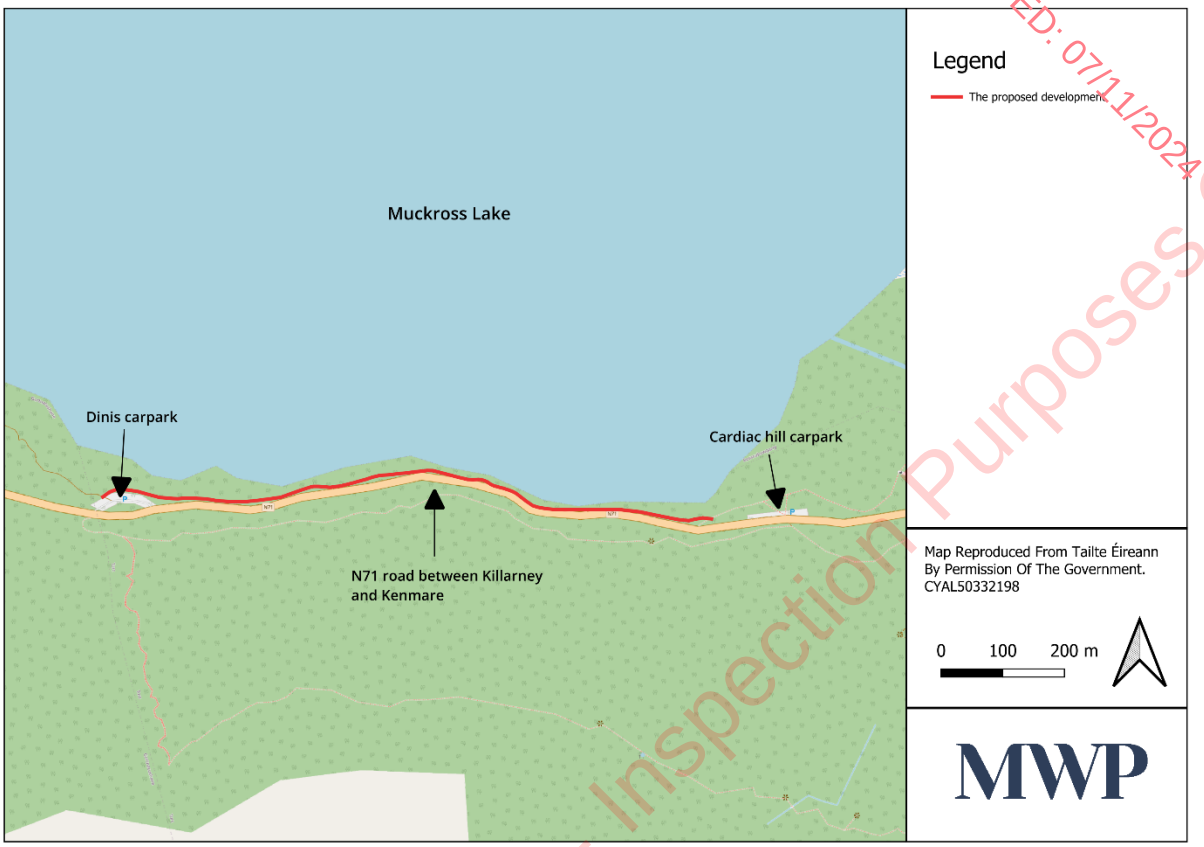

Figure 2: The proposed development site.

3. Methodology

3.1 Legislation and Published Guidance

This assessment was undertaken with regard to the following publications;

- *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2022)
- *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM[1], 2018)
- *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA[2], 2009)

The following legislative framework was also considered:

- EU Habitats Directive (92/43/EEC)
- EU Birds Directive (79/409/EEC)
- EU Water Framework Directive (WFD, 2000/60/EC)

[1] ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.2-April-22-Compressed.pdf (cieem.net)
[2] Layout 1 (tii.ie)

- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011), as amended
- Planning and Development Act 2000, as amended
- Wildlife Act 1976, as amended
- Flora (Protection) Order, 2015
- The European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272 of 2009) and (Amendment) Regulations 2012 and 2015

3.2 Desktop Study

A desktop study was carried out to collate and review available information and documentation relating to the biodiversity of the site and the geographical area extending away from it. The following publications, which include current best practice guidance, current scientific literature, up to-date data and datasets were reviewed:

- Ordnance Survey Ireland (OSI) aerial photography, 1:50000 mapping, GeoHive and online satellite imagery sources
- National Parks and Wildlife Service (NPWS)
- National Biodiversity Data Centre (NBDC) (on-line map-viewer)
- BirdWatch Ireland
- Teagasc soil area maps (NBDC website) and Geological Survey Ireland (GSI) area maps
- Environmental Protection Agency (EPA) water quality data
- Geological Survey Ireland (GSI) area maps
- River Basin District (RBD) datasets (Water Framework Directive)
- Inland Fisheries Ireland (IFI) fish sampling reports and fish data online
- Kerry County Development Plan 2022-2028
- Killarney Municipal District LAP 2018-2024
- Review of requested records from NPWS Rare and Protected Species database

3.2.1 Database Searches and Data Requests

The proposed development area lies within the Ordnance Survey Ireland National Grid hectad V98. Concise and site-specific information on species records available in this hectad was retrieved from the NBDC online database and reviewed.

On the 12th August, 5th September and 4th October 2024, requests were made to NPWS for Sensitive Data Access for hectad V98. No response to any data requests had been received at the time of writing.

On 16th of August, a request was made to I-WeBS (Irish Wetland Bird Survey) part of BirdWatch Ireland in relation to monthly counts of wetland bird species in 'Lough Leane & Killarney Valley– 0K009' I-Webs site and its five subsites which encompass the proposed development site. Data was received from BirdWatch Ireland on 22nd August 2024 and reviewed, in conjunction with the 'Lough Leane and Killarney Valley Site – 0K009' I-WeBS site data.

The NPWS EU Habitats Directive Annex Habitats Article 17 spatial datasets for Annex I habitats were accessed via the NPWS interactive map-viewer and reviewed. These datasets document the occurrence of Annex I habitats in Ireland.

Information received via the NPWS in response to the data request and database searches which included NBDC was used to help inform the baseline surveys and impact assessment in relation to the proposal.

3.2.2 Bat Conservation Ireland Bat Landscape Favorability Model

Bat Conservation Ireland produced a landscape conservation guide for Irish bat species using their database of species records. An analysis of the habitat and landscape associations of all bat species deemed resident in Ireland was undertaken and reported in Roche *et al.*, (2014). The geographical area suitable for individual species was used to identify the core favourable areas of each species. Habitat preferences for bat species were reviewed.

3.2.3 Bat Habitat Suitability Index (BHSI)

The NBDC online mapper includes a Bat Habitat Suitability Index (BHSI) layer derived from an analysis of the habitat and landscape associations of Irish bats compiled in Lundy *et al.* (2011). The index evaluation ratings range from 0 to 100 with 0 being the least favourable, and 100 the most favourable, for bats. Index evaluations are available for each species and overall rating is also available for all species in combination. Ratings are mapped to 2 km grid square resolution.

3.3 Zone of Influence (ZOI)

The zone of influence (ZOI) of a proposed development is the area over which ecological features may be affected by biophysical changes arising from the proposed works and associated activities. Since the nature, size and location of each project differs, the ZOI varies from project to project, and changes for different ecological features depending on their sensitivity to environmental variances. Features affected can include habitats, species, ecosystems and the processes on which they depend. These features may be geographically distant from a proposed project, but their ecological interests may be indirectly affected by the construction and operation of said project.

The following elements were considered when ascertaining the potential ZOI of the proposed development site:

- The nature, size and location of the project.
- Sensitive habitats and species identified within the study area.
- Any suitable habitats for high conservation value species identified within the study area and extending away from the study area.
- Ecological connectivity between the proposed development site and the wider landscape.
- The sensitivities of the relevant key ecological receptors.
- Identification of potential effect pathways to key ecological receptors.
- Habitat connectivity and foraging ranges of fauna.

3.4 Study Area

The study area for the proposed development site comprised the full extent (3.7 ha) of all elements of the proposal including the entire footprint (0.35 ha) of the proposed works of the proposed development site. Please see **Figure 2** above.

3.5 Field Surveys

The desktop study was supplemented by range of multidisciplinary and targeted field surveys undertaken throughout October 2023, April, June, July, August, September and October 2024, carried out by MWP ecologists. Ecological field survey methods for each of the targeted surveys, are outlined in Section 3.5.1 to 3.5.11 below.

A multidisciplinary walkover was carried out by MWP ecologists in collaboration with representatives from the NPWS on 16th October 2023 as part of AA process.

The ecological features of interest within and connected to the site were recorded and used to help identify the potential Important Ecological Features (IEFs) of the development (see Section 3.6, below, for further details on IEFs). The following literature was referred to during field surveys and throughout the ecological assessment process:

- Irish Red Lists including Terrestrial Mammals (Marnell, *et al*., 2019); Amphibians, Reptiles and Freshwater Fish (King, *et al*., 2011)
- Ireland Red List No. 8: Bryophytes (Lockhart, N., Hodgetts, N. & Holyoak, D. *et al.,* 2012)
- Birds of Conservation Concern in Ireland 2020 – 2026 (Gilbert *et al*., 2021)
- Irish Wildlife Manuals (IWM) 116 Checklists of protected and threatened species in Ireland. Version 2.1 Dec 2021 (Nelson, *et al*., 2019)
- Irish Red Data Book for Vascular Plants (Curtis & McGough, 1988)
- Review of records of plant species protected under the Flora (Protection) Order (FPO) of 2015 and the Irish Red Data Book (Wyse *et al*., 2016).
- Review of records of bryophytes protected under FPO (Hodgetts et al., 2015).

3.5.1 Habitats

Baseline habitat surveys were carried out as part of the MWP multidisciplinary ecological walkover surveys. Surveys were undertaken on 13th and 14th June and 11th September 2024. The habitat surveys had regard to 'Best Practice Guidance for Habitat Survey and Mapping' (Smith et al., 2011) and 'A Guide to Habitats in Ireland' (Fossitt,2000). Habitats within the study area were categorised to Level 3 according to Fossitt (2000). A habitat map for the overall proposed development site was prepared and is available in Section 4.3.

Habitats recorded within the proposed development site were evaluated with regard to potential links with EU Annex I habitats.

3.5.2 Rare and Protected Flora

In conjunction with the habitat surveys, botanical surveys were completed within the development footprint and included a 'look-see' search methodology (NRA, 2009) within habitat features likely to support protected species. This aimed to confirm the presence of plant species considered to be rare in both a national and local context.

Floral surveys were undertaken on 13thand 14th June 2024 and 11th September 2024 by MWP ecologists, which encompassed the optimum survey period for flora.

The habitat types recorded within the study area were used to assist in identifying the fauna considered likely to utilise the area. Habitats occurring were assessed for their potential suitability for protected faunal species.

3.5.2.1 Killarney Fern

Surveys targeting the Annex II species Killarney fern *(Vandenboschia speciosa*) were conducted on 15th August and 2nd October 2024. The objective was to identify the presence and distribution of Killarney fern within the proposed development site. Surveyors thoroughly examined all accessible areas with potentially suitable habitats for the species, including damp crevices, gullies, and rock faces near water, woodland crevices, damp forest floor, and boulder and rock outcroppings. Survey equipment included head torches and hand lenses with x10 and x20 magnification.

Surveys had regard to the following guidance documents:

- Irish Wildlife Manuals No. 133 'Monitoring and Assessment of Killarney Fern (*Vandenboschia speciosa* (Willd.) Kunkle) in Ireland, 2015-2018, (2022)
- Irish Wildlife Manuals No. 82. 'Monitoring methods for the threatened Killarney fern (*Trichomanes speciosum* Willd.) in Ireland' (Ní Dhúill et al., 2015)
- All-Ireland Species Action Plan; Killarney Fern, Environment and Heritage & National Parks and Wildlife Service, (2008)
- BSBI Code of Conduct for picking, collecting, photographing and enjoying wild plants; Botanical Society of Britain and Ireland; Botanical Society of Britain and Ireland, (2017).

3.5.3 Trees

Ground level tree inspections were undertaken by MWP ecologists on 12th and 13th August and 8th October 2024 using non-invasive techniques only. The survey concentrated on the trees within and adjacent to the proposed development site. All trees or groups of trees were assessed using the 'Cascade chart for tree quality assessment' as described in Table 1 of the BS 5837:2012[3]. Where accessible, trees were physically tagged with an individually numbered tag. Tree species, height, stem diameter, condition, life stage and crown spread were recorded for tagged trees within the site. Further information including results can be found in **Section 4.3.3** below.

3.5.4 Bryophytes

A bryophyte survey was carried out on the 15th August and 2nd October 2024 to identify any rare and protected bryophyte species listed under the Flora Protection Order (FPO) (2015) and those listed on Red List No. 8 Bryophytes within the study area. This survey has been undertaken in accordance with relevant legislation and sectoral guidance documents and publications;

- Ireland Red List No. 8 'Bryophytes: Mosses, Liverworts and Hornworts' (2012)[4]
- Irish Wildlife Manuals No. 87 'Revision of the bryophyte schedule for the Flora Protection Order(2015)[5].

Further information and survey results can be found in **Section 4.3.4** below.

3.5.5 Non-native/Invasive Flora

The presence of Invasive Alien Plant species (IAPS), including species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011, as amended), was determined within the study area during the multidisciplinary ecological walkover surveys undertaken by MWP on 13th and 14th June

[3] Microsoft Word - Table 1_flac
[4] https://www.npws.ie/sites/default/files/publications/pdf/RL8.pdf
[5] IWM87.pdf (npws.ie)

2024 and 11th September 2024. Further information including survey results for IAPS can be found in **Section 4.3.5**, below.

3.5.6 Non-Volant Mammals

Non-volant terrestrial mammals that cannot fly, or all land-based mammals excluding bats.

During multidisciplinary ecological walkover surveys, habitats within the study area were searched for any evidence of terrestrial mammal activity such as prints, droppings, burrow-holes, dens/setts, feeding signs and trails. The surveys had regard to '*Animal Tracks and Signs*' (Bang and Dahlstrom, 2006).

Given the type of habitats occurring, comprising mainly mixed broadleaved woodland and a lakeshore, these surveys had a particular focus on otter (*Lutra lutra*) and pine marten (*Martes martes*). The Muckross lake, which adjoins the northern boundary of the proposed development site, was evaluated in terms of its potential suitability for otter, and evidence of otter was searched for.

A number of Browning wildlife cameras were deployed to gather information on the presence of terrestrial mammal species. Further information and survey results with regards to non-volant mammals can be found in **Section 4.4.1** below.

3.5.6.1 Otter

Following the multidisciplinary ecological walkover surveys of the study area, a targeted otter survey of the Muckross Lake along the northern boundary and watercourses proximal to the proposed development site was undertaken on 16th April and 11th September 2024.

This survey was supplemented by additional searches for evidence of otter undertaken during aquatic ecology surveys for the proposed development on 9th September 2024 at individual aquatic survey sites.

During these surveys, any evidence of otter was searched for, including potential breeding/resting sites and other field signs such as spraints, tracks, prints and feeding remains.

The surveys had regard to the following guidance documents/literature:

- 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes' (NRA 2009)
- 'Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes' (NRA, 2006)
- 'Monitoring the Otter *Lutra lutra*' (Chanin, 2003a)
- 'Ecology of the European Otter' (Chanin 2003b)

3.5.7 Bats

A suite of bat surveys were undertaken at the study area between June and September 2024. Surveys had regard to Collins (2016) and Marnell *et al*. 2022, and comprised the following:

- Bat foraging/commuting habitat suitability survey
- Preliminary Roost Assessment (PRA)
- Passive automated bat surveys (PABS)

- Night-time Bat walkover surveys (NBWS)

Summaries of the bat survey methods employed at the study area are provided below. Please refer to the separate 'Bat Survey report' (MWP Doc. 23765-6002 Killarney National Park Walkway Bat Report) which has been prepared by MWP and which accompanies the planning application for more detailed information with regard to bat survey methodologies.

3.5.7.1 Bat Foraging and Commuting Habitat Evaluation

During daytime walkover surveys on 13th June 2024, the study area was evaluated in terms of habitats considered to be of potential importance to foraging/commuting bats.

Areas of potential bat foraging and commuting habitat were evaluated in relation to the wider landscape to determine landscape connectivity for local bat populations during field surveys and through the examination of aerial photographs during the desktop study.

This information was used to determine the potential value of each section of hedgerow/treeline as bat foraging/commuting habitat. Each section of hedgerow/treeline surveyed was assigned a suitability category ranging from 'Low' to 'High', with regard to Colllins (2023).

3.5.7.2 Preliminary Roost Assessment (PRAs)

A preliminary ground level roost assessment was carried out during the daytime walkover on 13th June 2024. The focus of the assessment was to identify features with suitability for roosting bats in trees.

Trees were studied and assessed for the presence of features with suitability for roosting bats including cavities, frost cracks, trunk and branch splits, rot holes, bark peel and hollow sections of trunk and branches. Surveyed trees were assigned a suitability category as 'Negligible', 'Low', 'Moderate' or 'High', with regard to Collins (2023)

3.5.7.3 Passive Automated Bat Surveys (PABS)

During the initial site walkover survey of the study area on 13th June 2024, a ground-truthing exercise was undertaken to select potentially suitable locations for the deployment of static detector units. This was undertaken in consideration of the potential suitability of habitats within the site for bat foraging and commuting. Particular attention was paid to the presence of linear features within the study area connecting the site to the surrounding hinterland.

Ground-level passive static bat detector surveys were undertaken within the study area on a minimum of five consecutive nights between June and September 2024 inclusive. A total of five units were deployed across the site on each occasion.

The bio-acoustic units were deployed, as follows:

- 14th – 19th June 2024 (summer bat survey season)
- 12th – 16th July 2024 (summer bat survey season)
- 3rd – 8th August 2024 (summer bat survey season)
- 6th – 10th September 2024 (summer bat survey season)

3.5.7.4 Bat Activity Surveys (Night Bat Walkover (NBW) Survey)

A bat transect survey involves walking along the predetermined route at dusk to monitor bat activity within the proposed development site. Transect surveys help assess bat presence, species diversity and activity levels within the proposed development site.

A total of eight NBW surveys (compromising six dusk surveys) were conducted between on 13th June, 25th June, 11th July, 25th July, 9th August, 29th August, 5th and 19th September 2024 within the proposed development site.

3.5.8 Birds

Bird surveys were conducted from June to September 2024 by MWP Senior Ornithologist. A transect route was walked along the N71 which runs parallel to the proposed development site on 10th June, 26th July, 19th August, 23rd September 2024 during the breeding season. A survey targeting wintering and migratory bird species was conducted on 25th October 2024. Observations were made from the shoreline adjacent to the proposed development site and from the N71 Road, with a focus on identifying wintering waders and other waterbird species. All bird species observed or heard along the transect route were recorded to establish bird populations within the area surrounding the proposed development site. This survey has been undertaken with regard to the following guidance documents:

- Bibby, C. J., Burgess, N. D., Hill, D. A., & Mustoe, S. H. (2000). Bird Census Techniques (2nd Edition)
- BTO, *Field Methods for Bird Surveys*[6]

For more information and survey results see **Section 4.4.3**, below.

3.5.9 Reptiles and Amphibians

During the multidisciplinary ecological walkover surveys during June, July and August 2024 other protected fauna such as amphibian and reptile species, were searched for.

Please see **Section 4.4.4,** below for survey results.

3.5.10 Aquatic Ecology

Freshwater aquatic surveys were carried out on 9th September 2024. The field surveys comprised an evaluation of aquatic habitats and biotic assessment using aquatic macroinvertebrates. Water quality affects the viability and quality of salmonid habitat so is useful in assessing habitats for aquatic organisms, including trout and salmon. To this end biological sampling and water quality indices were used to evaluate watercourses/waterbodies at selected locations.

See **Section 4.4.5** below for aquatic survey results.

3.5.10.1 Fish

The results of the aquatic habitat survey were used in conjunction with the document 'Ecology of the Atlantic Salmon' (Hendry and Cragg-Hine, 2003) to assess habitat suitability for salmonids at selected representative sites. An evaluation of lamprey nursery habitat was also carried out based on the habitat requirements of juvenile lampreys as outlined in Maitland (2003). Searches for juvenile lampreys were carried out using agitation sampling where suitable nursery habitat occurred.

[6] Recording birds | BTO - British Trust for Ornithology

The results of the stream habitat surveys were used in conjunction with the leaflet '*The Evaluation of habitat for Salmon and Trout*' (DANI, 1995) to assess habitat suitability for salmonids at selected representative sites. This leaflet (Advisory leaflet No. 1) was produced by the Department of Agriculture for Northern Ireland Fisheries Division and was designed for use in the EU salmonid enhancement programme.

3.5.10.2 Freshwater Macro-Invertebrates

Semi-quantitative sampling of benthic macroinvertebrates, or aquatic insects was undertaken at Luane_010 at two locations using kick-sampling (Toner *et al.*, 2005). Benthic (bottom dwelling) macroinvertebrates are small stream-inhabiting creatures that are large enough to be seen with the naked eye and spend all or part of their life cycle in or on the stream bottom. Three replicate, three-minute, multi-habitat kick samples were taken within a 50 m stretch using a 1 mm mesh kick net. All samples of invertebrates were combined for each site and live-sorted on location, fixed in ethanol and labelled for subsequent laboratory identification. The relative abundance and numbers of macroinvertebrates was recorded on-site at each site. The relative abundance and numbers of macroinvertebrates was recorded on-site at each site. Macroinvertebrate sampling was carried out in accordance with ISO 5667-3:2004: Water Quality – Sampling – Part 3: Guidance on the Preservation and Handling of Water Samples and ISO 7828: 'Water Quality – Methods of biological sampling – Guidance on Hand net sampling of aquatic benthic macro-invertebrates'. Macroinvertebrates were identified using keys listed in the references section. Biological water quality assessments were carried out for each site using biotic indices, based on the range and abundances of macroinvertebrates recorded. Details of biotic indices are provided in **Appendix 3**.

3.5.10.3 Slender Naiad

Targeted surveys were conducted for Slender Naiad (*Najas flexilis*) as it is listed under Annex II of the Habitats Directive and is qualifying interest for the Killarney National Park, Macgillycuddys's reeks and Caragh River Catchment SAC. Additionally, Slender Naiad is also protected under Annex IV of the Habitats Directive and under the FPO, 2015. During ecological site visits in May and June, coinciding with the flight period for this species, surveyors also searched for any adults on the wing (in flight). Survey was carried out on 9th September 2024 by MWP Aquatic Ecologists.

3.5.11 Terrestrial Macro-invertebrates

3.5.11.1 Marsh Fritillary

Marsh Fritillary (*Euphydryas aurinia*) was conducted to assess the presence and distribution of this species within the proposed development site . Marsh Fritillary is listed under Annex II of the Habitats Directive and is qualifying interest for the Killarney National Park, Macgillycuddys's reeks and Caragh River Catchment SAC. The survey involved systematic habitat assessments and targeted searches for Marsh Fritillary larval webs in suitable grassland habitats, particularly focusing on areas with a high density of the larval food plant, Devil's-bit Scabious (*Succisa pratensis*).

3.5.11.2 Kerry Slug

Kerry Slug (*Geomalacus maculosus*) surveys were undertaken at the proposed walkway and to support the application for derogation licence. Kerry Slug is listed under Annex II and IV of the Habitats Directive and is a qualifying interest for the Killarney National Park, Macgillycuddy's reeks and Caragh River Catchment SAC . Surveys were supposed to be carried out under licence from NPWS in August and September 2024 by MWP ecologists. A Derogation Licence application was submitted by MWP to the Wildlife Licencing Unit (WLU) of NPWS

on the 27th June 2024 in relation to proposed metric-trapping surveys for Kerry slug at the proposed development site to further inform the ecological baseline of the site Due to a backlog of requests, the application for a derogation licence was not processed by NPWS. As a result, the surveys was conducted on 11th September and 2nd October 2024 using a single methodology: hand-searching technique plus any incidental observations from ecological walkovers of the proposed development site were recorded. Typically, two primary methods would be employed for surveying the Kerry Slug: hand-searching and live refuge trapping with metric traps (McDonnell *et al.*, 2011b).

3.6 Important Ecological Features (IEFs)

Relevant habitats and associated flora, fauna, conservation sites and other ecological features/resources will be identified in **Section 5**, below, and then evaluated in terms of their local, national and international conservation importance using the evaluation criteria described in **Section 3.7.1**, below. Based on the outcomes of these evaluations, an assessment will then be made as to which of the ecological resources/features should be classed as an Important Ecological Features (IEFs). IEFs are ecological features/resources for which detailed assessment is required and, in the context of the study area, are taken to be those features deemed to have a 'Locally Important (higher value)' or higher classification. Finally, the significance of the potential ecological effects of the project on these IEFs will be assessed in **Section 8**, below.

3.7 Assessment Criteria

This section outlines the criteria upon which evaluations of the importance of ecological features and the assessments of the ecological impact of the project on these features are made, referring to relevant legislation and guidelines.

3.7.1 Evaluation

The evaluation outlined in this report and the assessment of the effects of the proposed project follows methodologies detailed in 'Guidelines for Ecological Impact Assessment in the UK and Ireland' (CIEEM, 2018) and 'Guidelines for Assessment of Ecological Impacts of National Roads Schemes' (NRA, 2009). The EPA (2022) 'Guidelines on information to be contained in Environmental Impact Assessment Reports' was also considered.

The habitats, flora, fauna and other ecological features or resources identified during desktop and field surveys are evaluated based on their conservation value by using the NRA (2009) guidelines which provided a basis for determination of whether a particular ecological receptor is of importance on the following scale:

- International
- National
- County
- Local Importance (higher value), and
- Local Importance (lower value)

The NRA (2009) guidelines clearly set out the criteria by which each geographic level of importance can be assigned. At the lowest end of the scale, Locally Important (lower value) receptors contain habitats and species that are widespread, of low ecological significance, and are of importance only in the local area. In contrast, Internationally Important receptors can comprise sites designated for conservation at an international level as

part of the Natura 2000 Network (SAC or SPA) or which provide the best examples of habitats, or internationally important populations of protected flora and fauna.

The value of habitats is assessed based on habitat condition, size, rarity, conservation and legal status. The value of fauna is assessed on biodiversity value, legal status and conservation status. Biodiversity value is based on its national distribution, abundance or rarity, and associated trends.

3.7.2 Impact Assessment

The ecological significance of the effects of the proposed development are assessed with regard to CIEEM (2018). This guidance document states that, "*For the purposes of EcIA, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general*".

Conservation objectives may be specific or broad and can be considered at a wide range of scales ranging from international to local (CIEEM, 2018). An impact on the conservation status of a habitat or species is considered to be significant if it will result in a change in conservation status.

Significant effects encompass impacts on the structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution). CIEEM (2018) defines the 'conservation status' for habitats and species, as follows:

- Habitats: conservation status is determined by the sum of the influences on the habitat that may affects its extent, structure and functions as well as its distribution and its typical species within a given geographical area.
- Species: conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

Significant effects should be qualified with reference to an appropriate geographic scale (CIEEM, 2018).

EPA (2022) guidance and criteria were also considered in determining significance and for assessing impact. Professional judgement is used. The EPA (2022) criteria for assessing quality of effects and the significance of effects are set out in **Table 1** and **Table 2,** below.

Table 1: Criteria for assessing impact quality based on EPA (2022).

Quality of Effect	Criteria
Positive	Change that improves the quality of the environment (for example, by increasing species diversity; or 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/Adverse	A change which reduces the quality of the environment (e.g., lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health/property or by causing nuisance).

Table 2: Criteria assessing effect significance based on EPA (2022).

Significance of Effects	Definition
Imperceptible	An effect capable of measurement but without significant consequences
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences

Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment
Very significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
Profound	An effect which obliterates sensitive characteristics

The following terms are used when quantifying the duration and frequency of the potential effects:

- Momentary – effects lasting from seconds to minutes.
- Brief – effects lasting less than a day.
- Temporary – effects lasting less than a year.
- Short-term – effects lasting 1 to 7 years.
- Medium term – effects lasting 7 to 15 years.
- Long term – effects lasting 15 to 60 years.
- Permanent – effects lasting over 60 years.
- Reversible – effects that can be undone, for example through remediation or restoration.
- Frequency – How often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).

Where ecological effects are assessed to be potentially significant, mitigation measures are proposed to remove or reduce the effects. The significance of the cumulative effects of the proposed project is also assessed by determining the ecological effects of the proposal in combination with other developments that either have planning permission, are under construction or are already in existence within the area. The cumulative impact with existing activities in the area is also considered in terms of potential in-combination effects. The significance of the residual effects after mitigation is then assessed see **Section 9** below for Cumulative Impacts

4. Description of Existing Environment

4.1 General Site Description

The proposed development site is in mixed broadleaved woodland, in Killarney National Park within the Electoral divisions (ED) of 'Muckross'. CSO data indicates that in 2022, Muckross had a total population of 250 residents.

The CORINE (2018) landcover data series (available on EPA's interactive map viewer) indicates that landcover at the proposed development site is classified as 'Mixed forests' (Level 3 Code: 313)[7]. The lands surrounding the proposed development site are classified as 'Water bodies', 'Peat bogs' or 'Broad-leaved forests'. The national Road N71 runs along the proposed development site to the south and is classified as 'Artificial surfaces'.

According to the Geological Survey Ireland (GIS) online map viewer, the proposed development site is mainly underlain by 'Glenflesk Chloritic Sandstone formation' with a description of 'Green sandstone and purple siltstone'[8].

[7] CORINE (2018) landcover available at https://gis.epa.ie/EPAMaps/.
[8] Geological Survey Ireland information available at https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx. .

Soils in the majority of the proposed development site are identified as 'Peat over lithoskeletal sandstone and shale bedrock' with imperfect drainage. Soils at the western end are categorised as 'Peat' identified as soil with poor drainage. Subsoils within the proposed development site are identified as 'Bedrock at or close to surface'.

The underlying bedrock aquifer is categorised as a 'Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones' (Ll) with the underlying bedrock aquifer to the east of the proposed development site categorized as a 'Regionally Important Aquifer - Karstified (diffuse)' (Rkd).

The groundwater vulnerability of the aquifer is recorded as 'Extreme' and 'Rock at or near surface' with a section of the western part of the site recorded as 'High'. The GSI define groundwater vulnerability as "*…a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities*"[9].

The Catchment Flood Risk Assessment and Management (CFRAM) maps[10] indicate that an extreme 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) and a 0.1% AEP (1 in 1000 year) current scenario fluvial flood zone is located along the shore of Muckross Lake. The majority of the proposed development site is not located within a flood zone according to the Strategic Flood Risk Assessment (SFRA) completed for by MWP for KCC as part of the Kerry CDP 2022-2028.

The proposed development site is located within Killarney National Park, Macgillycuddy's Reeks and Carragh River Catchment SAC and Killarney National Park SPA, collectively known as Natura 2000 sites. SPAs and SACs occurring within the potential ZOI of the proposed development site are identified below in **Section 4.5.1**.

4.2 Hydrology and Hydrogeology

The proposed development site is situated within the 'Laune-Maine-Dingle Bay' Water Framework Directive (WFD) catchment, the 'Laune_SC_010' WFD sub-catchment and the 'Laune_010' WFD river sub-basin. There is one watercourse within the proposed development site, Torc mountain stream (the Laune_010). Also, the proposed development runs along the shore south of Muckross Lake, see **Table 3** below.

Table 3: Watercourses and waterbodies in the vicinity of proposed development site

River name	River code	Distance from Proposed Development Site	WDF Status
Laune_010	IE_SW_22L010100	Within proposed development site in the western array. Ovengarriff River, which is part of Laune_010, approx. 200 m from Cardiac hill carpark, east array of the proposed development site.	Poor
Muckross	IE_SW_22_184	The proposed development runs along the shore of Muckross Lake.	High

Watercourse Luane_010 drains into Muckross Lake, which is part of the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, and is a subsite of Lough Leane & Killarney Valley I-Webs site.

The EPA undertakes water quality surveys along the Owengarriff River and the Muckross Lake. There are eight lake monitoring stations proximal to the proposed development site, five of them are operative and three are investigative. Only one river monitoring station is located proximal to the proposed development site. The river and lake water quality monitoring stations identified along these waterbodies proximal to the proposed development. Unfortunately, none of the monitoring stations in proximity to the proposed development site have

[9] Groundwater Vulnerability (gsi.ie)
[10] https://www.floodinfo.ie/map/floodmaps/

previously been tested for biological water quality (Q-Value). For a complete list of EPA monitoring stations in the area, please refer to **Table 4** and **Figure 3** below.

Table 4: EPA monitoring stations proximal to the proposed walkway route.

EPA Water Quality Monitoring Station	Station ID	Proximity of Monitoring Station to Nearest Point of Proposed development site
Owengarriff (Kerry) upstream Torc (New) Bridge	RS22O100200	Approx. 600 m east from eastern end of the proposed walkway route. Located upstream.
M_1, Hymo reporting station (Lake station)	LS220020702700050	On the lakeshore of the Muckross lake within study area.
M_6 (Lake station)	LS220020702700080	Approx. 560m northeast from eastern end of the proposed walkway route.
Midlake (Lake station)	LS220020702700010	Located within lake approx. 600 m from the proposed walkway route.
PRF_010 (Lake station)	LS220020702700100	Located within lake approx. 600 m from the proposed walkway route.
LIT_0010 (Lake station)	LS220020702700030	Located on the lakeshore approx. 720 m northwest of the western end of the proposed walkway route.
M_2 (Lake station)	LS220020702700060	Located on the lakeshore approx. 880 m northwest of the western end of the proposed walkway route.
Historical profile site (Lake station)	LS220020702700110	Located within lake approx. 600 m from the proposed walkway route.
Historical profile site (Lake station)	LS220020702700120	Located within lake approx. 600 m from the proposed walkway route.

The latest River Waterbody WFD Status (2016 - 2021) of Laune_010 is 'Poor'. This waterbody has been assigned a WFD River Waterbodies Risk (Cycle 3) status of 'At Risk' with significant pressure from urban wastewater.

The latest Lake Waterbody WFD Status (2016-2021) of the Lake Muckross is 'High' and has been assigned a WFD Lake Waterbodies Risk (Cycle 3) status of 'Not at Risk'.

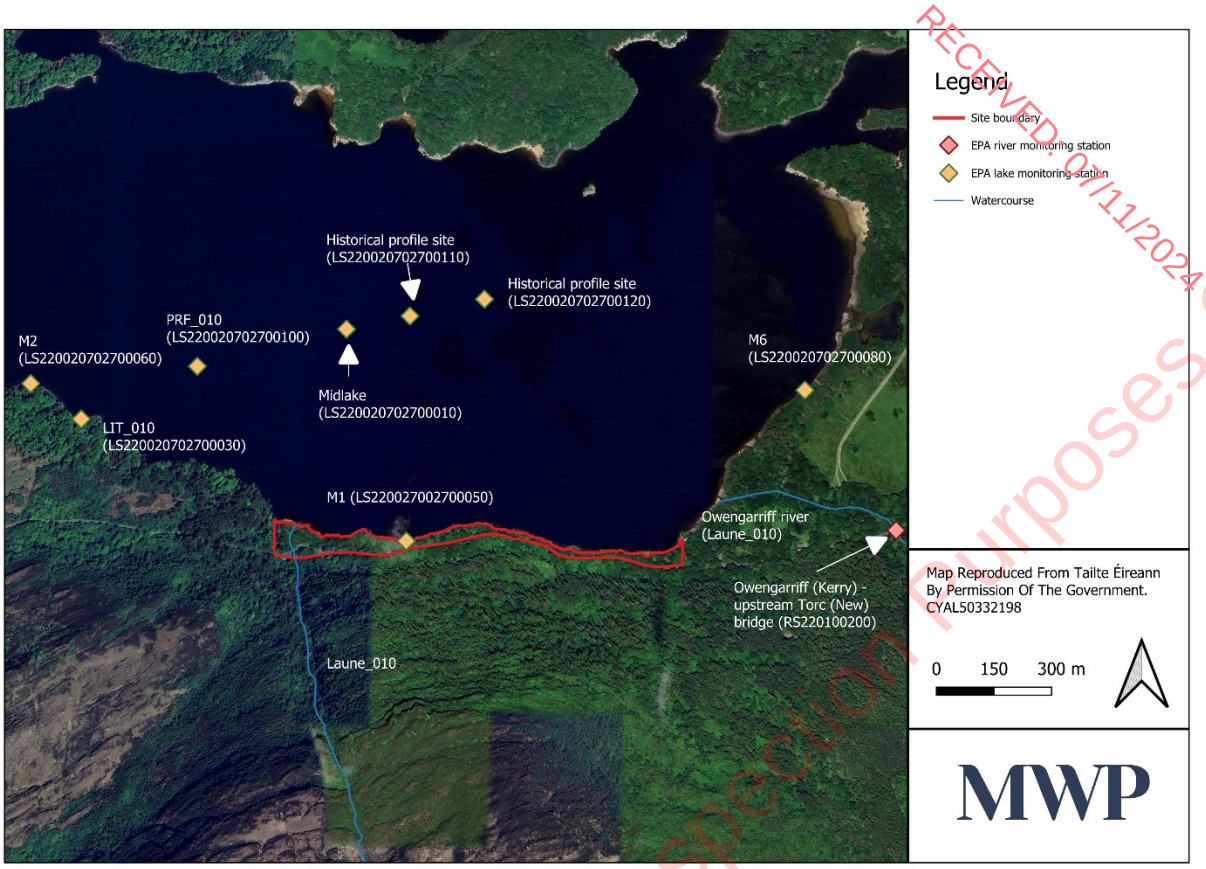

Figure 3: Watercourses and EPA monitoring stations proximal to the proposed development site.

The proposed development site overlies the 'Cahersiveen' Ground Waterbody, IE_SW_G_022. This has an overall Ground Waterbody WFD latest status of 'Good' and WFD Risk is 'Not at risk. According to EPA online map viewer, no groundwater vulnerability data is available as site overlain by surface water.

A review of the 'Laune_SC_010 Sub-catchment WFD Cycle 2 Assessment' report[11] determined that the following pressures have been identified with regard to this sub-catchment; 'urban wastewater' and 'urban run-off' for Ross Bay and 'anthropogenic pressures' for the 'Laune Muckross' groundwater body.

4.3 Habitats and Flora

The proposed development site runs through mainly an area characterised as Oak-Birch-Holly Woodland' (WN1) between the National Road N71 (BL3) and Muckross Lake (FL2). This is a sensitive area within Killarney National Park.

Oak-Birch-Holly Woodland (WN1) is a semi-natural habitat, which is the most dominant habitat found north of the N71 in the western part of the proposed development site. Tree species found within the site include mainly holly (*Ilex aquifolium*), pedunculate oak (*Quercus robur*), downy birch (*Betula pubescens*), silver birch (*Betula pendula*), Scots pine (*Pinus sylvestris*), hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), blackthorn (*Prunus spinosa*), hawthorn *(Crataegus monogyna*), rowan (*Sorbus aucuparia*), beech (*Fagus sylvatica*), willow (*Salix spp.*), field maple (*Acer campestre*), sweet chestnut (*Castanea sativa*), strawberry tree (*Arbutus unedo*), yew (*Taxus baccata*) and sycamore (*Acer pseudoplatanus*).

[11] Subcatchment Assessment

Scattered rocks and boulders were recorded on the woodland floor along with an array of ferns, rushes, sedges and other floral species such as deer fern (*Struthiopteris spicant*), hard fern (*Blechnum spicant*), bracken (*Pteridium aquilinum*), great wood-rush (*Luzula sylvatica*), star sedge (*Carex echinata*), ling heather (*Calluna vulgaris*), ivy *(Hedera helix*), tutsan (*Hypericum androsaeemum*), purple loosestrife (*Lythrum salicaria*), wood sanicle (*Sanicula europaea*), lesser burdock (*Arctium minus*), garden privet (*Ligustrum ovalifolium*) and greater birds-foot- trefoil (*Lotus pedunculatus*) . See **Figure 4** below for example of Oak-birch-holly woodland found within the proposed development site.

Figure 4: Oak-birch-holly woodland (WN1) at the western part of the proposed development.

Another dominant habitat found within the study area is Scrub (WS1). Scrub habitat dominates steep edges between N71 and the shores of Muckross lake. Floral species found include bracken, bramble (*Rubus fruticosus*), gorse (*Ulex europaeus*), dog rose (*Rosa canina*), bog myrtle (*Myrica gale*), bog asphodel (*Narthecium ossifragum*), burnet rose (*Rosa spinosissima*), marsh pennywort (*Hydrocote vulgaris*), maidenhair spleenwort (*Asplenium trichomanes*), common horsetail (*Equisetum arvense*), lesser meadow-rue (*Thalictrum minus*), meadowsweet (*Filipendula ulmaria*), tormentil (*Potentilla erecta*), bugle (*Ajuga reptans*), goldenrod (*Solidago virgaurea*), wood sage (*Teucrium scorodonia*), common knapweed (*Centaurea nigra*), foxglove (*Digitalis purpurea*), common spotted orchid (*Dactylorhiza fuchsia subsp. Fuchsia*), shoreweed (*Plantago uniflora*), common sedge (*Carex nigra*), royal fern (*Osmunda regalis*), honeysuckle (*Lonicera periclymenum*).

Also scattered young trees were found within scrub habitat include silver birch, spindle (*Euonymus europaeus*), rowan, pedunculate oak (*Quercus robur*), willow (*Salix ssp*.) and ash (*Fraxinus excelsior*). See **Figure 5** below for example of scrub habitat within the proposed development site.

Figure 5: Scrub habitat (WS1).

Within the eastern part of the proposed development site the woodland was identified as Broadleaved woodland (WD1). This woodland is mainly dominated by beech trees. Other trees recorded within this woodland are pedunculate oak , Scots pine , sycamore and willow .

Other flora species found within this woodland include gorse, ling heather , devil's-bit scabious (*Succisa pratensis)*, meadowsweet (*Filipendula ulmaria*), tormentil, bugle , common knapweed , common sedge , royal fern and bramble .

Along the N71 sections of Stone wall and other stonework (BL1) habitat was recorded. This habitat supports a diverse range of wall flora such as wild strawberry (*Fragaria vesca*), honeysuckle (*Lonicera periclymenum*), foxglove , bramble, lesser spearwort, kidney saxifrage (*Saxifraga hirsuta*), ivy , common polypody (*Polypodium vulgare*), herb robert (*Geranium robertianum*), Mexican fleabane (*Erigeron karvinskianus*), wild strawberry *(Fragaria virginiana*). Please see **Figure 6** below for example of stone wall and other stonework habitat.

Figure 6: Stone wall and other stonework (BL1) along the N71 road.

Bryophytes and Invasive species found and identified within habitats of the proposed development site, are discussed in Section 4.3.4 and 4.3.5 below.

The N71 was identified as Buildings and artificial surfaces (BL3) and runs along the proposed development site to the south. Dinis carpark, Dinis existed walkway/cycling pathway and rock armour that acts as bank support in steeper section between the N71 and Muckross lake was also identified as BL3. See Figure 7 below.

Figure 7: N71 and Dinis carpark identified as Buildings and artificial surfaces (BL3).

Muckross lake located within the northern end of study area was identified as Acid oligotrophic lakes (FL2). Muckross lake and the Upper Lake form high quality oligotrophic systems. Several streams within the western section of the proposed development site were identified as Eroding/upland Rivers (FW1), all of which flow into Muckross Lake. These streams may form part of the Laune_010 waterbody identified by EPA; however, due to previous works on the Dinis Loop Walkway, the natural flow of the stream has been altered. The stream is now divided into multiple channels, each are diverted through a series of culverts beneath the Dinis Loop Walkway.

A map detailing all habitats within the proposed development site is provided in **Figure 8** below.

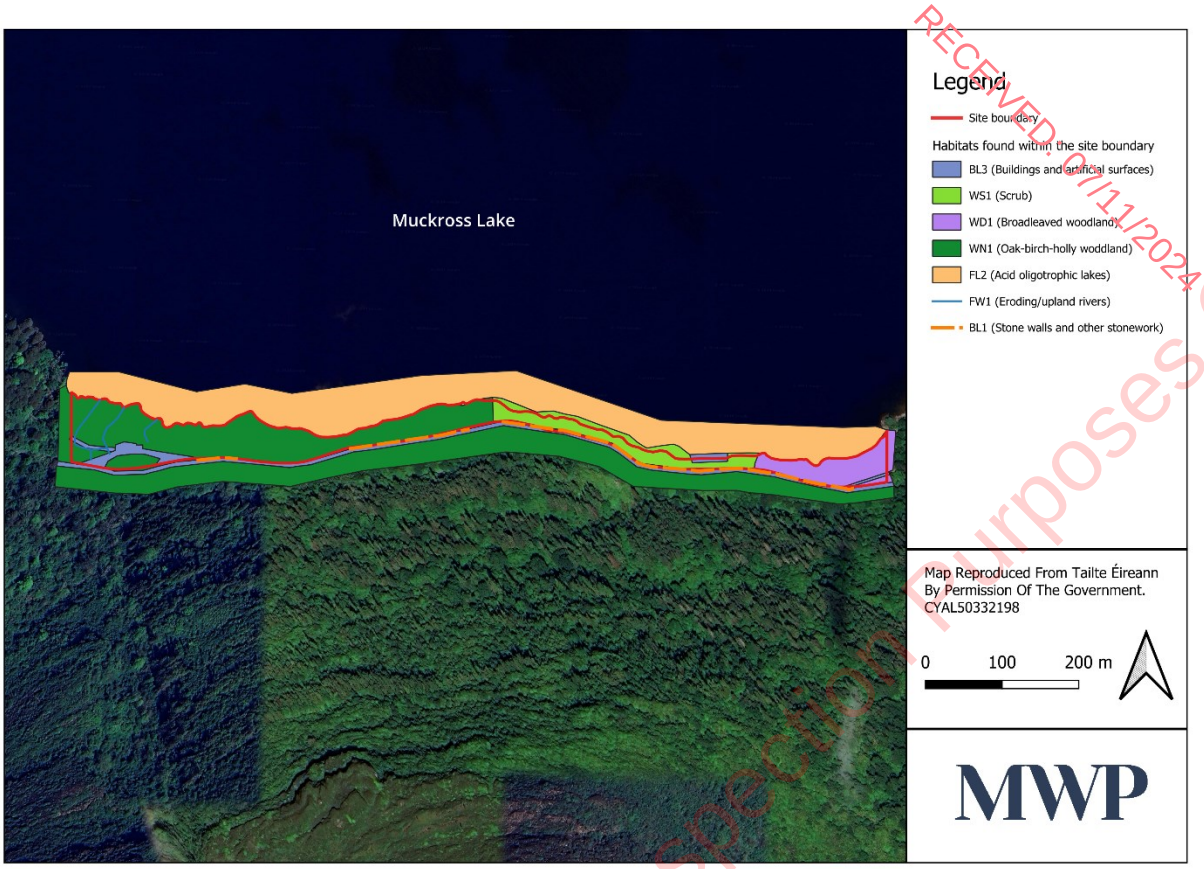

Figure 8: Habitat map of the study area of the proposed walkway route.

4.3.1 Annex I Habitats

The proposed development site is located within or adjacent to two Annex I habitats listed under the EU Habitats Directive[12]: Old oak woodland (91A0) and Residual alluvial forest (91E0). Both habitats are qualifying interest of Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC. Old oak woodland (91A0) habitat overlaps with most of the proposed development site, while residual alluvial forest (91E0) overlaps with the north-eastern corner of the site boundary.

[12] The Status of EU Protected Habitats and Species in Ireland (arcgis.com)

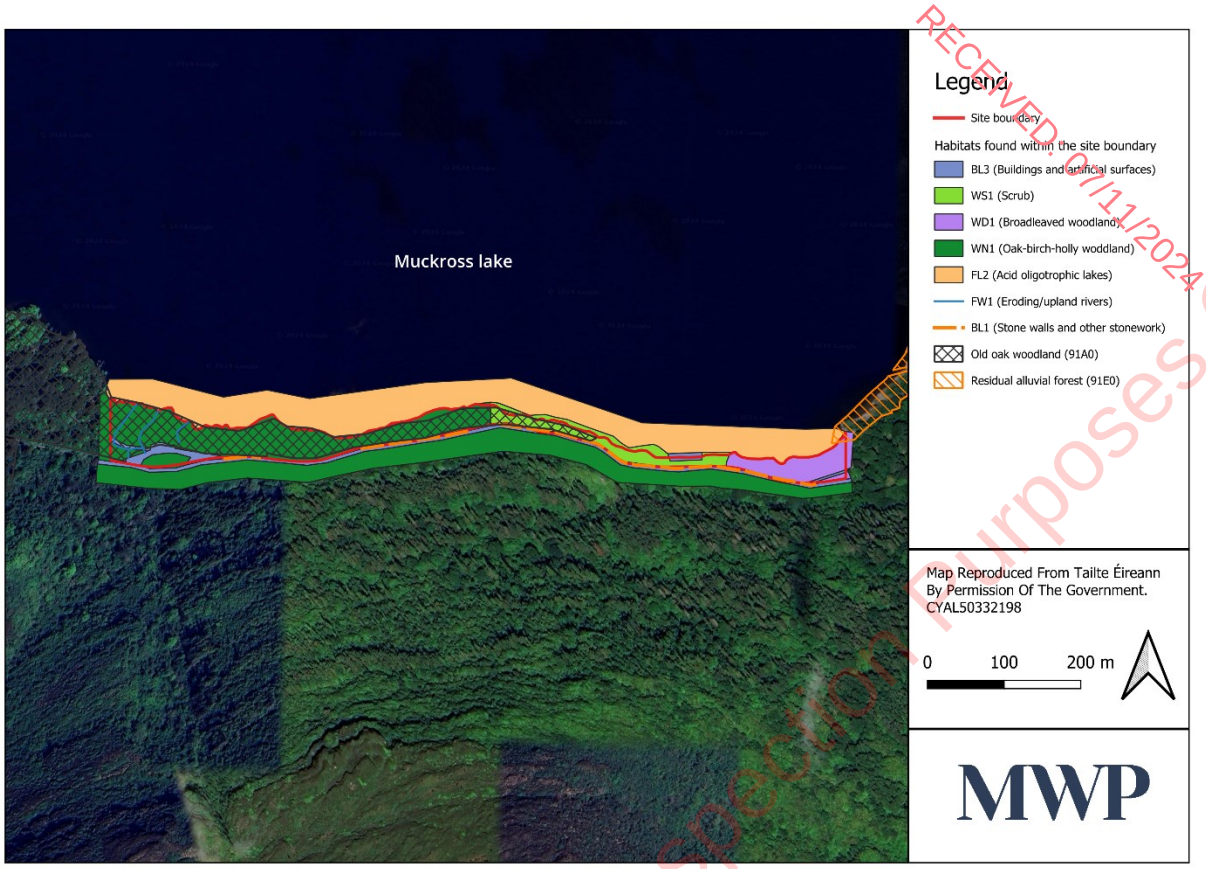

Figure 9: Annex I habitat within the proposed development site

4.3.2 Rare and Protected Flora

An on-line search of the NBDC database for species of conservation interest recorded within the hectad V98 was carried out.

A total of two FPO species have been previously recorded within the hectad V98, as outlined in **Table 5** below. These species are afforded legal protection in Ireland.

Table 5: Flora Protection Order (FPO) species recorded in V98.

Species Name	Level of Protection	Conservation Status[13]	Habitat requirements	Closest Species Record to Development Site[14]
Killarney Fern (*Trichomanes speciosum*)	FPO EU Habitats Directive Annex II and Annex IV	Red List (Least concern)	In dripping caves, cliffs, crevices and gullies by waterfalls, crevices in woodland[15]	Specific location not given, record is to the east adjacent to site

[13] Red List (Hodgetts *et al*, 2015)
[14] Maps - Biodiversity Maps (biodiversityireland.ie)
[15] IWM 82 Killarney Fern.pdf (npws.ie)

Species Name	Level of Protection	Conservation Status[13]	Habitat requirements	Closest Species Record to Development Site[14]
	Threatened Species: Vulnerable			
Slender Naiad (*Najas flexilis*)	FPO EU Habitats Directive Annex II and Annex IV	Red List (Near threatened)	Submerged macrophyte. Typically found on flat to gently sloping areas of the lake bed with soft substrata of mud, silt or fine sand[16]	Specific location not given, record is to the east adjacent to site

4.3.2.1 Killarney Fern

Killarney fern (*Trichomanes speciosum*) was not recorded during the ecological walkover of the proposed development site, likely due to the specific habitat requirements of this species. Killarney fern thrives in highly humid, shaded environments such as damp, sheltered ravines, rocky crevices, and humid woodlands, often near waterfalls or constantly moist conditions. The absence of such microhabitats, particularly the necessary high humidity and shaded conditions, within the proposed development site may explain why the species was not found.

4.3.3 Trees

Overall, 99 mature trees were surveyed within the proposed development site. The majority of the trees observed were classified as 'Good' (63%) with remainder classified as 'Fair' (24%), 'Poor' (11%) and 'Dead' (2%). See of the breakdown of tree species recorded within the proposed development site below in **Table 6**.

Table 6: Tree species recorded within the proposed development site.

Common Name	Scientific Name	Number of Observations
Ash	*Fraxinus excelsior*	6
Beech	*Fagus sylvatica*	11
Birch, Silver	*Betula pendula*	17
Chestnut, Sweet	*Castanea Sativa*	1
Hazel	*Corylus avellana*	10
Holly	*Ilex aquifolium*	21
Oak, Pedunculate	*Quercus robur*	23
Rowan	*Sorbus aucuparia*	1
Scot's Pine	*Pinus sylvestris*	3
Strawberry Tree	*Arbutus unedo*	1
Yew	*Taxus baccata*	5

[16] 1833 Najas flexilis Article 17 Backing Document (npws.ie)

Trees identified during the survey were classified into four categories: category A (high-quality), category B (good quality), category C (low-quality or trees with a diameter of less than 200mm), and category U (trees recommended for removal due to poor condition). A total of 34 trees were categorized as A, 50 as B, 11 as C, and 4 as U. Please for more in depth information refer to 'Tree Survey report' (MWP Doc. 23765 6007 KNP Tree Survey Report).

4.3.4 Bryophytes

An on-line search of the NBDC database for species of conservation interest recorded within the hectad V98 was carried out.

A total of 15 FPO bryophyte species have been previously recorded within the hectad V98, as outlined in Table 7 below.

Table 7: Flora Protection Order (FPO) bryophyte species recorded in V98.

Species Name	Level of Protection	Conservation Status[17]	Habitat requirements	Closest Species Record to Development Site[18]
Broad-leaved brook-moss (*Hygrohypnum duriusculum*)	FPO	Red List (Critically endangered)	Rocks in streams	c. 755.6 m southeast of site.
Club pincushion (*Ulota coarctata*)	FPO	Red List (Critically endangered)	A very rare epiphyte of willow and hazel, thought to be declining in Europe	c.1.3 km southeast of the site.
Bent-moss (*Campylostelium saxicola*)	FPO	Red List (Endangered)	Rock	Last recorded in the general area of the proposed development in 1906. Not re-found by David Holyoak during fieldwork in 2005, nor by Rory Hodd during targeted FPO survey in 2014, although it probably still occurs somewhere in this area[19].
Hooked plait-moss (*Hypnum uncinulatum*)	FPO	Red List (Near threatened)	Woodland	c. 1.6 km north of the site.

[17] Red List (Hodgetts *et al*, 2015)
[18] FPO Bryophytes (arcgis.com)
[19] Flora Protection Order - bryophytes (npws.ie)

Species Name	Level of Protection	Conservation Status[17]	Habitat requirements	Closest Species Record to Development Site[18]
Irish pincerwort (*Cephalozia Hibernica/ Cephalozia crassifolia*)	FPO	Red List (Endangered)	Shaded woods, oceanic	Within site 2014 growing on humic soil over rocks under dense, mature *Rhododendron ponticum*, below the main N71 road. This area of *R. ponticum* extends from the shore of Muckross Lake to ca. 400m altitude on the slopes of Torc Mountain[20]
Atlantic pouncewort (*Lejeunea mandonii*)	FPO	Red List (Endangered)	Mountain rock	c. 735.6 m southeast of site.
Ribbonwort (*Pallavicinia lyellii*)	FPO	Red List (Endangered)	Acid Mires	c. 5.1 km northeast of site.
Western featherwort (*Plagiochila atlantica/Plagiochila heterophylla*)	FPO	Red List (Endangered)	Shaded woods, oceanic	c. 5.5 km southwest of site.
Holt's scalewort (*Radula holtii*)	FPO	Red List (Near threatened)	Rocks, boulders in streams, waterfalls.	c. 758.8 m southeast of site.
Irish pouncewort (*Lejeunea hibernica*)	FPO	Red List (Near threatened)	Rocks, boulders in streams, waterfalls.	Torc waterfall in 2014 recorded near river below main waterfall c. 782.8 m southeast of site.
Wood's whipwort (*Mastigophora woodsii*)	FPO	Red List (Near threatened)	Montane heath	c. 4.1 km southeast of site.
Arch-leaved whipwort (*Bazzania pearsonii*)	FPO	Red List (Vulnerable)	Montane heath	c. 4.2 km southeast of site.

[20] Flora Protection Order - bryophytes (npws.ie)

Species Name	Level of Protection	Conservation Status[17]	Habitat requirements	Closest Species Record to Development Site[18]
Birds-foot earwort (*Scapania ornithopodioides*)	FPO	Red List (Vulnerable)	Montane heath	c. 4.4 km southeast of site.
Lesser copperwort (*Cephaloziella massalongi*)	FPO	Red List (Vulnerable)	Mine spoil	On northern shore of Muckross lake, c. 1.2 km north of the site.
Wilson's pouchwort (*Acrobolbus wilsonii*)	FPO	Red List (Vulnerable)	Shaded ravines	c. 778.4 m southeast of site.

Four Annex species were also recorded within V98. These include large white-moss (*Leucobryum glaucum*) listed in Annex IV, fir clubmoss (*Huperzia selago*), *Cladonia ciliata* and *Cladonia portentosa* listed in Annex V of the EU Habitats Directive.

During the bryophyte survey carried out on 15th August and 2nd October 2024, a total of forty-four different bryophyte species were identified within the study area. The survey revealed a diverse range of mosses and liverworts, highlighting the ecological richness of the site. No bryophytes protected by FPO were recorded within the bryophyte surveys. For full list of bryophyte species found please see **Appendix 3.**

4.3.5 Non-native/Invasive Flora

Documented records from the NBDC of high and medium impact invasive/non-native species of flora listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011, as amended) exist within the hectad V98 encompassing the study area. The nearest records to the proposed works site are douglas fir (*Pseudotsuga menziesii),* cherry laurel *(Prunus laurocerasus*), evergreen oak (*Quercus ilex*), sycamore , american skunk cabbage (*Lysichiton americanus*) all of which were found within the 2 km grid square V98S adjacent to the site to the east. See **Table 8** below with all non-native-invasive species of flora previously recorded in hectad V98.

Table 8: Non-native/Invasive Floral Species recorded in hectad V98.

Species Common Name	Scientific name	Impact	Regulation S.I. 477 Listed	Closest Species Record to Development Site
Douglas fir	*Pseudotsuga menziesii*	Medium	No	Found within 2 km grid square V98S adjacent to the site to the east.
Cherry laurel	*Prunus laurocerasus*	High	No	Found within 2 km grid square V98S adjacent to the site to the east.
Canadian waterweed	*Elodea canadensis*	High	Yes	Found within 2 km grid square V98T c.1.4 km northeast of the site.
Fringed water-lily	*Nymphoides peltata*	High	Yes	c. 1.6 km northwest of the site.

Species Common Name	Scientific name	Impact	Regulation S.I. 477 Listed	Closest Species Record to Development Site
Gunnera	*Gunnera tinctoria*	High	Yes	c.1.4 km northeast of the site.
Japanese knotweed	*Fallopia japonica*	High	Yes	c. 713.5 m northeast of the site.
Rhododendron	*Rhododendron ponticum*	High	Yes	c. 898.3 m to the southeast of the site
Black currant	*Ribes nigrum*	Medium	No	c.1.4 km northeast of the site
Red oak	*Quercus rubra*	Medium	No	c.1.4 km northeast of the site
Turkey oak	*Quercus cerris*	Medium	No	Found within 2 km grid square V98H c.1.1 km west of the site.
Evergreen oak	*Quercus ilex*	Medium	No	Found within 2 km grid square V98S adjacent to the site to the east.
Butterfly-bush	*Buddleja davidii*	Medium	No	Found within grid square V947883 c.3.4 km north of the site.
Common broomrape	*Orobanche minor*	Medium	No	c. 885.7 m northeast of the site.
Himalayan honeysuckle	*Leycesteria formosa*	Medium	No	c.1.4 km northeast of the site
Sycamore	*Acer pseudoplatanus*	Medium	No	Found within 2 km grid square V98S adjacent to the site to the east.
Traveller's-joy	*Clematis vitalba*	Medium	No	c.1.2 km northeast of the site
American Skunk Cabbage	*Lysichiton americanus*	Medium	Yes	Found within 2 km grid square V98S adjacent to the site to the east.
Himalayan knotweed	*Persicaria wallichii*	Medium	Yes	c. 1.7 km southwest of the site.
Three-cornered garlic	*Allium triquetrum*	Medium	Yes	c.1.4 km northeast of the site
Brazilian giant-rhubarb	*Gunnera manicata*	Medium	Yes	c.1.5 km northeast of the site

Seven invasive species, including species listed on the Third Schedule of the 2011 European Communities (Birds and Natural Habitats) Regulations (species of which it is offence to disperse, spread or otherwise cause to grow in any place), were found within the study area. Rhododendron (*Rhododendron ponticum*) is the most prevalent IAPS within the study area. It is particularly well-established to the south of the N71, forming a continuous hedge-like structure extending from the western to the eastern end of the study area. Rhododendron seedlings and small bushes were recorded scattered within Oak-birch-holly woodland and Scrub north of N71. See **Figure 10** below for photos of rhododendron within the proposed development site.

Figure 10: Scattered rhododendron north of N71 (left) and well-established rhododendron south of N71 (right).

The other six invasive species found within the proposed development site are Traveler's joy (Clematis vitalba), Montbretia (*Crocosmia X crocosmiflora),* Winter heliotrope (*Petasites fragrans*), Himalayan knotweed (*Persicaria walilichii*), Fuchsia (*Fuchsia magellanica*) and Butterfly bush (*Buddleja davidii*). These invasive floral species pose significant threats to native biodiversity by outcompeting native flora, altering habitat structure and affecting ecosystems functions. The distribution of these species is detailed in **Figure 12**, highlighting their locations within the proposed development site.

Figure 11: Traveller's joy and montbretia (left), Himalayan knotweed (right)

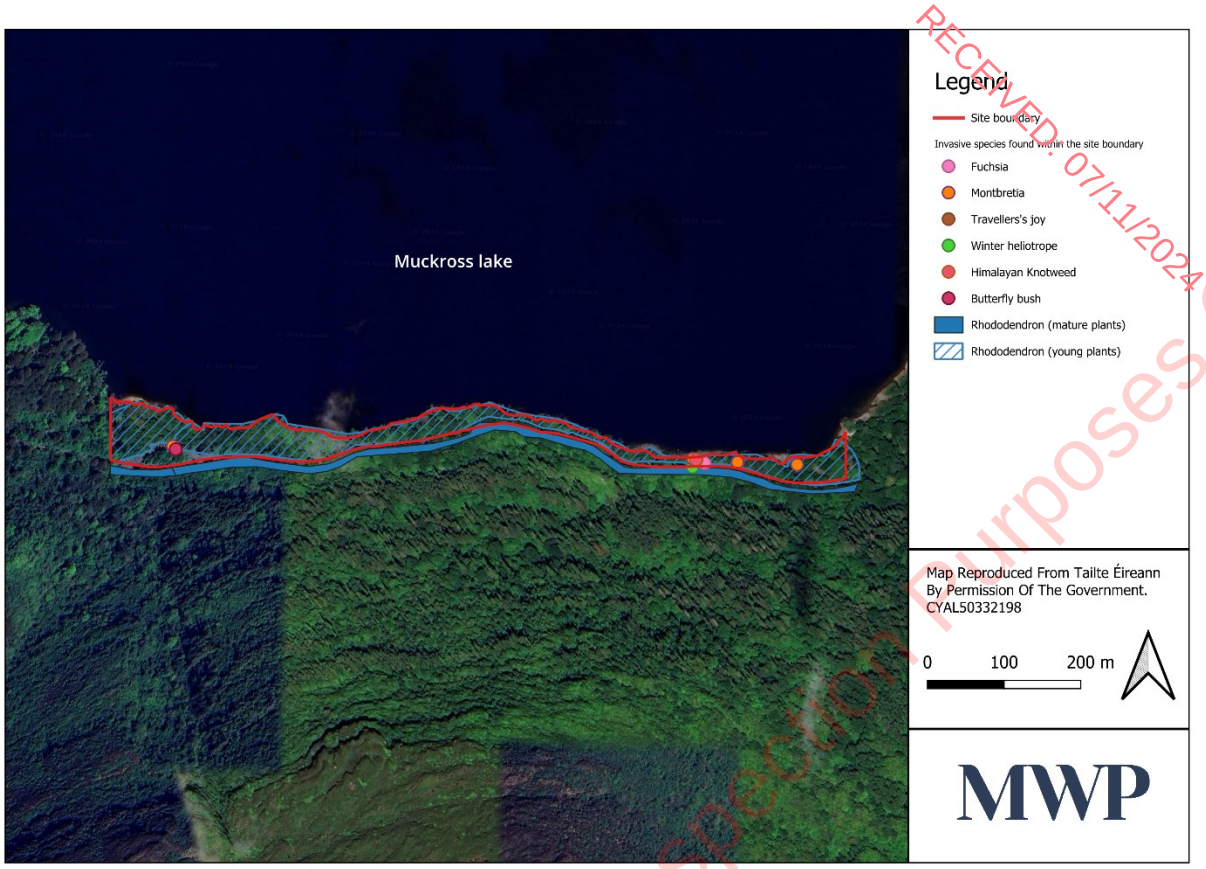

Figure 12: Invasive species recorded within study area and their location.

4.4 Fauna

4.4.1 Non-Volant Mammals

NBDC species lists, distribution maps generated on-line, and data received from NPWS were examined to assess the distribution of rare and protected terrestrial mammal species within the hectad V98. **Table 9** below lists protected mammal species which have previously been recorded and summarises their legal and conservation status in Ireland with regards to national and international legislation, and the most recent Irish Red List for Mammals (2019)[21].

Table 9: Terrestrial mammals recorded within V98.

Species	Distribution	Conservation/Legal Status[11]	Closest Species Record to Development Site
Otter *(Lutra lutra)*	Throughout Ireland	Irish Red Data Book: 'Near Threatened'; EU Habitats Directive Annex II and IV; Wildlife Acts; CITES Appendix 1	Recorded throughout hectad V98 and recorded within 100 m square V950846 within the site.
Badger *(Meles meles)*	Throughout Ireland	Irish Red Data Book: 'Least Concern'; Wildlife Acts	Recorded throughout the hectad V98 and recorded within 100m square V962846 c.251.2 m southeast of the site.

[21] https://www.npws.ie/sites/default/files/publications/pdf/Red%20List%20No.%2012%20Mammals.pdf

Species	Distribution	Conservation/Legal Status[11]	Closest Species Record to Development Site
Hedgehog *(Erinaceus europaeus)*	Throughout Ireland	Irish Red Data Book: 'Least Concern'; Wildlife Acts	Recorded throughout hectad V98 and recorded within 1 km square V9987 c.4km northeast of the site.
Pine Marten *(Martes martes)*	Throughout Ireland	EU Habitats Directive Annex V, Irish Red Data Book 'Least Concern', Wildlife Acts	Recorded throughout hectad V98. Recorded within 100 m square V944848 c. 724 m northwest of the site.
Red Deer (*Cervus elaphus)*	Established populations in Donegal, Kerry, Galway & Wicklow. Scattered populations in most other counties	Irish Red Data Book: 'Least Concern'; Wildlife Acts	Recorded throughout hectad V98. Recorded within 100 m square V964851 c. 725 m northeast of the site.
Red Squirrel (*Sciurus vulgaris*)	Widespread but may still be absent from midlands	Irish Red Data Book: 'Least Concern'; Wildlife Acts	Recorded throughout hectad V98. Recorded within 100 m square V952847 within the site.
Pygmy Shrew (*Sorex minutus)*	Throughout Ireland	Irish Red Data Book: 'Least Concern'; Wildlife Acts	Recorded throughout hectad V98. Recorded within 1 km square V9787 c 2.7 km northeast of the site.
Irish Hare (*Lepus timidus subsp. hibernicus*)	Throughout Ireland	EU Habitats Directive Annex V, Irish Red Data Book: 'Least Concern'; Wildlife Acts	Recorded throughout hectad V98. Recorded within 1 km square V9085 c. 5km northwest of the site.
Irish Stoat (*Mustela erminea subsp. hibernica*)	Throughout Ireland	Irish Red Data Book: 'Least Concern'; Wildlife Acts	Recorded throughout hectad V98. Recorded within 1 km square V9586 c. 1.2 km north of the site.

NBDC species lists generated on-line were also examined to assess the distribution of invasive terrestrial mammal species within the hectad V98. The following invasive species have been recorded.

- House Mouse (*Mus musculus)*
- American Mink (*Mustela vison*)
- Brown Rat (*Rattus norvegicus*)
- Sika Deer (*Cervus nippon*)
- Bank Vole (*Myodes glareolus*)
- European Rabbit (*Oryctolagus cuniculus*)
- Feral Goat (*Capra hircus*)

There are also records for other mammals within hectad V98, fox (*Vulpes vulpes*). Fox is not protected by law that is why it is not included in **Table 9** above.

Mammal species, namely Irish hare (*Lepus timidus*), hedgehog (*Erinaceus europaeus*), red squirrel (*Sciurus vulgaris)*, badger (*Meles meles*) and pygmy shrew (*Sorex minutus*) have been historically documented within hectad V98. It is probable that these species inhabit or use woodland and scrub habitats within the study area for commuting or foraging grounds.

Marine mammals were also recorded with in hectad V98, common seal (*Phoca vitulina*) was observed within the lakes of Killarney in 2021 and 2023. Common seal is a protected species under the EU Habitats Directive Annex II and Annex V and Wildlife Acts. No common seal was recorded during the ecological walkover of the proposed development area.

Field survey results

During the ecological walkover surveys conducted in June, July, August and September 2024, evidence of non-volant mammals was recorded, including mammal trails, potential dwellings, and droppings. The presence of Red Deer within the study area was confirmed by the identification of droppings. Additionally, scats from other mammal species were recorded, including mink along the lakeshore, pine marten near the western portion of the site by Dinis carpark, and stoat on boulders situated along the lakeshore. No breeding or resting areas were identified during the mammal surveys therefore trail cameras were strategically deployed throughout the site to further monitor mammal activity. During the bird survey on 25th October three red squirrels were recorded by surveyor. The cameras revealed the frequent presence of pine marten and Irish stoat (*Mustela erminea subsp. hibernica*), which were the most recorded non-volant mammals in the area, see Figures 13 and 14. Other species captured on the trail cameras included fox and wood mouse (*Apodemus sylvaticus*), indicating a diverse assemblage of small to medium-sized mammalian fauna utilising the site. The presence of these mammals suggests that the study area serves as an important habitat for non-volant mammals, contributing to the overall biodiversity of the region.

Figure 13: Irish stoat on trail camera.

Figure 14: Pine marten on trail camera.

Although no evidence of Otter was observed during the ecological walkover, aquatic survey or trail camera footage, it is likely that otters utilise Muckross lake and the Ovengarriff river proximal to the proposed development site. This assumption is supported by the fact that the proposed development site is located within Killarney National Park, Macgillycuddy's Reeks and Carragh River Catchment SAC, where otter is a conservation interest.

4.4.2 Bats

The development site is located within the 2 km grid square V98M. The overall bat suitability index rating for the 2 km square grid is 22.67 out of 100, this is considered to be low value for bats in general.

For individual bat species, the suitability index is highest for the Brown long-eared bat (*Plecotus auratus)* (suitable index 36/ V98M. See **Table 10.** below with suitability index for individual bat species recorded within 2 km square grid V98M.

Table 10: Suitability index for individual bat species within 2 km square grid V98M

Species Common Name	Scientific name	Suitability Index V98M
Soprano pipistrelle	*Pipistrellus pygmaeus*	26
Brown long-eared bat	*Plecotus auritus*	36
Common Pipistrelle	*Pipistrellus pipistrellus*	29
Leisler's bat	*Nyctalus leisleri*	28
Whiskered bat	*Myotis mystacinus*	7
Daubenton's bat	*Myotis daubentonii*	21

Species Common Name	Scientific name	Suitability Index V98M
Nathusius' pipistrelle	*Pipistrellus nathusii*	0
Natterer's bat	*Myotis nattereri*	22

According the NBDC website five bat species were previously recorded within the 2 km square grid V98M; Common pipistrelle (*Pipistrellus pipistrellus*), Daubenton's Bat (*Myotis daubentonii*), Lesser Horseshoe Bat (*Rhinolophus hipposideros*), Leisler's bat (*Nyctalus leisleri*) and Soprano pipistrelle (*Pipistrellus pygmaeus*). Although only five species were previously recorded, the woodland and river habitat in the vicinity of the proposed development site provides desired habitats for all bat species.

4.4.2.1 Bat Foraging and Commuting Habitat Suitability Survey

The site is bordered to the north by Muckross Lake and is surrounded on all other sides by dense mixed woodland. Muckross Lake offers excellent foraging opportunities, while the adjacent mixed woodland provides moderate commuting routes and high foraging potential for various species. To the south, the N71 road borders the site. While this road experiences significant traffic during the daytime, it is less busy in the evenings, and it is not heavily illuminated with artificial lighting, which helps minimise disturbance to nocturnal wildlife.

4.4.2.2 Preliminary Roost Assessment (PRAs)

During the daytime ecological walkover, three mature trees were identified within the proposed development site as having potential roosting features (PRF), see **Figure 15** below for an example of roosting features. Also see **Figure 16** for the location of trees with PRF within the proposed development site.

Tree 1 (T1), a mature holly, exhibited approximately six knot holes across the tree with roosting potential. Given the number of PRFs found and its location within suitable bat habitat T1 was considered to be of moderate potential.

Tree 2 (T2), a mature pedunculate oak, had two PRFs in the form of knot holes and also another in the form of lifting bark. Due to these features T2 was considered to be of low roosting potential.

Tree 3 (T3) exhibited approximately 5 knot holes and or rot holes with roosting potential and due to these features was considered to be of moderate roosting potential.

The study area does not contain any structures, or other habitat features potentially suitable for roosting bats.

Figure 15: Trees with potential roost features. Tree 1 (top left), tree 2 (top right), tree 3 (bottom).

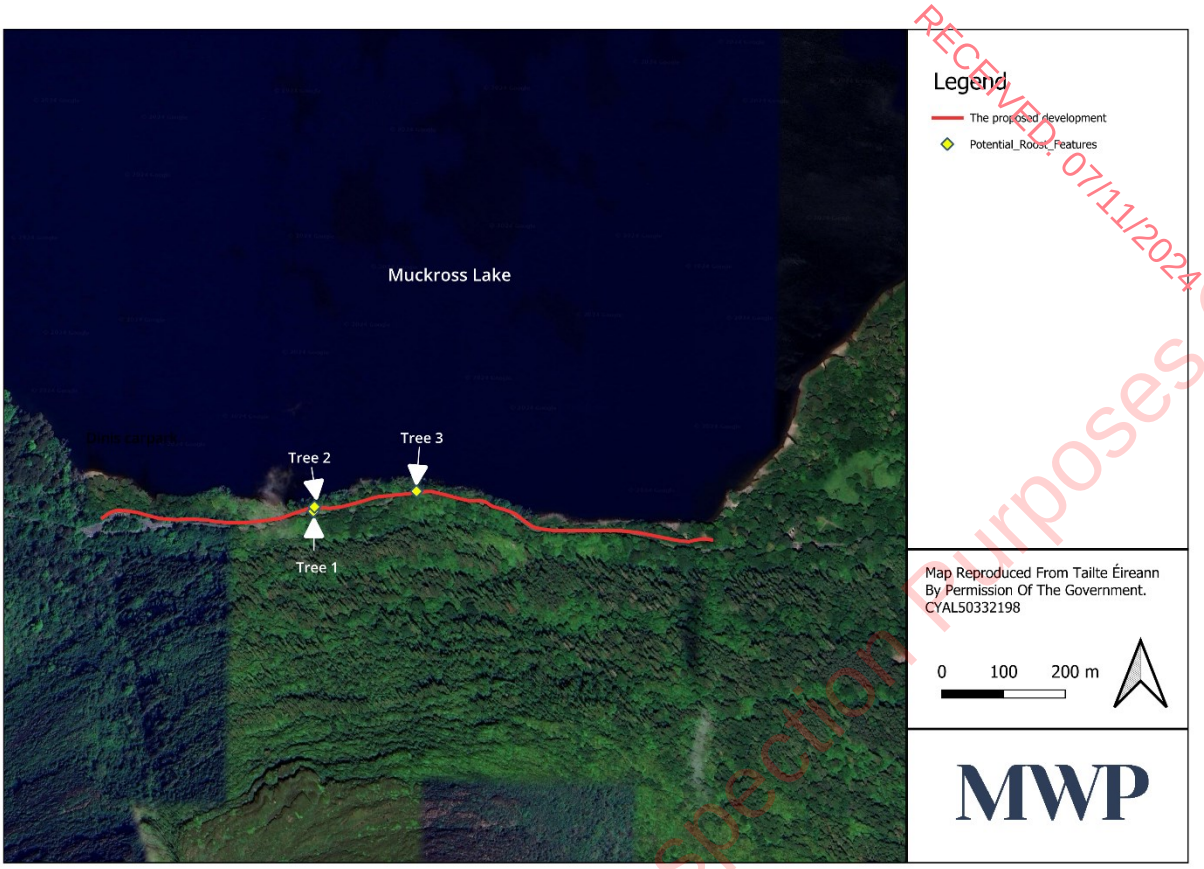

Figure 16: Location of trees with potential roost features.

4.4.2.3 Passive Automated Bat Survey (PABS)

Five static passive bat detectors units were deployed within the study area of the proposed development. Static units (SP1 – SP5) were deployed in June, July, August and September 2024 for five nights of consecutive optimum weather within each month. See **Figure 17** below for their location within the proposed development site.

A total of 31,096 bat passes were recorded over the deployment period. Soprano pipistrelle had the highest number of passes recorded 42.56% at the proposed development site.

All species recorded, with their combined total percentage passes, are as follows:

- Soprano pipistrelle (42.56%)
- Common pipistrelle (29.35%)
- Leisler's bat (16.25%)
- Species from the genus *Myotis* (7%)
- Brown long-eared bat (*Plecotus auritus*) (2.88%) and
- Nathusius' pipistrelle (*Pipistrellus nathusii*) (0.05%)

In addition to the above, calls recorded which could not be attributed to a species and/or genus during the PAB surveys are as follows:

- Unidentified (0.72%)

Figure 17: Static bat detectors location

During the bat activity survey, the highest number of bat passes was recorded at SP3, with a total of 10,432 passes over the survey period, peaking in August, indicating significant activity at this location. SP2 followed as the second most active site, recording 6,877 bat passes, with the highest levels of activity recorded in September. SP1 recorded 5,005 bat passes, also showing increased bat activity during August. SP5, with 4,811 bat passes, experienced its peak activity in September. The lowest level of activity was recorded at SP4, with 3,817 passes, with the highest bat presence noted in June. These results suggest varying levels of bat usage across the survey locations, with clear peaks during late summer and early autumn.

June

Bat species recorded at all sampling points across the June survey period, with their combined total percentage passes, are as follows:

- Leisler's bat (32.96% = 1,890 passes)
- Soprano pipistrelle (30% = 1,720 passes)
- Common pipistrelle (25.18% = 1,444 passes)
- Species from the genus *Myotis* (11% = 631 passes)
- Brown long-eared bat (0.33% = 41 passes)
- Lesser horseshoe (0.51% = 29 passes)

In addition to the above, calls recorded which could not be attributed to a species and/or genus during June PAB surveys are as follows:

- Unidentified (0.05% = 3 passes)

In June, a total of 5,734 bat passes were recorded across all sampling points. SP4 showed the highest level of bat activity, with 1,576 passes, while SP1 recorded the lowest activity, with 416 bat passes.

July

Bat species recorded at all sampling points across the July survey period, with their combined total percentage passes, are as follows:

- Soprano pipistrelle (38.10% = 2,030 passes)
- Common pipistrelle (30.48% = 1,624 passes)
- Leisler's bat (26.37% = 1,405 passes)
- Species from the genus *Myotis* (3.85% = 205 passes)
- Brown long-eared bat (0.24% = 13 passes)
- Lesser horseshoe (0.92% = 49 passes)

In July, a total 5,238 bat passes were recorded across all sampling points. SP3 recorded the highest level of bat activity, with 1,782 passes, while SP2 recorded the lowest activity, with 592 bat passes.

August

Bat species recorded at all sampling points across the August survey period, with their combined total percentage passes, are as follows:

- Common pipistrelle (40.74% = 4,151 passes)
- Soprano pipistrelle (38.68% = 3,941 passes)
- Leisler's bat (12.33% = 1,256 passes)
- Species from the genus *Myotis* (5.92% = 603 passes)
- Brown long-eared bat (0.95% = 97 passes)
- Lesser horseshoe (0.88% = 90 passes)

In addition to the above, calls recorded which could not be attributed to a species and/or genus during August PAB surveys are as follows:

- Unidentified (0.47% = 48 passes)

During August, a total of 10,188 bat passes were recorded, marking it as the busiest month of the survey period. The highest activity was observed at SP3, with 3,673 bat passes, while the lowest was recorded at SP5, with 999 passes.

September

Bat species recorded at all sampling points across the September survey period, with their combined total percentage passes, are as follows:

- Soprano pipistrelle (57.20% = 5,543 passes)
- Common pipistrelle (18.07% = 1,751 passes)
- Brown long-eared bat (7.96% = 771 passes)
- Species from the genus *Myotis* (7.63% = 739 passes)
- Leisler's bat (5.17% = 501 passes)
- Lesser horseshoe (2.11% =204 passes)

In addition to the above, calls recorded which could not be attributed to a species and/or genus during September PAB surveys are as follows:

- Unidentified (1.79% = 173 passes)

In September, a total of 9,690 bat passes were recorded across all sampling points. SP3 exhibited the highest level of bat activity, with 3,427 bat passes, while SP4 showed the least activity, with only 102 bat passes recorded

For more in-depth information and survey results from passive automated bat survey refer to the stand alone document 'Bat Survey Report' (MWP Doc. 23765-6002 Killarney National Park Walkway Bat Report).

4.4.2.4 Bat Activity Surveys (Night Bat Walkover (NBW) Survey)

Eight nocturnal bat walkover surveys were conducted along the designated transect route with 10 stopping points (SP) approx. 100m apart, meeting the minimum survey requirements as outlined in Collins (2023). Please see **Figure 18** below for transect route and stopping points. A summary of the results is provided below. For more detailed information, refer to the "Bat Survey Report" (MWP Doc. 23765-6002 Killarney National Park Walkway Bat Report).

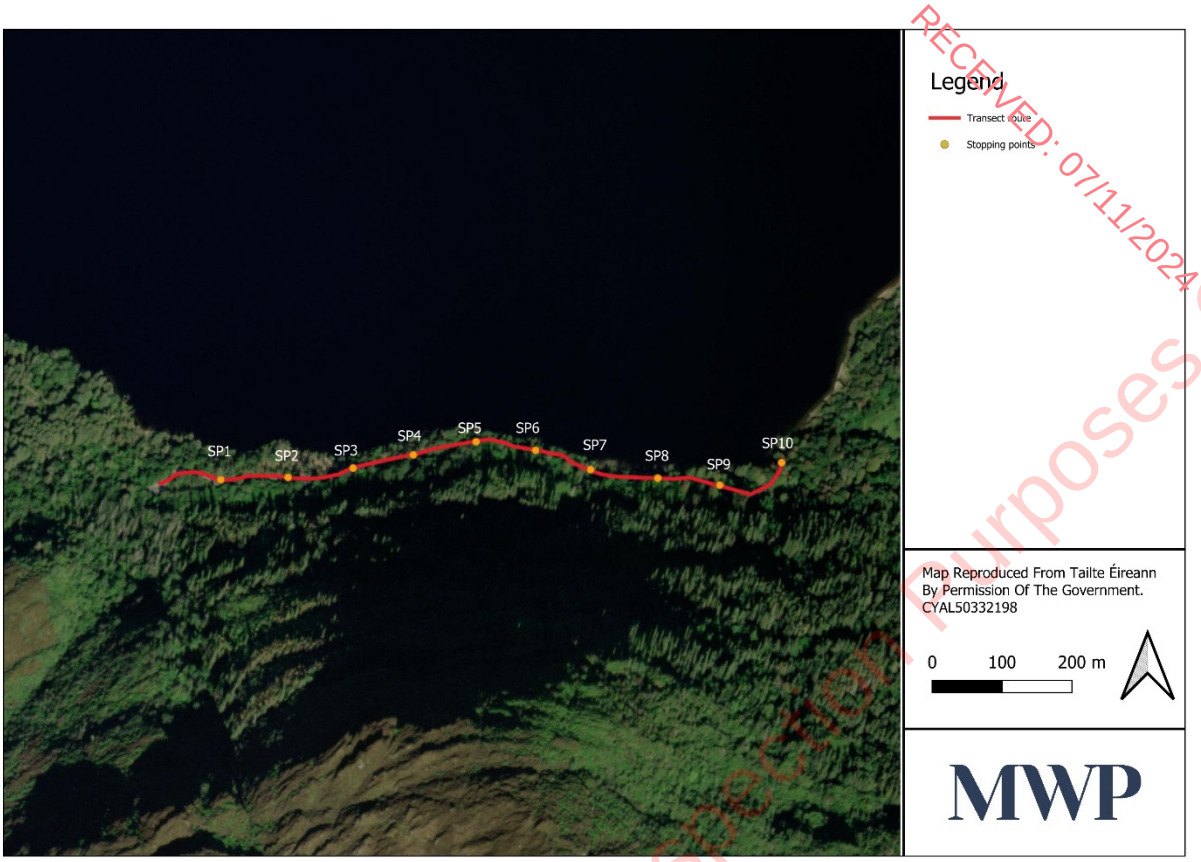

Figure 18: Transect route with stopping points.

13th June 2024

Soprano pipistrelle was the most recorded species during the night bat walkover on 13th June. Soprano pipistrelle was heard at stopping points 3, 4 and 5. Other species recorded were individual common pipistrelle at stopping point 5 and 6. Leisler's bat was heard at stopping point 7. When species were seen, these were found to be feeding overhead close to the woodland edge.

25th June 2024

Overall, a low level of activity was recorded during the night bat walkover on 25th June. Mainly pipistrelle activity recorded with common pipistrelle being the most recorded species at stopping points 5, 6 and 7 and soprano pipistrelle recorded at stopping point 3, 4 and 10. Small numbers of *Myotis spp*. Were recorded at stopping points 5, 7 and 8. Leisler's bat was also observed at stopping points 8, 9 and 10. Where species were seen, these were found to be feeding overhead close to the woodland.

11th July 2024

Moderate levels of activity was recorded with pipistrelle species the most dominant, especially soprano pipistrelle which were recorded at stopping points 1,2, 3, 4 and 6. Common pipistrelle was recorded at stopping point 7. Lesser horseshoe bat was recorded a few times at stopping points 4, 6, 7 and 8. Leisler's bat was recorded at stopping points 7 and 8. *Myotis spp.* was also recorded during the walkover at stopping points 7 and 8.

25th July 2024

Mostly pipistrelle species were recorded during the walkover on 25th July. Soprano pipistrelle passes were recorded at stopping points 1, 2, 3, 4, 5, 7, 9 and 10 while common pipistrelle was recorded at stopping points 5, 7, and 9. Single leisler's bat passes were recorded on numerous occasions at stopping points 1, 2, 3, 4, 8 and 10.

Lesser horseshoe bat was recorded at stopping point 7. *Myotis spp*. bat passes were recorded at stopping points 5 and 6.

9th August 2024

A high amount of activity was recorded during the walkover on 9th August. A large number of of pipistrelle species and *Myotis spp* passes were recorded. Both species were seen foraging along the treeline either side of the N71 road and they were also seen flying towards the lake and foraging above it. Common pipistrelle was recorded between stopping points and at stops 2, 4, 5, 6, 7, 8 and 9 while soprano pipistrelle passes were recorded at stopping points 4, 5, 8 and 9. Numerous *Myotis spp.* were recorded between stops 4 and 5, 5 and 6 and at stopping points 5, 7 and 9. Leisler's bat was recorded at stopping points 1, 3, 4, 8 and 9. Lesser horseshoe bat was observed between stops 4 and 5, 7 and 8 and at stops 7 and 9. The first calls of Lesser horseshoe bat were heard during the survey approx. 45 minutes after sunset. Also, single Nathusius' pipistrelle calls were observed at stopping point 5.

29th August 2024

Moderate levels of activity was recorded during the walkover with pipistrelle species being the most recorded. Leisler's and *Myotis spp. Were* both heard in fewer numbers and a single Lesser horseshoe pass was also recorded. Soprano pipistrelle was recorded at stopping points 1, 2 and 5. When this species was seen it was observed foraging and circling around woodland's edge close to the lake. Individual common pipistrelle bat passes were recorded at stopping points 3, 4 and 5. *Myotis spp.* passes were recorded at stopping points 2, 3, 4 and 5. A single Lesser horseshoe bat call was recorded at stopping point 4. Leisler's bat passes were recorded stopping point 1 and 5.

5th September 2024

Moderate levels of activity with pipistrelle being most dominant species recorded. Soprano pipistrelle was observed at stopping points 2, 4, 5, 6, 7, 9 and 10, they were also recorded between points 3 and 4, 4 and 5. Common pipistrelle was recorded at stopping points 5, 7, 9, 10 and also between points 6 and 7. Both pipistrelle species were observed commuting and foraging when seen. Lesser horseshoe, *Myotis spp*. and Leisler's were also recorded. Lesser horseshoe was recorded at stopping points 6 and 10. *Myotis spp.* were recorded at stopping points 6, 8 and 10. Leisler's bat passes were recorded at stopping points 1, 2, 5 and 8.

19th September 2024

Minimal activity was recorded during the survey on 19th September with mostly soprano and common pipistrelle recorded along with a small number of *Myotis spp*., Lesser horseshoe calls and single Leisler's call were also recorded. Soprano pipistrelle calls were recorded at stopping points 4, 5 and 6 while common pipistrelle calls were recorded at stopping point 6 and 9. *Myotis spp.* calls were recorded at stopping points 6, 7 and 10. Lesser horseshoe bat calls were recorded at stopping points 6, 7 and 9. A single Lesler's bat call was recorded at stopping point 4

4.4.3 Birds

A wide variety of bird species, including species of conservation concern, have previously been recorded within the hectad V98. Records from the NBDC show that 73 bird species were previously recorded in the area on . The proposed development site is located within the 2km grid square V98M. Birds of Conservation Concern in Ireland 2020-2026 (BoCCI) species previously recorded within V98M include;

- Mallard (*Anas platyrhynchos*) – Amber listed.
- Tufted Duck (*Aythya fuligula*) – Amber listed.

- Snipe (*Gallinago gallinago*) – Red listed.
- Cormorant (*Phalacrocorax carbo*) – Amber listed.
- Spotted Flycatcher (*Muscicapa striata*) – Amber listed.
- Ring Ouzel (*Turdus torquatus*) – Red listed.
- Grey wagtail (*Motacilla cinerea*) – Red listed.
- Meadow Pipit (*Anthus pratensis*) – Red listed.
- Willow Warbler (*Phylloscopus trochilus*) – Amber listed.

Mallard, Tufted duck and Cormorant are bird species that may utilise Muckross lake, including portions of the lake in the vicinity of the study area. Snipe typically prefers more wet habitats such as bog or wet woodland, which are not present within the study area. Grey wagtail prefers fast flowing rivers so it may utilise Owengarriff river located 200 m east from eastern part of the proposed development site. Meadow pipit is associated with bog and open habitat, which are absent from the proposed development site. Willow warbler, a summer breeding visitor, prefers habitats with willow trees along the edges of bogs and marshes. Spotted flycatcher is also a breeding summer visitor and prefers broadleaved woodland, habitat which encompasses most of the study area. Ring ouzel is a very rare bird species, which utilises scree slopes in mountainous terrain with limited vegetation and is unlikely to be found within the proposed development site.

Altogether 13 Annex I bird species were previously documented by the NBDC within hectad V98:

- Great Northern Diver (*Gavia immer*)
- Little Egret (*Egretta garzetta*)
- Peregrine Falcon (*Falco peregrinus*)
- Greater White-fronted Goose (*Anser albifrons*)
- European Golden Plover (*Pluvialis apricaria*)
- Kingfisher (*Alcedo atthis*)
- Whooper Swan (*Cygnus cygnus*)
- Merlin (*Falco columbarius*)
- Dunlin (*Calidris alpina*)
- Ruff (*Philomachus pugnax*)
- Corn Crake (*Crex crex*)
- Hen Harrier (*Circus cyaneus*)
- Nightjar (*Caprimulgus europaeus*)

Great northern diver, Little egret, Whooper Swan, Kingfisher and Dunlin were recorded in the past during the Irish Wetland Bird Survey (I-WeBS) in Lough Leane & Killarney Valley site, of which Muckross lake is part. Other wading bird species Golden plover and Ruff were not recorded during I-WeBS surveys. Golden plover breeds in bogs, heather moors and acid grasslands and during the winter it can be found in coastal or inland habitats. Ruff is rare winter visitor mainly found on estuaries along the southern coast of Ireland. Greater white-fronted goose another winter visitor utilising mainly intensively managed grasslands, not found within study area. Corn crake and Nightjar are very rare bird species, both utilising habitats not found within study area. Corn crake prefers grassland with

tall vegetation and Nightjar prefers conifer plantation or areas of clearfell forestry. Peregrine falcon could utilise study area as foraging or commuting habitat. Hen harrier and Merlin both prefer upland bog habitat for breeding and in winter move towards coastline.

Field survey results

Bird surveys were carried out on 10th June, 26th June, 19th August and 23rd September 2024. A transect route was walked along the N71 from Dinis carpark to Torc (Cardiac hill carpark). An additional bird survey was carried out on 25th October 2024 with a focus on wintering and migratory species. In total 21 bird species were recorded during the transect surveys. During the surveys, two BoCCI red-listed species, grey wagtail and snipe were recorded, along with five BoCCI amber-listed species: cormorant, common sandpiper (*Actitis hypoleucos*), goldcrest (*Regulus regulus*), mallard, and spotted flycatcher. Common sandpiper was recorded nesting northeast on the shore of Muckross Lake approx. 90 m from the northeastern boundary of the proposed development site. The remaining 14 species identified are BoCCI green-listed species. For a detailed list of bird species and their conservation status, refer to **Table 11** below.

Table 11: Bird species recorded during the bird surveys.

Species name	Scientific name	BoCCI status
Blackbird	*Turdus merula*	Green-listed
Blackcap	*Sylvia atricapilla*	Green-listed
Chiffchaff	*Phylloscopus collybita*	Green-listed
Common sandpiper	*Actitus hypoleucos*	Amber-listed
Cormorant	*Phalacrocorax carbo*	Amber-listed
Goldcrest	*Regulus regulus*	Amber-listed
Great tit	*Parus major*	Green-listed
Grey heron	*Ardea cinerea*	Green-listed
Grey wagtail	*Motacilla cinerea*	Red-listed
Hooded crow	*Corvix cornix*	Green-listed
Jay	*Garrulus glandarius*	Green-listed
Long tailed tit	*Aegithalus caudatus*	Green-listed
Mallard	*Anas platyrhynchos*	Amber-listed
Robin	*Erithacus rubecula*	Green-listed
Raven	*Corvus corax*	Green-listed
Snipe	*Gallinago gallinago*	Red-listed
Song thrush	*Turdus philomelos*	Green-listed
Spotted flycatcher	*Musciapa striata*	Amber-listed
Treecreeper	*Certhia familiaris*	Green-listed

Species name	Scientific name	BoCCI status
Woodpigeon	*Columba palumbus*	Green-listed
Wren	*Troglodytes troglodytes*	Green-listed

The habitats of the proposed development site, especially oak-birch-holly woodland and broadleaved woodland, provide suitable conditions for foraging and nesting birds. Muckross lake and its shores provides suitable habitat for wading bird species. Most bird species are protected under the Irish Wildlife Acts (1976 – 2012), where it is an offence to hunt, interfere with or destroy their breeding or resting places (unless under statutory licence/permission).

4.4.4 Reptiles and Amphibians

NBDC records exist for common frog (*Rana temporaria*), smooth newt (*Lissotriton vulgaris*) and common lizard (*Zootoca vivipara*) within hectad V98. Common frog has a widespread distribution in Ireland and is found from coastal areas to uplands. Smooth newt is widespread in Ireland but is locally distributed. Newts and frogs are amphibious, breeding in freshwater and utilising woodland, damp grassland, marsh and scrub for foraging. Common lizards are a widespread native reptile species in Ireland (apart from Laois and Westmeath) and are primarily found in areas of bog, heath, coastline and along the fringes of coniferous woodland, but may also occupy other habitats, such as non-intensive grassland, gardens and built-up areas (King *et al.*, 2011).

No reptiles were observed during the ecological surveys conducted at the proposed development site. Common frog was observed during the ecological walkover on 14th June 2024.

4.4.5 Aquatic Ecology

The field surveys comprised an evaluation of aquatic habitats and biotic assessment using aquatic macroinvertebrates. Field work was carried out on 9th September 2024. Two sites were surveyed: one on the Torc Mountain Stream (EPA code 22T47, Site 1); and one at the shore of Muckross Lake (Site 2), as shown in **Figure 19** below.

Several streams are located in the western part of the proposed development site, which are likely to be part of the EPA waterbody Laune_010. However, due to previous modifications made during works on the Dinis Loop Walkway, the natural flow of the Laune_010 has been altered. The Laune_010 waterbody is now divided into multiple channels, each diverted through a series of culverts beneath the walkway, as shown in **Figure 19** below. All these streams and channels eventually drain into Muckross Lake, which lies downslope of the proposed development site.

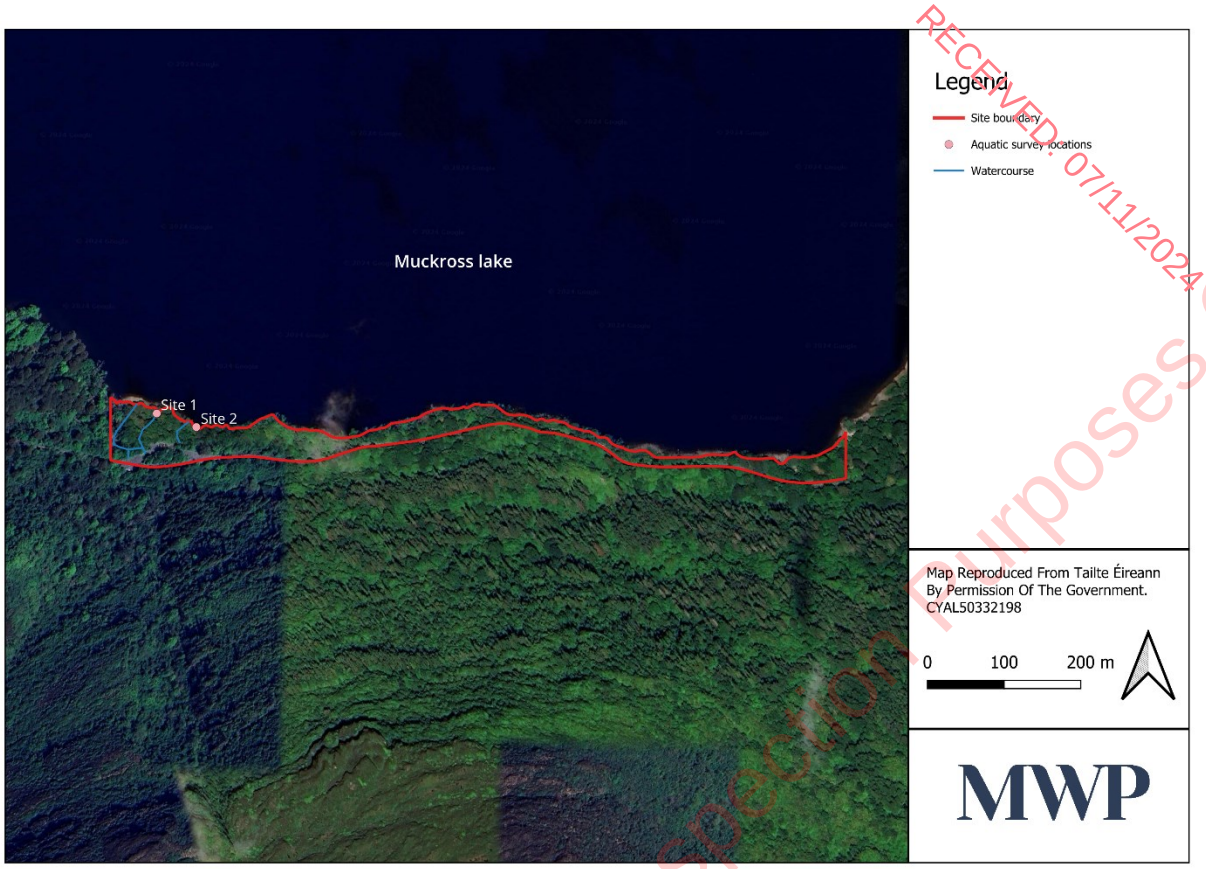

Figure 19: Aquatic surveys sites.

4.4.5.1 Fish

There are NBDC records for numerous fish species within hectad V98 including, the OSPAR-listed[22] critically endangered European eel (*Anguilla anguilla*) and threatened species Atlantic salmon (*Salmo salar*). Based on the physical characteristics of the Torc Mountain Stream (Laune_010), watercourse within the proposed development, it is not considered a significant producer of salmonids. The size of the stream is a limiting factor in terms of holding adult trout and is deemed too small to be used by salmon. The lower reach of the stream (between the N71 and Muckross Lake) could be used by small trout for spawning and as a nursery area of trout but is only a marginal habitat in this regard. Also either stream or lakeshore do not hold any suitable habitat for brook lamprey (*Lampetra planeri*) or river lamprey (*Lampetra fluviatilis*). Please see **Figure 20**, below for photos of aquatic survey's sites.

Muckross Lake and the surrounding area of the proposed development site hold limited ecological value either for European eel or Atlantic salmon. It is likely that adult salmon are confined to the deeper sections of the lake.

[22] OSPAR – Convention for the Protection of the Marine Environment of the North-East Atlantic List of Threatened and/or Declining Species & Habitats | OSPAR Commission

Figure 20: Site 1 on the Torc Mountain Stream (left) had a considerable amount of overlying peat silt. Typical character of shoreline of Muckross Lake (Site 2) adjacent to the proposed development site (right).

4.4.5.1 Freshwater Macro-Invertebrates

Stream Laune_010 demonstrated good water quality, as indicated by a healthy community of macro-invertebrates, and would be assigned a Q-value of 4 based on the results. For results from the aquatic survey refer to **Appendix 4**. See **Figure 21** below for photos of macro-invertebrates recorded during the biological sampling.

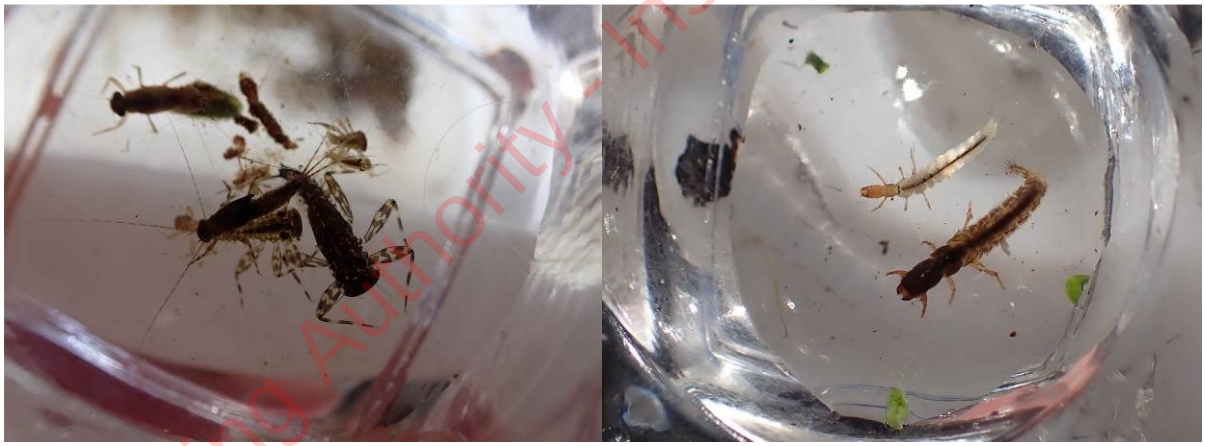

Figure 21: Larvae of mayfly (left) and caseless caddisfly (right) recorded during biological sampling in September 2024.

4.4.5.2 Slender Naiad

A review of NBDC on-line mapping determined that records exist within the surrounding area of the proposed development site for the Annex II plant species, Slender naiad . This species is also protected under FPO (2015). The closest of these records comprises a record somewhere within the 2 km grid square V98S which partially overlaps with the proposed development site at its eastern extent – no specific location is available from the NBDC within this area.

During the aquatic surveys on 9th September 2024 no evidence of Slender naiad was recorded in Muckross Lake within the study area of the proposed development site. The absence of Slender naiad could be attributed to the lack of potential and suitable habitat within the study area of the proposed development site.

Aquatic plants recorded during the aquatic survey in Muckross Lake were Guilworth (*Isoetes lacustris*), Water lobelia (*Lobelia dortmanna*) and Spiked milfoil (*Myriophylum spicatum*). There were no aquatic macrophytes recorded within the stream.

4.4.5.3 Freshwater pearl mussel

Records for freshwater pearl mussel (*Margaritifera margaritifera*) an Annex II and Annex V species exist within the hectad V98; however, there is no suitable habitat for aquatic species within the proposed development site as watercourse draining the site do not hold any suitable habitat for this species.

4.4.6 Terrestrial Macro-invertebrates

4.4.6.1 Marsh Fritillary

There are several previous records for the Annex II species Marsh fritillary butterfly (*Euphydryas aurinia*) within the hectad V98. The proposed development site does not offer suitable habitat for Marsh fritillary, despite the presence of Devil's-bit scabious (*Succisa pratensis*), the main foodplant for the species, being recorded within the area. Marsh fritillary require specific habitat conditions, such as wet grasslands or damp meadows with a mosaic of vegetation structure. The absence of these optimal habitat features within the proposed development site likely limits the suitability for sustaining a viable Marsh fritillary population.

4.4.6.2 Kerry Slug

There are previous records for Annex II and Annex IV species Kerry slug (*Geomalacus maculosus*) within the hectad V98. The closest documented record of Kerry slug is located approximately 0.97 km south of the subject site (dated 2005). During the targeted survey on 11th September, a single Kerry slug was recorded on a wet boulder along the shore of Muckross Lake, within the surrounding scrub habitat. An additional eight individuals were observed at one location during a multi-disciplinary daytime walkover on the 16th April 2024. During the habitat survey on 13th June 2024, two Kery slugs were recorded on tree trunk and rock outcropping. While the surveys confirmed the presence of Kerry slugs within the proposed development area, the absence of an NPWS licence imposed certain limitations on the survey. As a result, trapping mats, a key method for Kerry slug detection, could not be utilised. Please see **Figure 22** below for photos of Kerry slug recorded during the ecological walkover surveys and **Figure 23** for location of sightings.

NBDC records from the hectad V98 indicate documented records for other butterflies and moths (*Lepidoptera*), beetles (*Coleoptera*), bees (*Hymenopteran*) and other terrestrial invertebrate groups.

Figure 22: Kerry slug

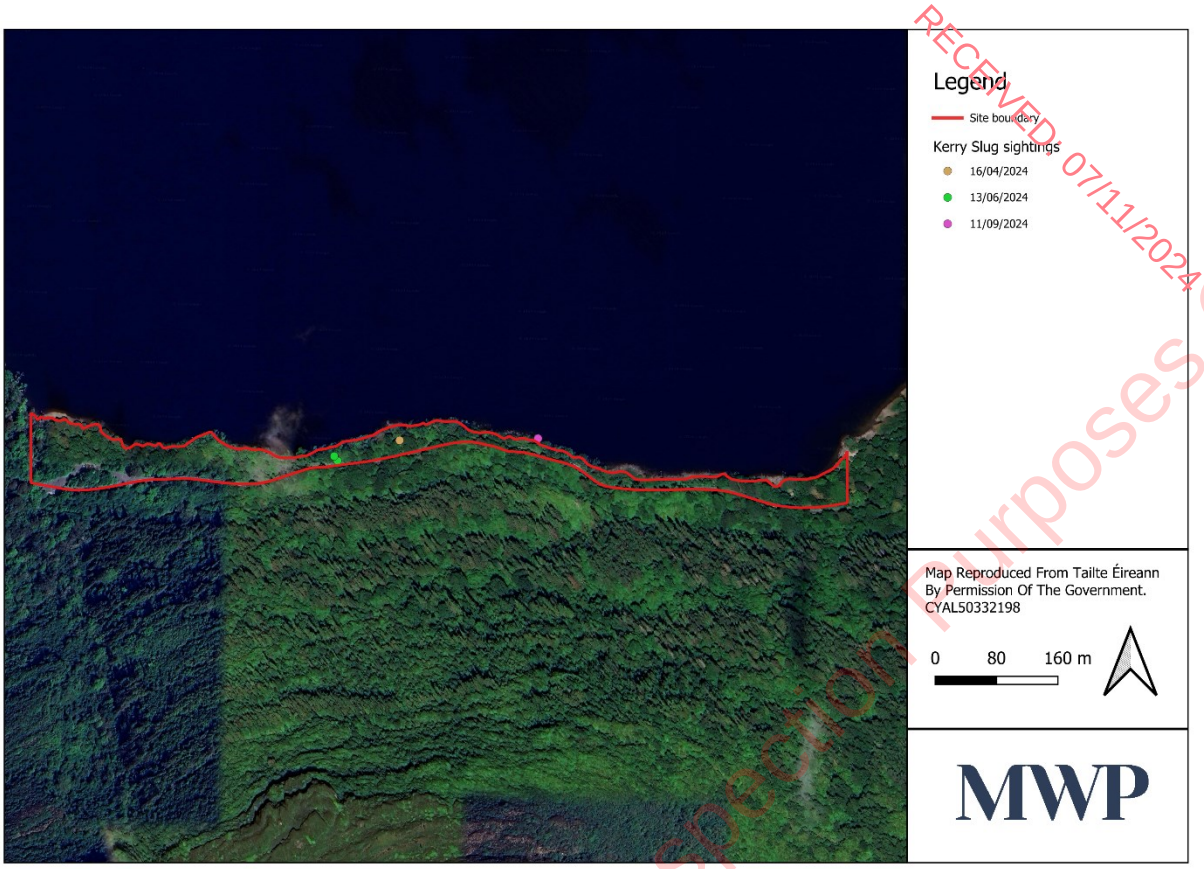

Figure 23: Kerry slug sightings.

4.5 Designated Sites

This section describes the designated sites considered to be within the potential ZOI of the proposal, including their qualifying features, distance from the proposed development, and whether it is considered that a source-receptor ecological pathway exists between the proposed development and each designated site. The ZOI is established using the Source-Pathway-Receptor model. In order for an impact to occur there must be a risk initiated by having a 'source' (e.g., excavation), a 'receptor' (e.g., a protected species associated with aquatic or riparian habitats), and an impact pathway between the source and the receptor (e.g., a waterbody which connects the development site to the protected species or habitats).

4.5.1 Sites of International Importance

The Habitats Directive (92/43/EEC) seeks to conserve natural habitats of wild fauna and flora by the designation of Special Areas of Conservation (SACs), while the Birds Directive (79/409/EEC) seeks to protect birds of special importance by the designation of Special Protection Areas (SPAs). It is the responsibility of each member state to designate SPAs and SACs, both of which form part of Natura 2000, a network of protected sites throughout the European Community.

The precautionary principle and the Source-Pathway-Receptor model has been adopted in identifying potentially affected Natura 2000 sites. **Table 12,** below, lists the Natura 2000 sites located within the potential ZOI of the proposal and includes each site's qualifying features of conservation interest. All sites are mapped in **Figure 24,** below.

Table 12: Qualifying features of conservation interest of Natura 2000 sites located within the potential ZOI of the proposed development.

Designated Site	Site Code	Distance from development site	Qualifying Features of Conservation Interest[23]
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment (SAC)	000365	The SAC is located within the proposed development site	**Habitats** - Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] - Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea* [3130] - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] - Northern Atlantic wet heaths with *Erica tetralix* [4010] - European dry heaths [4030] - Alpine and Boreal heaths [4060] - Juniperus communis formations on heaths or calcareous grasslands [5130] - Calaminarian grasslands of the *Violetalia calaminariae* [6130] - Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] - Blanket bogs (* if active bog) [7130] - Depressions on peat substrates of the Rhynchosporion [7150] - Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] - Taxus *baccata* woods of the British Isles [91J0] **Species** - Kerry Slug (*Geomalacus maculosus*) [1024] - Freshwater Pearl Mussel (*Margaritifera margaritifera*) [1029] - Marsh Fritillary (*Euphydryas aurinia*) [1065] - Sea Lamprey (*Petromyzon marinus*) [1095] - Brook Lamprey (*Lampetra planeri*) [1096] - River Lamprey (*Lampetra fluviatilis*) [1099] - Salmon (*Salmo salar*) [1106] - *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] - Otter (*Lutra lutra*) [1355]

Designated Site	Site Code	Distance from development site	Qualifying Features of Conservation Interest[23]
			- Killarney Fern (*Trichomanes speciosum*) [1421] - Slender Naiad (*Najas flexilis*) [1833] - Killarney Shad (*Alosa fallax killarnensis*) [5946]
Killarney National Park SPA	004038	Located within SPA.	**Species** - Merlin (*Falco columbarius*) [A098] - Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]
Castlemaine Harbour SAC	000343	5.6km to the northwest	**Habitats** - Estuaries [1130] - Mudflats and sandflats not covered by seawater at low tide [1140] - Annual vegetation of drift lines [1210] - Perennial vegetation of stony banks [1220] - Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] - *Salicornia* and other annuals colonising mud and sand [1310] - Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] - Mediterranean salt meadows (*Juncetalia maritimi*) [1410] - Embryonic shifting dunes [2110] - Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] - Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] - Dunes with Salix repens ssp. argentea (*Salicion arenariae*) [2170] - Humid dune slacks [2190] - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Species** - Sea Lamprey (*Petromyzon marinus*) [1095] - River Lamprey (*Lampetra fluviatilis*) [1099] - Salmon (*Salmo salar*) [1106] - Otter (*Lutra lutra*) [1355] - Petalwort (*Petalophyllum ralfsii*) [1395]
Old Domestic Building, Curraglass Wood SAC	002041	8.3km to the southeast	**Species** - Lesser Horseshoe Bat (*Rhinolophus hipposideros*) [1303]
Eirk Bog SPA	004108	11.2km to the southwest	**Species** - Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] -

Designated Site	Site Code	Distance from development site	Qualifying Features of Conservation Interest[23]
Blackwater River (Kerry) SAC	002173	13.7km to the southwest	**Habitats** - European dry heaths [4030] **Species** - Kerry Slug (Geomalacus maculosus) [1024] - Freshwater Pearl Mussel (Margaritifera margaritifera) [1029] - Salmon (*Salmo salar*) [1106] - Lesser Horseshoe Bat (*Rhinolophus hipposideros*) [1303] - Otter (*Lutra lutra*) [1355]
Kenmare River SAC	000160	14.4km to the south	**Habitats** - Large shallow inlets and bays [1160] - Reefs [1170] - Perennial vegetation of stony banks [1220] - Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] - Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] - Mediterranean salt meadows (*Juncetalia maritimi*) [1410] - Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] - Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] - European dry heaths [4030] - Juniperus communis formations on heaths or calcareous grasslands [5130] - Calaminarian grasslands of the *Violetalia calaminariae* [6130] - Submerged or partially submerged sea caves [8330] **Species** - Narrow-mouthed Whorl Snail (*Vertigo angustior*) [1014] - Lesser Horseshoe Bat (*Rhinolophus hipposideros*) [1303] - Otter (*Lutra lutra)* [1355] - Harbour Seal (*Phoca vitulina*) [1365]

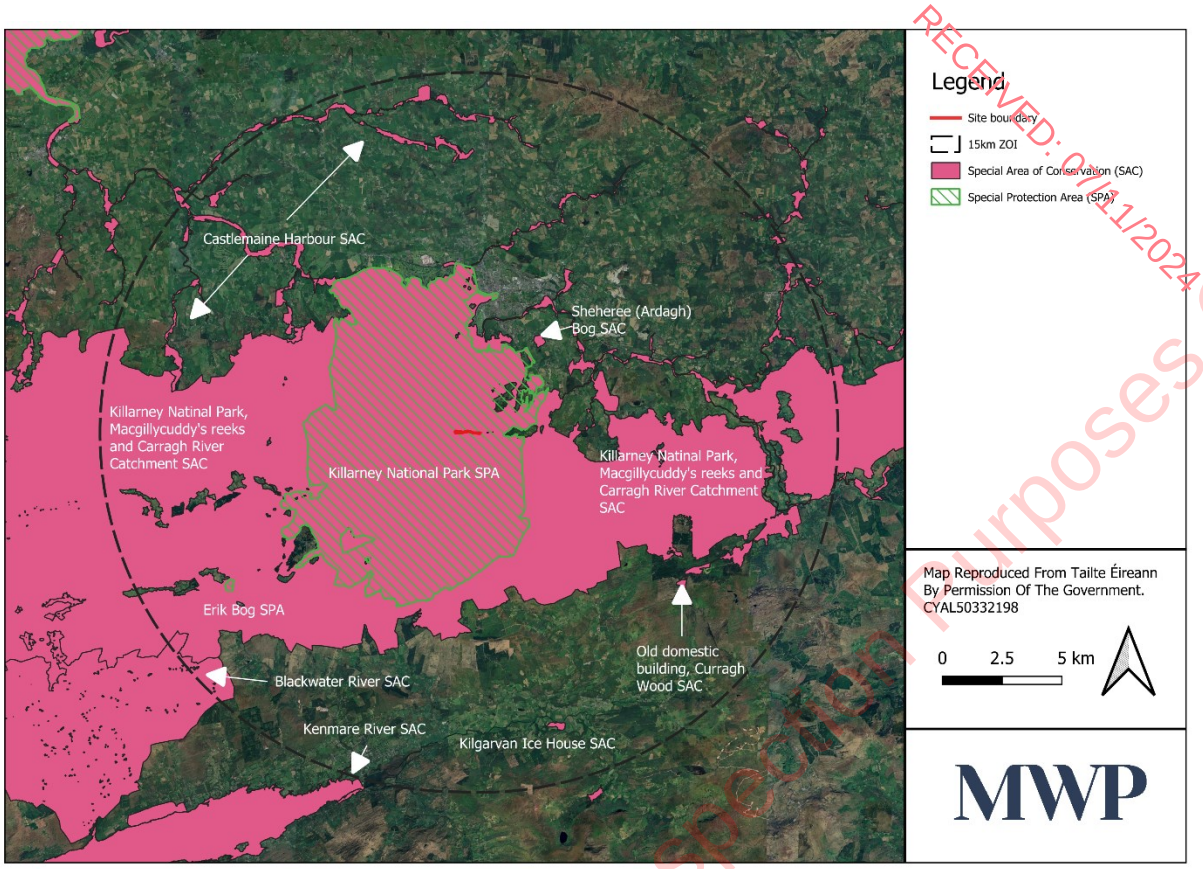

Figure 24: Natura 2000 sites within potential ZOI

4.5.2 Sites of National Importance

In Ireland, sites of national importance are termed Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs). While the Wildlife (Amendment) Act 2000 has been passed into law, pNHAs will not have legal backing until the consultative process with landowners has been completed. This process currently remains ongoing.

On a precautionary basis, nationally designated sites within 10 km of the proposed development are deemed to be within the potential ZOI. With regards to the nature and scale of the project, it is considered that anything beyond this distance is highly unlikely to experience any impact from the proposed works and thus are outside the potential ZOI of the development.

A review of nationally designated sites within a 10 km radius determined that there are three pNHA located within the potential ZOI of the proposed development site (see **Table 13** and **Figure 25**, below).

Table 13: Nationally important sites within the potential zone of influence (ZOI)

Designated Site	Site Code	Distance from subject site	Features of Conservation Interest
Killarney National Park, Macgillycuddy's Reeks and Caragh	000365	Within pNHA	Oak woodland, *Quercus robur*

Designated Site	Site Code	Distance from subject site	Features of Conservation Interest
River Catchment pNHA			
Sheheree (Ardagh) Bog pNHA	000382	Approx. 4.3km to the northeast	Blanket bog
Doo Loughs pNHA	000350	Approx. 5.2km to the west	Blanket bog

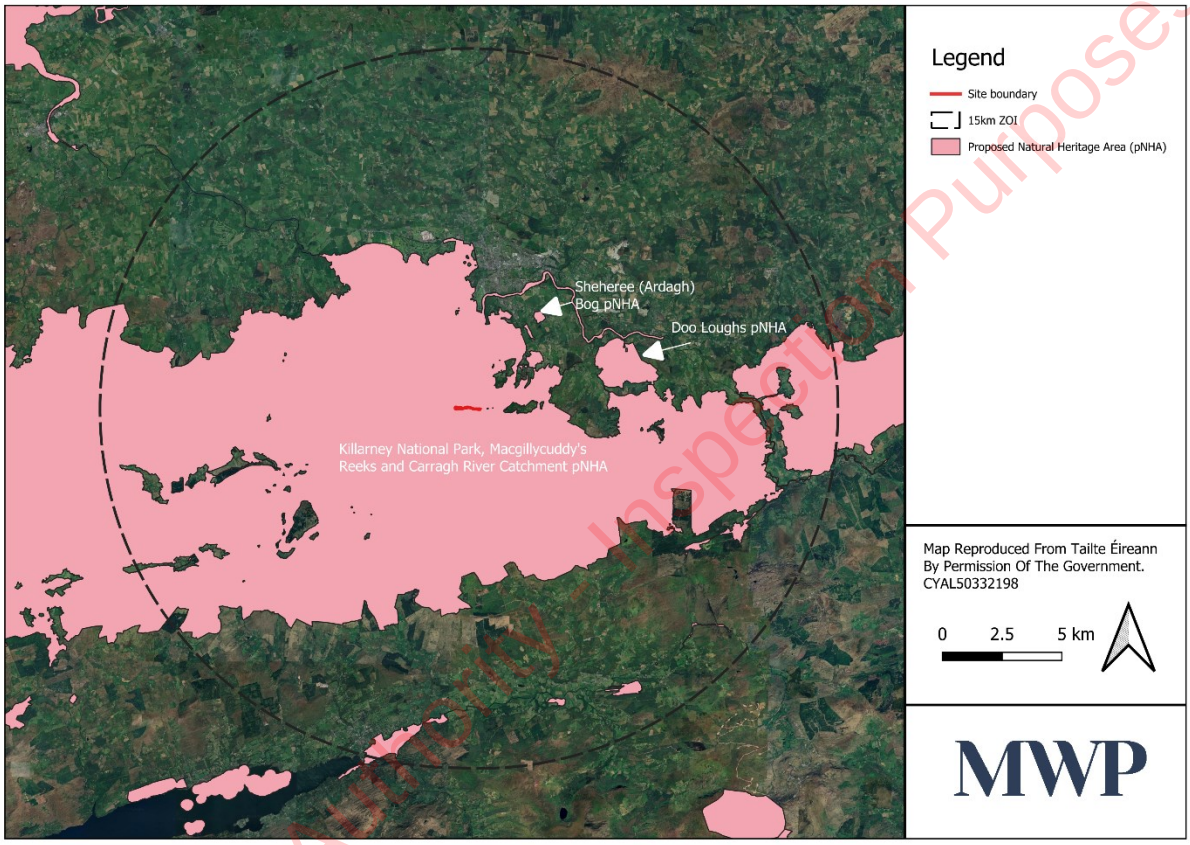

Figure 25: pNHA sites within 10km ZOI

4.5.3 Additional Sites

Upon a careful examination of the I-WeBS online map viewer, it is evident that there is one wetland site and five subsites situated within the potential ZOI (10 km) of the proposed development site. I-WeBS is Ireland's programme for monitoring population trends of wintering birds. I-Webs surveys take place each winter from September through to March inclusive. See **Table 14** below for I-WeBS sites within ZOI of the proposed development site.

Table 14: I-Webs sites within ZOI of the proposed development site.

Designated Site	Site Code	Distance from subject site
Lough Leane and Killarney Valley - Site	0K009	Located within the site
Lough Leane - Subsite	0K011	Located 1.7 km to the north.
Middle Lake - Subsite	0K500	Located within the subsite.
Long Range – Subsite	0K302	Located 1.4 km to the west.
Back channel – Subsite	0K303	Located 1.4 km to the west.
Upper Lake – Subsite	0KS99	Located 2.9 km to the southwest.

Between the winter seasons of 2018/19 and 2023/24, a total of 40 bird species were recorded within the Lough Leane & Killarney Valley site, which includes Muckross Lake. Six of these species are protected under Annex I of the EU Birds Directive, including the Whooper swan, red-throated diver (*Gavia stellata*), great northern diver, Little egret, bar-tailed godwit (*Limosa lapponica*), and kingfisher. Among the recorded species, nine are BoCCI red-listed species, nineteen are amber-listed, and seven are green-listed species . Three of these species were unidentified species of gull. The BoCCI an assessment of the conservation status of all regularly occurring bird species on the island of Ireland. For further details on bird species and their conservation status, please refer to Appendix 2.

The proposed development site is located within the Killarney National Park and there are also three Nature Reserves within the ZOI (10 km) of the proposed site, see Table 15 below.

Table 15: Nature Reserves within ZOI (10km)

Designated Site	Importance	Approximate distance from subject site
Sheheree Bog Nature Reserve	Only raised bog in the Killarney district. It has a well developed lagg or marginal drainage system, a very rare feature in this country. It is a habitat of slender cottongrass (*Eriophorum gracile*). The bog is considered to be very valuable for comparative studies with the intermediate and blanket bog of the Killarney and Owenreagh valleys.[24]	4.3km to the northeast.
Derrycunnihy Wood Naure Reserve	Old native oak woodlands with some patches of bog and lakeshore. It is best example of damp-climate oceanic wood with luxuriant growth of mosses and ferns high up in the trees.[25]	5km to the southwest.
Eirk Bog Nature Reserve	Part of a very developed and little disturbed example of an intermediate bog with associated poor fen and blanket bog/wet heath communities.[26]	11.2km to the southwest.

[24] Sheheree Bog Nature Reserve | National Parks & Wildlife Service (npws.ie)
[25] Derrycunnihy Wood Nature Reserve | National Parks & Wildlife Service (npws.ie)
[26] Eirk Bog Nature Reserve | National Parks & Wildlife Service (npws.ie)

4.5.4 Evaluation of Designated Sites as Ecological receptors

An NIS prepared by MWP to accompany the planning application determined that significant effects on SAC's or SPA's within the ZOI are unlikely (MWP Doc. 23765-6004, NIS Proposed Dinis Loop Walkway/Cycleway at Torc). It has been concluded that the project, alone or in combination with other plans or projects, is unlikely to result in significant effects on Natura 2000 sites considered to be within the ZOI of the proposed development site, and these sites will therefore not be considered further in this evaluation.

All three Nationally Important sites listed in **Table 13** and three Nature Reserves listed in **Table 15**, above spatially overlap with Natura 2000 sites. On the basis of the conclusion of the NIS, significant impacts on these nationally designated sites identified in **Tables 13 and 15** above are not envisaged and thus will not be considered further in this evaluation.

5. Identification and Evaluation of Habitats, Flora and Fauna as Important Ecological Features (IEFs)

The habitats and associated flora, fauna and other ecological features or resources identified in **Sections 4.3 and 4.4**, above, will now be evaluated based on their local, national and international conservation importance using the evaluation criteria described in **Section 3.7**, above.

Following these evaluations, an assessment will then be made as to which of these habitats and/or species are considered to be IEFs that may be impacted upon i.e., which habitat and/or species has the potential to be significantly impacted during the construction or operational phase of the proposed works.

5.1 Habitats

The following table (**Table 16**) presents an evaluation of the ecological value/importance of the habitats identified within the receiving environment of the proposed development, and rationale for inclusion, or exclusion, as an IEF.

Table 16: Evaluation of habitats within the proposed development site.

Habitat type	Ecological value relative to the works site (NRA, 2009)	Important Ecological Feature? (Y/N)	Rationale
Oak-Birch-Holly Woodland (WN1)	International importance	Yes	Overlaps with Annex I habitat Old Oak Woodland [91A0]. Providing valuable breeding, foraging and commuting habitat for local fauna such as birds, bats, mammals and invertebrates.
Broadleaved woodland (WD1)	International importance	Yes	Partially overlaps with Annex I habitat Residual Alluvial Woodland (91E0). Mainly beech trees found within this part of the woodland. Providing some breeding, foraging and commuting habitats for local fauna.
Buildings and artificial surfaces (BL3)	International importance[27]	Yes	Not a valuable habitat for local biodiversity.
Scrub (WS1)	International importance	Yes	Of local biodiversity value for range of fauna such as birds, bats, small mammals and invertebrates.

[27] Any habitat overlapping either SAC or SPA is classified as International importance.

Habitat type	Ecological value relative to the works site (NRA, 2009)	Important Ecological Feature? (Y/N)	Rationale
Acid oligotrophic lakes (FL2)	International importance	Yes	Muckross lake is important part of high quality oligotrophic systems.
Eroding/upland rivers (FW1)	International importance	Yes	Small streams located in western array of the proposed development site. All streams are depositing into Muckross Lake.
Stone walls and other stonework (BL1)	International importance	Yes	Stone walls along the N71 offer limited value to local biodiversity, primarily serving as habitat for certain floral species.

5.2 Rare and Protected Flora

There are no records for rare and protected plant species within the proposed development site and none were recorded during the ecological walkover surveys. None of the species outlined in **Section 4.3.2**, above, are considered to comprise IEFs for the project and so will not be considered further in this evaluation.

5.3 Fauna

The following table (**Table 17**) presents an evaluation of the ecological value/importance of the faunal species identified as occurring or having the potential to occur within the receiving environment of the proposed development site and rationale for inclusion, or exclusion, as an IEF.

Table 17: Evaluation of faunal species in relation to the proposed development works.

Species	Ecological value relative to works site (NRA, 2009)	Important Ecological Feature?	Rationale
Otter *(Lutra lutra)*	Local importance (higher value)	**Yes**	Utilises waterbodies for foraging so potentially suitable habitat in Muckross lake and also in Owengarriff river. No evidence of Otter within or adjacent to site during ecological surveys. Closest NBDC record within western array of the proposed development site. Precautionary principle.
Badger *(Meles meles)*	Local importance (higher value)	**Yes**	Evidence of badger not found during the ecological walkover. Precautionary principle.
Hedgehog *(Erinaceus europaeus)*	Local importance (higher value)	**Yes**	No evidence of this species recorded during ecological surveys. The closest NBDC record approx. 4 km to the northeast of the proposed development site. Precautionary principle.
Pine Marten (*Martes martes*)	Local importance (higher value)	**Yes**	Pine marten was recorded on trail cameras deployed within the study area, confirming its presence on site. Habitats within the study site are also suitable for this species.
Red Deer (*Cervus elaphus)*	Local importance (higher value)	**Yes**	Red deer droppings found during the ecological walkover of the site, confirming its presence.

Species	Ecological value relative to works site (NRA, 2009)	Important Ecological Feature?	Rationale
Red Squirrel (*Sciurus vulgaris*)	Local importance (higher value)	Yes	No evidence of this species recorded during the ecological walkovers of the site. The nearest NBDC previous record was within the proposed development site.
Pygmy Shrew *(Sorex minutes)*	Local importance (higher value)	Yes	No evidence of this species recorded during ecological surveys. The closest past record was 2.7 km to the northeast of the proposed development site. Suitable habitat occurs within the site and the species has a widespread distribution. Precautionary principle.
Irish hare (*Lepus timidus subsp. Hibernica*)	Local importance (higher value)	Yes	No evidence of this species was recorded during ecological surveys.. Some habitats present may be of value for foraging/resting. The closest NBDC record approx. 1.8 km north of northern array of the proposed development site. Precautionary principle.
Irish Stoat (*Mustela erminea*)	Local importance (higher value)	Yes	This species was recorded on trail cameras within the proposed development site. Some habitats found within the proposed development may be of value for foraging and breeding.
Birds	Local importance (higher value)	Yes	Habitats within and surroundings of the proposed development site of value as breeding and foraging habitat for a wide range of bird species.
Amphibians & reptiles	Local importance (higher value)	Yes	Evidence of common frog was recorded within the proposed development site. However, this species has a wide distribution and habitats within the surroundings are considered suitable.
Kerry slug	International importance	Yes	Kerry slug was recorded during the ecological walkovers of the proposed development site.
Bats	Local importance (higher value)	Yes	Soprano pipistrelle, common pipistrelle, , *Myotis spp*. ,Leisler's bat, Brown long-eared bat, Nathusius' pipistrelle and lesser horseshoe bat were recorded during the bat surveys confirming their presence within the proposed development site.

6. Do Nothing Scenario

The proposed development site primarily consists of woodland and scrub within Killarney National Park. If the proposed development does not proceed, it is expected that the existing woodland and scrub habitats will remain largely unchanged, continuing to provide valuable ecological functions within the park. However, given that the N71 is a key route on the Ring of Kerry, which experiences high volumes of tourist traffic including coaches and cars, there may be a need for future upgrades to this road.

7. Potential Impacts of the Project

This section will identify the ecological impacts of the construction, operational and decommissioning phases of the proposed development on the local natural environment.

7.1 Construction Phase

The construction phase effects associated with the proposed development will/may compromise the following, see **Table 18** below:

Table 18: Construction phase effects potentially associated with the proposed development site.

Construction Phase Effect	Source
Habitat loss/alteration	Via construction of temporary site compound, vegetation clearance, excavation work, construction activity including groundworks, movement of plant and machinery, storage of construction materials and spoil, ancillary site development works. Works within sensitive woodland habitat. Vegetation clearance, young trees within woodland and stripping top-soil, where necessary. Movement of machinery, storage of construction materials and spoil, ancillary site development works. Treatment/management of IAPS including use of chemical herbicides (multi-annual treatment approach) and risk of airborne drift. Risk of spreading/introduction of invasive species within the site associated with construction activity. Many IAPS's are effective at colonising disturbed ground particularly at construction sites. Spread of species via seeds and the re-growth from plant fragments. Site clearance and movement of earth and soil during earthworks can cause the unintentional spread of IAPS to new areas
Indirect/direct water quality effects	Sediment/pollutant laden run-off may arise from exposed areas during groundworks/excavations, from material storage areas, from construction vehicles/plant or from on-site temporary toilets and washing facilities. Via leaching of fuels/oils, cementitious material etc to Muckross Lake as the nearest waterbody in the event of accidental spillage.
Direct species disturbance/displacement	Increased human presence. Noise/vibration associated with construction works and human activity.
Indirect species disturbance/displacement	Via indirect water quality effects. Via loss/fragmentation/direct or indirect alteration of foraging, commuting, breeding or resting habitat. Via impacts on prey biomass.

7.2 Operational Phase

The operational phase effects associated with the proposed development are considered to be/may comprise the following, see **Table 19** below:

Table 19. Operational phase effects potentially associated with the project

Operational Phase Effect	Source
Direct/indirect habitat alteration	On-going treatment and management of IAPS. Management of IAPS during operation will predominantly comprise continued herbicide treatment, as and where required within the site, rather than any form of physical remediation; however, there may be a requirement for some degree of physical remediation comprising pulling of seedlings in relation to certain IAPS infestations. In this instance, there may be a risk of further spread or dispersal of IAPS within the site.
Water quality effects	Potential risk to Muckross Lake and groundwater quality from use of chemical herbicides.
Direct/indirect species disturbance/displacement	Due to increased, human presence on the site, impacts on prey biomass, indirect alteration of foraging/commuting habitat.

7.3 Decommissioning Phase

In the event of decommissioning the proposed development site, the ecological impacts are expected to be similar to those observed during the construction phase. This would likely include habitat disturbance, potential displacement of fauna, and the risk of spreading IAPS.

8. Assessment of Potentially Significant Effects

A significant ecological effect is an effect that undermines biodiversity in general, while in broad terms it is the impact on the structure and function of designated sites, habitats or ecosystems. A significant effect is one that is of sufficient importance to require an assessment so that the decision maker is adequately informed of the environmental consequences of permitting a project (CIEEM, 2018). The significance of the potential ecological effects of the proposed development are determined using professional judgement and with reference to the following guidance:

- Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018)
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)

8.1 Construction Phase

8.1.1 Potential Habitat Loss/Alteration Impacts

The following table (Table 20) describes the potential construction phase effects on habitats classed as IEFs at the proposed development site, and the significance of the impact.

Table 20: Evaluation of the significance of unmitigated impacts to habitats identified as IEF's during the construction phase of the proposed development site.

IEF	Extent/Location/Evaluation (NRA, 2009)	Description of Unmitigated Impact	Significance of Unmitigated Impact (EPA, 2022)
Oak-birch-holly woodland (WN1)	Occurs within the proposed development site. Of local biodiversity value for range of fauna. Evaluated as international importance due to presence of Ancient oak woodland, Annex I habitat within the woodland.	Habitat Loss This habitat is located within the construction works footprint. Loss of vegetation on woodland floor and possible removal of immature trees. Habitat loss required. Habitat Alteration/Disturbance Habitat alteration/disturbance may occur outside the construction works footprint due to encroachment from works areas, side-casting/storage of materials or spread of IAPS.	Direct habitat loss effects are assessed as **Permanent, Slight, Negative effects.** Habitat alteration effects are assessed as **Short-term, Slight, Negative effects.**
Broadleaved woodland (WD1)	Occurs within the proposed development site. Of local biodiversity value for range of fauna. Evaluated as international importance due to overlapping with SAC , SAP and Annex I habitat, Residual alluvial forest.	Habitat Loss This habitat is located within the construction works footprint. Loss of vegetation on woodland floor and possible removal of immature trees. Habitat loss required. Habitat Alteration/Disturbance Habitat alteration/disturbance may occur outside the construction works footprint due to encroachment from works areas, side-casting/storage of materials or spread of IAPS.	Direct habitat loss effects are assessed as **Permanent, Slight, Negative effects.** Habitat alteration effects are assessed as **Short-term, Slight, Negative effects**
Buildings and artificial surfaces (BL3)	Occurs within the proposed development site. Evaluated as international importance due to overlapping with SAC and SPA.	Habitat Loss No habitat loss required. Habitat Alteration/Disturbance No habitat alteration/disturbance not predicted.	Direct habitat loss effects are assessed as **Neutral effects.** Habitat alteration effects are assessed as **Neutral effects.**
Scrub (WS1)	Occurs within the proposed development site. Of local biodiversity value for range of fauna.	Habitat Loss This habitat is located within the construction works footprint. Some vegetation removal is	Direct habitat loss effects are assessed as **Permanent, Slight, Negative effects** Habitat alternation effects are assessed as **Short-term, Slight, Negative effects**

	Evaluated as international importance due to overlapping with SAC, SPA and Annex I habitat, old oak woodland.	required. Habitat loss required. Habitat Alternation/Disturbance Habitat alternation/disturbance may occur outside the construction works footprint due to encroachment from works areas, side casting/storage of materials or spread of IAPS.	
Acid oligotrophic lake (FL2)	Adjacent to the study area of the proposed development site Of local biodiversity value Evaluated as international importance due to overlapping with SAC and SPA.	Habitat loss No habitat loss required. Habitat Alternation/Disturbance Habitat alternation/disturbance may occur by indirect water quality impacts.	Direct habitat loss effects are assessed as **Neutral effects** Habitat alternation effects are assessed as **Short-term, Slight, Negative effects**
Eroding/upland rivers (FW1)	Occurs within the proposed development site. Of local biodiversity value. Evaluated as international importance due to overlapping with SAC and SPA.	Habitat loss No habitat loss required. Habitat Alternation/Disturbance Habitat alternation/disturbance may occur by indirect water quality impacts from construction works.	Direct habitat loss effects are assessed as **Neutral effects.** Habitat alternation effects are assessed as **Short-term, Slight to moderate, Negative effects.**
Stone walls and other stonework (BL1)	Occurs within the proposed development site. Of local biodiversity value. Evaluated as international importance due to overlapping with SAC and SPA.	Habitat loss No habitat loss required. Habitat Alternation/Disturbance No habitat alternation/disturbance predicted.	Direct habitat loss effects are assessed as **Neutral effects.** Habitat alternation effects are assessed as **Neutral effects.**

8.1.2 Potential Impacts to Faunal Species

The following table (**Table 21**) describes the potential construction phase effects on faunal IEFs at the proposed development site, and the significance of the impact:

Table 21: Potential construction phase effects on faunal IEFs at the proposed development site.

IEF	Ecological value relative to study area (NRA, 2009)	Unmitigated Impacts	Significance of unmitigated impacts (EPA, 2022)
Hedgehog, Irish stoat, Pine marten, Irish hare, Badger, Pygmy shrew, Red deer, Red squirrel	Local importance (higher value)	There will be loss of minor areas of potentially suitable habitat; however, this will not be significant in the context of the surrounding area and the	Potential habitat effects on these IEFs assessed as **Short-term, Not significant, Negative effects**.

IEF	Ecological value relative to study area (NRA, 2009)	Unmitigated Impacts	Significance of unmitigated impacts (EPA, 2022)
		abundance of suitable habitat which will continue to be available. Direct/indirect disturbance and/or displacement effects could potentially ensue as a result of increased noise, vibration and human activity.	Potential disturbance/ displacement effects on these IEFs assessed as **Short-term, Not Significant, Negative Effects.**
Otter	Local importance (higher value)	The habitats encompassed within the site are suitable for otter; however, no suitable habitat for Otter should be lost during the construction phase. Direct disturbance and/or displacement effects could potentially ensue as a result of increased noise, vibration and human activity.	Potential habitat effects on otter as **Neutral effects**. Potential direct disturbance/ displacement effects on Otter assessed as **Short-term, Imperceptible, Negative Effects.**
Birds	Local importance (higher value)	There will be loss of minor areas of potentially suitable habitat; however, this will not be significant in the context of the surrounding area and the abundance of suitable habitat which will continue to be available. Direct/indirect disturbance and/or displacement effects could potentially ensue as a result of increased noise, vibration and human activity.	Potential habitat effects on birds assessed as **Short-term, Not significant, Negative effects**. Potential disturbance/ displacement effects on birds assessed as **Short-term, Not Significant, Negative Effects.**
Bats	Local importance (higher value) apart from Lesser horseshoe bat International importance	<u>Foraging and commuting habitat loss</u> Minor alternation to foraging habitat by adding structure to the linear feature. <u>Potential roosting habitat loss</u> No removal of mature trees to compromise potential roosting habitat. <u>Disturbance/Displacement</u> Direct/indirect disturbance and/or displacement effects could arise on foraging/resting/breeding bats as a result of increased noise/vibration, human activity, loss/alteration of habitat.	Loss/alteration of bat foraging habitat effects are assessed as **Permanent, Not significant, Negative effects.** Loss/alteration of bat roosting habitat effects are assessed **as Neutral effects.** Potential direct/indirect effects on bats assessed as **Temporary to Short-term, Slight to Moderate, Negative Effects**.

IEF	Ecological value relative to study area (NRA, 2009)	Unmitigated Impacts	Significance of unmitigated impacts (EPA, 2022)
Fish, Amphibians and Reptiles	Local importance (higher value) apart	There will be minor loss of potentially suitable habitat within woodland and scrub due to top soil and vegetation removal. Direct/indirect disturbance effects could potentially ensue as a result of increased noise, vibration and human activity.	Potential habitat effects assessed as **Temporary to Short-term, Not significant, Negative effects.** Potential disturbance/ displacement effects assessed as **Temporary to Short-term, Not Significant, Negative Effects.**
Kerry slug	International importance	There will be minor loss of potentially suitable habitat within the proposed development site due to topsoil and vegetation removal Direct/indirect disturbance effects could potentially ensue as a result of presence of machinery and human activity.	Potential habitat effects assessed as **Temporary to Short term, Not significant, Negative effects** Potential disturbance/displacement effects assessed as **Temporary to Short term, Slight to Moderate, Negative effects**

8.1.3 Potential Spread of Invasive Species

Seven IAPS were identified during the ecological survey of the proposed development site, as discussed in **Section 4.3.5**. Rhododendron is most abundant IAPS within the study area.

There is potential for IAPS to be spread further to the area as a result of the construction phase, particularly where vegetation clearance will be required. The spread or introduction of IAPS has the potential to cause **local negative localised long-term slight-moderate effects**. The impact is **slight – moderate** depending on what IAPS may be introduced.

The CEMP will include biosecurity measures to avoid any spread of IAPS. Further details on these measures and recommendations are presented below in **Section 10.7.**

8.1.4 Potential Impacts on Water Quality

Construction works in general can pose a risk to the aquatic environment via several mechanisms. Excavation works, ground movement and disturbance, storage and stockpiling of materials can result in sediment erosion and run-off which can lead to siltation of the aquatic environment. The use of plant and machinery poses a risk of accidental ingress of fuel, oils, lubricants etc, to the aquatic environment, as does on-site storage of these and other such substances. The use of concrete and other cementitious materials, generation of washout and use of chemicals also poses a risk to water quality. In general, such materials can enter the aquatic environment via direct discharges to drainage features, overland flow and/or leaching to groundwater in the event of a spillage/leakage.

Laune_010 which is located within the proposed development site and Muckross Lake, which lies adjacent to the footprint of the proposed cycling/walking route, could potentially be affected by accidental spillages or leaks during construction activities. Potential impacts on water quality were assessed as **Brief, Imperceptible , Negative Effects**

8.2 Operational Phase

8.2.1 Potential Habitat Loss/Alterations Impacts

The following table (**Table 22**) describes the potential operational phase effects on habitats classed as IEFs at the proposed development site, and the significance of the impact.

Table 22: Evaluation of the significance of unmitigated impacts to habitats identified as IEF's during the operational phase of the proposed development site.

IEF	Extent/Location/Evaluation (NRA, 2009)	Description of Unmitigated Impact	Significance of Unmitigated Impact (EPA, 2022)
Oak-birch-holly woodland (WN1)	Occurs within the proposed development site. Of local biodiversity value for range of fauna. Evaluated as international importance due to presence of Ancient oak woodland, Annex I habitat within the woodland and overlapping with SAC and SPA.	Habitat Loss No habitat loss is predicted during the operational phase. Habitat Alteration/Disturbance Habitat alteration/disturbance may result from increased human activity within area.	Direct habitat loss effects are assessed as **Neutral effects.** Habitat alteration effects are assessed as **Long-term, Slight, Negative effects.**
Broadleaved woodland (WD1)	Occurs within the proposed development site. Of local biodiversity value for range of fauna. Evaluated as international importance due to overlapping with SAC, SAP and Annex I habitat, residual alluvial forest.	Habitat Loss No habitat loss is predicted during the operational phase. Habitat Alteration/Disturbance Habitat alteration/disturbance may result from increased human activity within area.	Direct habitat loss effects are assessed as **Neutral effects.** Habitat alteration effects are assessed as **Long-term, Slight, Negative effects.**
Buildings and artificial surfaces (BL3)	Occurs within the proposed development site. Evaluated as international importance due to overlapping with SAC, SAP and Annex I habitat, residual alluvial forest.	Habitat Loss No habitat loss is predicted during the operational phase. Habitat Alteration/Disturbance No habitat alteration/disturbance predicted during the operational phase.	Direct habitat loss effects are assessed as **Neutral effects.** Habitat alteration effects are assessed as **Neutral effects.**
Scrub (WS1)	Occurs within the proposed development site. Of local biodiversity value for range of fauna. Evaluated as international importance due to overlapping with SAC, SPA and Annex I habitat, old oak woodland.	Habitat Loss No habitat loss is predicted during the operational phase. Habitat Alternation/Disturbance Habitat alternation/disturbance may result from increased human activity within area.	Direct habitat loss effects are assessed as **Neutral effects** Habitat alternation effects are assessed as **Long-term, Slight, Negative effects**

Acid oligotrophic lake (FL2)	Adjacent to the study area of the proposed development site Of local biodiversity value Evaluated as international importance	Habitat loss No habitat loss predicted during the operational phase. Habitat Alternation/Disturbance Habitat alternation/disturbance may occur by indirect water quality impacts from increased human activity for example by littering.	Direct habitat loss effects are assessed as **Neutral effects** Habitat alternation effects are assessed as **Brief, Slight, Negative effects**
Eroding/upland rivers (FW1)	Occurs within the proposed development site. Of local biodiversity value. Evaluated as local importance (higher value).	Habitat loss No habitat loss predicted during the operational phase. Habitat Alternation/Disturbance No habitat alternation/disturbance predicted during the operational phase. This part of the proposed development site is already experiencing a high level of human activity.	Direct habitat loss effects are assessed as **Neutral effects** Habitat alternation effects are assessed as **Neutral effects**.
Stone walls and other stonework (BL1)	Occurs within the proposed development site. Of local biodiversity value. Evaluated as international importance due to overlapping with SAC and SPA.	Habitat loss No habitat loss required. Habitat Alternation/Disturbance No habitat alternation/disturbance predicted.	Direct habitat loss effects are assessed as **Neutral effects.** Habitat alternation effects are assessed as **Neutral effects.**

8.2.2 Potential Impacts to Faunal Species

The following table (**Table 23**) describes the potential operational phase effects on faunal IEFs at the proposed development site, and the significance of the impact:

Table 23: Potential operational phase effects on faunal IEFs at the proposed development site

IEF	Ecological value relative to study area (NRA, 2009)	Unmitigated Impacts	Significance of unmitigated impacts (EPA, 2022)
Hedgehog, Irish stoat, Pine marten, Irish hare, Badger, Pygmy shrew, Red deer, Red squirrel	Local importance (higher value)	No loss of potential suitable habitats predicted during the operational phase. Direct/indirect disturbance and/or displacement effects could potentially ensue as a	Potential habitat effects on these IEFs assessed as **Neutral effects.** Potential disturbance/ displacement effects on these IEFs assessed as **Long-term, Not Significant, Negative Effects.**

IEF	Ecological value relative to study area (NRA, 2009)	Unmitigated Impacts	Significance of unmitigated impacts (EPA, 2022)
		result of increased human activity.	
Otter	Local importance (higher value)	No suitable habitat loss predicted during the operational phase. Direct disturbance and/or displacement effects could potentially ensue as a result of increased human activity.	Potential habitat effects on otter as **Neutral effects**. Potential direct disturbance/ displacement effects on otter assessed as **Long term, Imperceptible, Negative Effects.**
Birds	Local importance (higher value)	No suitable habitat loss for bird species is predicted during the operational phase. Direct/indirect disturbance and/or displacement effects could potentially ensue as a result of increased human activity.	Potential habitat effects on birds assessed as **Neutral effects**. Potential disturbance/ displacement effects on birds assessed as **Long term, Not Significant, Negative Effects.**
Bats	Local importance (higher value) apart from Lesser horseshoe bat International importance	<u>Foraging, commuting and roosting habitat loss</u> Minor alternation to foraging, commuting habitat. <u>Disturbance/Displacement</u> Direct/indirect disturbance and/or displacement effects could arise on foraging/resting/breeding bats as a result of increased human activity.	Loss/alteration of bat foraging/roosting habitat effects are assessed as **Long-term, Not significant, Negative effects** Potential direct/indirect effects on bats assessed as **Long-term, Slight to Moderate, Negative Effects**.
Amphibians and Reptiles	Local importance (higher value) apart	No habitat loss during the operational phase. Direct/indirect disturbance effects could potentially ensue as a result of increased human activity.	Potential habitat effects assessed as **Neutral effects** Potential disturbance/ displacement effects assessed as **Long-term, Not Significant, Negative Effects.**
Kerry slug	International importance	No habitat loss is predicted during the operational phase. Direct/indirect disturbance effects could potentially ensue as result of increased human activity.	Potential habitat effects assessed as **Neutral effects** Potential disturbance/displacement effects assessed as **Long-term, Not significant, Negative effects**

8.2.3 Potential Spread of Invasive species

While the spread of IAPS is most likely to occur during the construction phase, there remains a potential risk of IAPS being introduced or further dispersed during the operational phase of the cycling/walking pathway. Human activities, such as maintenance work, recreational use, and the movement of bicycles and pedestrians, can inadvertently transport seeds or fragments of IAPS into the area. Additionally, vehicles and machinery used for routine maintenance can contribute to the spread of IAPS, further threatening the ecological integrity of the surrounding habitats. Continuous monitoring and management strategies will be necessary to mitigate these risks and protect local biodiversity.

8.2.4 Potential Impacts on Water Quality

Increased human activity, including recreational use and maintenance works, can lead to the inadvertent introduction of pollutants, such as litter, oil residues, and other contaminants, into nearby watercourses. Stormwater runoff from the pathway surface during rainfall events can also transport pollutants into adjacent waterbodies, including Muckross Lake. Mitigation measures, including proper drainage management and regular monitoring, will be essential to minimise these potential impacts on water quality and protect the ecological integrity of the surrounding aquatic habitats.

9. Cumulative Impacts

A cumulative effect arises from incremental changes caused by other past, present or reasonably foreseeable future actions together with the proposed development. According to EPA (2022), cumulative effects can be described as 'the addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects'.

When in-combination impacts are assessed, it is necessary to identify the types of impacts that may ensue from the project under consideration and from other sources in the existing environment that cumulatively are likely to affect aspects of the structure and function of the relevant Natura 2000 sites (EC, 2001).

The EC (2001)[28] guidelines on the provision of Article 6 of the Habitats' Directive state that the phrase 'in combination with other plans or projects' in Article 3(3) of the Habitats Directive refers to the cumulative effects due to plans or projects 'that are currently under consideration together with the effects of any existing or proposed projects or plans.' Relevant plans and projects have been identified below.

9.1 Plans

Plans that are relevant to the region encompassing the proposed development site include the 'Kerry County Development Plan 2022 – 2028'[29]. The Killarney Municipal District LAP 2023-2029 was also considered[30]. This plan will replace the existing Killarney Town Plan as contained in the Kerry County Development Plan (KCDP) (2022-2028) (Volume 2) and the Killarney Municipal District LAP (2018-2024).

[28] Managing and protecting Natura 2000 sites - European Commission
[29] County Development Plan | (c) Kerry County Cuncil
[30] https://consult.kerrycoco.ie/ga/system/files/materials/2001/Killarney%20MD%20Issues%20Paper%20-%2008-02-23%20FINAL.pdf

In general, County Development Plans incorporate a range of environmental and natural heritage policy safeguards. These safeguards to protect the natural environment will also apply to the proposal described in this report. No significant cumulative effects are predicted between the proposal and the Kerry County Development Plan (2022-2028).

9.2 Permitted and Proposed Developments in the Locality

A search of Kerry County Council's online planning enquiry system[31] for granted or on-going planning applications for the townland of Muckross, encompassing the proposed development site was undertaken on the 21st August 2024.

No granted or on-going planning applications were available (other than the current application which is the subject of this report – Planning Ref. 2460025).

No significant habitat loss impacts are predicted because of the proposal. No significant cumulative habitat effects due to the potential interaction between the proposed works and other proposed/permitted developments are predicted.

In relation to cumulative disturbance/displacement effects on fauna due to increased activity/noise levels, no significant disturbance/displacement effects on fauna are envisaged. Therefore, no significant cumulative disturbance/ displacement effects on fauna due to the potential interaction between the proposed works and other proposed/permitted developments are predicted.

Given the nature, scale and location of the proposed development considered in this report, and the potential impacts which have been identified, significant cumulative impacts due to potential interaction with granted or out-standing planning permissions as outlined above, are not predicted.

9.3 Existing Land-use and On-going Activities

The proposed development site is located within Killarney National Park therefore the main existing land-use and on-going activities are recreational due to its popularity with local residents and tourists. Therefore, it is important to consider the potential for increased footfall during the operational phase, which could lead to increased noise, rubbish and disturbance. However, it is unlikely that this will significantly exacerbate the existing disturbance already caused by traffic from N71 road.

No potential construction or operational phase water quality impacts have been identified in relation to the proposed development; therefore, no significant cumulative water quality impacts potentially arising due to interaction with existing land-use and on-going activities are envisaged.

9.4 EPA Licensed Facilities

There are no active IEL Licensed premises located within the vicinity of the proposed development site, but there is one IPC facility and one Urban Wastewater Treatment (UWWT) plant within the sub-catchment Laune_SC_010.

The Killarney UWWT Plant (Active License Number: D0037-01), has a primary effluent emission point that empties into the Folly stream (Laune_010), which discharges into Lough Leane, 1 km downstream. According to the Annual Environmental Report 2022 by Uisce Éireann a deterioration in water quality has been identified, however it was not established if it was caused by the UWWT Killarney[32]. Within the 'Laune_010' river sub-basin where Urban

[31] https://www.eplanning.ie/KerryCC/SearchExact/Address
[32] D0037-01_2022_AER.pdf (water.ie)

Wastewater (Wastewater discharge) has been identified as significant pressure[33]. See Table 25, below with EPA facilities near by the proposed development site.

The proposed works will not result in uncontrolled emissions, and no hazardous material/substances are expected to reach the receiving environment. Any potential impacts to water quality during construction are considered **Brief, Imperceptible , Negative Effects.**

Table 24: EPA facilities within Subcatchment Laune_SC_010.

EPA Facility	License Number	License Status Type	Distance from the Proposed Development Site
UWWT Killarney	D0037-01	Licensed	Approx. 5.1 km to the north of the proposed development site.
IPC Liebherr Container Cranes Limited	PO146-02	Licensed	Approx. 7.1 km to the north of the proposed development site..

10. Mitigation

10.1 Ecological Clerk of Works (ECoW)

A competent Ecological Clerk of Works (ECoW) will be appointed for the duration of the works and will report to the Project Manager. The Construction Manager will communicate regularly with the ECoW to ensure mitigation measures are applied to specific works. The ECoW will carry out tasks as required, including managing the implementation of mitigation and enhancement measures for the protection of fauna, flora and other important ecological features as outlined below, and will ensure the ecological protection measures are *in situ* ahead of the works on site.

The ECoW is to maintain a regular presence on-site throughout the construction phase. The ECoW will have the power to halt works in the event that any environmental impacts, other than those identified and where necessary mitigated against in the NIS and EcIA, arise.

10.2 Temporary Site Compounds

Adequate parking facilities will be made available within the construction compounds for all site workers during the course of construction. There is to be no parking of vehicles outside of designated parking areas during the construction phase.

10.3 Management of Fuel/Oil etc.

The management of fuel/oil and other chemicals on site will have regard to the following standard measures:

[33] Water Quality in 2022 - An Indicators Report (epa.ie)

- Chemicals will be bunded and where applicable, stored within double skinned tanks/containers with the capacity to hold 110% of the volume of chemical contents. Ancillary equipment such as hoses and pipes will be contained within the bund.
- Measures will be implemented throughout the construction stage to prevent contamination of the soil from oil and petrol leakages.
- Where required, refuelling of plant on-site will only be carried out at a designated area within the site compound. Only designated trained operators will be authorised to refuel plant on site. Rigid and articulated vehicles will be fuelled off site as will all site vehicles (jeeps, cars and vans).
- Only mechanically sound plant will be permitted access to the Site. All plant used should be regularly inspected for leaks and fitness for purpose.
- Procedures and contingency plans will be set up to deal with emergency accidents or spills. An emergency spill kit with oil boom and absorbers will be kept on site in the event of an accidental spill/emergency. The contents of the spill kit will be replenished if used and they will be checked on a scheduled basis during environmental inspections and audits. All crews will be trained in the use of spill kit equipment.
- All emergency procedures and equipment will be in place prior to the commencement of any works.
- An Emergency Response Plan will be implemented in the event of any environmental incidents such as spillage of oil/fuel during the construction phase of the project. All emergency procedures and equipment will be in place prior to the commencement of any works.
- The local authority will be informed immediately of any spillage or pollution incident that may occur on-site during the construction phase.

10.4 Management of Construction Waste

Any introduced semi-natural (road building materials) or artificial (PVC piping, cement materials) materials will be taken off site at the end of the construction phase. Any accidental spillage of solid state introduced materials will be removed from the site by the appropriate means.

10.5 Storage of Materials

- The storage of materials, containers, stockpiles and waste, however temporary, should follow best practice at all times and be restricted to designated areas only within the demarcated extent of works footprint.
- Material stockpiles should be kept to a minimum size, and be located on impermeable bases, where necessary.
- Storage of materials will be located away from any temporary drains and moving plant, machinery and vehicles.
- Fuel, oils etc. will be stored in a secure, bunded area within a designated location and under cover to prevent damage from the elements.
- Excavated material will be deposited in designated material deposition areas only.

10.6 Construction Site Bio-security

The following measures are recommended in relation to construction site bio-security and reducing the risk of introduction or spread of IAPS within the proposed development site.

- A pre-construction survey for IAPS should be undertaken in advance of construction commencing.
- Any management and control measures required on-site during the construction phase are to be carried out strictly in accordance with best practice guidance as set out in '*The Management of Noxious Weeds and Non-native Invasive Species on National Roads*' (NRA, 2010) and best practice management guidelines for various species published by Invasive Species Ireland[42].
- Where any IAPS is identified within the works footprint, the appointed contractor is to develop and implement an appropriate method statement with regard to managing IAPS on-site. Fencing and/or advisory signage is to be erected. Where stands are small, comprising individual plants, the use of signage may suffice. Exclusion zones will be established to prevent access by plant or operatives to the invasive species plant area to prevent any further potential spread of the invasive species.
- All vehicles, machinery and equipment/tools are to arrive to site clean and steam washed. Visual inspections are to take place. Any machinery or equipment returning from a different construction site will be cleaned, steam washed and visually inspected again before re-entering the site.
- All PPE brought to site is to be clean and dry. All PPE will be visually inspected, and any attached vegetation or debris removed. Work boots will be dipped in or scrubbed with a disinfectant solution and thoroughly dried afterwards before being used on the site for the first time. PPE and tools will remain on site for the duration of construction.

10.7 Management of Invasive species

- A pre-construction survey for IAPS is to take place in advance of the commencement of site works to inspect existing stands of IAPS for new growth and identify any new stands which may have emerged in the intervening period.
- Where any IAPS is identified within/adjacent to the works footprint, fencing and/or advisory signage is to be erected around stands.
- No non-essential ground maintenance or any other ground disturbance should take place within IAPS fenced areas. Where works are required within/adjacent to infested areas, the appointed contractor is to develop and implement an appropriate method statement with regard to managing IAPS on-site and ensuring bio-security compliance. This should be done in consultation with a suitably qualified specialist.
- Under no circumstances is any IAPS plant or rhizome material to be cut, dug out or in any other way disturbed without the advice of a suitably qualified specialist.
- Large areas of disturbed/bare soil should be mulched, where appropriate, and seeded/planted at the earliest opportunity with native species to stabilise the soil and deter any subsequent reinvasion. Planting should be carried out with regard to '*Horticulture Code of Good Practice: To prevent the introduction and spread of invasive non-native species* (Kelly, 2012).
- Where application of herbicides is required to treat IAPS on-site, the proximity of ecological receptors is to be taken into account. Herbicide use is to be minimised as much as possible and targeted to the specific IAPS. Where use of herbicides is required, non-residual, aquatic approved herbicides are to be used.

- Herbicides are not to be used in windy or foggy weather, during or preceding rainfall or where rainfall is forecast within 12 hours or during particularly cold weather to reduce risk of spray drift, run-off or poor plant uptake.
- Herbicides are to be applied strictly in accordance with the manufacturer's recommendations and by competent, experienced and licenced personnel registered as a Professional Pesticides User.
- All management and control measures implemented on-site during the construction phase are to be carried out in accordance with best practice guidance as set out in '*The Management of Invasive Alien Plant Species on National Roads (GE-ENV-01104)'* TII (2020), '*The Management of Noxious Weeds and Non-native Invasive Species on National Roads*' NRA (2010), and '*Best Practice Management Guidelines Rhododendron Rhododendron ponticum and Cherry Laurel Prunus laurocerasus'* Maguire, et al., (2008).

10.7.1 Rhododendron Management

The management of Rhododendron within the project area will involve a combination of mechanical and chemical control methods, as detailed below according to the NPWS management plan[34]:

1. Mechanical control
    - *Cutting and mulching*: Larger Rhododendron bushes are cut at ground level using chainsaws or brush cutters. The cut material is then mulched to reduce bulk and prevent regrowth. Care is taken to minimize soil disturbance, which can promote further invasive growth.
    - *Stump* removal: Where feasible, stumps are removed mechanically. However, in areas where stump removal is impractical, follow-up treatments are crucial to prevent regrowth from root systems.
2. Chemical control
    - *Stump treatment*: Freshly cut stumps are treated with herbicides (e.g., glyphosate) to prevent regrowth. Application is carefully controlled to minimize impacts on non-target species and is conducted by trained personnel in compliance with the NPWS guidelines.
    - *Foliar spraying*: In dense thickets where direct access to stumps is limited, targeted foliar spraying of herbicide is employed. This approach is conducted with careful consideration of weather conditions to reduce spray drift and impacts on surrounding vegetation.
3. Monitoring and follow up
    - Post-treatment monitoring will be conducted to assess the effectiveness of control measures. Follow-up treatments will be scheduled as necessary to address any regrowth or missed plants.
    - Long-term monitoring will ensure that Rhododendron does not re-establish, and control measures will be adapted based on monitoring results.

10.7.2 Himalayan Knotweed Management

The management of Himalayan Knotweed within the project area will involve the following steps:

1. Containment and site hygiene

[34] https://www.npws.ie/sites/default/files/publications/pdf/IWM33.pdf

- Infested areas will be clearly demarcated with fencing and signage to prevent accidental disturbance. Site personnel will be trained on biosecurity measures, including cleaning tools, machinery, and footwear when exiting contaminated areas to prevent the spread of rhizomes.
- Excavated soil from infested areas will not be reused elsewhere on-site unless it has been treated and certified as knotweed-free.

2. Chemical control

- Due to sensitive habitat within site location stem injection methods will be used to deliver herbicides directly into the plant, minimizing off-target impacts.

10.8 Protection of Bats

All Irish bat species and their resting places are protected under the Wildlife Acts 1976 to 2021 and by the Habitats Directive which protects rare species, including bats, and their habitats. All bat species are listed in Annex IV of the Habitats Directive as species protected across their entire natural range and the Lesser horseshoe bat is further listed, under Annex II.

The principal information in relation to construction phase mitigation measures for bats are presented as follows.

10.8.1 Soft Felling

If felling of mature trees is required, pre-construction bat surveys are to be carried out on all trees earmarked for felling to determine presence/absence of roosting bats.

Bats are most vulnerable to disturbance during hibernation and maternity seasons, therefore, it is recommended that the removal of trees identified as suitable for bats are removed outside of these seasons in September/October. Soft felling is recommended to mitigate against disturbance to any bats present in the tree(s) during the removal process. Soft felling involves leaving cut tree limbs and other cut elements of a tree grounded over night to allow bats to make their way out.

10.9 Protection of Badger

A pre-construction survey for Badger should be undertaken prior to the commencement of any works as per NRA (2006) guidance in order to identify any changes within the site. The pre-construction survey should be undertaken no more than 10-12 months in advance of construction commencement. The survey should be supplemented by an additional survey immediately prior to site works commencing if a sufficient time period has elapsed since the pre-construction survey.

In the event of a Badger sett(s) being identified within or in proximity of the development site, all construction activity and site works will be undertaken in accordance with relevant best-practice guidance set out in NRA (2005) in relation to construction works and badger and any specific mitigation, where required, will be carried out under relevant license from NPWS.

10.10 Protection of Otter

To protect the Otter, a strictly protected species under Annex IV of the EU Habitats Directive and the Wildlife Acts, mitigation measures will be implemented during the proposed works. Prior to construction, pre-construction

surveys will be conducted to confirm the presence or absence of Otter holts, couches, or signs of activity within or near the work area. If any active holts are identified, a buffer zone of at least 150 m will be established around the holt, with no works allowed within this area unless under license from the NPWS.

To minimize disturbance, works near watercourses will be restricted to daylight hours to avoid interference with Otters' nocturnal activities. Additionally, site lighting will be directed away from watercourses to avoid disturbing commuting or foraging otters. Silt fences and pollution prevention measures will be employed to ensure that water quality is maintained, as Otters rely on clean water for foraging. Regular monitoring will be carried out during the construction phase to ensure compliance with mitigation measures and to detect any changes in Otter activity in response to the works. These measures will help safeguard Otters and their habitats during and after construction activities.

10.11 Protection of Pine Marten

To protect Pine marten during the proposed development, specific mitigation measures will be implemented to minimise potential impacts on this legally protected species under the Wildlife Acts 1976–2012. Pre-construction surveys will be conducted to identify any dens or areas of high Pine marten activity within or adjacent to the development site. In the event of removing trees within the proposed development site, the entire route should be walked and inspected and all trees scheduled for removal should be clearly marked. A qualified and experienced ecologist must be present during this process. Binoculars should be used to carefully examine the canopy of each tree marked for removal, ensuring that it does not contain any nests or significant cavities that could serve as potential nesting sites for Pine marten. If active dens are found, a buffer zone of at least 100 m will be established to avoid disturbance and works within this buffer will be prohibited during the breeding season (March to August) to protect breeding females and their young.

10.12 Protection of Kerry Slug

The Kerry Slug is a protected species under Annex II and Annex IV of the EU Habitats Directive and is also protected under the Wildlife Acts. To mitigate potential impacts on this species during the proposed development, a series of specific measures will be implemented to avoid disturbance, reduce habitat loss, and ensure the conservation of the Kerry Slug within the study area. The following mitigation measures are proposed:

1. **Pre-construction survey** - Additional pre-construction surveys will be undertaken prior to the commencement of any works to update the status of Kerry Slug presence within the site. Surveys are to be undertaken no more than 3 days in advance of each works section so as to minimise the time frame within which Kerry slugs could migrate into surveyed areas. These surveys will employ both hand-searching and live refuge trapping methods under a licence from NPWS.
2. **Exclusion zones and protective fencing** - Areas identified as suitable habitats for Kerry Slug will be demarcated with protective fencing to prevent access by construction machinery and personnel. No construction activities will be permitted within these exclusion zones to avoid direct disturbance or destruction of slug habitat. Buffer zones of at least 5 meters will be established around key habitat features such as rocky outcrops, damp woodland, and mossy areas, which are particularly favoured by the Kerry Slug.
3. **Habitat enhancement and restoration** - Following construction, any disturbed areas within exclusion zones will be restored to their original condition, with an emphasis on recreating suitable microhabitats for Kerry Slug, such as the re-establishment of moss cover and fallen deadwood. Enhancement measures may include the creation of additional refuges in the form of rock piles or the introduction of native moss species to encourage the re-colonization of restored habitats.

4. **Education** - All construction personnel will be provided with an environmental toolbox talk detailing the importance of the Kerry Slug, the location of sensitive habitats on-site, and the mitigation measures in place. training will be provided to workers on how to identify Kerry Slug and what steps to take if the species is encountered during works.
5. **Monitoring and reporting** - Regular monitoring by an experienced ecologist will be carried out throughout the construction phase to ensure compliance with mitigation measures and to assess any unforeseen impacts on Kerry Slug.
6. **Translocation** - In the event that Kerry Slug individuals are found within the construction area, all works in the immediate vicinity will cease, and appropriate relocation efforts will be undertaken by a licensed ecologist, with measures to ensure no harm to the individuals.

10.13 Protection of Water Quality

Relevant guidance published by the National Roads Authority (NRA, now TII), and applicable to assessing watercourses in Ireland were also followed, including 'Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes' (NRA, 2008). IFI (2016) 'Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters' was also consulted in relation to necessary mitigation.

Section 171 of the Fisheries (Consolidation) Act 1959 creates the offence of throwing, emptying, permitting or causing to fall onto any waters deleterious matter. Deleterious matter is defined as not only any substance that is liable to injure fish but is also liable to damage their spawning grounds or the food of any fish, or to injure fish in their value as human food or to impair the usefulness of the bed and soil of any waters as spawning grounds or other capacity to produce the food of fish. It is necessary to get written permission from Inland Fisheries Ireland to proceed with works in any areas where disturbance to the spawning and nursery areas of both salmonids and lampreys occur. Salmon, all lamprey species and their habitats are further protected under the EU Habitats Directive.

Under Section 3 of the Local Government (Water Pollution) Act, 1977 (as amended by Sections 3 and 24 of the 1990 Act) it is an offence to cause or permit any polluting matter to enter waters. Suspended solids would be a key parameter here. Likewise, any visual evidence of oil/fuel in the river would constitute an offence.

Standard construction measures are to be implemented with regard to runoff and sediment control.

- Erosion and sediment controls are to be implemented, as required, prior to any site works commencing.
- Clean water runoff will be intercepted and diverted away from construction site runoff to avoid cross-contamination of clean water with soiled water.
- The area of exposed ground will be minimised.
- Excavations will be minimised.

Excavations will only be carried out following installation of appropriate sediment controls measures (e.g. temporary silt fences) which will slow run-off and trap suspended sediment. Silt fences are to be installed at each area of excavation/clearance or at temporary/sub-compounds, as required.

The management of concrete on site will have regard to the following elements:

- A designated trained operator experienced in working with concrete will be employed for all concrete works.
- There shall be no pouring/use of concrete during periods of rain reducing risk of run-off.
- Concrete works will be regularly inspected by the Environmental Manager.
- Any small volumes of incidental wash generated from cleaning of hand tools, cement mixers or other plant, as required, will be contained in designated areas within the temporary site compounds. Sediment in

washout will be allowed to settle out and reach neutral pH before clarified water is released and allowed to percolate to ground. Settled solids will be appropriately disposed of off-site.

- Concrete trucks will be prohibited from washing out on-site.

In case of a spill, immediate action will be taken. Any contaminated runoff will be retained and treated until neutral pH is achieved before discharge of clarified water to ground.

10.14 General Protection of other Fauna/Habitats

- Movement of construction plant/construction vehicles is to be restricted as much as is practicably possible to within the extent of works footprint within the development site boundary.
- Disturbance of fauna will be limited by controlling the movement of construction vehicles and personnel. Construction vehicles and personnel will not encroach onto habitats beyond the proposed development footprint.
- Construction materials and wastes are to be kept in designated areas to reduce risk of accidental injury/entrapment of any wildlife on-site.
- All temporary construction lighting is to be switched off outside daylight hours.
- To reduce the level of night-time disturbance to nocturnal fauna, construction activities should be restricted to standard construction hours. Construction work will not take place outside of these hours unless in exceptional circumstances.
- Removal of vegetation will only be undertaken outside the bird breeding and nesting season which encompasses March 1st to August 31st inclusive, in accordance with Section 40 of the Wildlife Acts.
- Vegetation removal within the site is to be minimised and be restricted to those areas of vegetation which have been identified for removal (to be clearly marked by contractor staff prior to removal). Removal of vegetation from anywhere outside of marked areas will not be permitted.
- Species such as Hedgehog and Pygmy shrew are mobile and so are expected to disperse from the area; however, young are vulnerable to impacts during vegetation clearance and/or during periods of hibernation, in the case of Hedgehog. Prior to any vegetation clearance, the area to be cleared will be checked by a suitably qualified ecologist to check for the presence of young mammals, or hibernating hedgehog, as appropriate.
- Should any resting or breeding place of any protected species be discovered within the site during construction works, works will cease immediately, the area will be cordoned off and the advice of NPWS sought.

11. Residual Effects

Residual effects are impacts that remain once mitigation has been implemented or impacts that cannot be mitigated against.

11.1 Construction Phase Residual Effects

Please see **table 26** below to see any predicted residual effects on IEFs during the construction phase.

Table 25: Summary of predicted residual effects on IEFs during the construction phase.

Receptor	Construction phase effects (without mitigation)	Mitigation Measures	Residual Effects (with mitigation)
Oak-birch-holly (WN1)	Direct habitat loss effects are assessed as **Permanent, Slight, Negative effects.** Habitat alteration effects are assessed as **Short-term, Slight, Negative effects.**	Presence of ECoW Construction site biosecurity.	Potential construction phase habitat loss effects are assessed as **Permanent, Slight, Negative residual effects**. Construction phase potential habitat alteration residual effects assessed as **Short-term, Slight, Negative residual effects** Residual effect: **Slight residual effects**
Broadleaved woodland (WD1)	Direct habitat loss effects are assessed as **Permanent, Slight, Negative effects.** Habitat alteration effects are assessed as **Short-term, Slight, Negative effects.**	Presence of ECoW Construction site biosecurity.	Potential construction phase habitat loss effects are assessed as **Permanent, Slight, Negative residual effects**. Construction phase potential habitat alteration residual effects assessed as **Short-term, Slight, Negative residual effects** Residual effect: **Slight residual effects**
Buildings and artificial surfaces (BL3)	Direct habitat loss effects are assessed as **Neutral effects.** Habitat alteration effects are assessed as **Neutral effects.**	Presence of ECoW	Potential construction phase habitat loss effects are assessed as **Neutral residual effects**. Construction phase potential habitat alteration residual effects assessed as **Neutral residual effects.** Residual effect: **Neutral residual effects**
Scrub (WS1)	Direct habitat loss effects are assessed as **Permanent, Slight, Negative effects** Habitat alternation effects are assessed as **Short-term, Slight, Negative effects**	Presence of ECoW Construction site biosecurity.	Potential construction phase habitat loss effects are assessed as **Permanent, Slight, Negative residual effects.** Construction phase potential habitat alternation residual effects assessed **as Short-term, Slight, Negative residual effects.** Residual effect: **Slight residual effects.**
Acid oligotrophic lake (FL2)	Direct habitat loss effects are assessed as **Neutral effects** Habitat alternation effects are assessed as **Short-term, Slight, Negative effects**	Presence of ECoW Construction site biosecurity Silt fences	Potential construction phase habitat loss effects are assessed as **Neutral residual effects.** Construction phase potential habitat alternation residual effects assessed as **Short-term, Slight, Negative residual effects** Residual effect: **Slight residual effects**

Eroding/upland rivers (FW1)	Direct habitat loss effects are assessed as **Neutral effects** Habitat alternation effects are assessed as **Short-term, Slight to moderate, Negative effects**	Presence of ECoW Construction site biosecurity Silt fences	Potential construction phase habitat loss effects are assessed as **Neutral residual effects.** Construction phase potential habitat alternation residual effects assessed as **Short-term, Slight to moderate, Negative residual effects** Residual effect: **Slight to moderate residual effects**
Stone walls and other stonework (BL1)	Direct habitat loss effects are assessed as **Neutral effects.** Habitat alteration effects are assessed as **Neutral effects.**	Presence of ECoW	Potential construction phase habitat loss effects are assessed as **Neutral residual effects**. Construction phase potential habitat alteration residual effects assessed as **Neutral residual effects.** Residual effect: **Neutral residual effects**
Hedgehog, Irish stoat, badger, pine marten, Irish hare, red squirrel, red deer	Potential habitat effects on these IEFs assessed as **Short-term, Not significant, Negative effects**. Potential disturbance/ displacement effects on these IEFs assessed as **Short-term, Not Significant, Negative Effects.**	Compliance with Wildlife Acts Presence of ECoW Pre-construction badger survey and pine marten survey.	Potential residual habitat effects assessed as **Short-term, Not Significant, Negative residual effects**. Potential residual disturbance/displacement effects assessed as **Short-term, Not Significant, Negative residual effects.** Residual effect: **No significant residual effects.**
Otter	Potential direct disturbance/ displacement effects on otter assessed as **Neutral effects.** Potential indirect disturbance/ displacement effects on otter assessed as **Short-term, Imperceptible, Negative Effects.**	Compliance with Wildlife Acts Presence of ECoW Pre-construction otter survey.	Potential residual habitat effects assessed as **Neutral residual effects** Potential residual disturbance/ displacement effects assessed as **Short-term, Imperceptible, Negative residual effects.** Residual effect: **No significant residual effects.**
Birds	Potential habitat effects on birds assessed as **Short-term, Not significant, Negative effects**. Potential disturbance/ displacement effects on birds assessed as **Short-term, Not Significant, Negative Effects.**	Presence of ECoW Compliance with Wildlife Acts regarding vegetation removal	Potential residual habitat effects on birds assessed as **Short-term, Not significant, Negative residual effects.** Potential residual disturbance/displacement effects on birds assessed as **Short-term, Not Significant, Negative residual effects.** Residual effect: **No significant residual effects.**
Bats	Loss/alteration of bat foraging habitat effects are assessed as **Permanent, Not significant, Negative effects.**	Compliance with Wildlife Acts regarding disturbance of roosting/resting locations	Potential residual habitat effects on bats assessed as **Permanent, Not Significant, Negative residual effects.**

	Loss/alteration of bat roosting habitat effects are assessed as **Neutral effects.** Potential direct/indirect disturbance/displacement on bats assessed as **Temporary to Short-term, Slight to Moderate, Negative Effects**.	Presence of ECoW	Potential disturbance/ displacement residual effects are assessed as **Temporary to Short-term, Slight to Moderate, Negative residual effects.** Residual effect: **Slight to moderate residual effects.**
Amphibians and Reptiles	Potential habitat effects assessed as **Temporary to Short-term, Not significant, Negative effects.** Potential disturbance/ displacement effects assessed as **Temporary to Short-term, Not Significant, Negative Effects.**	Presence of ECoW	Potential residual habitat effects assessed as **Temporary to Short-term, Not Significant, Negative residual effects.** Potential residual disturbance/ displacement effects assessed as **Temporary to Short-term, Not Significant, Negative residual effects.** Residual effect: **No significant residual effects.**
Kerry Slug	Potential habitat effects assessed as **Temporary to Short-term, Not Significant, Negative Effects.** Potential disturbance/displacement effects assessed as **Temporary to Short-term, Slight to Moderate, Negative Effects.**	Presence of ECoW Mitigation to protect Kerry slug	Potential residual habitat effects assessed as **Temporary to Short-term, Not significant, Negative residual effects.** Potential residual disturbance/displacement effects assessed as **Temporary to Short-term, Slight to Moderate, Negative residual effects.** Residual effect: **Slight to moderate residual effects.**
Water Quality	**Brief, Imperceptible , Negative Effects** on water quality at the local level.	Surface Water Network Design and Controls Foul Water Network Design and Controls Site Management	Potential water quality effects are assessed as **Brief, Imperceptible Negative effects** at the local level. Residual effect: **No significant residual effects.**

11.2 Operational Phase Residual Effects

Please see **Table 27** below for any predicted residual effects during the operational phase.

Table 26: Summary of predicted residual effects on IEFs during the operational phase.

Receptor	Construction phase effects (without mitigation)	Mitigation Measures	Residual Effects (with mitigation)
Oak-birch-holly (WN1)	Direct habitat loss effects are assessed as **Neutral effects.**	Habitat reinstatement	Potential operational phase habitat loss effects are assessed as **Neutral residual effects**.

	Habitat alteration effects are assessed as **Long-term, Slight, Negative effects.**		Operational phase potential habitat alteration residual effects assessed as **Long-term, Slight, Negative residual effects** Residual effect: **Slight residual effects**
Broadleaved woodland (WD1)	Direct habitat loss effects are assessed as **Neutral effects.** Habitat alteration effects are assessed as **Long-term, Slight, Negative effects.**	Habitat reinstatement	Potential operational phase habitat loss effects are assessed as **Neutral residual effects**. Operational phase potential habitat alteration residual effects assessed as **Long-term, Slight, Negative residual effects** Residual effect: **Slight residual effects**
Buildings and artificial surfaces (BL3)	Direct habitat loss effects are assessed as **Neutral effects.** Habitat alteration effects are assessed as **Neutral effects.**		Potential operational phase habitat loss effects are assessed as **Neutral residual effects**. operational phase potential habitat alteration residual effects assessed as **Neutral residual effects.** Residual effect: **Neutral residual effects**
Scrub (WS1)	Direct habitat loss effects are assessed as **Neutral effects** Habitat alternation effects are assessed as **Long term, Slight, Negative effects**		Potential operational phase habitat loss effects are assessed as **Neutral residual effects.** Operational phase potential habitat alternation residual effects assessed **as Long-term, Slight, Negative residual effects.** Residual effect: **Slight residual effects.**
Acid oligotrophic lake (FL2)	Direct habitat loss effects are assessed as **Neutral effects** Habitat alternation effects are assessed as **Brief, Slight, Negative effects**		Potential operational phase habitat loss effects are assessed as **Neutral residual effects**. Operational phase potential habitat alternation residual effects assessed as **Brief, Not significant, Negative residual effects.** Residual effects: **Not significant residual effects**
Eroding/upland rivers (FW1)	Direct habitat loss effects are assessed as **Neutral effects** Habitat alternation effects are assessed as **Neutral effects**		Potential operational phase habitat loss effects are assessed as **Neutral residual effects**. Operational phase potential habitat alternation residual effects assessed as **Neutral residual effects.** Residual effects: **Neutral residual effects**
Stone walls and other stonework (BL1)	Direct habitat loss effects are assessed as **Neutral effects.** Habitat alteration effects are assessed as **Neutral effects.**		Potential operational phase habitat loss effects are assessed as **Neutral residual effects**. operational phase potential habitat alteration residual effects assessed as **Neutral residual effects.** Residual effect: **Neutral residual effects**

Hedgehog, Irish stoat, badger, pine marten, Irish hare, red squirrel, red deer	Potential habitat effects on these IEFs assessed as **Neutral effects** Potential disturbance/ displacement effects on these IEFs assessed as **Long-term, Not Significant, Negative Effects.**	Compliance with Wildlife Acts Educational signage	Potential residual habitat effects assessed as **Neutral residual effects**. Potential residual disturbance/displacement effects assessed as **Long-term, Not Significant, Negative residual effects.** Residual effect: **No significant residual effects.**
Otter	Potential direct disturbance/ displacement effects on otter assessed as **Neutral effects.** Potential indirect disturbance/ displacement effects on otter assessed as **Long term, Imperceptible, Negative Effects.**	Compliance with Wildlife Acts Educational signage	Potential residual habitat effects assessed as **Neutral residual effects** Potential residual disturbance/ displacement effects assessed as **Long-term, Imperceptible, Negative residual effects.** Residual effect: **No significant residual effects.**
Birds	Potential habitat effects on birds assessed as **Neutral effects** Potential disturbance/ displacement effects on birds assessed as **Long-term, Not Significant, Negative Effects.**	Bird boxes installation Compliance with Wildlife Acts regarding vegetation removal	Potential residual habitat effects on birds assessed as **Neutral residual effects.** Potential residual disturbance/displacement effects on birds assessed as **Long-term, Not Significant, Negative residual effects.** Residual effect: **No significant residual effects.**
Bats	Potential foraging, commuting and roosting habitat effects on bats assessed as **Long-term, Not significant, Negative effects** Potential direct/indirect disturbance and/or displacement effects on bats assessed as **Long-term, Slight to Moderate, Negative effects**	Compliance with Wildlife Acts regarding disturbance of roosting/resting locations Bat boxes installation Educational signage	Potential residual habitat effects on bats assessed as **Long-term, Not Significant, Negative residual effects.** Potential disturbance/ displacement residual effects are assessed as **Long-term, Slight to Moderate, Negative residual effects.** Residual effect: **Slight to moderate residual effects.**
Amphibians and Reptiles	Potential habitat effects assessed as **Neutral effects.** Potential disturbance/ displacement effects assessed as **Long-term, Not Significant, Negative Effects.**	Educational signage	Potential residual habitat effects assessed as **Neutral residual effects.** Potential residual disturbance/ displacement effects assessed as **Long-term, Not Significant, Negative residual effects.** Residual effect: **No significant residual effects.**
Kerry slug	Potential habitat effects assessed as **Neutral effects**. Potential disturbance/displacement effects assessed as **Long-term, Not Significant, Negative Effects.**	Educational signage	Potential residual habitat effects assessed as **Neutral residual effects.** Potential residual disturbance/displacement effects assessed as **Long-term, Not Significant, Negative residual effects.** Residual effects**: No significant residual effects**.

12. Enhancement Opportunities

It is crucial that development projects are not only sustainable but also contribute positively to local biodiversity and nature conservation. Enhancing ecological value within and around development sites can lead to significant long-term benefits for both wildlife and the community. The integration of biodiversity enhancement measures into the development design ensures that natural habitats are preserved, restored, or created, thereby supporting local species and ecosystem functions.

12.1 Bird Boxes Scheme

To enhance the site for birds, it is recommended that artificial nest boxes (minimum 10 No.) be installed at appropriate locations to provide additional nesting habitat for a variety of species.

BirdWatch Ireland, the British Trust for Ornithology (BTO) and the Royal Society for the Protection of Birds (RSPB) have produced various guidelines with regard to the construction/purchase and installation of nest boxes[35] for various common species, many of which occur within the site, such as blue tit (*Cyanistes caeruleus*), great tit (*Parus major*), coal tit (*Periparus ater*), house sparrow (*Passer domesticus*), robin (*Erithacus rubecula*) and pied wagtail (*Motacilla alba*). Guidelines are also available for species types of nest-boxes for species such as swift and house martin[36].

These guidelines outline the various factors which should be considered with regard to installation of nest boxes for specific target species, such as nest box characteristics/dimensions, appropriate height above ground for installation, aspect and degree of vegetation cover required.

Installation of a nest box scheme should be undertaken under the direction of the appointed ecologist. The final number and location of bird boxes to be installed will be confirmed by the appointed ecologist.

12.2 Bat Boxes Scheme

It is recommended that an additional bat-box scheme is implemented to enhance the value of the site for bats by providing additional artificial roost-sites. The bat box scheme should be initiated prior to commencement of the development (NRA, 2006a).

Bat-boxes (minimum 10 No.) should be erected in suitable foraging habitat. The design, siting and installation of any bat-box scheme should be undertaken by a bat specialist and/or the appointed ecologist and should follow NRA guidance (NRA, 2006a) and Bat Conservation Ireland (BCIreland) Guidance37.The final number and location of bat boxes to be installed will be confirmed by the appointed ecologist.

Any bat box scheme should also be registered with BCIreland.

[35] https://birdwatchireland.ie/build-nest-boxes-for-birds-in-your-garden-this-spring/; https://www.bto.org/sites/default/files/bto-nest-boxes-essential-guide.pdf

[36] https://www.rspb.org.uk/birds-and-wildlife/advice/how-you-can-help-birds/nestboxes/how-to-attract-house-martins/; https://birdwatchireland.ie/app/uploads/2019/10/Saving-Swifts-Guide_pdf.pdf

[37] https://www.batconservationireland.org/wp-content/uploads/2013/09/Leaflet_3_batboxes.pdf; https://www.batconservationireland.org/wp-content/uploads/2015/05/BCIrelandGuidelines_BatBoxes.pdf

12.3 Pine Marten Boxes Scheme

A Pine marten den box scheme can be a valuable initiative to support local populations and enhance biodiversity within the proposed development site. Den boxes should be installed in suitable woodland areas, ideally close to existing pine marten activity or where dens were previously recorded. A minimum height of 4-5 m above ground is recommended to reduce the risk of predation and human disturbance. Boxes should be installed on mature trees, with at least 100 m between individual boxes to prevent territorial disputes between martens[38].

In addition to installing boxes, maintaining habitat connectivity to encourage movement between den sites and feeding areas.

The final number and location of den boxes to be confirmed by the appointed ecologist.

12.4 Biodiversity/Wildlife Signage

It is recommended to erect educational display boards about the environment and local ecology along the cycling/walkway route to enhance greenway users experience. Below are some suggestions how to effectively integrating signage. Signs suggested below are an important part of the visitor experience and to make the visitor more aware of the location and also about risks. For examples of educational/wildlife signage see **Appendix 6.**

12.4.1 Biodiversity Hotspot Signs

Placing signs near areas of ecological interest such as protected habitats or areas where protected species are present. These signs can include information on local flora and fauna, their ecological roles and conservation status.

12.4.2 Interpretive Panels

Installing interpretive panels at key points such as viewing platforms, explaining the history, geology and significance of the landscape. It may include information about IAPS management efforts and how visitors can help to prevent the spread. “Leave no trace” signs can remind visitors of principles such as staying on designated paths, not disturbing wildlife and taking all litter home.

12.4.3 QR codes

Adding QR codes to signs that link to websites or apps with additional information, such as bird calls, species identification guides or videos explaining conservation efforts.

13. Conclusion

A comprehensive ecological impact assessment has been conducted, and the proposed development site, located within Killarney National Park, is considered to be of ‘International’ importance due to the presence of Annex I habitat within the area. Additionally, the site is classified as ‘International importance’ from an ecological perspective, as it encompasses habitats of high conservation value and supports species and habitats of special importance and high conservation priority.

[38] PM-Den-Box-1.pdf (vincentwildlife.ie)

The potential impacts of the proposed development were thoroughly considered and assessed to ensure that all effects on IEFs are adequately addressed. Following the implementation of mitigation measures and best practice construction methodologies, no significant residual effects are anticipated.

Four **slight negative** residual impacts on biodiversity were identified during the construction phase (see **Table 26** above), including impacts on Oak-birch-holly woodland (WD1), Broadleaved woodland (WN1), Scrub (WS1), Acid oligotrophic lakes (FL2) and three **slight to moderate negative residual effects**, including Eroding/upland rivers (FW1), bats, Kerry slug associated with the construction of the proposed development site. During the operational phase of the proposed development site, three **slight negative** residual impacts, affecting Oak-birch-holly woodland (WN1), Broadleaved woodland (WD1), Scrub (WS1), and one **slight to moderate** residual impacts were identified affecting bats (see **Table 27**).

With the implementation of the avoidance and mitigation measures outlined in this report, the overall ecological impact of the proposed project, compared to the 'do-nothing' scenario, is considered to be **a permanent, slight, negative effect** at a local level. The ongoing commitment to protecting and enhancing the ecological integrity of Killarney National Park is crucial to preserving the unique biodiversity and habitats within the park.

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Appendix 1

Profiles of field surveyors

Rob Beer

Rob is a Senior Ecologist with six years full-time experience, since graduating in 2017. Rob has recently joined MWP and had previously been working in the UK. Rob is experienced in a range of standard and complex ecological surveys in accordance with British standards, including but not limited to, UK habitat classification surveys and JNCC Phase 1 surveys, Biodiversity Net Gain (BNG) metric and reporting, bat surveys (stages 1 & 2), reptile surveys, badger surveys, & great crested newt (GCN) surveys. Rob is a holder of a Natural England bat license level 2, a holder of a Natural England GCN license level 1 and has a FISC level 2 certificate. Rob has also recently acquired a NPWS bat survey license (DER/BAT 2024-112). Rob also has extensive experience with ecological clerk of works (EcOW) for a range of species across diverse project types, from small householder projects to large infrastructure projects such as rail and road schemes. This includes conducting supervisions and overseeing licenced works in relation to bat, badger and GCN. Rob has extensive experience in bat related work and historically volunteered with a number of different bat groups in the UK; this has enabled him to gain a vast amount of experience in all types of bat surveys and work. In addition to his experience with stage 1 and 2 surveys he has also been part of numerous hibernation roost surveys, and other roost counts/inspections where he is proficient in the use of endoscopes and hand netting, and the handling of bat species. Rob also undertook surveys and bat sonogram analysis and compiled and tabulated data from the static surveys and NBW's undertaken.

Jennifer Snook

Jennifer is an Ecologist at MWP and has been working in the ecology sector in Ireland since 2022 where she has completed numerous ecological surveys and reports for a range of projects across different industries. Jennifer is particularly competent in bird, mammal and habitat survey methodology with over two years of experience in these areas. In 2023, Jennifer qualified with a Bachelor of Science (Honours) in Wildlife Biology from Munster Technological University, Tralee, Co. Kerry, and has a DipHe in Business Management. Jennifer is registered with the Chartered Institute of Ecology and Environmental Management (CIEEM) and has many licenses, qualifications and memberships for various wildlife groups and organisations in Ireland.

Orla van der Noll

Orla is an Ecologist at MWP and has been working in the ecology sector since March 2021 where she has completed numerous ecological reports for a range of projects across Ireland. She is particularly competent in bird and bat survey methodology with over two years of experience in these areas. In 2020, Orla qualified with a first-class honours Master's degree in *Marine Biology* from Bangor University, Wales, and a Bachelors (Hons) degree in *Ecology and Environmental Biology* from University College Cork in 2018. Orla is registered with the Chartered Institute of Ecology and Environmental Management (CIEEM) as a Qualifying member.

Fiona McKenna

Fiona McKenna (BSc Hons, Wildlife Biology) is an Ecologist with MWP. Fiona has over 5 years' experience with MWP in ecological surveying and report writing for impact assessments. She has contributed to numerous reports for Screening for Appropriate Assessment, Natura Impact Statements (NIS), Ecological Impact Assessment (EcIA)

and Biodiversity chapters for EIARs. She has also authored and contributed to a number of reports for ornithological and bat survey work and is experienced in the collation of data and in field ecology survey techniques.

Salona Reedy

Salona is an Ecologist (MSc, BSc) who has been working full-time with Malachy Walsh and Partners (MWP) since January 2024. Salona has a master's degree in environmental science and has over 8 years consultancy experience of undertaking and contributing to EIAR and Ecological reports for a variety of projects. Salona was involved in the survey stage for this report. She is familiar with various ecological survey methodologies including habitat/survey mapping and zoological surveys and has worked on research teams both in Ireland and abroad. She has undertaken assessments for a wide variety of projects and has authored many ecological reports including Screenings for Appropriate Assessment Reports (Stage 1), Natura Impact Statements (Stage 2), and Ecological Impact Assessments.

Maureen Kelliher

Maureen qualified with a Bachelors (Hons) Degree in Wildlife Biology from Munster Technological University Tralee in 2023. As part of her degree, Maureen completed her work placement with Malachy Walsh and Partners (MWP) in 2022 and was subsequently employed full-time at the company prior to commencement of her final year. Throughout her four-year undergraduate degree, Maureen gained a generous experience in data collation and ecological survey methods. She assisted in field data collection for the EPA biological monitoring of rivers in 2022 and 2024, as part of WFD water quality monitoring, where she identified aquatic macroinvertebrates, preserved phytobenthos samples and undertook River Hydromorphology Assessment Technique (RHAT) surveys. Maureen is an accredited Freshwater Pearl Mussel Stage I and Stage II surveyor and has successfully completed a training course on surveying for white-clawed crayfish and biological water quality assessment using the Q-value method. She is also involved in the Feale Catchment Invasive Alien Species Survey and Management Strategy for the National Parks and Wildlife Services. Maureen is an outdoor enthusiast very familiar with the Irish countryside and negotiating various types of terrain for over 14 years.

Gerard Hayes

Gerard is a Senior Aquatic Ecologist with over 15 years' experience in environmental consultancy. He is a member of the Chartered Institute of Ecology and Environmental Management (MCIEEM) and the Freshwater Biological Association (FBA). Gerard has a diverse ecological profile, with aquatic fauna, phase 1 habitat, mammal (including bats), bird, amphibian, macroinvertebrate, and tree survey experience. He has had numerous responsibilities including report writing (EIS, EIA, EA, AA, NIS), waste assimilation capacity assessment, and ecological monitoring. His project involvement has been primarily in the areas of wind energy development, waste-water treatment plants, roads/bridges, water supply, flood defense and hydro schemes. He is co-author and/or carried out surveys for NPWS Irish Wildlife Manual Nos. 15, 24, 26, 37, 45. This included juvenile lamprey electrical fishing surveys in the Boyne, Corrib, Moy and Suir catchments, the latter which he led. He has collated field data and prepared river water quality assessment reports for EPA biological monitoring of rivers as part of Water Framework Directive (WFD) monitoring. He has been formally trained in WFD river monitoring (Environmental Protection Agency), Stage 1 and Stage 2 freshwater pearl mussel Surveying (Dr. Evelyn Moorkens), aquatic macroinvertebrate identification (Freshwater Biological Association).

Deirdre O'Brien

Deirdre O'Brien has been working periodically with Malachy Walsh and Partners since 2018 and on a full-time basis since 2019. During that time, she has carried out field work which included invasive species survey's, bird surveys, freshwater macroinvertebrate sampling and identification, (sensu Q' value assessment), collection of water samples. She has also gained experience in standard field survey methodologies including mammal surveying and habitat mapping. She has been formally trained in Stage 1 and Stage 2 freshwater pearl mussel Surveying (Dr. Evelyn Moorkens). She has acquired experience in the completion of Appropriate Assessment (AA), Natura Impact Statement (NIS) and Ecological Impact Assessment (EcIA). She has experience with general ecological report writing and has helped complete numerous reports for bird survey work and is experienced in the collation of data and in field ecology survey techniques.

Úna Williams

Úna has worked with MWP for five years and is an experienced field ecologist. She is familiar with various ecological survey methodologies including habitat/survey mapping and zoological surveys and has worked on research teams both in Ireland and abroad. She has undertaken assessments for a wide variety of projects including renewable energy developments, and infrastructural and coastal development projects. Úna has designed and carried out several Collision Risk Models for proposed wind farms and has authored many ecological reports including Screenings for Appropriate Assessment Reports (Stage 1), Natura Impact Statements (Stage 2), and Ecological Impact Assessments.

Davey Farrar

Davey Farrar is a Senior Ornithologist with MWP. Davey has more than 30 years of bird survey experience. He has worked on projects for Hen Harriers for UCC and Estuary Bird Monitoring for BirdWatch Ireland. Davey has worked on many projects in Ireland and the UK and is proficient in VP Surveys, Transect Surveys, Point Count Surveys, Red Grouse Surveys and Hinterland Surveys. Davey is also proficient in identification of Moths, Butterflies and Dragonflies. He has added two First Irish Records to the bird list of Ireland.

Appendix 2

Bird species recorded at Lough Leane I-WeBS subsite

Table A1: Bird species recorded between winter seasons 2018/19 until 2023/24

Common name	Latin name	Conservation status	Years recorded
Mute Swan	*Cygnus olor*	Amber	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Whooper Swan	*Cygnus cygnus*	Amber, Annex I	2021/2022
Greylag Goose	*Anser anser*	Amber	2021/22
Shelduck	*Tadorna tadorna*	Amber	2020/21
Wigeon	*Mareca penelope*	Amber	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Gadwall	*Mareca strepera*	Amber	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Teal	*Anas crecca*	Amber	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Mallard	*Anas platyrhynchos*	Amber	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Pintail	*Anas acuta*	Amber	2018/19, 2021/22
Shoveler	*Spatula clypeata*	Red	2018/19, 2020/21, 2022/23
Pochard	*Aythya ferina*	Red	2020/21, 2021/22, 2022/23
Tufted duck	*Aythya fuligula*	Amber	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Scaup	*Aythya marila*	Red	2018/19, 2020/21
Goldeneye	*Bucephala clangula*	Red	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Red-breasted Merganser	*Mergus serrator*	Amber	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Red-throated Diver	*Gavia stellata*	Amber, Annex I	2022/23
Great Northern Diver	*Gavia immer*	Amber, Annex I	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24

Common name	Latin name	Conservation status	Years recorded
Little Grebe	*Tachybaptus ruficollis*	Green	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Cormorant	*Phalacrocorax carbo*	Amber	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Little Egret	*Egretta garzetta*	Green, Annex I	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Grey Heron	*Ardea cinerea*	Green	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Moorhen	*Gallinula chloropus*	Green	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Coot	*Fulica atra*	Green	2018/19, 2019/20,2020/21,2021/22, 2022/23
Lapwing	*Vanellus vanellus*	Red	2018/19, 2020/21
Snipe	*Gallinago gallinago*	Red	2021/22, 2022/23
Bar-tailed Godwit	*Limosa lapponica*	Red, Annex I	2019/20
Curlew	*Numenius arquata*	Red	2018/19, 2020/21, 2021/22, 2022/23
Redshank	*Tringa totanus*	Red	2020/21, 2021/22, 2022/23, 2023/24
Greenshank	*Tringa nebularia*	Green	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Common Sandpiper	*Actitis hypoleucos*	Amber	2018/19, 2019/20,2020/21, 2022/23, 2023/24
Kingfisher	*Alcedo atthis*	Amber, Annex I	2021/22, 2022/23, 2023/24
Black-headed Gull	*Chroicocephalus ridibundus*	Amber	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Lesser Black-backed Gull	*Larus fuscus*	Amber	2018/19, 2019/20,2020/21,2021/22, 2022/23, 2023/24
Herring Gull	*Larus argentatus*	Amber	2019/20
Great Black-backed Gull	*Larus marinus*	Green	2018/19, 2019/20, 2020/21, 2021/22
Egyptian Goose	*Alopochen aegyptiaca*	N/A	2021/22
Dipper	*Cinclus cinclus*	Green	2022/23, 2023/24

Appendix 3

Bryophytes

Table A2: Bryophytes found within the proposed development site

Species Name	Latin name	Conservation Status
Greasewort	*Aneura pinguis*	Red List (Least concern)
Common smoothcap	*Atrichum undulatum*	Red List (Least concern)
Barbula	*Barbula spp.*	Red List (Least concern)
Waterside feather moss	*Brachythecium rivulare*	Red List (Least concern)
Pointed Spear-moss	*Calliergonella cuspidata*	Red List (Least concern)
Notched pouchwort	*Calypogeia arguta*	Red List (Least concern)
Common pouchwort	*Calypogeia fissa*	Red List (Least concern)
Hair-pointed feather-	*Cirriphyllum piliferum*	Red List (Least concern)
Great scented liverwort	*Conocephalum conicum*	Red List (Least concern)
Greater Fork-moss	*Dicranum majus*	Red List (Least concern)
Broom fork-moss	*Dicranum scoparium*	Red List (Least concern)
Cylindric beard-moss	*Didymondon insulanus*	Red List (Least concern)
White earwort	*Diplophyllum albicans*	Red List (Least concern)
Common striated feather-	*Eurhynchium striatum*	Red List (Least concern)
Fissidens	*Fissidens spp.*	Red List (Least concern)
Common pocket-moss	*Fissidens taxifolius*	Red List (Least concern)
Shinning hookeria	*Hookeria lucens*	Red List (Least concern)
Mountain fern moss	*Hylocomium splendens*	Red List (Least concern)
Hypnum	*Hypnum spp.*	Red List (Least concern)

Species Name	Latin name	Conservation Status
Heather plait-moss	*Hypnum jutlandicum*	Red List (Least concern)
Large mouse-tail moss	*Isothecium alopecuroides*	Red List (Least concern)
Slender mouse-tail moss	*Isothecium myosuroides*	Red List (Least concern)
Common feather moss	*Kindbergia praelonga*	Red List (Least concern)
Western pouncewort	*Lejeunea lamacerina*	Red List (Least concern)
Short-beaked wood-moss	*Loeskeobryum brevirostre*	Red List (Least concern)
Bifid crestwort	*Lophocolea bidentata*	Red List (Least concern)
MacKay's pouncewort	*Marchesinia mackaii*	Red list (Least concern)
Forked veilwort	*Metzgeria furcata*	Red List (Least concern)
Swan's neck thyme moss	*Mnium hornum*	Red List (Least concern)
Crisped neckera	*Neckera crispa*	Red List (Least concern)
Pellia	*Pellia spp.*	Red List (Least concern)
Hart's-tongue thyme-	*Plagiomnium undulatum*	Red List (Least concern)
Waved silk-moss	*Plagiothecium undulatum*	Red List (Least concern)
Common haircap	*Polytrichum commune*	Red List (Least concern)
Bank haircap	*Polytrichum formosum*	Red List (Least concern)
Dotted thyme-moss	*Rhizomnium punctatum*	Red List (Least concern)
Riccardia	*Riccardia sp.*	Red List (Least concern)
Long-beaked Water	*Rhynchostegium riparioides*	Red List (Least concern)
Little Shaggy-moss	*Rhytidiadelphus loreus*	Red List (Least concern)
Straggling pouchwort	*Saccogyna viticulosa*	Red List (Least concern)
Scapania	*Scapania spp.*	Red List (Least concern)

Species Name	Latin name	Conservation Status
Fox-tail feather-moss	*Thamnobryum alopecurum*	Red List (Least concern)
Common tamarisk-moss	*Thuidium tamariscinum*	Red List (Least concern)
Handsome woolywort	*Trichocolea tomentella*	Red list (Least concern)

Appendix 4

Biotic indices

Table A3: Intercalibration of EPA Q-rating system with Water Framework Directive status based on macroinvertebrates.

Q Value*	WFD Status	WFD Intercalibration Common Metric Value[39]	Pollution Status	Condition**	Ecological description
Q5, Q4-5	High	0.92	Unpolluted	Satisfactory	No or only minor difference from reference condition. Normal community structure, sensitive species present. Ecological processes functioning normally.
Q4	Good	0.853	Unpolluted	Satisfactory	Slight difference from reference condition. Slight change in community structure. Fewer sensitive species present, but increase in species richness and productivity. Ecological processes functioning normally.
Q3-4	Moderate	0.764	Slightly polluted	Unsatisfactory	Moderate difference from reference condition. Moderate change in community structure and loss of some niche species. Some ecological processes altered. Reduced resilience and ability to absorb external shocks.
Q3, Q2-3	Poor	0.627	Moderately polluted	Unsatisfactory	Major difference from reference condition. Significant change in community structure. Significant loss of niche species. Food chains and biogeochemical pathways significantly altered. Limited ability to absorb external shocks
Q2, Q1-2, Q1	Bad	0.42	Seriously polluted	Unsatisfactory	Severe difference from reference condition. Severe change in community structure. Severe loss of niche species and ecological functioning. Food chains collapse and biogeochemical pathways breakdown. Water body incapable of supporting most aquatic life.

** These Values are based primarily on the relative proportions of pollution sensitive to tolerant macroinvertebrates (the young stages of insects primarily but also snails, worms, shrimps etc.) resident at a river site.*
*** "Condition" refers to the likelihood of interference with beneficial or potential beneficial uses.*

[39]From:https://www.epa.ie/pubs/reports/water/other/wfd/EPA_water_WFD_monitoring_programme_main_report.pdf

EPA Biological Assessment of Water Quality in Rivers and Streams*

Biotic Indices (Q Values) and typical associated macroinvertebrate community structure

WFD Status Groups	Families	High Q5	High Q4-5	Good Q4	Moderate Q3-4	Poor Q3	Poor Q2-3	Bad Q2	Bad Q1-2	Bad Q1
Group A										
Plecoptera	All except Leuctridae	At least 3 taxa well represented i.e., common to dominant.	At least 2 taxa well represented i.e., common to dominant.	At least 1 taxon in reasonable numbers	At least 1 taxon Few - Common	Absent	Absent	Absent	Absent	Absent
Ephemeroptera	Heptageniidae									
	Siphlonuridae									
	Ephemera danica	Expect 3 or more Group A taxa outside of June – Sept period	Expect >2 Group A taxa outside of June-Sept period							
	Ameletus inopinatus									
Lamellibranchiata	*Margaritifera margaritifera*									
Group B										
Plecoptera	Leuctridae	Few to Numerous	Few to Numerous	Few to Numerous	Few/Absent to Numerous	Few/Absent	Absent	Absent	Absent	Absent
Ephemeroptera	Baetidae (excl. *B. rhodani* agg.)									
	Leptophlebiidae									
Trichoptera	All Cased Trichoptera									
Odonata	Odonata									
Hemiptera	Aphelocheiridae									
Group C										
Ephemeroptera	*Baetis rhodani/Baetis atlanticus*	Few to Dominant	Few to Dominant	Numerous to Dominant	Numerous to Excessive	Numerous to Excessive	Few to Common	Absent	Absent	Absent
	Ephemerellidae									
	Caenidae	Few to Numerous Group C taxa can represent over 70% of total abundance with good diversity and no single taxa dominant	Few to Numerous Group C taxa can represent over 70% of total abundance with good diversity and no single taxa dominant	Common to Numerous (Never Excessive)	Common to Excessive (usually Dominant or Excessive as a group) Diversity can be reduced with a few taxa dominant	Dominant to Excessive Diversity reduced with a few taxa dominant	Few to Common Diversity reduced with a few taxa	Absent	Absent	Absent
Trichoptera	All Uncased Trichoptera									
Hemiptera	All excl Aphelocheridae									
Coleoptera	All									
Hydracarina	All									
Diptera	All (excl. *Chironomus* & *Eristalis*)									
	Simuliidae	Few	Few to common	Few to Numerous	Common to Dominant/Excessive	Common to Excessive	Few to Common	Absent	Absent	Absent
Crustacea	All (excl. Asellidae & *Crangonyx* spp.)									
	Gammarus c.f. duebeni	Few to common	Few to common	Common to Dominant	Common to Excessive	Common to Excessive	Few to Common	Absent	Absent	Absent
Gastropoda	All (excl. *Radix peregra, Physella*)									
Lamellibranchiata	*Anodonta* sp.									
Hirudinea	*Piscicola* sp.	Ephemeroptera, Trichoptera may be well represented Others few or absent.	Ephemeroptera, Trichoptera may be well represented Others few or absent.							
Platyhelminthes	All									
Oligochaeta	Lumbriculidae, Lumbricidae									
Group D										
Crustacea	Asellidae, *Crangonyx*	Few or Absent	Few or Absent	Few or Absent	Few/Absent to Common	Few/Absent to Common	Dominant to Excessive	Dominant to Excessive	Few to common	Few or Absent
Megaloptera	Sialidae									
Gastropoda	*Radix peregra, Physella*									
Lamellibranchiata	*Sphaeriidae,*									
Hirudinea	All excl. *Piscicola*									
Oligochaeta	Naididae, Enchytraeidae									
Group E										
Oligochaeta	Tubificidae,	Few or Absent	Few or Absent	Few or Absent	Few or Absent	Few or Absent	Few to Common	Few/Absent to Common	Common to Numerous	Dominant
Diptera	Chironomus, Eristalis spp.									

* This scheme is not intended for assessment of conditions in stagnant waters or where substratum is mud, bedrock or sand. It should be borne in mind that faunal composition is affected by such factors as ground water input, calcification, drainage, canalisation, culverting, marked shading and seasonal factors. Note: **The occurrence/abundance of groups in above table refers to some but not necessarily all the constituents of the group. Single specimens may be ignored.**

Few (<5%), Common (6-20%), Numerous (21-50%), Dominant (51-74%), Excessive (>75%)

Table A4: BMWP Scores, categories and interpretation.

BMWP score	Category	Interpretation
0-10	Very poor	Heavily polluted
11-40	Poor	Polluted or impacted
41-70	Moderate	Moderately impacted
71-100	Good	Clean but slightly impacted
>100	Very good	Unpolluted, unimpacted

Appendix 5

Freshwater Macroinvertebrates Results

Table A5: Macroinvertebrates recorded during biological sampling carried out at Torc Mountain Stream and Muckross Lake, Co. Kerry during September 2024

	Pollution sensitivity group	Functional group	Site 1	Site 2
MAYFLIES (*Uniramia, Ephemeroptera*)				
Family *Heptagenidae*				
Heptagenia sp.	A	Scraper & gathering collector		***
Spiny crawler mayflies (*Seratellidae*)				
Seratella sp.	C	Gathering collector	**	**
Baetidae				
Large dark olive *Baetis rhodani*	C	Scraper & gathering collector	***	
STONEFLIES (Order *Plecoptera*)				
Brown stoneflies (*Nemouridae*)				
Protonemura sp.	A	Shredder	**	
CASED CADDIS FLIES (*Tricoptera*)				
Northern caddisflies (*Limnephilidae*)	B	Shredder	*	
Long horned caddisflies (*Leptoceridae*)	B	Shredder		**
Beraeidae	B	Shredder		**
CASELESS CADDIS FLIES (Trichoptera)				
Grey flags (*Hydropsychidae*)				
Hydropsyche sp.	C	Filtering collector	***	
Trumpet-net caddisflies (*Polycentropodidae*)				
Polycentropus sp.	C	Filtering collector	***	**
DRAGONFLIES (*Odonata, Anisoptera*)				
Club-tailed dragonflies (*Gomphidae*)	B	Predator		*
TRUE FLIES (*Diptera*)				
Blackfly (*Simulidae*)				
Simulium sp.	C	Filtering collector	**	
BEETLES (*Coleoptera*)				
Diving beetles (*Dytiscidae*)				
Sub family *Hydroporinae*	C	Predator		
Riffle Beetle (*Elmidae*)				
Limnius volckmarii	C	Scraper		**
Minute moss beetles (*Hydraenidae*)				
Hydraena sp.	C	Predator	**	
Marsh beetles (*Helodidae*)	C	Predator		
SNAILS (Mollusca, *Gastropoda*)				
Family *Hydrobiidae*				
Jenkin's spire shell *Potamopyrgus antipodarium*	C	Scraper	***	
CRUSTACEANS (*Crustacea*)				

Amphipods (Amphipoda, Gammaridae)				
Freshwater shrimp *Gammarus* sp.	C	Shredder	***	***
Isopods, *Asellidae*				
Asellus aquaticus	D	Shredder		**
Anomopoda				
Daphnia sp.	C	Predator & scraper		***
MITES (*Arachnidae*)				
Hydrachnidae	C	Predator		***
LEECHES (*Hirudinae*)				
Erpobdellidae				
Erpobdella sp.	D	Predator		
BUGS (*Hemiptera*)				
SEGMENTED WORMS (*Annelida, Clitellata*)				
Aquatic earthworm (*Lumbricidae)*	D	Gathering collector	**	**
FLATWORMS (*Platyhelminthes*)				
Dugesidae	E	Gathering collector		**

*Single, **Few (1-5%), ***Common (6-25%), ****Numerous (26-50%), *****Dominant (51-75%), ******Excessive (>75%).

Appendix 6

Educational Wildlife Signage

Figure A1: Example of educational signage to inform visitors.

Figure A2: Example of biodiversity hot spot to inform vistors about local wildlife.

Figure A3: example of QR code signage to inform visitors.