# Appendix 5-5

## Terrestrial and Aquatic Invertebrate Survey Report

MWP

# Terrestrial and Aquatic Invertebrate Survey Report

## Proposed Rínn Rua Hotel and Leisure Park, Reenroe, Co. Kerry

**Rínn Rua Holiday Park LTD.**

**April 2024**

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# 1. Introduction



A Planning Application is being lodged to Kerry County Council (KCC) for permission to renovate the existing derelict Reenroe Hotel and develop a holiday park on lands located at Reenroe and Emlaghmore West, near Ballinskelligs, Co. Kerry (see **Figure 1** below). Malachy Walsh and Partners Engineering and Environmental Consultants (MWP) were engaged by the Applicant (Rínn Rua Holiday Park LTD.) to undertake baseline ecology surveys at the proposed development site and undertake an assessment of the potential impacts of the proposed development on the flora and fauna of the receiving environment as part of an Environmental Impact Assessment Report (EIAR). A separate Biodiversity Enhancement Plan (BEP) has also been prepared by MWP. Please refer to **Appendix 5-7** of **Volume 3** of the **EIAR** for more information.

As part of this assessment, surveys for terrestrial and freshwater aquatic invertebrates were undertaken by MWP ecologists. All invertebrates encountered were recorded; however, the surveys targeted the following major groups: bees (Hymenoptera), beetles (Coleoptera), butterflies and moths (Lepidoptera), dragonflies and damselflies (Odonata), grasshoppers and crickets (Orthoptera), slugs and snails (Mollusca), spiders (Araneae), true bugs (Hemiptera) and two-winged (true) flies (Diptera).

This '*Terrestrial and Aquatic Invertebrate Survey Report*' outlines the results of the invertebrate surveys undertaken by MWP in May, June, July, August and October 2023. This report has been prepared by Hazel Dalton (BSc., BBus.), Senior Ecologist with MWP with over nine years' experience in ecological surveying and impact assessment. Field surveys were undertaken by Hazel Dalton, Gerard Hayes, Petr Dobes and Oisín Casasín. Please refer to **Appendix 5-1** of **Volume 3** of the **EIAR** for more information on individual surveyor profiles.

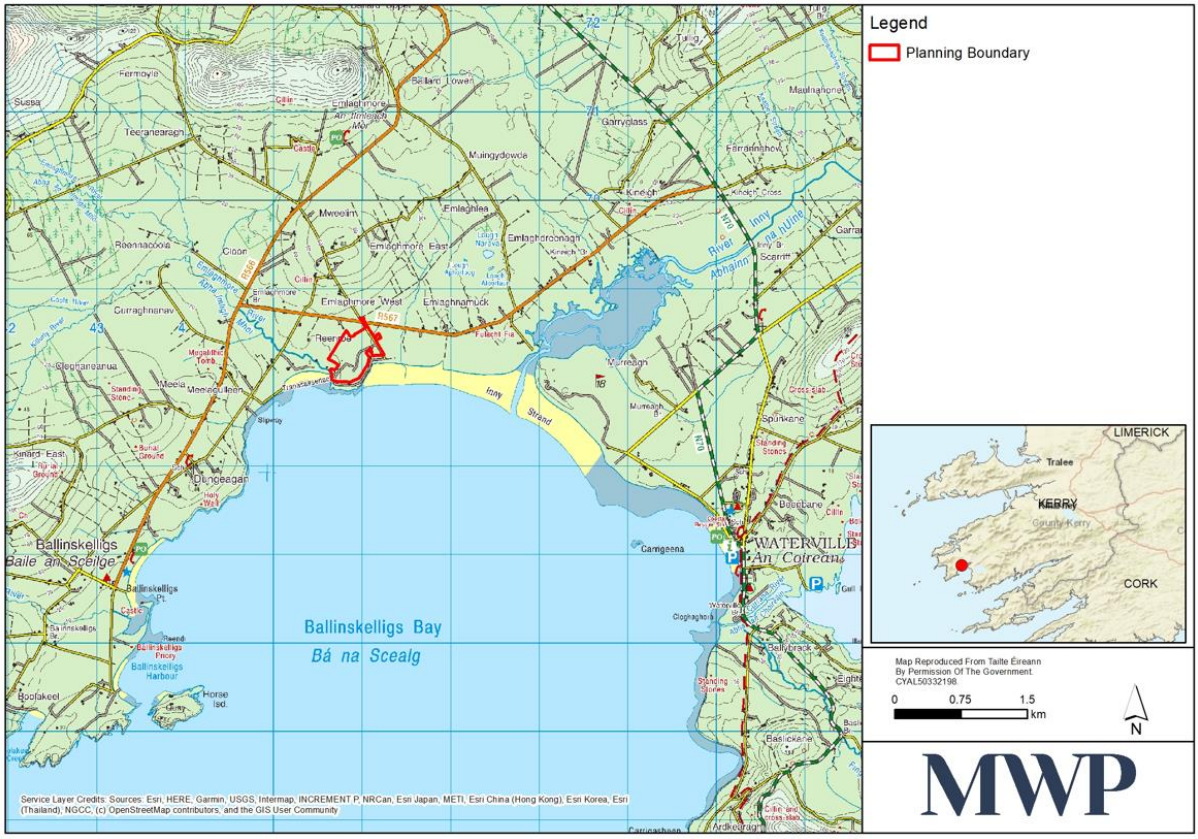


**Figure 1. Site location**

## 2. Consultation



A pre-application planning meeting was held between the Applicant, MWP and Kerry County Council (KCC) on the 7th June 2023. During this meeting, a general overview of the approach to ecology fieldwork in relation to the proposed development, including an outline of surveys and findings to date, was presented to KCC.

Consultation was also undertaken with a range of statutory and non-statutory consultees as part of preparation of the EIAR for the proposed development. As part of the scoping response received from the Department of Housing, Local Government and Heritage Development Applications Unit (DAU) on the 27th July 2023, it was recommended that ecology surveys include surveys for both terrestrial and aquatic invertebrates (both undertaken – see Section 6.2 below).

Pre-planning consultation was also undertaken directly with the National Parks and Wildlife Service (NPWS). A site visit was undertaken between staff ecologists from MWP and the NPWS local Conservation Ranger for the area on 11th January 2024 during which the proposal and ecological survey findings to date were discussed.

## 3. Major Invertebrate Species Group Overviews in an Irish Context

Natural and semi-natural habitats, such as grasslands, wetlands and waterbodies, heath and bog, fen and flush, woodland and scrub, and areas of exposed rock, provide important habitats for invertebrates. Habitat edges/transitional zones and habitat mosaics and niches also have an important role to play in supporting invertebrates both at a micro and macro scale, as they provide the necessary conditions, such as warmth and shelter, which are required to support the environmental requirements of the various stages of invertebrate life cycles (O'Connor, Á. and Nelson, B., 2022).

The following sections provide an overview of the major invertebrate species groups in Ireland, their basic general ecological requirements and/or their legal and conservation status, with regard to the various Irish Red Lists which are available from NPWS[1]. More detailed species accounts have been included where a species is afforded a higher level of legislative protection (i.e., invertebrate species listed on Annex II of the EU Habitats Directive).

### 3.1 Bees

Bees, and other insects such as flies, play a crucial eco-system role as pollinators of wild plants and crops, as well as providing pest control and/or as prey for insectivores (NBDC, 2021). There are 98 species of wild bee native to Ireland, including 21 species of bumblebee and 77 species of solitary bee. Little is known about the habitat and ecological requirements of the majority of bee species in Ireland. (Fitzpatrick *et al*., 2006), such as the nesting and foraging requirements of individual species and their specific plant-pollinator relationships (NBDC, 2021).

Of the 98 species of wild bee native to Ireland, 30 species are threatened with extinction and a further 12 are considered near threatened (NBDC, 2021). More than half of all bumblebee species and just under half of all solitary bee species are showing evidence of decline (Fitzpatrick *et al*., 2006). No native Irish bee species are currently protected by existing national legislation.

### 3.2 Butterflies and Moths

Butterflies, together with moths, make up the insect order Lepidoptera, one of four species-rich insect orders in Ireland. Lepidoptera play an important role as herbivores, as pollinators and as a prey item for birds, bats and other fauna.

[1] https://www.npws.ie/publications/red-lists

Butterflies can be found in a wide variety of habitats and settings such as semi-natural grasslands, scrub, woodland and hedgerows, bog, fen, heath and limestone pavement, coastal habitats such as coastal grassland, machair, sea cliffs and sand dunes, and in urban settings such as gardens and parks.

Butterflies are important indicators of biodiversity, and they can be used to monitor the health of ecosystems and the impact of land management. Butterfly populations are monitored in Ireland by the National Biodiversity Data Centre (NBDC) through the Irish Butterfly Monitoring Scheme, which has been running since 2007. There are 33 resident and regular migrant species of Irish butterflies. In Ireland, 18% of our native butterfly species are threatened with extinction (NBDC, 2021). The principal causes for the decline in butterfly populations in Ireland and across Europe are related to changes in land management, such as the intensification of agriculture and changing farm practices, including the abandonment of traditional grazing on more marginal land (Regan *et al*., 2010).

In Ireland, six species of butterfly are threatened (Endangered or Vulnerable) and five species are Near Threatened. This situation is due to population declines and range reductions caused mainly by decline in habitat quality. No butterfly species are legally protected in the Republic of Ireland under the Wildlife Act, 1976 or the Wildlife (Amendment) Act, 2000 (Regan, *et al*., 2010).

Moths can be found in every terrestrial habitat in Ireland. The greatest number of species is found in woodland habitats, especially in broad-leaved natural and semi-natural woodlands. Grassland also supports a significant number of moth species (Allen et al., 2016). There are approximately 1,500 species of moth which have been recorded in Ireland. Approximately 8% of macro-moth species are threatened with extinction in Ireland. Currently, no moth species are legally protected in Ireland (NBDC, 2021).

### 3.2.1 Marsh Fritillary

The Marsh Fritillary (*Euphydryas aurinia*), native to Ireland, is listed in Annex II of the European Union Habitats Directive [92/43/EEC]. It is the only Annex II listed insect species which is found in Ireland. This species is currently listed as a qualifying interest of 12 SACs in Ireland[2]. Under the Red List of Irish Butterflies (Regan *et* al. 2010), this species has been most-recently assessed as 'Vulnerable'. The overall assessment of the conservation status of this species is currently 'Inadequate' but 'Improving' (NPWS, 2019).

The adult butterflies fly from May to June. Mature females lay their eggs on the underside of the leaves of the larval food plant devil's bit scabious (*Succisa pratensis*). Eggs are laid in single large batches of up to 350 eggs. The larvae hatch roughly 30 days later in early to mid-June and, as soon as they hatch, they spin a web close to the ground, around the plant's basal leaves. The larvae live in large groups creating small areas of dense webs, feeding mainly on the undersides of the leaves to which the web is attached. During the larval stage they cluster together, basking in sunlight to increase their body temperature to aid food digestion. By late September these dense webs and the black coloured larvae are very conspicuous and can be seen attached to basal leaves and, in some circumstances, to other surrounding vegetation. The larvae stay together in colonies until March when they disperse and pupate, after which they emerge as adults in early April to May, when the cycle begins again.

Although marsh fritillary is widely recorded in Ireland, the species generally exists in extremely localised colonies where it is only found in areas of low intensity land use, typically where grazing by cattle at low stock density occurs, or areas not mown too short or too frequently. The species requires a low (ideally 25 cm or less), open sward with at least a 25% density of devil's-bit scabious (Harding, 2009). Because the feeding larvae will abandon the initial plant once it has been consumed, females never lay on isolated plants. There must be adjoining plants to which the feeding larvae can move quickly and easily. The distribution of the food plant, and therefore the species itself, is influenced by its preference for moist soil and a patchwork of short and long vegetation (8 – 25 cm). Availability of the food plant is, also, strongly correlated with elevation (Botham *et al*., 2011).

[2] https://www.npws.ie/protected-sites/sac Accessed: 28th February 2023

Vegetation structure within the sward has been shown to be important; the height of the surrounding vegetation is likely to be important in creating and maintaining the optimal microclimatic conditions necessary for larval survival (Porter, 1981; Konvicka *et al*. 2003; Fowles & Smith 2006), and there must be a patchwork of open areas within the sward where larvae can receive sufficient sunlight close to ground level in which to bask. A degree of light grazing, preferably by cattle, is essential to maintain flower-rich areas, specifically devil's-bit scabious, in an open sward. In addition to these constraints, slope aspect is an important factor influencing the selection of egg laying locations. Because the larvae need sunlight that penetrates close to ground level the female selects plants that face south, southwest or southeast, that are sheltered, but not overshadowed or obstructed, by a tussock of sheltering grass or scrub e.g. gorse (*Ulex* spp.), heather or bog myrtle (*Myrica gale*). On exposed west facing slopes the eggs are placed on sheltered plants near the base of the slopes. North facing slopes are unlikely to be used[3].

Marsh fritillary populations occupy the landscape in a meta-population structure, *i.e.* a central population with outlying colonies occupying habitat patches connected via migration. Negative impacts to suitable habitat patches may result in meta-populations becoming more fragmented and isolated, reducing meta-population function. Colonies have been recorded on sand dunes, fens, cutover raised bogs, blanket bogs, wet heaths, unimproved wet, neutral or calcareous grasslands, and calcareous and coastal heaths. Suitable habitat conditions often occur on the edges of these habitats or on tracksides, but not on improved grassland, intact bogs, deeply flooded sites or woodland[4]. The sites that support these colonies are maintained by a variety of management, accidental or deliberate, including grazing and burning. Most sites are in lowland situations below 200 m, but the species has been recorded at up to 350 m elevation and perhaps higher in recent years.

Current NPWS Article 17 distribution mapping for marsh fritillary indicates that the known range and distribution does not encompass the relevant hectad, V46 (NPWS, 2019). During baseline ecological field surveys at the study area, the species food-plant, devils-bit scabious, was recorded and areas of potentially suitable habitat for marsh fritillary were identified (see **Section 7.2.1** below).

## 3.3 Dragonflies and Damselflies

Dragonflies and damselflies are predatory insects of other invertebrates. They are found exclusively in and around freshwater habitats, as their larval stages are aquatic and thus completely reliant on freshwater. They can be found in a variety of habitats ranging from large lakes to drainage ditches to small pools and seepages in peat bogs. There are 24 species of dragonfly and damselfly resident in Ireland. Four (17%) of the Irish species are assessed as threatened, and one species as near threatened (Nelson, et al., 2011). No dragonfly or damselfly species is afforded legal protection in Ireland.

The study area includes many drainage ditches and a watercourse which comprise suitable habitat for dragonflies and damselflies.

## 3.4 Non-marine Molluscs

There are 150 native species of non-marine mollusc in Ireland. One is considered to be regionally extinct, forty-six are threatened with extinction and six are near threatened. Species declines are primarily driven by habitat loss (e.g., loss of marginal agricultural wetlands through drainage), habitat change (e.g. reduced water quality) and habitat management (e.g., woodland management practices). Climate change and invasive species, such as zebra mussel (*Dreissena polymorpha*) may also be playing in role in the decline of our native species (Byrne, *et al*., 2009).

Ireland's non-marine molluscan fauna is of international importance. Six species are legally protected under the European Habitats Directive; Kerry slug (*Geomalacus maculosus*), freshwater pearl mussel (*Margaritifera*

[3] Content in this paragraph adapted from Harding (2009)
[4] Content in this paragraph derived from NPWS (2019)

*margaritifera*), both of which are also protected under the Wildlife Act, 1976, Wildlife (Amendment) Act, 2000 and other relevant amendments), narrow-mouthed whorl snail (*Vertigo angustior*), Geyer's whorl snail (*Vertigo geyeri*) and Des Moulin's whorl snail (*Vertigo moulinsiana*). Of these legally protected species, only the Kerry slug is not considered threatened in Ireland. However, the Irish population of this species is of particular international importance as the species is restricted to south-west Ireland and northern Iberia, and the Iberian populations are severely threatened (Byrne, *et al*., 2009).



### 3.4.1 Kerry Slug

The Kerry slug, a gastropod of the family Arionidae, is protected by the Wildlife Acts 1976[5] and is listed under Annex II of the Habitats Directive. It is also listed in Annex IV of the Habitats Directive and as such is strictly protected from injury, or disturbance / damage to any breeding or resting place wherever it occurs. The overall assessment of the Conservation Status for the species is 'Favourable' (NPWS, 2019).

Historically, the Kerry slug has been considered to be restricted to areas of Kerry and West Cork where it occurs most commonly in either of two broad habitat types in circumstances where the humidity is high. These habitat types are:

- broadleaved woodland
- rock outcrops associated with heath or blanket bog.

Within these habitats, the species tends to only be present if there are outcroppings of Devonian Old Red Sandstone and lichen, liverwort and/or mosses in which the species shelters and feeds and where there are humid conditions (Platts and Speight 1988), although in 2010, the species was recorded feeding on lichen-covered granite boulders and in conifer woodland for the first time (Kearney, 2010).

A review of current NPWS Article 17 distribution mapping determined that the known range and distribution for Kerry slug encompasses the relevant hectad, V46 (NPWS, 2019); however, the study area does not contain any of the habitat-types typically associated with Kerry slug. Targeted surveys for this species were not undertaken and the species is not considered further in this report.

### 3.4.2 Freshwater Pearl Mussel

The freshwater pearl mussel is protected by the Wildlife Acts 1976[5] and is listed under Annex II and Annex V of the Habitats Directive. Freshwater pearl mussel (*Margaritifera margaritifera*) is a relatively large, long-lived bivalve mollusc which occurs in rivers, streams and lakes. Like many other bivalves they are filter-feeders removing small particles from the surrounding water (Moorkens, 1999). Freshwater pearl mussels typically occur in clean, fast-flowing, well-oxygenated rivers, which have unconsolidated substrates. Stable, clean gravel and sand with adequate availability of dissolved oxygen provides ideal habitat for juveniles. Water pH and hardness is also important with distribution mainly restricted to acidic, soft waters over-lying non-calcareous rock-types. Low nutrient status is also critical such that excess macrophyte and algal growth is prevented; therefore, oligotrophic waterbodies are required. The current overall conservation status has been assessed as 'Bad' (NPWS, 2019).

Current NPWS Article 17 distribution mapping for this species indicates that the known range and distribution does not encompass the relevant hectad, V46 (NPWS, 2019). The study area does not contain suitable habitat for freshwater pearl mussel. Targeted surveys for this species were not undertaken and the species is not considered further in this report.

[5]Kerry slug and freshwater pearl mussel were added to the Wildlife Act, 1976 by regulations made in SI 112/1990.

### 3.4.3 Whorl snails



All whorl snails favour damp or wet habitats, living mostly in moss, leaves or decaying vegetation. Many species are sensitive to changes in hydrology/drainage (the dampness of the habitat) (NPWS, 2019), as well as grazing management and disturbance (Moorkens & Killeen, 2011). There are three species of whorl snail native to Ireland that are listed on Annex II and Annex V of the EU Habitats Directive; narrow-mouthed whorl snail, Geyer's whorl snail and Des Moulin's whorl snail, all of which are stringent in their hydrogeological requirements (Moorkens & Killeen, 2011). All three species are also protected under the Wildlife Act, 1976 & Wildlife (Amendment) Act, 2000.

Narrow-mouthed Whorl Snail (*Vertigo angustior*)

The narrow-mouthed whorl snail is one of eight species of the *Vertigo* genus found in Ireland. They are found in damp and wet habitats such as dunes, damp grassland, fen and marsh, salt marsh and flood plains (NPWS, 2019). At a broad level, the species appears to be present in a very wide range of habitat categories but the ecotone within which it is restricted means that the exact conditions which its presence demands are rare (NPWS, 2019). It is considered to be under threat in Ireland and was assessed as Vulnerable on the Irish Red List (Byrne *et al*., 2009).

Geyer's whorl snail (*Vertigo geyeri*)

Geyer's whorl snail is found within the saturated and decaying roots of small sedges (particularly *Carex viridula* ssp. *brachyrrhyncha*) and associated fen mosses (particularly *Drepanocladus revolvens* and *Campylium stellatum*) (NPWS, 2019). It is stringent in its requirement for saturated water conditions in calcareous, groundwater-fed flushes. This micro-habitat often occurs within small mosaics of suitable areas of fen habitat, which can in itself occur in a broad variety of habitat-types in Ireland including raised bog laggs, transitions mires, lake shore, hill or mountain slopes, and wetlands associated with coastal dunes and machair. This species of whorl snail requires stable conditions and is particularly sensitive to changes in hydrology, requiring a degree of openness within the habitat that prevents the succession of shade-loving plants (NPWS, 2019).

Geyer's whorl snail is found locally in calcareous fens in central Ireland and more widely in western coastal counties from Galway to Donegal (NPWS, 2019). The species is considered to be under threat in Ireland and was assessed as Vulnerable on the Irish Red List (Byrne *et al*., 2009).

Des Moulin's whorl snail (*Vertigo moulinsiana*)

Des Moulin's whorl snail lives on living and dead stems and leaves of tall wetland plants. It requires tall, structured vegetation containing tall riparian grasses and sedges, particularly *Glyceria maxima*, *Phragmites australis*, *Carex riparia* and *Cladium mariscus*. As well as the tall vegetation structure, this species also requires a stable hydrology with the water table at, or slightly above, the ground surface for much of the year and very low amplitude seasonal flooding. In the summer and autumn, it climbs tall vegetation, or in severe conditions can be found on the lower leaves of plants, while in winter it descends to the litter level and becomes less active (NPWS, 2019). Populations of *V. moulinsiana* are found widely in central and southern Ireland. It is found mainly in calcareous, lowland wetlands, especially swamps, fens and marshes bordering rivers, canals, lakes and ponds. It is considered to be under threat in Ireland and was assessed as Endangered on the Irish Red List (Byrne *et al*., 2009).

Current NPWS distribution mapping for all three Annex II whorl snail species, as above, indicates that the known ranges and distributions do not encompass the relevant hectad, V46 (NPWS, 2019).

The study area includes pockets of damp grassland and wetland that are potentially suitable for *Vertigo* species.

## 3.5 Other Invertebrates (White-clawed Crayfish, Mayflies and Water Beetles)

White-clawed Crayfish (*Austropotamobius pallipes*)

White-clawed crayfish require relatively hard water with high calcium levels. The species preferentially selects streams and rivers that combine a shallow riffle flow with large rocks in the channel (Reynolds 1998). In Ireland, the species most commonly occurs in small and medium-sized lakes, large rivers, streams and drains, where there is adequate dissolved oxygen and sufficient lime to provide the calcium required to harden their exoskeletons following moulting (Gallagher *et al*., 2006 cited in Reynolds *et al.*, 2010). Overhanging bank-side vegetation has been highlighted as an important factor in determining crayfish abundance, as this provides shade, food and cover (Holdich, 2003 cited in Reynolds *et al.*, 2010).

White-clawed crayfish are protected under the Wildlife Act, 1976[6], and are listed on Annex II and Annex V of the EU Habitats Directive. Current NPWS Article 17 distribution mapping for this species indicates that the current known range and distribution does not encompass the relevant hectad, V46 (NPWS, 2013). There are no records held by the NBDC for this species for County Kerry. The study area does not contain suitable habitat for freshwater white-clawed crayfish. Targeted surveys for this species were not undertaken and the species is not considered further in this report.

Mayflies

Mayflies are an order of insects which are totally reliant on aquatic habitats where they live most of their life as juveniles, emerging solely to reproduce. They have colonised a range of aquatic habitats including streams, rivers, ponds and lakes. The greatest number of species are associated with running water where some have adapted to particular flow and substrate conditions, while other are not so restricted in their habitat requirements (Kelly-Quinn & Regan, 2012). There are 33 species of Irish mayflies (Ephemeroptera), six (18%) of which are assessed as Threatened. Most of the Threatened species inhabit rivers, although some also occur in lakes. Water pollution is a key threat to species (Kelly-Quinn & Regan, 2012). No mayfly species are afforded legal protection in Ireland.

Water beetles

A total of 244 taxa of beetle have been evaluated for their Red List conservation status in Ireland. Of the wetland species, eight are considered to be regionally extinct, 19 either critically endangered or endangered, 22 are vulnerable and 24 are near threatened (Foster *et al*., 2009). No species of water beetle are afforded legal protection in Ireland.

# 4. Study Area

The study area was taken to be the full extent of the proposed development site and a portion of adjoining lands under the ownership and control of the Applicant where targeted biodiversity enhancement measures are proposed (see **Figure 2** and **Figure 3** below).

[6] White-clawed crayfish added to the Wildlife Act, 1976 by regulations made in SI 112/1990.

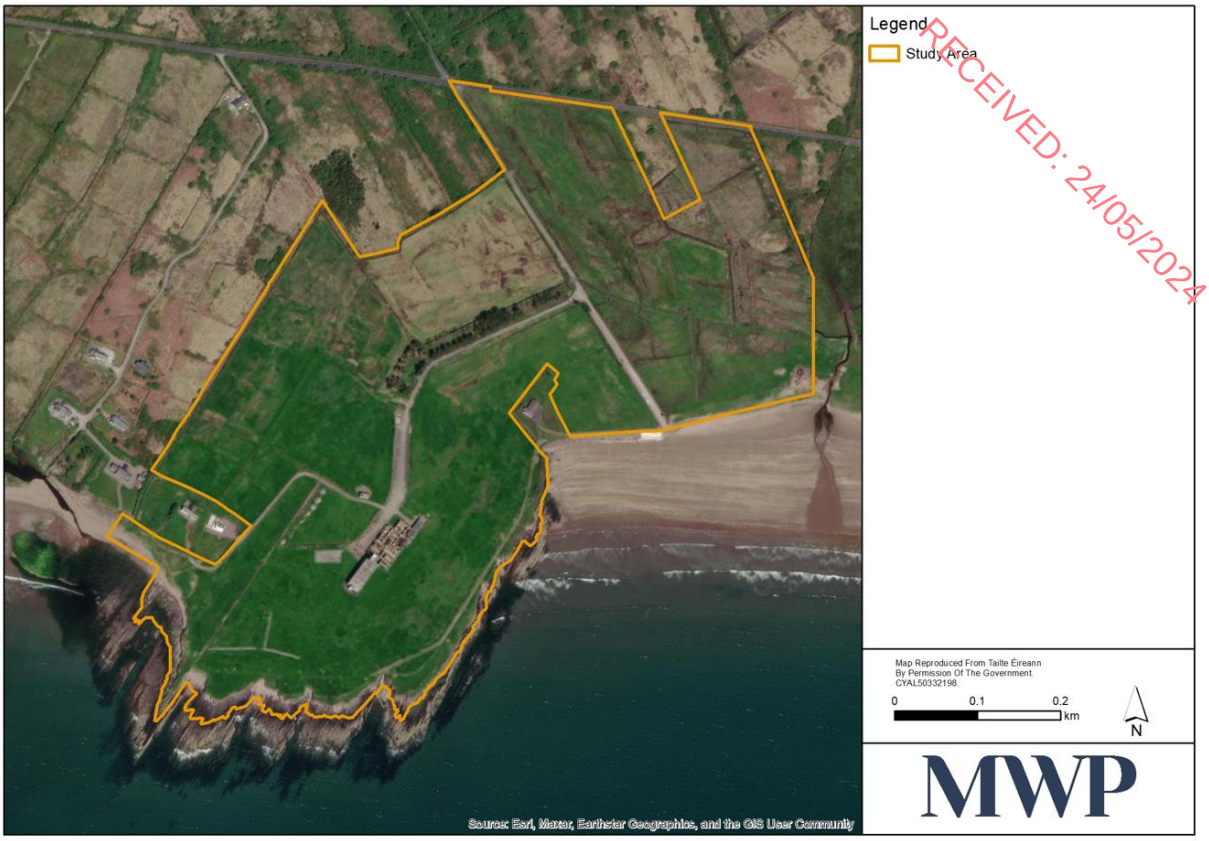




Figure 2. Study area

## 5. Site Overview

The study area is located on the coast, approximately 2 km north-east of Ballinskelligs and 4.5 km north-west of Waterville in rural south County Kerry.

The western part of the study area, taken to be the area west of the existing local road (L-7535) providing public access from the R567 road to Inny Strand (or the 'local beach access road'), accounts for the vast majority of the 22.6 Ha proposed development site. This area consists mainly of rush/*Molinia* dominated wet grassland occurring on drained and degraded peatland soils in the north, and areas of freer draining semi-improved grassland in mosaic with wet grassland to the south, all grazed by sheep. The coastal fringes to the south and southwest support semi-improved and localised areas of more diverse dry neutral and calcareous grassland over rocky sea cliffs/rocky shore along the fringes of Ballinskelligs Bay, which extends southwards (please refer to **Figure 3** below for habitat map). Two structures, comprising a large, derelict hotel (see **Plate 1** below), and a derelict stone cottage, also occur.

The eastern part of the study area (to east of the local beach access road L-7535), comprising the proposed targeted 'Biodiversity Enhancement Area' (BEA), is categorized as wet grassland on degraded peatland soils, with localised areas of improved grassland, pockets of scrub and with adjoining drainage channels and earth banks (see **Plate 2** below). The south-eastern corner of this area supports a localised area of reed and large sedge swamp influenced by intermittent tidal influxes or the backing up of high tidal water of the Inny (Kerry)_030 watercourse, which forms the eastern study area boundary.

Lands throughout the study area are managed for agriculture, comprising sheep grazing. Some areas show signs of over-grazing, poaching, exposed peat/soil, while other areas are not as intensively grazed.


**Plate 1. Left) view from south of proposed development site showing grassland habitat which surrounds the derelict hotel building and right) example of damper rush and Molinia dominated habitat in north-east corner of proposed development site**

**Plate 2. View of eastern section of study area comprising the proposed Biodiversity Enhancement Area (BEA) where targeted measures for biodiversity enhancement are proposed**

There are no watercourses within the study area; however, a network of deep drainage ditches associated with field boundaries criss-crosses much of the site. A section of the study area boundary overlaps with the EPA registered 2nd order 'An Rinn Rua' stream[7], which drains to Ballinskelligs Bay on Inny Strand at the south-eastern corner of the study area (see **Figure 3** below). The western part of the study area is drained by the 4th order 'Emlaghmore21' river[8], which is located a short distance beyond the south-western study area boundary. This watercourse also drains to Ballinskelligs Bay at Trá na Sassanach. These watercourses drain the lands within the site, fed by the artificial drainage network described above, as well as peatland, farmland and forestry on surrounding lands.

There are areas of ecological importance in the immediate area, and extending into the wider landscape, including Ballinskelligs Bay and Inny Estuary SAC (000335) and the Ballinskelligs Bay and Inny Estuary pNHA (000335) with which it overlaps. The SAC and pNHA comprise the marine waters of Ballinskelligs Bay, some adjoining terrestrial areas and the River Inny Estuary. The southern fringe of the study area overlaps with both the SAC and pNHA. The Ballinskelligs Bay and Inny Estuary SAC is designated for coastal terrestrial habitats (two types of saltmarsh)[9], neither of which are encompassed within the study area, and a species of rare plant, a liverwort known as petalwort (*Petalophyllum ralfsii*). With regard to the SAC and any potentially notable invertebrate species, a review of the site synopsis for the SAC determined that no invertebrate species are mentioned (NPWS, 2013).

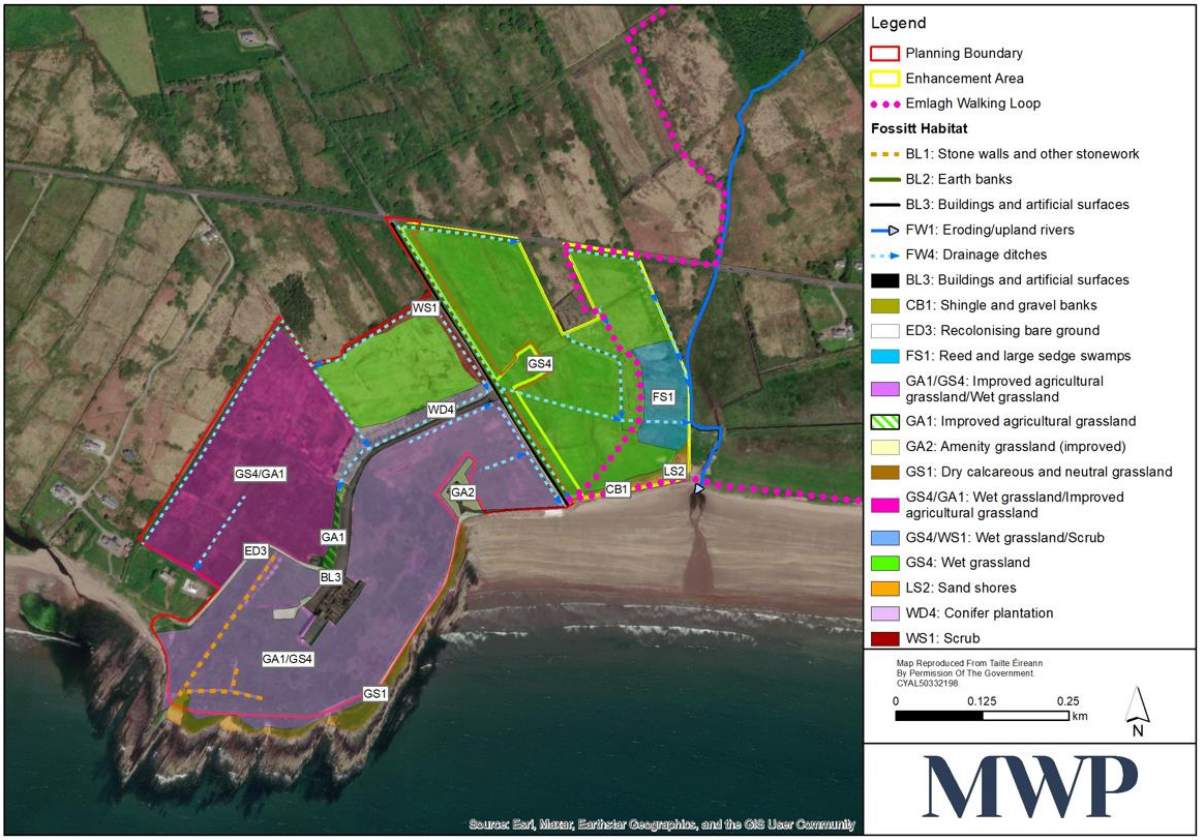


**Figure 3. Habitat map**

[7] EPA Code IE_SW_21I010900
[8] EPA Code IE_SW_21E010400
[9] [1330] Atlantic Salt Meadows, [1410] Mediterranean Salt Meadows

# 6. Methodology



## 6.1 Desk Study

As part of the desk-top study, a search for terrestrial and freshwater aquatic invertebrate species records held by the NBDC for the relevant hectad V46 was carried out[10]. Results of this search were reviewed, with a particular focus on presence of protected invertebrate species and/or invertebrate species which have been assessed as having an unfavourable conservation status in Ireland. On-line searches for the 1 km grid squares encompassing the study area were also undertaken to gain an understanding of existing NBDC species records for the more immediate area surrounding the proposed development site.

Information received from the NPWS data request for rare and protected species was reviewed with regard to invertebrate species. The NPWS Article 17 spatial datasets available on-line for Annex I invertebrate species distribution were also reviewed[11] for the presence of any nearby records.

## 6.2 Field Surveys

There follow descriptions of the field survey methods employed at the study area with regard to terrestrial and aquatic invertebrates.

### 6.2.1 Marsh Fritillary

During initial ecological walkover surveys, potentially suitable habitat containing the species required foodplant, devils bit-scabious, was recorded within the study area; therefore, targeted surveys for marsh fritillary were undertaken. The NBDC has produced specific recommended field survey guidance with regard to marsh fritillary. The aims of the marsh fritillary surveys undertaken were to:

- Record suitable habitat for this species within the study area and undertake a condition assessment of these areas of habitat.
- Confirm presence/absence of this species within the study (adults/larval webs).

Surveying comprised two main elements; a Habitat Condition Assessment (HCA) survey and a larval web survey, both based on the methodology outlined in the NBDC's 'Habitat Condition Assessment for Marsh Fritillary' and 'Marsh Fritillary Larval Web Survey'[12].

In addition to the above surveys, during all site surveys coinciding with the flight period for marsh fritillary (May to June), field surveyors searched for any adults on the wing (in flight).

#### 6.2.1.1 Habitat Condition Assessment (HCA)

The primary survey comprised of a HCA survey based on the methodology outlined in the NBDC 'Habitat Condition Assessment for Marsh Fritillary' guidance. HCA surveys were carried out within the study area within five pre-selected survey areas comprising habitats considered potentially suitable due to the presence of devil's-bit scabious (see **Figure 4** below). HCA surveys were conducted by staff ecologists from MWP on the 19th May, 16th June and 12th July 2023. **Table 1** below, describes the areas which were surveyed as part of the HCA surveys including various topographical and habitat characteristics of relevance to suitability for this species such as elevation, slope aspect and broad habitat category occurring. The location of these survey areas is shown in **Figure 4** below.

[10] https://maps.biodiversityireland.ie/Map
[11] https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17 Accessed 14/12/23
[12] Available at: Marsh Fritillary Monitoring Scheme - National Biodiversity Data Centre (biodiversityireland.ie)

**Table 1. Description of topographical and habitat characteristics of the marsh fritillary HCA survey areas**

| Survey Area ID | Elevation Range[13] (metres) | Slope | Area (Ha) | Habitat Type |
|---|---|---|---|---|
| **Area A** | 10 | South/Southwest | 0.83 | Rush-dominated wet grassland, with areas of semi-improved agricultural grassland, on drained and degraded peat soils. Some localised damp areas, and presence of peatland flora (see **Plate 3** below). |
| **Area B** | 9-11 | South | 2.55 | Rush-dominated wet grassland on drained and degraded peat soils. Presence of peatland flora (see **Plate 4** below). |
| **Area C1** | 4-7 | South | 1.11 | Rush-dominated wet grassland on drained and degraded peat soils, grading into reed and large sedge swamp. Localised damp areas (see **Plate 5** below). |
| **Area C2** | 4-11 | South/Southeast | 4.25 | Rush-dominated wet grassland on drained and degraded peat soils (see **Plate 6** below). |
| **Area D** | 4-6 | South/Southeast | 3.12 | Rush-dominated wet grassland on drained and degraded peat soils, grading into reed and large sedge swamp (see **Plate 7** below). |

Additional details on each survey area such as degree of exposure and information on the extent of management, if any, such as enclosure, grazing, burning etc, were recorded during the HCA surveys.

During the HCA surveys, surveyors walked zig-zag transects within each survey area, stopping at regular intervals (every 20 paces), to record data on the following criteria, as per NBDC guidance:

- Vegetation height recorded as per average height bands (A = <12 cm, B = 12-25 cm, C = 25-50 cm, and D = >50 cm).
- Devil's-bit scabious abundance (A = 1-2 plants/$m^2$, B = 3-9 plants/$m^2$, C = 10+ plants/$m^2$, and D = no plants).
- Presence of structured vegetation, tussocks/dominant tussock-forming species.
- Presence of low invading scrub.
- Evidence of stock grazing (poaching, dung etc.).

Based on the results of the assessment each survey area was then assigned to one of the following categories, as per NBCD guidance:

- Good Condition Habitat (**GC**): >20% freq. of Scabious of category B/C abundance growing in 12-25 cm tall swards and <10% cover of tall scrub (>0.5 m tall)
- Suitable (Under-grazed) Habitat (**SU**): >20% freq. of Scabious of category B/C abundance growing in >25 cm tall swards and <20% freq. of Scabious of category B/C abundance growing in 12-25 cm tall swards
- Suitable (Over-grazed) Habitat (**SO**): >20% freq. of Scabious of category B/C abundance growing in <12cm tall swards and <20% freq. of Scabious of category B/C abundance growing in 12-25 cm tall swards
- Unsuitable habitat (**US**): <5% freq. of Scabious of category B/C abundance growing in >25 cm tall swards.

[13] https://irish.gridreferencefinder.com/

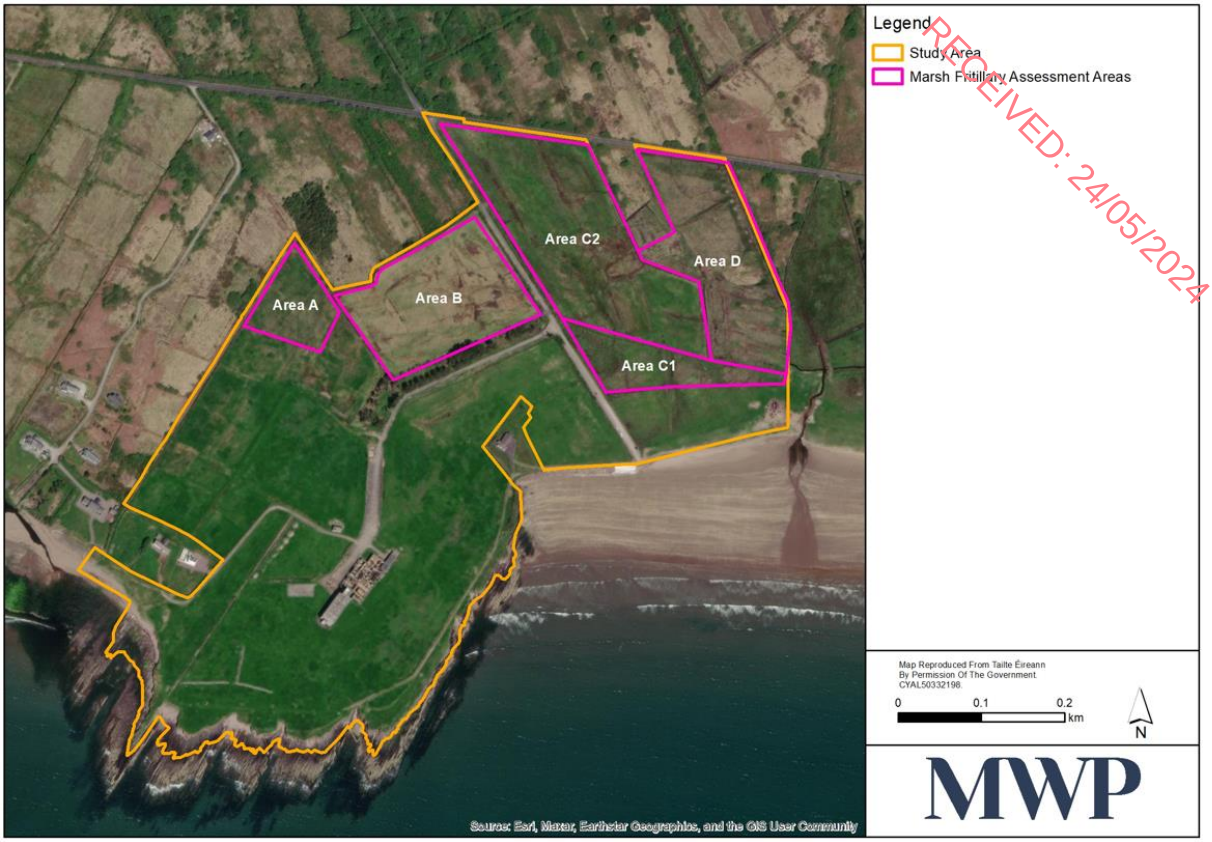




**Figure 4. Marsh fritillary Habitat Condition Assessment (HCA) survey areas**

**Plate 3. View of marsh fritillary HCA survey 'Area A' and example of ground-cover vegetation/sward structure**


**Plate 4. View of marsh fritillary HCA survey 'Area B' and example of ground-cover vegetation/sward structure**

**Plate 5. View of marsh fritillary HCA survey 'Area C1' and example of ground-cover vegetation/sward structure**

**Plate 6. View of marsh fritillary HCA survey 'Area C2' and example of ground-cover vegetation/sward structure**


**Plate 7. View of marsh fritillary HCA survey 'Area D' and example of ground-cover vegetation/sward structure**

#### 6.2.1.2 Larval Web Survey

The optimum period to survey for larval webs is when the webs are most conspicuous, ideally during late August or early September, although counts can be done into mid to late September[14], and into October[15]. Larval web surveys were carried out by MWP ecologists on the 14th August and 18th October 2023. During the survey, searches of devils-bit scabious plants for occupied/unoccupied larval webs were undertaken. These surveys had a particular focus on those survey areas identified as comprising potentially suitable habitat during the Habitat Condition Assessment – see Section 6.2.1.1 above).

#### 6.2.1.3 Adult Surveys

During site field surveys coinciding with the flight period for marsh fritillary (May to June), field surveyors also searched for any marsh fritillary adults 'on the wing' (in flight). These surveys were undertaken on 19th May and 16th June 2022.

For all marsh fritillary survey results please refer to Section 7.2.1 below.

### 6.2.2 Other Terrestrial Invertebrates

Surveys for other terrestrial invertebrates, such as other butterflies, moths, bees, dragonflies and damselflies, slugs and snails, beetles, spiders and flies were undertaken by MWP staff ecologists on various dates between May and October 2023, comprising 19th May, 16th June, 12th July, 14th August and 18th October 2023. The surveys involved walkovers of the study area in which all representative habitats within the site, including wet grassland, semi-improved and improved grassland, reed and large sedge swamp, conifer treeline, scrub, earth banks and ditches, and stonewalls, were surveyed for terrestrial invertebrates (see Plates 8 to 10, below).

Within each representative habitat-type, various surveys methods were employed on various dates. These methods included direct observation, hand-searching, and/or use of sweep-nets/beating trays. Direct observation involved direct recording of species on the wing/resting (butterflies, dragonflies, hoverflies, bees, bumblebees).

Hand-searching for invertebrates included:

[14] NBDC Marsh Fritillary Larval Web Recording Form
[15] https://www.npws.ie/research-projects/animal-species/invertebrates/marsh-fritillary-euphydryas-aurinia

- Turning over and examining the undersides of rocks, stones and other objects on or in the ground, particularly those in partially shaded places.
- Checking the underside of peeling tree bark or dead wood.
- Searching vegetation, including thorough checks of the stems, leaves and flowers of a representative selection of plants.
- Fingertip searching through moss, leaf-litter/other ground detritus.
- Checking areas of bare soil.

Sweep-netting and beating trays were employed to sample invertebrates in the field and shrub layer. Sweep netting involved moving the net from side to side while walking forward at a moderate pace to capture insects resting on vegetation or in-flight. Sticks and beating trays were used to capture invertebrates dislodged from vegetation. Any invertebrates captured were carefully removed to/placed in an examination tray for identification or were photographed in-situ, prior to being released in the same location as where captured.

**Plate 8. Examples of semi-improved wet grassland (left) and reed and large sedge swamp (right) habitats surveyed for invertebrates.**

**Plate 9. Examples of Molinia-dominated wet grassland with bare peat soil (left) and conifer treeline with underlying vegetation (right) surveyed for invertebrates.**


**Plate 10. Examples of improved grassland (left) and earth bank (right) habitats surveyed for invertebrates.**

### 6.2.3 Aquatic Invertebrates

Aquatic habitats within the study area were surveyed for freshwater aquatic macroinvertebrates on the 22nd May 2023. This was undertaken in tandem with amphibian surveys.

Four survey sites within the study area, comprising drainage ditches and a section of the 'An Rinn Rua' stream bounding the south-east of the study area, were selected for survey. The survey sites selected were considered to comprise the most suitable potential habitat for aquatic macroinvertebrates within the study area. It is noted that, at the time of survey, most drainage ditches in the study area had been recently maintained, were devoid of growing plants and had very little water, therefore, overall were found to comprise poor supporting habitat for this group of fauna. Surveys were undertaken using a dip net, swept through vegetation at each location five times, before the net contents were emptied into an examination tray. **Table 2** and **Figure 5** below provide informant on the locations of the aquatic survey sites.

**Table 2. Description of aquatic survey sites**

| Site No. | ITM x | ITM y | Description |
|---|---|---|---|
| Site 1 | 446422 | 568402 | Located on a section of the 'An Rinn Rua' Stream comprising the eastern boundary of the study area (see **Plate 11** below). |
| Site 2 | 446388 | 568527 | Located on a drainage ditch along the eastern boundary of the study area, connecting to the 'An Rinn Rua' Stream (see **Plate 11** below). |
| Site 3 | 446230 | 568419 | Located on a recently maintained internal drainage ditch within the eastern half of the study area (see **Plate 12** below). |
| Site 4 | 445903 | 568431 | Located on a drainage ditch at the northern boundary of the western half of the study area (see **Plate 12** below). |


**Figure 5. Location of aquatic survey sites within the study area**

**Plate 11. Site 1 (left) on the 'An Rinn Rua' Stream, and Site 2 (right) on a drainage ditch in the north-east of the study area which drains to the stream**


**Plate 12. Site 3 (left) on a recently maintained field drain in the middle of the proposed enhancement area. Site 4 (right) on a field drain in the north of the proposed development site**

# 7. Results

## 7.1 Desk Study

For the hectad V46, records are held by the NBDC for a wide variety of species of worms, crustaceans, insects (beetles, bees, butterflies and moths, grasshoppers, may flies, caddis flies and stoneflies, dragonflies, true flies, millipedes) and non-marine molluscs. These records also include the Annex II species marsh fritillary and Kerry slug.

Table 3 below outlines the invertebrate species for which the NBDC holds records for the hectad V46, and which are protected and/or have been assessed as having an unfavourable conservation status. Where these species are known to occur in any of the 1 km grid squares encompassing the study area (V4568, V4567, V4667, V4668), this is also indicated in the table and the nearest species record in relation to the study area is outlined.

**Table 3. Invertebrate species for which the NBDC holds existing records for the hectad V46, and which are protected and/or have been assessed as having an unfavourable conservation status in Ireland**

| Common Name | Scientific Name | Level of Protection/Conservation Status[16] | 1 km squares encompassing study area[17] | Closest record to study area |
|---|---|---|---|---|
| Dark green fritillary | *Argynnis aglaja* | None/Vulnerable | N/a | NBDC records at Inny Strand (2011), approx. 0.6 km east of study area. |
| Grayling | *Hipparchia semele* | None/Near threatened | N/a | Historical NBDC record at Hogs Head, Waterville (1964), in excess of 5 km from study area |
| Marsh Fritillary | *Euphydryas aurinia* | Annex II/Vulnerable | N/a | NBDC holds historical marsh fritillary records for the hectad V46 from the All-Ireland Marsh Fritillary Database: 1950 – 1984. There is a recent NBDC record (2018) from Portmagee Bog (V437737), located |

[16] https://www.npws.ie/sites/default/files/publications/pdf/RL_2010_Butterflies.pdf; https://www.npws.ie/sites/default/files/publications/pdf/Fitzpatrick_et_al_2006_Bee_Red_List.pdf

[17] 1 km squares V4568, V4567, V4667, V4668

| Common Name | Scientific Name | Level of Protection/Conservation Status[16] | 1 km squares encompassing study area[17] | Closest record to study area |
|---|---|---|---|---|
| | | | | approximately 5.4 km north-west of the study area. |
| Small Heath | *Coenonympha pamphilus* | None/Near Threatened | N/a | NBDC record from Waterville area (2003), in excess of 5 km from study area. |
| Wall butterfly | *Lasiommata megera* | None/Endangered | Yes (1 record) | NBDC record located approximately 200 m east of the study area (2021). |
| Moss Carder Bee | *Bombus muscorum* | None/Near threatened | Yes (1 record) | NBDC record located approximately 200 m east of the study area (2020). |
| Red-tailed Carder Bee | *Bombus ruderarius* | None/Vulnerable | N/a | NBDC records from Ballinskelligs area (2011), located approximately 3.5 km south-west of study area. |
| Large Red-Tailed Bumble Bee | *Bombus (Melanobombus) lapidarius* | None/Near Threatened | N/a | NBDC records from Ballinskelligs area (2011), located approximately 3.5 km south-west of study area. |
| English Chrysalis Snail | *Leiostyla anglica)* | None/Vulnerable | N/a | NBDC record from Waterville Dunes (1998), located approx. 1.7 km east of study area. |
| Kerry Slug | *Gemalacus maculosus* | Annex II/Favourable | N/a | Both the NBDC and NPWS hold records for Kerry slug for hectad V46, the closest of which is located approximately 2 km north-east of the study area (NBDC – V4869), as well as a record located 2.8 km to the south-west (NPWS protected and threatened species database). |
| Point Snail | *Acicula fusca* | None/Vulnerable | N/a | NBDC record from Waterville Dunes (1998), located approx. 1.7 km east of study area. |

**Table 4** below outlines other invertebrate species (not protected and/or nationally assessed for conservation status) which have been previously recorded in the immediate vicinity of the study area.

**Table 4. Other invertebrate species (not protected and/or assessed for conservation status in Ireland) for which the NBDC holds existing records for the 1 km grid squares encompassing study area[18]**

| Common Name | Scientific Name | 1 km (V4568) | 1 km (V4668) | Year of Record |
|---|---|---|---|---|
| Emperor moth | *Saturnia pavonia* | Yes (1 record) | N/a | 2019 |
| Large white butterfly | *Pieris brassicae* | N/a | Yes (2 records) | 2021 |
| Peacock butterfly | *Inachis io* | N/a | Yes (1 record) | 2021 |
| Ringlet butterfly | *Aphantopus hyperantus* | N/a | Yes (1 record) | 2020 |
| Speckled wood butterfly | *Pararge aegeria* | N/a | Yes (2 records) | 2021 |

[18] Records shown in **Table 4** for 1 km grid squares V4568 and V4668. No NBDC terrestrial/freshwater aquatic invertebrate records available for either V4567 or V4667. https://maps.biodiversityireland.ie/Map

| Common Name | Scientific Name | 1 km (V4568) | 1 km (V4668) | Year of Record |
|---|---|---|---|---|
| Ruddy darter dragonfly | *Sympetrum sanguineum* | N/a | Yes (1 record) | 2021 |
| Cinnabar moth | *Tyria jacobaeae* | N/a | Yes (1 record) | 2022 |
| Garden tiger moth | *Arctia caja* | N/a | Yes (1 record) | 2022 |
| Oak eggar moth | *Lasiocampa quercus* | N/a | Yes (1 record) | 2022 |
| Six-spot burnet moth | *Zygaena filipendulae* | N/a | Yes (1 record) | 2020 |
| Field grasshopper | *Chorthippus brunneus* | N/a | Yes (1 record) | 1990 |
| Diptera (true fly species) | *Sericomyia silentis* | N/a | Yes (1 record) | 2023 |



Records are also held by the NBDC for the invasive invertebrate species common garden snail (*Cornu aspersum*), Jenkins' spire snail (*Potamopyrgus antipodarum*) and wrinkled snail (*Candidula intersecta*).

## 7.2 Field Surveys

### 7.2.1 Marsh Fritillary

Habitat Condition Assessment

A total area of 11.86 Ha was surveyed for marsh fritillary within the study area. Using the guidance set out in the NBDC's Habitat Condition Assessment for Marsh Fritillary[19], it was determined that two of the five survey areas, 'Field C2' and 'Field D', both located within the proposed BEA (please refer to **Figure 4** above), comprise potentially 'suitable habitat (under-grazed)'.

These areas encompass a combined total area of 7.4 Ha of potentially suitable habitat (4.25 Ha in 'Field C2' and 3.1 Ha in 'Field D'), accounting for 62% of the total area surveyed. The three survey areas encompassed within the main development site were found to be not suitable for marsh fritillary on the basis of the HCA results. The results of the HCA survey at each survey area are outlined in more detail in **Table 5** below.

**Table 5. Results of marsh fritillary HCA surveys for each survey area**

| Survey Area | Results | HCA Category assigned[20] |
|---|---|---|
| A | Devil's-bit scabious was, overall, found to be either totally absent or rare, recorded in only 14% of stopping points (n=28). | **Unsuitable habitat (US)** |
| B | Devil's-bit scabious was, overall, either totally absent or rare, only recorded in 10% of stopping points (n=59). | **Unsuitable habitat (US)** |
| C1 | Devil's-bit scabious was either totally absent or rare, only found in 4.5 % of stopping points (n=80). | **Unsuitable habitat (US)** |
| C2 | Devil's-bit scabious was occasional across Area C2, recorded in 20% of stopping points (n=91). | **Suitable (Under-grazed) (SU)** |
| D | Devil's-bit scabious was frequent across Area D, recorded in 34% of stopping points (n=67). | **Suitable (Under-grazed) (SU)** |

[19] Available at https://biodiversityireland.ie/surveys/marsh-fritillary-monitoring-scheme/
[20] Based on NBDC habitat condition assessment criteria for marsh fritillary

The scarce frequency of devil's-bit scabious in Areas A, B and C1 is likely due to a combination of factors including burning, grazing (sheep), poaching and land drainage. Deep perimeter/field drains are a common feature of these areas. The higher frequency of devil's-bit scabious recorded in Area C2 and Area D is likely largely due to the relatively lower levels of sheep grazing in these areas. This is evidenced in Area D in particular by a low '% frequency of stock grazing signs <10%', higher 'mean vegetation height' and higher 'percentage frequency of low invading scrub', relative to other areas surveyed (see **Table 6** below).



**Table 6. Breakdown of results of Habitat Condition Assessments (HCA) in each survey area with regard to defined NBDC habitat suitability criteria**

| Assessment | Field A | Field B | Field C1 | Field C2 | Field D |
|---|---|---|---|---|---|
| Mean Veg Height (cm) | 12-25 | 25-50 | <12 | 25-50 | 25-50 |
| % frequency of scabious | 14 | 10 | 4.5 | 20 | 34 |
| % frequency of scabious (A) | 7 | 2 | 0 | 3 | 3 |
| % frequency of scabious (B) | 4 | 7 | 0 | 9 | 12 |
| % frequency of scabious (C) | 4 | 2 | 4.5 | 8 | 19 |
| % frequency of 12-25 cm swards | 61 | 32 | 24 | 31 | 30 |
| % frequency of (B/C) in 12-25 cm swards | 4 | 3 | 3 | 7 | 10.5 |
| % frequency of (B/C) in <12 cm swards | 0 | 0 | 0 | 2 | 7.5 |
| % frequency of (B/C) in >25 cm swards | 0 | 5 | 1.5 | 8 | 13 |
| % frequency of structured vegetation | 82 | 83 | 34 | 55 | 54 |
| % frequency of low invading scrub | 0 | 15 | 6 | 18 | 33 |
| % frequency of stock grazing signs | 43 | 54 | 100 | 78 | 9 |
| Tall (0.5m) scrub cover (%) | 0 | 0 | 0 | 5 | 10 |
| Habitat Condition Category[21] | **US** | **US** | **US** | **SU** | **SU** |

Adult & Larval Web Survey

No marsh fritillary larval webs or adult butterflies on the wing were recorded during any of the targeted or multi-disciplinary ecology surveys undertaken within the study area.

### 7.2.2 Other Terrestrial Invertebrates

A total of 44 species of terrestrial invertebrate were identified during surveys in May, June, July, August and October 2023. These are included in **Table 7** below.

**Table 7. Other terrestrial invertebrate species recorded during surveys**

| Taxa | Species/Group Recorded |
|---|---|
| Arachnida, Araneae (Spiders) | – Wolf spider (Lycosidae sp.)<br>– Orb-weaver spider (Araneidae sp.)<br>– Spotted wolf spider (*Pardosa amentata*)<br>– Common crab spider (*Xysticus cristatus*) |
| Arachnida, Opilliones (Harvestmen) | – Common harvester spider (Opilliones) |
| Lepidoptera (Butterflies/Moths) | – Speckled wood (*Pararge aegeria*)<br>– Peacock (*Aglais io*)<br>– Wall brown (*Lassiommata megera*) |

[21] US: Unsuitable habitat; SO: Suitable (Over-grazed) habitat; SU: Suitable (Under-grazed) habitat; GC: Good condition habitat

| Taxa | Species/Group Recorded |
|---|---|
| | – Common blue (*Cupido minimus*)<br>– Owlet moth (Noctuidae sp.)<br>– White ermine moth (caterpillar) (*Spilosoma lubricipeda*)<br>– Little grey moth (*Dipleurina lacustrata*)<br>– Leaf blotch miner moth (Gracillariidae sp.) |
| Diptera (Two-winged flies) | – Common sawfly (Symphyta sp.)<br>– Cinnamon sedge caddisfly (*Limnephilus lunatus*)<br>– Crane fly (Tipuloidea sp.)<br>– Hoverfly parasitoid wasp (Ichneumonidae sp.)<br>– Noon fly (*Mesembrina meridiana*)<br>– Yellow dung fly (*Scathophaga stercoraria*)<br>– Hoverfly (*Platycheirus clypeatus*)<br>– Chequered hover fly (*Melanostoma scalare*)<br>– Common bog hoverfly (*Sericomyia silentis*) |
| Hymenoptera (Bees/Wasps) | – Honeybee (Apis sp.)<br>– Common carder bee (*Bombus pascuorum*)<br>– Enicospilus wasp (Enicospilus sp.)<br>– Orange-legged furrow bee (*Halictus rubicundus*)<br>– Garden bumblebee (*Bombus hortorum*) |
| Coleoptera (Beetles)/<br>Dermaptera (Earwigs)/<br>Hemiptera (True Bugs & relatives) | – Marsh damselbug (*Nabis limbatus*)<br>– Spittlebugs (Aphrophoridae sp.)<br>– Common Green capsid (*Lygocoris pabulinus*)<br>– Plant bugs (Miridae sp.)<br>– Hirta beetle (*Lagria hirta*)<br>– Beetle (*Carabus clatratus*)<br>– Green leafhoppers (Cicadellidae sp.)<br>– Green Shield bug (Pentatomidae sp.)<br>– Plant bug (*Orthops campestris*)<br>– Leaf beetle (Chrysomelidae sp.)<br>– Seven spotted Ladybug (*Coccinella septempunctata*)<br>– Earwig (Dermaptera sp.) |
| Mollusca (Slugs & Snails) | – Doorsnail (Clausiliidae sp.)<br>– Hedgehog slug (*Arion intermedius*)<br>– Large black slug (*Arion ater*) |
| Odonata (Dragonflies & Damselfies) | – Common darter (*Sympetrum striolatum*) |
| Orthoptera (Grasshoppers & Crickets) | – Common green grasshopper (*Omocestus viridulus*) |


**Plate 13. Examples of invertebrate species recorded during surveys Left) wall butterfly, Middle) common carder bee, Right) speckled wood butterfly.**

### 7.2.3 Aquatic Invertebrates

Results of aquatic invertebrate surveys at each survey site (see **Figure 4** above) are summarised hereunder. **Table 8** below outlines all macroinvertebrate species recorded during aquatic sampling in the study area during May 2023.

#### 7.2.3.1 Site 1

This reach of the channel is of low gradient and classified as a drainage ditch. It had a depth of ca. 60 cm. It featured some common reed (*Phragmites australis),* but was generally devoid of submerged flora. Three-spined stickleback (*Gasterosteus aculeatus*) (see **Plate 14** below) was found here along with the macroinvertebrates Limnephilidae, *Potamopyrgus antipodarium*, *Lymnea peregra*, Chironomidae, Zygoptera and mayfly larvae of Leptophlebiidae.

#### 7.2.3.2 Site 2

This drain was very shallow and no more than 10 cm deep at the time of survey. Vegetation comprised water starwort (*Callitriche* sp.), soft rush (*Juncus effusus*), lesser spearwort (*Ranunculus flammula*), pondweed (*Potamogeton* sp.), fool's water cress (*Apium nodiflorum*) and water cress (*Rorippa nasturtium aquaticum*). The macroinvertebrate community comprised *Gammarus* sp., Anisoptera, *Gerris* sp. *Hydrometra* sp., Sphaeridae, *P. antipodarium*, *Glossiphonia complanata*, *Rheotanytarsus* sp., *Chironomus* sp. and mayfly larvae of Leptophlebiidae.

#### 7.2.3.3 Site 3

The banks and bed supported no vegetation, where sampled. This reach of the drain had not been recently maintained, and so vegetation present was not strictly associated with aquatic habitats i.e. bramble (*Rubus fruticosa*) agg. and soft rush. The bacterium *Leptothrix ochracea* was recorded in this drain, an indicator of iron-rich fresh water and wetlands with only low concentrations of organic matter. The only faunal life recorded here was *Chironomous* sp., green chironomid and marsh beetle (Helodidae).

#### 7.2.3.4 Site 4

This drainage ditch had not been recently maintained and had water to a depth of ca. 20 cm at the time of survey. Plants growing in this channel were *Potamogeton* sp., lesser spearwort, Yorkshire fog grass (*Holcus lanatus*) and soft rush. The macroinvertebrate community was limited to larvae of true flies, Sphaeridae and Mesovelidae.

**Table 8 Macroinvertebrates recorded during sampling on drainage ditches in the study area during May 2023.**

| Taxa | Site 1 | Site 2 | Site 3 | Site 4 |
|---|---|---|---|---|
| **MAYFLIES** (Uniramia, Ephemeroptera) | | | | |
| Prong-gilled mayflies (Leptophlebiidae) | x | x | - | |
| **CASED CADDIS FLIES** (Tricoptera) | | | | |
| Northern caddisflies (Limnephilidae) | x | - | - | - |
| **DRAGONFLIES** (Odonata, Anisoptera) | - | x | - | - |
| **DAMSELFLIES** (Odonata, Zygoptera) | x | - | - | - |
| **TRUE FLIES** (Diptera) | | | | |
| Family Chironomidae | | | | |
| Bloodworm *Chironomous sp*. | - | x | x | x |
| Green chironomid | x | x | x | x |
| *Rheotanytarsus* sp. | - | x | - | - |
| **BEETLES** (Coleoptera) | | | | |
| Whirligig beetle (Gyrinidae) | - | - | - | - |
| Diving beetles (Dytiscidae) | x | - | - | - |
| Water scavenger beetles (Hydrophilidae) | x | - | - | - |
| Haliplidae | x | - | - | - |
| Marsh beetles (Helodidae) | - | - | x | - |
| **SNAILS** (Mollusca, Gastropoda) | | | | |
| Family Lymnaeidae | | | | |
| Wandering snail *Lymnaea peregra* | x | - | - | - |
| Family Hydrobiidae | | | | |
| Jenkin's spire shell *Potamopyrgus antipodarium* | x | x | - | - |
| **MUSSELS** (Mollucsa, Bivalva) | | | | |
| Orb/Pea Mussels (Sphaeridae) | - | x | - | x |
| **CRUSTACEANS** (Crustacea) | | | | |
| Amphipods (Amphipoda, Gammaridae) | | | | |
| Freshwater shrimp *Gammarus* sp. | - | x | - | - |
| **LEECHES** (Hirudinae) | | | | |
| Glossiphonidae | | | | |

| Taxa | Site 1 | Site 2 | Site 3 | Site 4 |
|---|---|---|---|---|
| *Glossiphonia complanata* | - | x | | - |
| **BUGS** (Hemiptera) | | | | |
| Water striders (Gerridae) | | | | |
| *Gerris* sp. | - | x | - | - |
| Mesovelidae | - | x | - | x |
| Water Measurer (Hydrometridae) | - | x | - | - |
| **SPIDERS** (Crustacea, Arachnida) | | | | |
| Water mite (Order Hydrachnidae) | x | - | - | - |

**Plate 14. Three-spined stickleback recorded at Site 1 (left) and tadpole recorded at Site 4 (right)**

# 8. Discussion & Conclusion



No Annex II invertebrate species were recorded on-site during the targeted invertebrate surveys or any other ecological baseline surveys. In general, the majority of invertebrate species identified are considered common and widespread. Most of the species recorded were associated with damper areas of open grassland and the wetland habitats which occur within the study area. Invertebrate species diversity was not found to be high, likely associated with the extent to which much of the site has been modified/improved for agriculture and on-going land management practices.

Notable was the single record of wall butterfly, recorded outside the proposed development site in the proposed biodiversity enhancement area on 14th August 2023 (see **Plate 13** above). This species is classed as 'Endangered' in Ireland. Once found throughout Ireland, England, Wales, and parts of Scotland, the wall butterfly has suffered severe declines over the last several decades[22]. This record, together with the existing NBDC record for this species a short distance east of the study area (recorded 2021 – see **Table 3** above), indicates the potential presence of a local population in the general area.

With regard to the results of targeted marsh fritillary surveys undertaken, this species was not recorded anywhere within the study area. Habitat suitability surveys, undertaken to determine if potentially suitable habitat occurs within the study area, determined that no 'Good Condition Habitat' is present, as per habitat criteria set out by the NBDC. The majority of survey areas were determined to comprise 'Unsuitable Habitat', due to either an absence or scarcity of the species required food-plant, devil's bit scabious, believed to be due to a combination of land management factors such as drainage, ground disturbance and heavy sheep grazing. However, potentially 'Suitable (Under-grazed) (SU)' habitat was identified in two of the survey sub-sections ('Area C2' and 'Area D'), as outlined in **Section 7.2.1** above. With regard to these areas, comprising a total area of 7.4 Ha, should more suitable land management practices be implemented, namely changes in grazing regime, it is considered that there is potential for conditions to become more favourable for marsh fritillary in these areas.

A site-specific Biodiversity Enhancement Plan (BEP), incorporating these areas, has been prepared and includes specific measures proposed in relation to both marsh fritillary and wall butterfly, as well as other invertebrate species. In addition, the Plan includes measures aimed at enhancing the overall study area, including the proposed development site, for invertebrates and pollinators generally. Please see the BEP which can be found in **Appendix 5-7** of **Volume 3** of the **EIAR**, and also the **Landscape Design Rationale** and **Overall Landscape Master Plan** for this planning application for more information on general measures for pollinators.

[22] https://butterflyconservation.ie/wp/butterfly-conservation-ireland-annual-report-2023/

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