Chapter 12
Biodiversity

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12 BIODIVERSITY

12.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) describes the approach and methodology for the assessment of the potential impacts on biodiversity resulting from the BusConnects Galway: Dublin Road Scheme (hereafter referred to as the Proposed Development). The existing baseline conditions and results of surveys carried out to inform the assessment are detailed in the following sections, in addition to the impact assessment and proposed mitigation measures and monitoring required to reduce or eliminate any residual effects.

The aim of the Proposed Development, when in operation, is to provide enhanced walking, cycling and bus infrastructure on this key access corridor in Galway city and environs, which will enable and deliver efficient, safe, and integrated sustainable transport movement along the corridor. The objectives of the Proposed Development are described in Chapter 1 (Introduction) of this EIAR. The Proposed Development, which is described in Chapter 4 (Proposed Development Description) of this EIAR has been designed to meet these objectives.

The design of the Proposed Development has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental impacts, where practicable, whilst ensuring the objectives of the Proposed Development are attained. In addition, feedback received from the comprehensive consultation programme undertaken throughout the option selection and design development process have been incorporated, where appropriate.

12.2 Assessment Methodology

In accordance with the requirements of Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (hereafter referred to as "the EIA Directive"), this chapter of the EIAR describes the baseline ecological conditions within the Site and the potential direct and indirect significant effects that could arise from the Proposed Development on biodiversity, with particular attention to species and habitats protected under both EU and Irish law.

The EIA Directive does not provide a definition of biodiversity. However, as noted in the European Commission, Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission 2013), Article 2 of the Convention on Biological Diversity, gives the following formal definition of biodiversity:

'*biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems*' (CBD 2006). Alongside the term '*biodiversity*' the terms '*ecology*' and '*ecological*' are also used throughout this Chapter as broader terms to consider the relationships of biodiversity receptors to one another and within their wider environment.

A review of the Proposed Development was undertaken which identified numerous Key Ecological Receptors (KERs) within the study area that could potentially be impacted by the Proposed Development. In accordance with CIEEM (2018), impact assessment is only undertaken of KERs. These are features within the zone of influence of the Proposed Development which are '*both of sufficient value to be material in decision making and likely to be affected significantly*'. These KERs are examined in detail in this Chapter. The methodologies used to collate information on the baseline biodiversity environment and assess the likely significant effects of the Proposed Development are detailed in the following sections.

The zone of influence (ZoI) for the development is determined which identifies any important ecological features present outside of the Proposed Development site, that could be significantly affected. Important ecological features may include sites designated for nature conservation, protected habitats, and species,

as well as habitats and species identified in red lists or of importance for conservation of biodiversity. An assessment of the effects of the Proposed Development on these features will be carried out and mitigation measures will be recommended where necessary.

This Chapter also refers to the Appropriate Assessment Screening Report (hereafter referred to as the AA Screening Report) and the Natura Impact Statement (hereafter referred to as the NIS) which has also been prepared on behalf of Galway City Council (GCC) and will be submitted with the application for approval, so as to enable An Bord Pleanála (the Board), as competent authority, to carry out the assessments required pursuant to Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, as amended (hereafter referred to as the Habitats Directive).

12.2.1 Guidelines and Legislation

The following legislation is relevant to this report:

- The Habitats Directive 92/43/EEC, as amended;
- The Birds Directive 2009/147/EC, as amended;
- European Communities (Birds and Natural Habitats) Regulations 2011 as amended;
- Planning and Development Acts 2000, as amended – Part XAB;
- The EIA Directive Council Directive 2014/52/EU;
- Wildlife Act 1976, as amended;
- Flora (Protection) Order 2022 (S.I. No. 235/2022); and
- EC Regulation on the prevention and management of the introduction and spread of invasive alien species (1143/2014), as amended.

The following guidance documents were used in the preparation of this biodiversity chapter:

- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017);
- Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2022a);
- CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute Ecology and Environmental Management. Version 1.2;
- Guidance Document on the strict protection of animal species of Community interest under the Habitats Directive. Commission Notice (2021) Brussels, 12.10.2021 C (2021) 7301 final;
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHLGH, 2018);
- European Commission Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (EU, 2013); and
- Office of the Planning Regulator (2021). Appropriate Assessment Screening for Development Management. OPR Practice Note PN01.

12.2.2 Study Area

The Proposed Development extents are illustrated in the General Arrangement Drawings (BCGDR-BTL-GEO_GA-XX-DR-CR-00001_00013) in Volume 3 of this EIAR. Ecological surveys were carried out for each of the biodiversity receptors listed in Table 12-1. The study areas for the ecological desk study and field surveys were identified through considering the nature of the Proposed Development, the size and location of the Proposed Development, the ecological features likely, or known, to be present, and potential impact on these ecological features within the ZoI.

The study area for the desk-based study is the 10 km grid square M32 within which the Proposed Development and the surrounds are located. Grid squares are used to provide a study area for the desk

study as species records from the National Biodiversity Centre (NBDC) are provided within grid squares rather than as point data.

The study area used for the field surveys is the Site as defined by the red line boundary, temporary works boundary and study area outlined in Figure 12-1.

The ecological surveys were designed based upon the characteristics of the Proposed Development and its likely significant impacts on the baseline environment during construction and/or operation. The ecological survey areas are described in Table 12-1.

Table 12-1 Ecological Survey Areas for Each Ecological Receptor

Ecological Receptor	Study Area Description
Habitats	This includes the red line boundary, temporary works compound and boundary and a buffer zone beyond these boundaries. This covers all areas where habitats could be directly or indirectly affecting during construction / operation.
Mammals (excluding bats)	This includes the red line boundary, temporary works compound and boundary and a buffer zone beyond these boundaries. This covers all areas where mammals could be directly or indirectly affected during construction / operation.
Bats	This includes the red line boundary, temporary works compound and boundary and a buffer zone beyond these boundaries. This covers all areas where bats could be directly or indirectly affected during construction / operation.
Birds	This includes the red line boundary, temporary works compound and boundary and a buffer zone beyond these boundaries. This covers all areas where birds could be directly or indirectly affected during construction / operation.
Invertebrates	This includes the red line boundary, temporary works compound and boundary and a buffer zone beyond these boundaries. This covers all areas where invertebrates could be directly or indirectly affected during construction / operation.
Amphibians and reptiles	This includes the red line boundary, temporary works compound and boundary and a buffer zone beyond these boundaries. This covers all areas where amphibians and / or reptiles could be directly or indirectly affected during construction / operation.

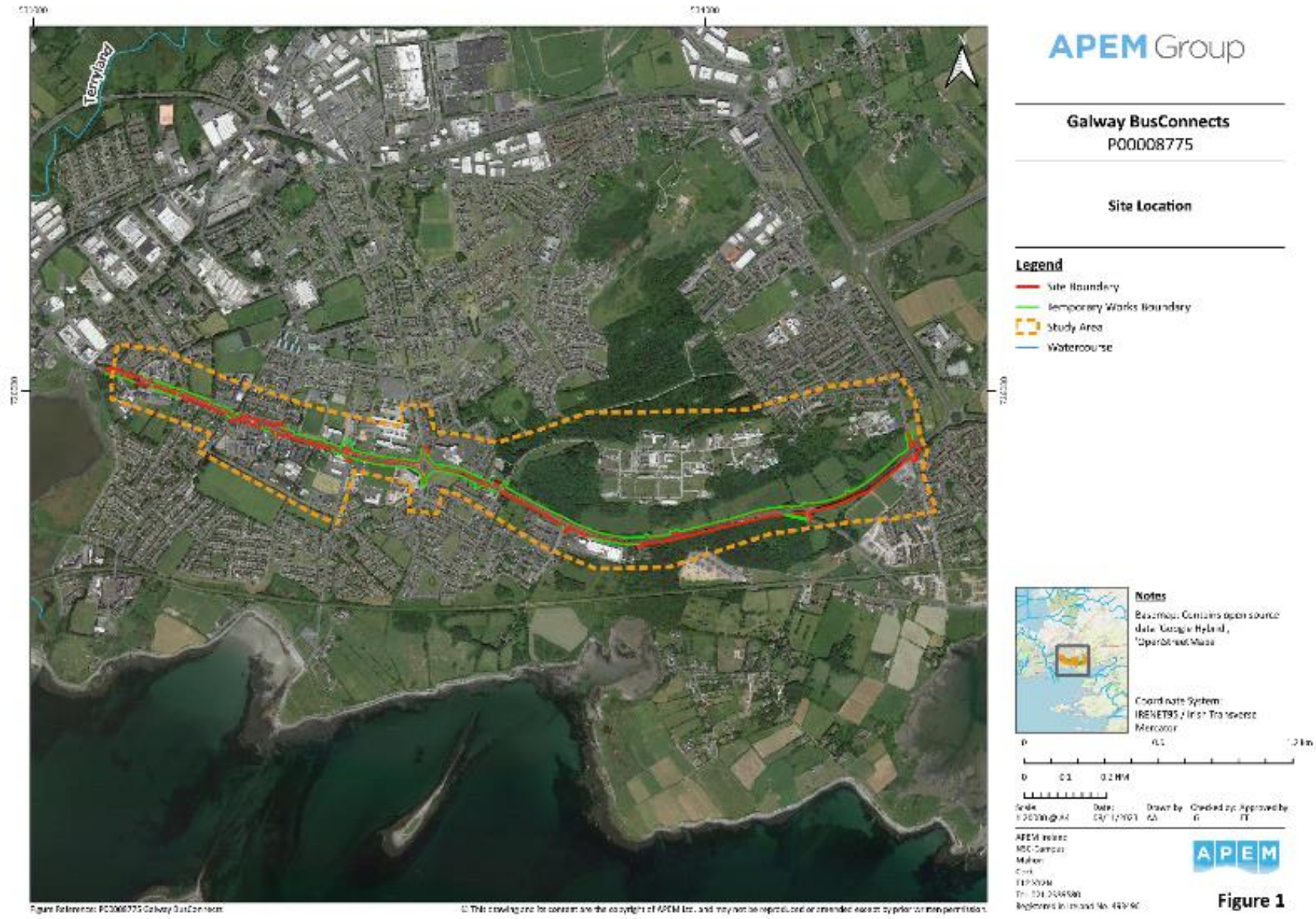

Figure 12-1 Site Location.

12.2.3 Ecology Surveys

This section of the report describes the various ecological survey methodologies used to collate baseline ecological information in the preparation of this Chapter. The ecological surveys carried out are summarised in Table 12-2.

Table 12-2 Ecological Surveys and Survey Dates between 2022-2024

Survey	Survey Date(s)	Surveyor Reference
Habitat Survey	20th October 2022 13th June 14th June 30th June and 2nd July 2023 30th July 2024	APEM
Mammal surveys (excluding Bats)	13th June 14th June 30th June 2nd July 2023 and 27th March 2024	APEM
Bat Surveys	13th June 2nd July 2023, 27th March 30th July and 20th August 2024	APEM
Breeding Birds	14th June 30th June 2023 and 27th March 2024	APEM
Wintering Birds	21st December 2022 16th January 21st February and 21st March 2023	APEM
Amphibian and reptile habitat suitability assessment	13th June 14th June 2023	APEM
Marsh Fritillary species-specific survey	23rd August 2023	APEM

The approach to field surveys is based on accepted standard practice and methods. Habitats within the study area were classified after '*A Guide to Habitats in Ireland*' (Fossitt, 2000). The dominant plant species present in each habitat type were recorded during the field surveys and this is considered sufficient to allow accurate classification of the habitats present. A habitat map was then prepared using QGIS software. Particular attention was given to the potential for Annex I Lowland Hay Meadows [6510] habitat types expected to be within the study area. Habitat surveys involved an initial walkover in October 2022, followed by habitat surveys in 2023 and then a validation survey in 2024 to ensure no changes had occurred since the previous surveys.

Incidental sightings or evidence of birds, mammals or amphibians were also noted during the habitat survey and the habitats within the study area were evaluated for their potential to support protected species. Evidence of use of the area by mammals, such as badger setts, scat, and hair, were noted where they occur within the study area.

Trees and/or structures suitable for roosting bats and potential suitable bat foraging were noted where they occurred within the study area. Buildings affected by the Proposed Development (i.e. demolition) were inspected externally. Trees/ structures within the study area were visually inspected from the ground level for Potential Roost Features (PRF) where it was considered likely that they may be suitable for use by roosting bats. These includes features such as knotholes, cracks / splits in limbs, dense ivy, loose or lifting bark, or hollows / cavities. Potential roosts / roost features and bat foraging habitat were evaluated using the criteria set out in the Bat Conservation Trust (BCT) guidelines (Collins, 2016), subsequently updated in 2023.

Walked bat activity surveys (transects) were undertaken on four occasions over two years, the first-year surveys being on 13th June 2023 and 2nd July 2023, and the second-year surveys on the 30th of July and

20th of August 2024. The survey on the night of 13th June 2023 was undertaken following a day with some thundery showers, followed by a warm dry night. The survey on 2nd July 2023 was undertaken following a warm, dry day followed by a warm dry night. The survey on the 30th of July 2024 was undertaken following a warm, dry day with a warm night. Finally, the last survey on the 20th of August was undertaken following a period of unsettled wet and windy weather, but the night was dry with a light breeze. An appropriate transect route focussing on areas with moderate to high habitat suitability for bats was identified during the initial habitat surveys. This transect was walked for the duration of each survey, which commenced from 30 minutes before dusk to 2 hours after dusk. Two ecologists were present for the duration of each survey and maintained a steady walking pace to ensure the sampling area is the same per unit time as per the guidelines. Information collected include species recorded, number of bats, flight direction and behaviour (e.g., commuting or foraging). Equipment used for the duration of the survey included the Titley Scientific Anabat Scout bat detector, the BatLogger M Bat detector, an InfraRed torch, the NightFox Night Vision Goggles and the Canon XA60 InfraRed camera.

A sunrise breeding bird survey was undertaken on 14th and 30th June 2023. An additional breeding bird survey was undertaken on the 27th March 2024. These surveys were conducted via a walkover / walking transect following outline methodology in the Countryside Bird Survey Manual prepared by BirdWatch Ireland and the National Parks and Wildlife Service (BWI and NPWS, 2012) as relevant. Limitations to survey are discussed separately below. While the sunrise breeding bird surveys were undertaken during later part of the survey season, and results show no breeding to be taking place within the study area, the assessment has taken a precautionary approach. The additional survey in March 2024 provides data at the beginning of the breeding season. Due the habitats that will be affected by the Proposed Development being optimal nesting and foraging habitats, the assessment assumes that breeding birds will be present during the breeding season and therefore has applied appropriate mitigation so as to avoid development during the breeding season. A 3-hour walkover was completed focussing on areas where land-take is likely to occur, and in areas where habitat suitability is highest for breeding birds. Species and numbers seen and / or heard, and notes on behaviour were recorded. Equipment used for the surveys included binoculars and notepads for recording data. Habitat suitability for target species such as Barn Owl was also assessed during walkover surveys due to records present in the area. Potential Nest Sites (PNS) and Active Nest Sites (ANS) for Barn Owls were searched for during the surveys as part of an investigative field survey following methodologies in TII 2017 and Shawyer, C. R. (2011).

Winter bird surveys were conducted via a walkover / walking transect following methodology in the Countryside Bird Survey Manual prepared by BirdWatch Ireland and the National Parks and Wildlife Service (BWI and NPWS, 2012). These surveys were undertaken on the 21st December 2022, 16th January 2023, 21st February 2023 and the 21st of March 2023. Vantage Point (VP) surveys were also undertaken at one location at Lough Atalia. A 3-hour walkover was completed focussing on areas where land-take is likely to occur, and in areas where habitat suitability is highest for wintering birds. Weather conditions were varied across the surveys. Surveys were undertaken in periods of light, moderate, heavy and no rain, as well as a temperature range of 0-11°C. Species and numbers seen and / or heard, and notes on behaviour were recorded. Equipment used for the survey included binoculars and notepads for recording data.

A Marsh fritillary larval web survey was undertaken on 23rd August 2023. A transect was walked systematically through the western Meadows field where field scabious was recorded previously. No devil's bit scabious was recorded during the habitat surveys. However, field scabious was recorded. Each field scabious plant was searched for the presence of larval webs, both occupied and unoccupied. Any instances of larval webs were recorded if they occurred. The area of field scabious habitat was also estimated and marked on a map.

12.2.3.1 Limitations

Desk study data is unlikely to be exhaustive, especially in respect of species, and is intended mainly to set a context for the study. It is, therefore, possible that important habitats or protected species not identified during the data search do in fact occur within the vicinity of the Site. Interpretation of maps and aerial photography has been conducted in good faith, using recent imagery, but it has not been possible to verify the accuracy of any statements relating to land use and habitat context outside of the field study area.

The field surveys were carried out during varied weather conditions but posed no limitations on the surveys. Bat surveys were carried out during the June, July and August summer months, while previous surveys during other seasons were used to supplement baseline data. Breeding bird surveys were undertaken during the month of June as token surveys as the survey window for earlier breeding surveys in 2023 was missed due to delays. To supplement this, an additional breeding bird survey was undertaken in March 2024. The majority of target species in the area were focussed on those within the nearby SPA, the majority of which are wintering species.

The report takes account for these limitations by applying a precautionary approach in relation to protected habitats and / or species.

12.2.4 Categorisation of the Baseline Environment

The desk study involved the collection and review of relevant published and unpublished sources of data, collation of existing information on the ecological environment and consultation with relevant statutory bodies. The following sources were consulted during the desk study to inform the scope of the ecological surveys:

- National Parks and Wildlife Service (NPWS) website, maps, and metadata available *www.npws.ie*
- National Parks and Wildlife Service (NPWS) website Flora Protection Order Map Viewer – Bryophytes *https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=71f8df33693f48edbb70369d7fb26b7e*
- National Biodiversity Data Centre (NBDC) website and 10 km grid squares covering the Site *www.biodiversityireland.ie* ; *https://maps.biodiversityireland.ie/Map*
- Environmental Protection Agency's (EPA) Mapping Information System *https://gis.epa.ie/EPAMaps/* for EPA website datasets (soil, surface water quality, ground water quality, designated sites)
- Teagasc Soil area maps *http://gis.teagasc.ie/soils/map.php*
- Inland Fisheries Ireland (IFI) *https://www.fisheriesireland.ie/*
- Geological Survey Ireland (GSI) area maps *https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228*
- River Basin Management Plan for Ireland 2018 – 2021 *https://www.gov.ie/en/publication/429a79-river-basin-management-plan-2018-2021/?referrer=http://www.housing.gov.ie/water/water-quality/river-basin-management-plans/river-basin-management-plan-2018-2021*
- River Basin Management Plan for Ireland 2022 – 2027 (Draft) *https://www.gov.ie/en/consultation/2bda0-public-consultation-on-the-draft-river-basin-management-plan-for-ireland-2022-2027/*
- EIAR Biodiversity chapters for nearby development via the EIA Portal *https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1*
- BirdWatch Ireland website https://birdwatchireland.ie/
- Birds of Conservation Concern in Ireland (BoCCI) *https://birdwatchireland.ie/app/uploads/2021/04/BOCCI4-leaflet-2-1.pdf*
- Bat records from Bat Conservation Ireland's (BCI) database. data request was made in February 2024 and data received March 2024.
- Irish Red Data List for Vascular Plants, NPWS (Wyse Jackson et al., 2016)
- Irish Red List for Butterflies, NPWS (Regan et al., 2010)
- Irish Red Data List for Terrestrial Mammals, NPWS (Marnell et al., 2019)

Available information and literature on the Site was reviewed to inform the fieldwork and impact assessment. The Site and the surrounding area will be viewed using satellite imagery.

The following datasets were consulted to inform the in-combination assessment:

- Galway City Council planning portal *https://www.galwaycity.ie/online-planning-system*
- An Bord Pleanála Planning *https://www.pleanala.ie/en-ie/home/*

- Department of Housing, Planning, and Local Government – online land use mapping *www.myplan.ie/en/index.html*
- Department of Housing, Planning, and Local Government- EIA Portal *https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal*
- Department of Housing, Planning, and Local Government – online land use mapping https://www.myplan.ie/;
- Galway City Development Plan 2023-2029 https://www.galwaycity.ie/development-plan-2023-2029
- National Development Plan 2021-2030 *https://www.gov.ie/en/publication/774e2-national-development-plan-2021-2030/*
- Galway City Biodiversity Action Plan 2014-2024 *https://www.galwaycity.ie/uploads/downloads/publications/recreation_leisure/Biodiversity_Plan_2014.pdf*

12.2.5 Assessment Methodology

The biodiversity and ecological impacts of the Proposed Development have been assessed in accordance with CIEEM 2018, however, the following guidelines have all been considered during the assessment process:

- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009);
- Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022); and
- CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM 2018).

Ecological 'features' such as sites, habitats, assemblages, species, or individuals (including those requiring strict protection under Article 12 of the Habitats Directive (Regs 51 and 52 of SI 477/2011)), which occur in the vicinity of a project, all require assessment. The term 'ecological receptor' is used to describe an ecological resource once it has been determined that the Proposed Development may result in a significant impact. In accordance with CIEEM (2018), impact assessment is only undertaken of Key Ecological Receptors (KERs). These are features within the zone of influence of the Proposed Development which are '*both of sufficient value to be material in decision making and likely to be affected significantly'*.

The importance of an ecological feature should be considered within a defined geographical context (CIEEM 2018). The following frame of reference has been used in this case, relying on known/ published accounts of distribution and rarity where available, and professional judgement:

- International (European);
- National (Ireland);
- Regional (Connacht);
- County (Galway);
- Townland (Galway);
- Local (Intermediate between the Site and Townland); and
- Site ("the Site").

The above CIEEM frame of reference is applied to the ecological features identified during the desk study and surveys to inform this report.

In assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Examples of relevant lists and criteria include:

- Species of European conservation importance (as listed on Annexes II, IV and V of the Habitats Directive or Annex 1 of the Birds Directive);
- Species protected under the Wildlife Act 1976, as amended;

- Birds of Conservation Concern in Ireland (BoCCI); and
- Red List of Terrestrial Mammals.

12.2.5.1 Impact Assessment

The impact assessment was carried out with regard to the criteria outlined in CIEEM (2018). The process involves the following steps:

- Identifying and characterising potential impacts;
- Incorporating measures to avoid and mitigate (reduce) these impacts;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects (if required); and
- Identifying opportunities for ecological enhancement.

When describing impacts, reference is made to the following characteristics, as appropriate:

- Positive or negative (type of effect on ecological receptor);
- Extent (size of affected ecological receptor or proportion of population affected by the impact);
- Magnitude (degree of effect on ecological receptor);
- Duration (period of time over which the effect will occur);
- Timing and frequency (how often the effect will occur); and
- Reversibility (can the effect be reversed; will it be permanent or temporary).

The impact assessment process considers both direct and indirect impacts: direct ecological impacts are changes that are directly attributable to a defined action, e.g., the physical loss of habitat occupied by a species during the construction process. Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process, or feature, e.g., the creation of roads which cause hydrological changes, which, in the absence of mitigation, could lead to the drying out of wet grassland.

Consideration of conservation status is important for evaluating the effects of impacts on individual habitats and species and assessing their significance:

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

12.2.5.2 Significant Effects

In determining ecologically significant effects the CIEEM Guidelines (CIEEM 2018) were followed, which requires consideration of whether:

- Any processes or key characteristics will be removed or changed;
- There will be an effect on the nature, extent, structure and function of component habitats; and
- There is an effect on the average population size and viability of component species.

CIEEM (2018) also states that the consideration of conservation status is important for evaluating the effects of impacts on individual habitats and species and assessing their significance.

Conservation Status

The definitions for conservation status given in the Habitats Directive, in relation to habitats and species, are also used in the CIEEM Guidelines (CIEEM 2018):

- For natural habitats, conservation status means the sum of the influences acting on the natural habitat and its typical species, that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species, at the appropriate geographical scale; and
- For species, conservation status means the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations, at the appropriate geographical scale.

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.

After the definitions provided in the Habitats Directive, the conservation status of a habitat is favourable when:

- Its natural range and the areas it covers within that range are stable or increasing;
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- The conservation status of its typical species is favourable as defined below under species.

Moreover, the conservation status of a species is favourable when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

According to the CIEEM Guidelines (CIEEM 2018) methodology, if it is determined that the integrity and / or conservation status of an ecological feature will be impacted on, then the level of significance of that impact is related to the geographical scale at which the impact will occur (i.e., Local, County, National, International). In some cases, an impact may not be significant at the geographic scale at which the ecological feature has been valued but may be significant at a lower geographical level. For example, a particular impact may not be considered likely to have a negative effect on the overall conservation status of a species which is considered to be internationally important. However, an impact may occur at a local level on this internationally important species. In this case, the impact on an internationally important species is considered to be significant at only a Local Level, rather than International level.

12.2.5.3 Cumulative Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a particular location.

Other plans and projects that were considered when establishing cumulative effects are:

- Proposals for which consent has been applied but which are awaiting determination;
- Projects which have been granted consent, but which have not yet been started or which have been started but are not yet completed (i.e., under construction);
- Proposals which have been refused permission, but which are subject to appeal, and the appeal is undetermined;
- Constructed developments whose full environmental effects are not yet felt and therefore cannot be accounted for in the baseline; or
- Developments specifically referenced in a National Policy Statement, a National Plan or a Local Plan.

12.3 Baseline Environment

12.3.1 Zone of Influence (ZoI)

The 'zone of influence' for a project is *"the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries. The zone of influence will vary for different ecological features depending on their sensitivity to an environmental change"* (CIEEM 2018).

The ZoI of air quality effects is generally local to the Proposed Development and not greater than a distance of 50m from the Proposed Development boundary, and 500m from the Construction Compound during the Construction Phase, and up to 200m the Proposed Development boundary during the Operational Phase (refer to Chapter 7 (Air Quality) of this EIAR for more detail).

The hydrogeological ZoI for the Proposed Development is variable depending on the nature of the proposed works at specific locations and the receiving environment ground conditions, this is deemed to extend beyond the Proposed Development boundary and is discussed with reference to specific construction activities in Chapter 14 (Land, Soils, Geology & Hydrogeology) of this EIAR.

With regards to hydrological impacts, the distances over which water-borne pollutants are likely to remain in sufficient concentrations to have a likely significant effect on receiving waters and associated wetland / terrestrial habitat is highly site-specific and related to the predicted magnitude of any potential pollution event. Evidently, it will depend on volumes of discharged waters, concentrations and types of pollutants (in this case sediment and/or hydrocarbons), volumes of receiving waters, and the ecological sensitivity of the receiving waters. In the case of the Proposed Development, this includes: all coastal habitats downstream of where the Proposed Development will drain to, or cross water bodies listed and the marine environment of Galway Bay including the Coastal Lagoon of Lough Atalia.

The ZoI for small mammal species would be expected to be limited to no more than approximately 100m from the Proposed Development boundary due to their small territory sizes and sedentary lifecycle. The ZoI for otters, badgers, stoat, and hedgehogs may extend over greater distances than small mammal species and bird species due to their ability to disperse many kilometres from their natal / resting sites. The ZoI for significant disturbance impacts to badger and otter breeding / resting places may extend as far as approximately 150m from the Proposed Development boundary. This ZoI (i.e. approximately 150m from the Proposed Development boundary) for badgers and otters has been defined in accordance with the following guidance: Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA 2008, the Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (NRA 2006) and the Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA 2008) and is considered to be of a precautionary distance. During construction-related disturbance, the screening effect provided by surrounding vegetation and buildings would likely reduce the actual distance of the ZoI for badgers and otters.

The ZoI of potential effects to bat roosts would not be expected to exceed approximately 200m from the Proposed Development boundary in most cases but, as effects are dependent on many factors (such as species, roost type, surrounding habitat, commuting routes *etc.*), this is assessed on a case-by-case basis and the ZoI may increase / decrease from this distance accordingly. Given the large foraging ranges for some species, the ZoI of potential landscape scale impacts, such as habitat loss and severance, could extend for several kilometres from the Proposed Development but the most significant effects are likely to occur within 1km of important roost sites (e.g., maternity roosts).

The ZoI of the Proposed Development in relation to likely significant effects on most breeding bird species is generally limited to habitat loss within the footprint of the Proposed Development, and disturbance / displacement during construction and disruption in territorial singing due to noise during operation. Disturbance effects may extend for several hundreds of metres from the Proposed Development.

The ZoI in relation to indirect impacts to wintering birds could extend up to approximately 300m from the Proposed Development for general construction activities, as many species (such as waterbirds) are highly susceptible to disturbance from loud and unpredictable noise during construction. However, as many estuarine bird species use inland habitat areas at distances from the coast, the ZoI for *ex-situ* impacts could extend a considerable distance from the Proposed Development. In the case of the Proposed Development, impacts to wintering birds within this 300m band could affect the use of potential *ex-situ* sites for bird species listed as SCIs of European sites.

In terms of construction noise, levels below 50dB (decibels) would not be expected to result in any response from foraging or roosting birds. Noise levels between 50dB and 70dB would provoke a moderate effect / level of response from birds (i.e., birds becoming alert and some behavioural changes (e.g., reduced feeding activity)), but birds would be expected to habituate to noise levels within this range. Noise levels above 70dB would likely result in birds moving out of the affected zone or leaving the site altogether. At approximately 300m, typical noise levels associated with construction activity (British Standard Institute (BSI) British Standard (BS) 5228-1:2009 +A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise (hereafter referred to as BS 5228–1) (BSI 2008)) are generally below 60dB or, in most cases, are approaching the 50dB threshold.

The ZoI in relation to amphibian species is likely to be limited to direct habitat loss and severance within the Proposed Development boundary and / or indirect impacts to water quality in wetland habitats hydrologically connected to the Proposed Development.

The ZoI in relation to the common lizard is likely to be limited to direct habitat loss and severance within and across the Proposed Development boundary and disturbance / displacement effects in the immediate vicinity during construction.

The ZoI in relation to protected invertebrates is likely to be limited to direct habitat loss and severance within the Proposed Development boundary and disturbance / displacement effects in the immediate vicinity during construction.

The ZoI for designated conservation areas may be determined by considering the Proposed Development's potential connectivity with European sites, in terms of:

- Nature, scale, timing and duration of all aspects of the proposed works and possible impacts, including the nature and size of excavations, storage of materials, flat/sloping sites;
- Distance and nature of potential pathways (dilution and dispersion; intervening 'buffer' lands, roads etc.); and
- Location of ecological features and their sensitivity to the possible impacts.

Table 12-3 Potential Zone of Influence of the Proposed Development.

Potential Receptor / Impact	ZoI
Air Quality	500 m
Hydrological Receptors (Watercourses: Freshwater, Coastal, Marine)	All coastal habitats downstream, cross waterbodies, marine environment of Galway Bay and Coastal Lagoon of Lough Atalia
Small mammal species	100 m
Large mammal species	150 m
Bat Roost Disturbance	200 m
Foraging / Commuting Bats	1 km
Birds	300 m
Disturbance from Noise	300 m

The potential for source pathway receptor connectivity is firstly identified through GIS interrogation and detailed information is then provided on sites with connectivity. As a precautionary approach (EC, 2015) in defining the ecological features which may be affected in relation to designated sites, the conservation interests of every European Site were examined in order to ascertain whether there could be potential physical or ecological connectivity to the Proposed Development and the associated likely project impacts. European sites that are located within a potential ZoI of the Proposed Development, due to a potential for connectivity, are listed in Table 12-4and presented in Figure 12-2 below.

Table 12-4 European Sites (SACs and SPAs) Located within the Potential Zone of Influence of the Proposed Development.

Site Code	Site Name	Distance (km) 1	Qualifying Interests and Conservation Objective
004031	Inner Galway Bay SPA	0.055	Black-throated Diver (*Gavia arctica*) [A002] Great Northern Diver (*Gavia immer*) [A003] (M) Cormorant (*Phalacrocorax carbo*) [A017] (M) Grey Heron (*Ardea cinerea*) [A028] (M) Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] (M) Wigeon (*Anas penelope*) [A050] (M) Teal (*Anas crecca*) [A052] (M) Red-breasted Merganser (*Mergus serrator*) [A069] (M) Ringed Plover (*Charadrius hiaticula*) [A137] (M) Golden Plover (*Pluvialis apricaria*) [A140] (M) Lapwing (*Vanellus vanellus*) [A142] (M) Dunlin (*Calidris alpina*) [A149] (M) Bar-tailed Godwit (*Limosa lapponica*) [A157] (M) Curlew (*Numenius arquata*) [A160] (M) Redshank (*Tringa totanus*) [A162] (M) Turnstone (*Arenaria interpres*) [A169] (M) Black-headed Gull (*Chroicocephalus ridibundus*) [A179] (M) Common Gull (*Larus canus*) [A182] (M) Sandwich Tern (*Sterna sandvicensis*) [A191] (M) Common Tern (*Sterna hirundo*) [A193] (M) Wetland and Waterbirds [A999] (M) https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004031.pdf
000268	Galway Bay Complex SAC	0.063	Mudflats and sandflats not covered by seawater at low tide [1140] (M) Coastal lagoons [1150] (R) Large shallow inlets and bays [1160] (M) Reefs [1170] (M) Perennial vegetation of stony banks [1220] (M) Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] (M) Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] (R)

[1] Distances indicated are the closest geographical distance between the Proposed Development and the European site boundary as determined through the use of GIS.

Site Code	Site Name	Distance (km) 1	Qualifying Interests and Conservation Objective
			Mediterranean salt meadows (*Juncetalia maritimi*) [1410] (R) Turloughs [3180] (M) Juniperus communis formations on heaths or calcareous grasslands [5130] (R) Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] (M) Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] (M) Alkaline fens [7230] (M) Limestone pavements [8240] *Lutra lutra* (Otter) [1355] (R) *Phoca vitulina* (Harbour Seal) [1365] (M) https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000268.pdf
000297	Lough Corrib SAC	1.5	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] (R) Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea* [3130] (R) Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. [3140] (R) Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] (M) Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] (M) Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] (M) Active raised bogs [7110] (R) Degraded raised bogs still capable of natural regeneration [7120] (refer to 7110) Depressions on peat substrates of the Rhynchosporion [7150] (refer to 7110) Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] (M) Petrifying springs with tufa formation (*Cratoneurion*) [7220] (M) Alkaline fens [7230] (M) Limestone pavements [8240] (M) Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] (M) Bog woodland [91D0] (M) *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] (R) *Austropotamobius pallipes* (White-clawed Crayfish) [1092] (M) *Petromyzon marinus* (Sea Lamprey) [1095] (R) *Lampetra planeri* (Brook Lamprey) [1096] (M) *Salmo salar* (Salmon) [1106] (M) *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] (R) *Lutra lutra* (Otter) [1355] (M) *Najas flexilis* (Slender Naiad) [1833] (R) *Hamatocaulis vernicosus* (Slender Green Feather-moss) [6216] (M) https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000297.pdf

Site Code	Site Name	Distance (km) 1	Qualifying Interests and Conservation Objective
004042	Lough Corrib SPA	3.9	Gadwall (*Anas strepera*) [A051] (R) Shoveler (*Anas clypeata*) [A056] (R) Pochard (*Aythya ferina*) [A059] (R) Tufted Duck (*Aythya fuligula*) [A061] (R) Common Scoter (*Melanitta nigra*) [A065] (M) Hen Harrier (*Circus cyaneus*) [A082] (R) Coot (*Fulica atra*) [A125] (R) Golden Plover (*Pluvialis apricaria*) [A140] (M) Black-headed Gull (*Chroicocephalus ridibundus*) [A179] (R) Common Gull (*Larus canus*) [A182] (R) Common Tern (*Sterna hirundo*) [A193] (R) Arctic Tern (*Sterna paradisaea*) [A194] (R) Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] (R) Wetland [A999] (M) https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004042.pdf

12.3.2 Designated Conservation Areas

12.3.2.1 Natura 2000 Sites

An Appropriate Assessment Screening (AAS) Report and Natura Impact Statement (NIS) have been completed for the Proposed Development (APEM, 2024). The closest Natura 2000 site is the Inner Galway Bay SPA (Site Code: 004031) which is located just ca. 55 m from the red line. The Galway Bay Complex SAC (Site Code: 000268) is located ca. 63 m from the project.

The AAS report identifies connectivity with these sites via the stormwater network within Galway City and the outfall locations within Lough Atalia and Galway Bay. Due to proximity, there is also the potential for non-native invasive species impacts that could spread over this short distance to the designated sites. The AAS also identified potential impacts on some qualifying interests of the Lough Corrib SAC (Site Code: 000297) and Lough Corrib SPA (Site Code: 004042), however, no connectivity to other Natura 2000 sites were identified (APEM, 2024).

Evaluation: Due to the connectivity with the Natura 2000 network, designated sites are evaluated to be of **International Ecological Importance**.

12.3.2.2 Natural Heritage Areas and Proposed Natural Heritage Areas

Natural Heritage Areas are designations under section 18 of the Wildlife (Amendment) Act to protect habitats, species or geology of national importance. Proposed Natural Heritage Areas are not formally designated.

The closest Natural Heritage Areas to the Proposed Development is the Creggana Marsh NHA, located ca. 3.7 km south-east. This site is also designated as an SPA and so the potential for significant impacts on this site are covered in the aforementioned NIS (APEM, 2024). The next closest NHA is the Moycullen Bog NHA, located ca. 4.7 km north-west. This site is not designated as an SPA or SAC. There is no downstream hydrological connection between the Proposed Development site and this NHA. There is also no ecological or landscape connectivity between the site and this NHA, with Galway City and various other barriers present in-between.

The closest proposed Natural Heritage Area is located ca. 55 m (0.05 km) south. This is the Galway Bay Complex pNHA and this shares a boundary with the Galway Bay Complex SAC, and thus, is covered in the

NIS (APEM, 202). The Lough Corrib pNHA located ca. 1.7 km north-west also partly shares a boundary with the Lough Corrib SAC, considered in the Appropriate Assessment Screening (APEM, 2024).

The NHAs and pNHAs are identified in Figure 12-3.

Evaluation: Due to the connectivity with the Natura 2000 network, designated sites are evaluated to be of ***National Ecological Importance***

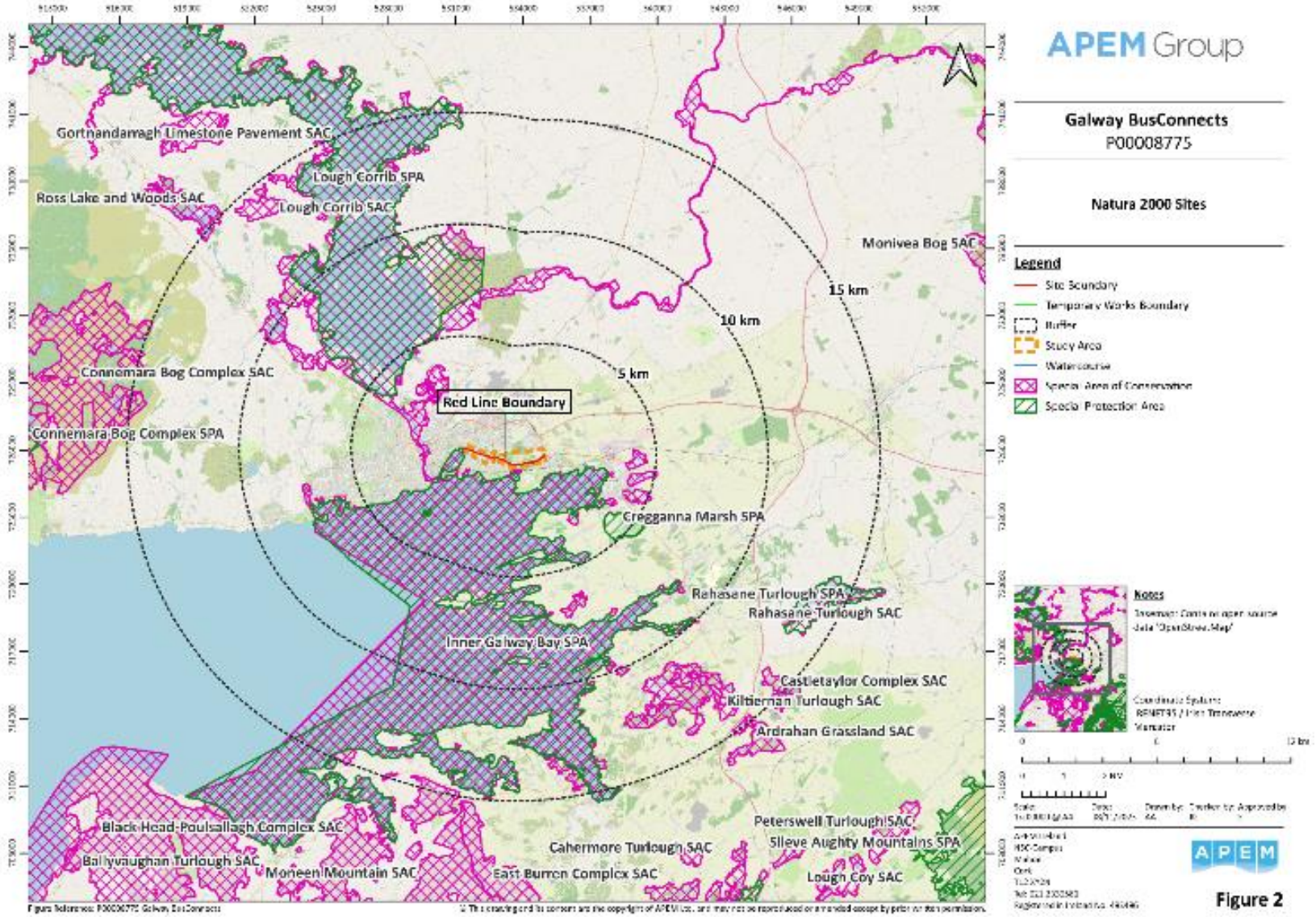

Figure 12-2 European Sites

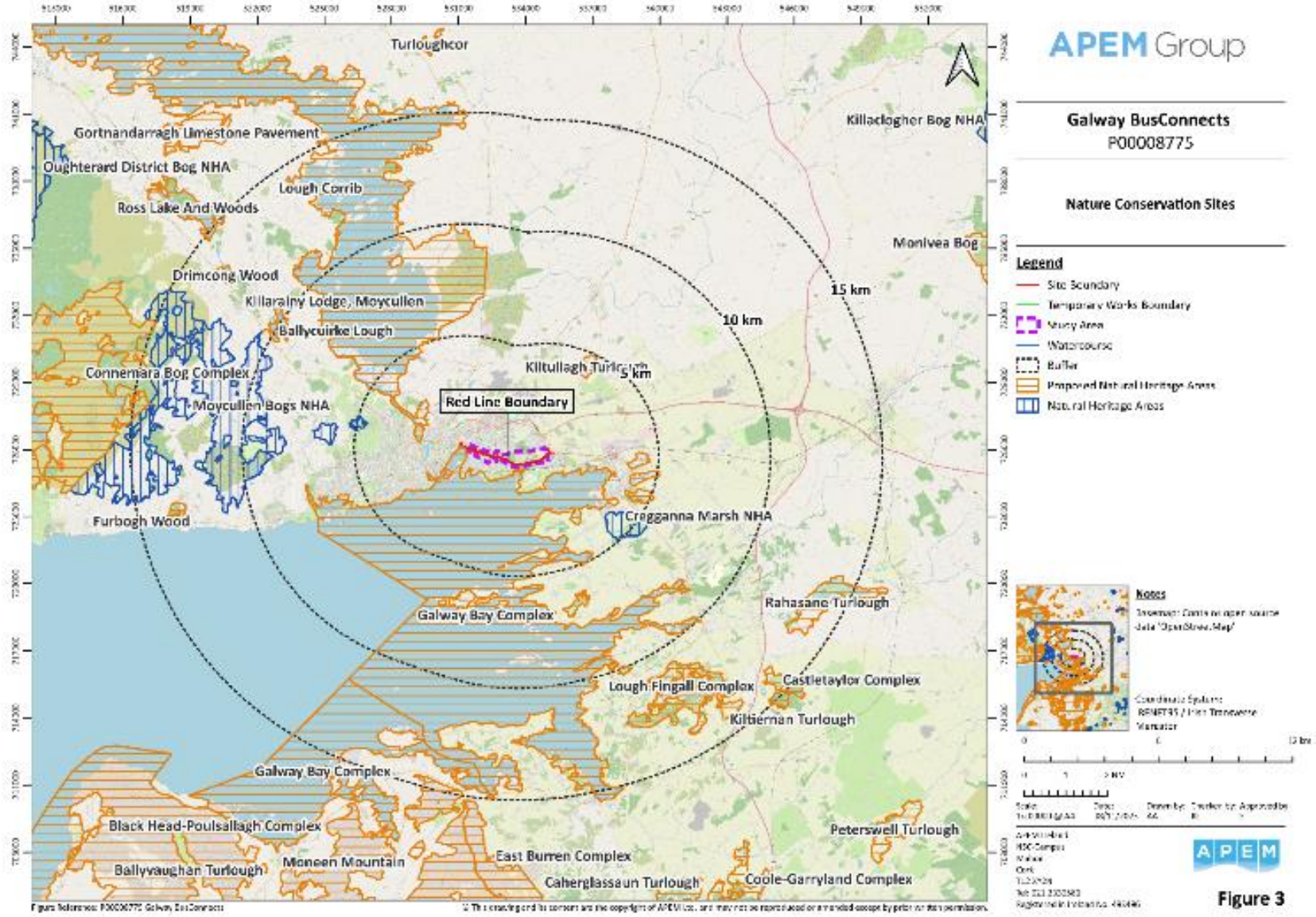

Figure 12-3 National Sites

12.3.3 Habitats, Flora and Fauna

12.3.3.1 Habitats and Flora

12.3.3.1.1 Overview

Habitat survey results are presented below by Habitat type, using Fossitt (2000). Habitat types are described in relation to their location and extent within the study area, as well as dominant and notable flora species present. The extent of habitat types are shown in habitat maps at the end of this section (refer to Figure 12-4, Figure 12-5, Figure 12-6, Figure 12-7). Potential affiliations with Annex I habitat types are described where appropriate. The habitat types recorded within the study area, as discussed in this section, are as follows:

- (Mixed) broadleaved woodland (WD1);
- Scattered trees and parkland (WD5);
- Oak-ash-hazel woodland (WN2);
- Scrub (WS1);
- Hedgerows (WL1);
- Treelines (WL2);
- Improved agricultural grassland (GA1);
- Amenity grassland (GA2);
- Dry meadows and grassy verges (GS2);
- Recolonising bare ground (ED3);
- Dense Bracken (HD1);
- Stone walls and other stonework (BL1); and
- Buildings and artificial surfaces (BL3).

In some sections of the dry meadows and grassy verges (GS2) habitat type, characteristic species of Annex I habitat types were recorded, and this has potential affiliations with Annex I Lowland Hay Meadows [6510]. Rare and protected plant species and invasive species are discussed in subsequent sections.

12.3.3.1.2 (Mixed) broadleaved woodland – WD1

This habitat was mainly represented to the south of the R388 near the middle section of the Proposed Development, as well as in the area of Merlin Park to the north. Species recorded include beech (*Fagus sylvatica*), common ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*) and non-native pine (*Pinus* sp.). Fossitt (2000) note that this habitat type is present when the majority (>75%) of trees observed are broadleaved species, including native/non-native varieties and a canopy greater than 5 m in height. Due to the protection status for woodland within the County Development Plan 2019-2025 (CDP), and the Galway City Development Plan 2023-2029, the woodlands within the Site would be considered as ecological corridors in the context of Article 10 of the Habitats Directive.

Habitat Evaluation: Due to the ecological value of the habitat in accordance with the CDP, the habitat type is deemed to be of ***Local Ecological Importance***.

12.3.3.1.3 Scattered trees and parkland – WD5

This habitat was represented in the study area on school grounds and where amenity grassland grades into scattered trees. Fossitt (2000) characterises this habitat type by a lack of canopy cover (<30%) but also the prominence of individual trees in the area. Species observed were ash, sycamore, and oak (*Quercus* sp.).

Habitat Evaluation: Due to the low ecological value of the habitat and the strict management regime, it is deemed to be of ***Site Ecological Importance***.

12.3.3.1.4 Oak-ash-hazel woodland – WN2

This habitat type is present in the study area in Merlin Park, primarily to the north of the Merlin Park Hospital. The canopy is dominated by ash and with a hazel (*Corylus avellana*) scrub layer. No oak species were recorded, however. Ground flora recorded include Ivy (*Hedera helix*), bramble (*Rubus fruticosus* agg), violet

(*Viola* sp.), lords and ladies (*Arum maculatum*), bluebells (*Hyacinthoides non-scripta*), primrose (*Primula vulgaris*) and ferns: hart's tongue fern (*Asplenium scolopendrium*), deer fern (*Blechnum spicant*) and royal fern *(Osmunda regalis*). Due to the protection status for green spaces such as Merlin Park within the CDP, as well as linkages and connectivity between the green spaces, the woodlands within the Site would be considered as ecological corridors in the context of Article 10 of the Habitats Directive.

Habitat Evaluation: Due to the ecological value of the habitat in accordance with the CDP, the habitat type is deemed to be of ***Local Ecological Importance***.

12.3.3.1.5 Scrub – WS1

This habitat was primarily represented on the fringes of woodland, grassland as well as in areas left unmanaged. Fossitt (2000) characterises this habitat type as shrubs, brambles and stunted trees, covering more than 50% of the observed area. Common species recorded in the study area include Hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), bramble, cleavers (*Galium aparine*) and nettle (*Urtica dioica*).

Habitat Evaluation: Due to the ecological value of the habitat and the location of this habitat within the wider habitats, the habitat type is deemed to be of ***Local Ecological Importance***.

12.3.3.1.6 Hedgerows – WL1

This habitat was represented by linear features of shrub and occasional trees within the survey area, present as field and property boundaries. The shrubs/trees were observed on raised banks and less than 4m wide. The hedges consisted of a mixture of flora, such as Hawthorn, honeysuckle (*Lonicera periclymenum*), bramble, bindweed (*Calystegia sepium*), blackthorn, spindle, common ash, nettle, and cleavers. Due to the importance of enhancing linkages and connectivity within the green network in the CDP, the hedgerows within the Site would be considered as ecological corridors in the context of Article 10 of the Habitats Directive.

Habitat Evaluation: Due to the ecological value of the habitat in accordance with the CDP, the habitat type is deemed to be of ***Local Ecological Importance***.

12.3.3.1.7 Treelines – WL2

This habitat was represented by linear trees present as field and property boundaries. Fossitt (2000) states that the canopy of these trees is to be greater than 5m in height and the width of the line no greater than 4m. Treelines were mostly present along the R388 and to the western and eastern extents as field boundaries. The trees consisted of a mixture of hawthorn, sycamore, horse chestnut (*Aesculus hippocastanum*), cypress (*Cupressus* sp.), hazel and common ash. Due to the importance of enhancing linkages and connectivity within the green network in the CDP, the treelines within the Site would be considered as ecological corridors in the context of Article 10 of the Habitats Directive.

Habitat Evaluation: Due to the ecological value of the habitat in accordance with the CDP, the habitat type is deemed to be of ***Local Ecological Importance***.

12.3.3.1.8 Improved agricultural grassland – GA1

This habitat is present in the study area mostly to the eastern extent of the Proposed Development with some small land parcels used for agriculture. Dominant species recorded included rye grasses (*Lolium* spp.), thistle (*Cirsium* spp.), curly leaved, narrow leaved and broad-leaved docks (*Rumex* spp.), ribwort plantain (*Plantago lanceolata)* and nettles.

Habitat Evaluation: Due to the low ecological value of the habitat and the management regime, it is deemed to be of ***Site Ecological Importance***.

12.3.3.1.9 Amenity grassland – GA2

This habitat was represented in the study area by primarily residential gardens, and on the grounds of hotels and the Merlin Park Hospital. The temporary construction compound also comprises this habitat type and is currently used as a sports pitch. Swards are kept short and well managed with low species diversity. Species present are clovers (*Trifolium* spp.), daisies (*Bellis perennis*) and plantains (*Plantago* spp.).

Habitat Evaluation: Due to the low ecological value of the habitat and the strict management regime, it is deemed to be of ***Site Ecological Importance***.

12.3.3.1.10 Dry meadows and grassy verges – GS2

This habitat was represented by two (western and eastern) of the three fields located to the south of Merlin Park Hospital. These fields are known locally as 'The Meadows' and it's understood these are mown once-twice annually. No grazing occurs by livestock, which is a characteristic of Dry Calcareous Grassland GS1. Species diversity was found to be high with characteristics species yellow rattle (*Rhinathus minor*), knappweed (*Knautia arvensis*), birds foot trefoil (*Lotus corniculatus*), ox-eye daisy (*Leucanthemum vulgare*) and grasses red fescue *(Festuca rubra*), cock's foot (*Dactylis glomerata*), Yorkshire fog (*Holcus lanatus*), timothy grass (*Phleum pratense*), quaking grass (*Briza media*) and created dog's tail (*Cynosurus cristatus*). Other species recorded include red clover (*Trifolium pratense*), white clover (*Trifolium repens*), ribwort plantain, eyebright (*Euphrasia officinalis*), sorrel (*Rumex acetosa*), common spotted orchid (*Dactylorhiza fuchsia*), O'Kelly's spotted orchid (*Dactylorhiza fuchsia var. okellyi*) and St John's wort (*Hypericum perforatum*). The grassland is noted to be orchid rich but with common spotted orchid dominant.

Characteristic species for Annex I lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510] were absent from the study area, however, due to the dominant yellow rattle and red fescue, this would be classified as community 3e *Festuca rubra – Rhinanthus minor* under the Irish Semi-natural grasslands survey and thus corresponds to the Annex I Lowland Hay Meadows habitat type [6510] (O'Neill *et al*., (2013).

Habitat Evaluation: Due to the ecological value of the habitat and the affinity to Annex I habitat lowland hay meadows [6510], the habitat type is deemed to be of ***National Ecological Importance***.

The remaining middle field is dominated by grassland species cock's foot, Yorkshire fog, timothy grass, quaking grass, red fescue and created dog's tail and comprises fewer vascular species. Common ragwort *Senecio jacobaea* is also present in parts. Although present, yellow rattle and red fescue are not dominant. This field is not characteristic of community 3e *Festuca rubra – Rhinanthus minor* under the Irish Semi-natural grasslands survey and thus do not correspond to the Annex I lowland hay meadows habitat type [6510].

Habitat Evaluation: Due to the ecological value of the habitat and the connectivity to the adjacent fields with affinity to Annex I habitat lowland hay meadows [6510], the habitat type is deemed to be of ***Local Ecological Importance***.

12.3.3.1.11 Recolonising bare ground – ED3

This habitat was represented in the study area with artificial surfaces, such as tarmac and concrete, which have been recolonised with over 50% vegetation cover (Fossitt, 2000), This is present in small, fragmented sections primarily to the east of the study area. Species recorded include nettles, willowherbs (*Epilobium* spp.), ribwort plantain and dandelion (*Taraxacum* sp.).

Habitat Evaluation: Due to the low ecological value of the habitat and the prevalence of the habitat type within the greater surroundings, it is deemed to be of ***Site Ecological Importance***.

12.3.3.1.12 Dense Bracken – HD1

This habitat was represented in the study area as the edges of the Meadow fields to the north of the R388 road. In general, this habitat type acts as a buffer between the existing road and the grassland fields in the

meadows. Bracken (*Pteridium aquilinum*) is the dominant and only plant species recorded in this habitat type. Bracken forms dense stands here and dies back in the winter.

Habitat Evaluation: This habitat type in general has a low ecological value but does provide some shelter for mammals and other wildlife. This habitat type is deemed to be of ***Local Ecological Importance.***

12.3.3.1.13 Stone walls and other stonework – BL1

This habitat was represented by stonewalls in the study area, primarily to the north of the R388 and south of Merlin Park. The main feature was that of dry stone and mortar that occur as field/property boundaries. Species observed included ivy (*Hedera helix*), spleenwort (*Asplenium trichomanes*) and Ivy-leaved toadflax (*Cymbalaria muralis*). Due to the protection status for stone walls within the CDP, the stone walls within the Site would be considered as ecological corridors in the context of Article 10 of the Habitats Directive.

Habitat Evaluation: Due to the ecological value of the habitat in accordance with the CDP, the habitat type is deemed to be of ***Local Ecological Importance***.

12.3.3.1.14 Buildings and artificial surfaces – BL3

This habitat type is dominant in the urban study area. This is best represented by residential housing, roads, derelict structures, commercial properties, car parks, and pavements. The gardens present within the western section of the Proposed Development comprise ornamental flora species and flower beds.

Habitat Evaluation: Due to the low ecological value of the habitat and the prevalence of the habitat type within the greater surroundings, it is deemed to be of ***Site Ecological Importance***.

Refer to Figure 12-4, Figure 12-5 and Figure 12-6 below for habitat map.

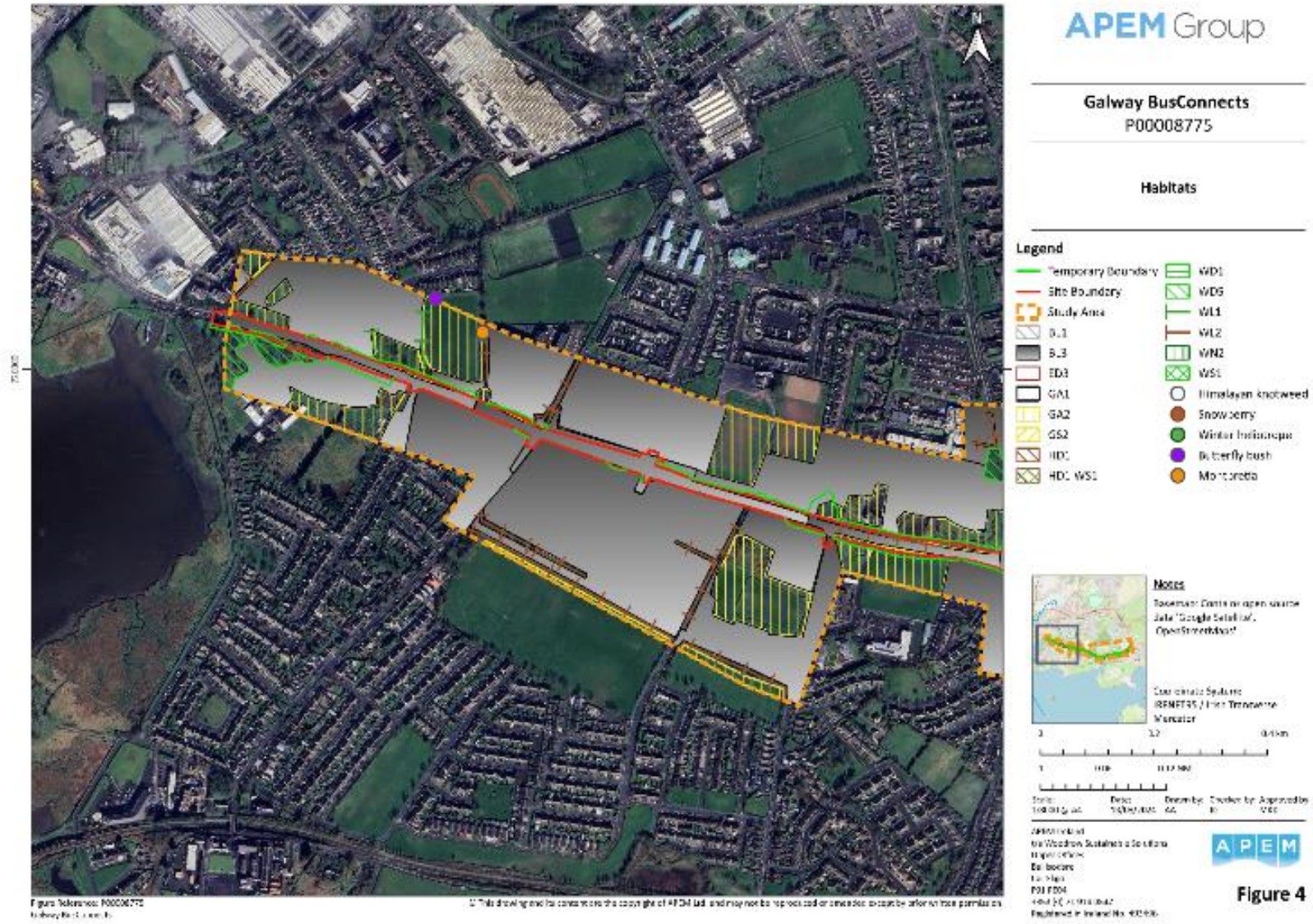

Figure 12-4 Habitat map – showing western section.

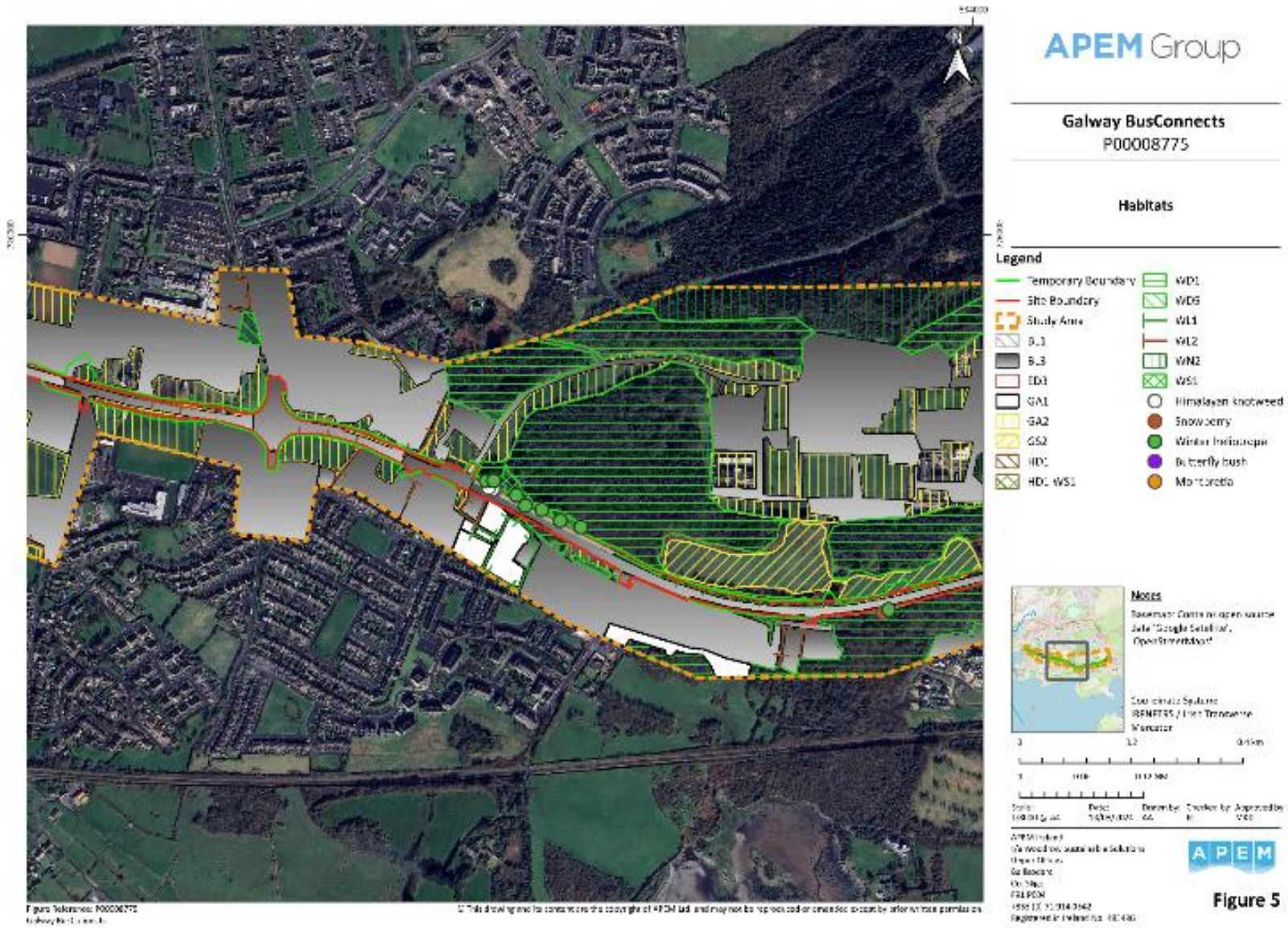

Figure 12-5 habitat map - showing central section.

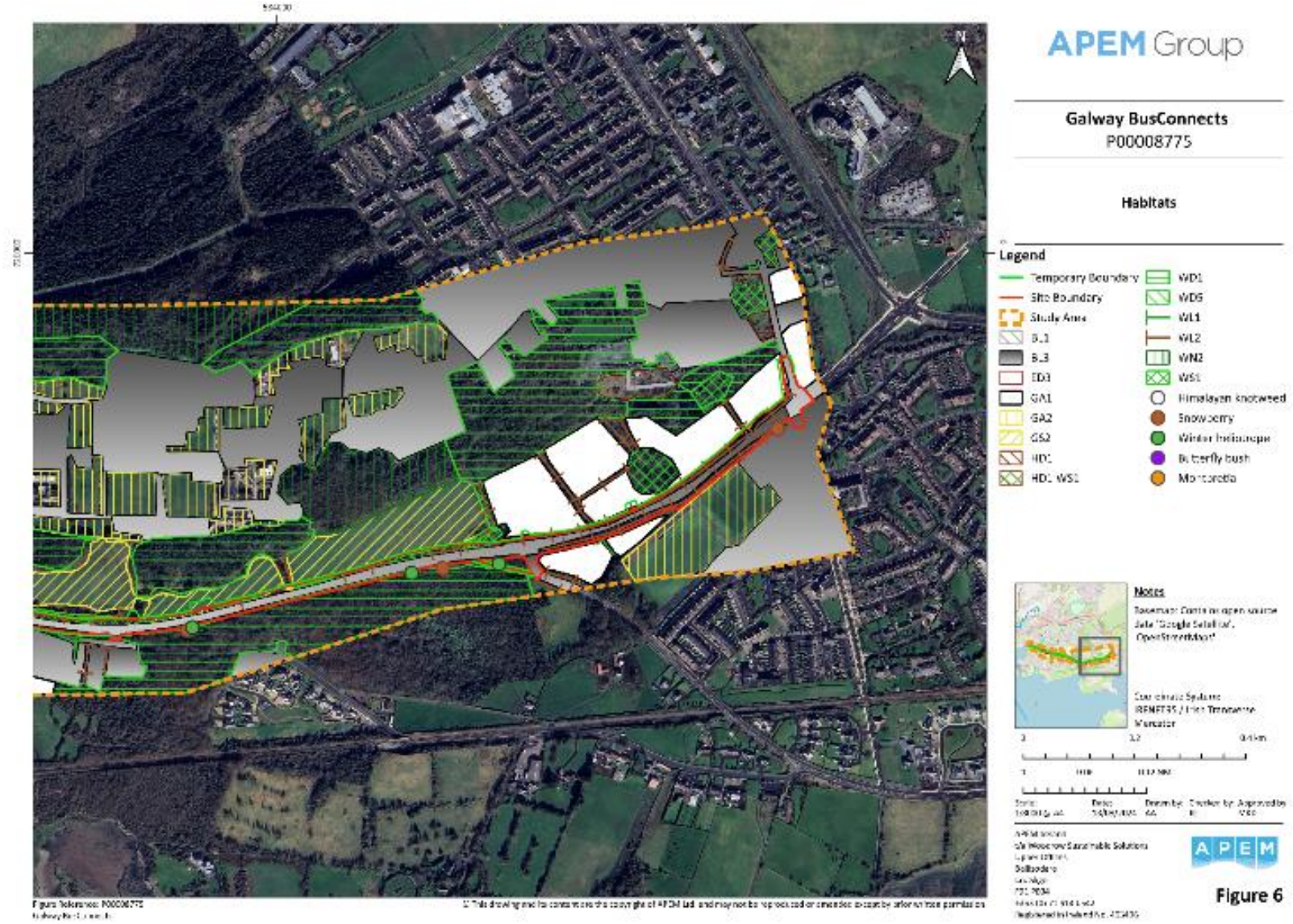

Figure 12-6 Habitat map – showing eastern section.

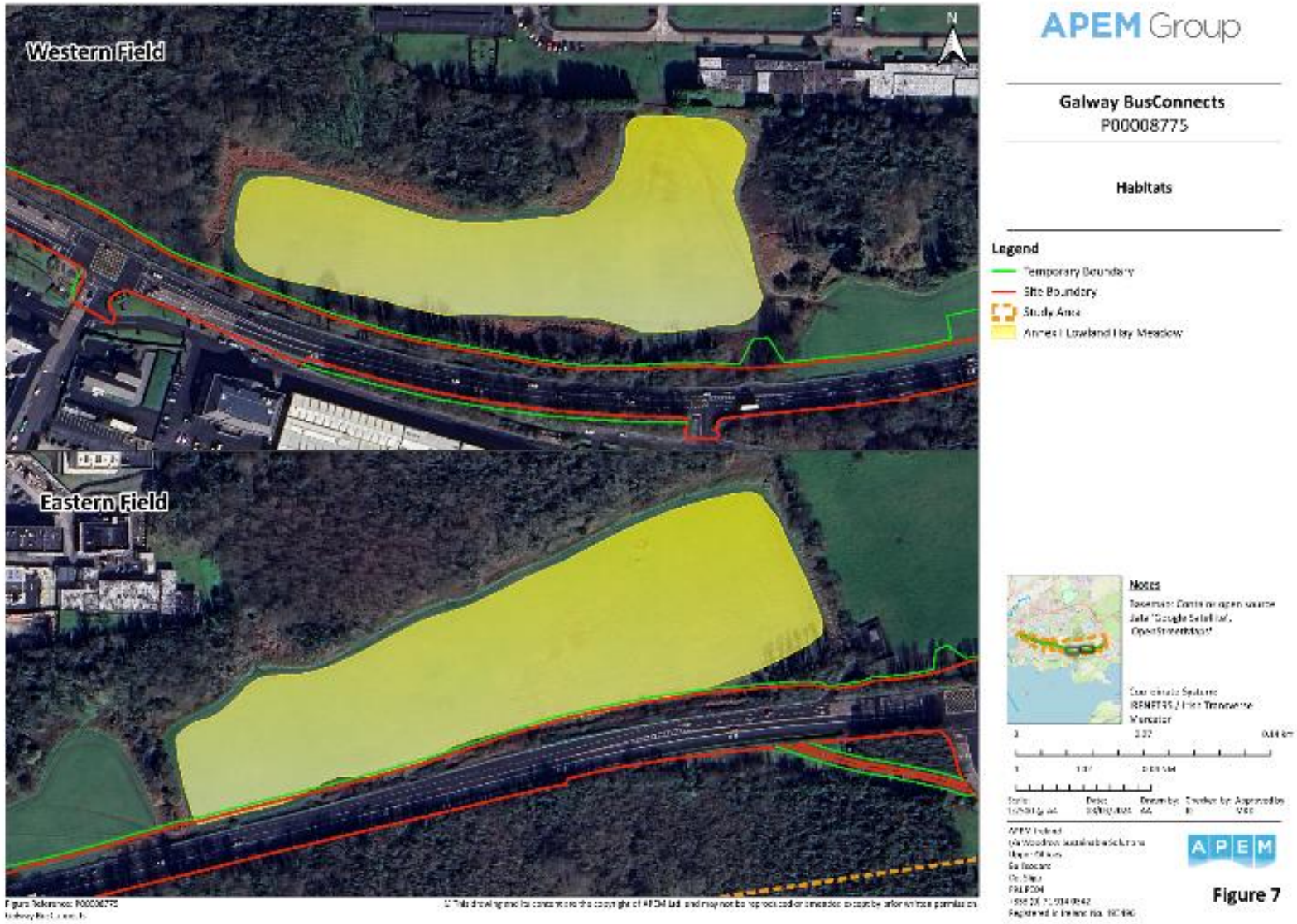

Figure 12-7 Habitat map – Annex I Lowland Hay Meadow

12.3.3.1.15 Protected Flora

No rare or protected plant species listed on the Flora (Protection) Order 2022 were identified within the footprint of the Proposed Development during the habitat survey.

The desk study found that there are no Flora Protection Order records within the 10km grid square M32 within which the Site is situated (NBDC, 2023).

Evaluation: The Site is assessed as being of ***Site Ecological Value*** only for protected flora species.

12.3.3.1.16 Non-Native Invasive Flora Species

Desk Study

Desk study results revealed that 17 non-native invasive flora species have been recorded within the 10 km grid square M32 (NBDC, 2023). These species are listed as both high and moderate impact non-native invasive species as identified by Biodiversity Ireland and Kelly *et al* (2013); refer to Table 12-5 below for the species and their level of impact.

Table 12-5 Invasive flora species recorded within 10 km grid square M32 (NBDC, 2023)

Name	Date of Last Record	Impact Level	Designation
Butterfly-bush (*Buddleja davidii*)	24/01/2023	Medium	No
Cherry Laurel (*Prunus laurocerasus*)	18/05/2017	High	No
Common Broomrape (*Orobanche minor*)	14/06/2020	Medium	No
Bohemian Knotweed (*Fallopia japonica x sachalinensis* = F. x *bohemica)*	23/08/2022	High	Invasive Species under Regulation S.I. 477 of 2011 (Ireland). 'Third Schedule' species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 as amended (Under Vectors Part 3 – Soil or spoil from infested areas)
Giant Hogweed (*Heracleum mantegazzianum*)	31/07/2013	High	Invasive Species under Regulation S.I. 477 of 2011 (Ireland). 'Third Schedule' species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations –2011 as amended
Himalayan Honeysuckle (*Leycesteria formosa*)	14/07/2019	Medium	No
Himalayan Knotweed (*Persicaria wallichii*)	13/07/2016	Medium	Invasive Species under Regulation S.I. 477 of 2011 (Ireland). 'Third Schedule' species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 as amended
Japanese Knotweed (*Fallopia japonica*)	18/05/2017	High	Invasive Species under Regulation S.I. 477 of 2011 (Ireland).

Name	Date of Last Record	Impact Level	Designation
			'Third Schedule' species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations –2011 as amended
Japanese Rose (*Rosa rugosa*)	01/05/2017	Medium	No
Narrow-leaved Ragwort (*Senecio inaequidens*)	16/08/2019	Medium	No
Pampas-grass (*Cortaderia selloana*)	04/11/2021	Medium	No
Rhododendron *Rhododendron ponticum*	29/08/2015	High	Invasive Species under Regulation S.I. 477 of 2011 (Ireland). 'Third Schedule' species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 as amended
Sycamore (*Acer pseudoplatanus*)	29/09/2015	Medium	No
Three-cornered Leek (*Allium triquetrum*)	23/03/2022	Medium	Invasive Species under Regulation S.I. 477 of 2011 (Ireland). 'Third Schedule' species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 as amended
Traveller's-joy (*Clematis vitalba*)	25/08/2020	Medium	No
Wall Cotoneaster (*Cotoneaster horizontalis*)	23/04/2020	Medium	No
Wild Parsnip (*Pastinaca sativa*)	16/08/2019	Medium	No

Field Survey

Field surveys identified Himalayan knotweed in one location within the study area. This area has multiple stands and was noted to have grown in size from surveys between 2023 and 2024. This is located behind a stone wall in an area of scrub to the north of the R338 at Merlin Park, as shown in Figure 12-4, Figure 12-5 and Figure 12-6. Winter heliotrope (*Petasites pyrenaicus*) was also recorded in multiple locations within this area and is common along the fringes of woodland throughout the study area. Snowberry (*Symphoricarpos albus*) was also recorded in multiple locations but was most commonly recorded to the south of the R338 scattered within treelines, hedgerows and the edges of woodland habitat. RPS (2020) did note the presence of Japanese knotweed near the entrance to Merlin park during ecological surveys. No evidence of this was found during the current surveys, but the Himalayan knotweed was observed not far from here. Within the temporary construction compound, butterfly-bush (*Buddleja davidii)* and montbretia *(Crocosmia x crocosmiiflora)* were recorded on the edges of the sports pitch. Refer to Figure 12-4, Figure 12-5 and Figure 12-6.

Evaluation: the Site is assessed as being of ***Local Ecological Value*** only for non-native invasive species.

12.3.3.2 Fauna

Protected and notable fauna are presented in Table 12-6 below. Using best judgement and existing species data from the M32 grid square (NBDC, 2023) the desk study illustrates protected and notable species recorded as present within study area in the last ten years. No non-native invasive fauna species subject to regulations were recorded as present in this data set.

12.3.3.2.1 Non-Volant Mammals

Desk Study

Table 12-6 presents the findings of the desktop study for non-volant mammals within the 10km grid square M32 (NBDC, 2023).

The conservation categories in Table 12-6 are based on the checklist of protected and threatened species in Ireland (Wildlife Manuals, No. 116.).

Table 12-6 Non-Volant Mammals Species recorded within 10 km grid square M32 (NBDC, 2023)

Mammal Name	Year of last record	Record count	EU HD*	WA**	Conservation Status (Marnell et al. 2019)
Badger (*Meles meles*)	2021	48		✓	Least Concern
Hedgehog (*Erinaceus europaeus*)	2022	154		✓	Least Concern
Otter (*Lutra lutra*)	2021	15	II IV	✓	Least Concern
Pine marten (*Martes martes*)	2020	3	V	✓	Least Concern
Red squirrel (*Sciurus vulgaris*)	2015	70		✓	Least Concern
Eurasian Pygmy Shrew (*Sorex minutus*)	2016	1		✓	Least Concern

* European Council, Habitats Directive 92/43/EEC
** Wildlife Act 1976, as amended

Red squirrel has been recorded within the Merlin Park Woodlands to the north of the Proposed Development by local wildlife groups.

Field Survey

During the site surveys none of the species listed in Table 12-6 were observed nor evidence of their usage of the area witnessed. The most suitable habitat present within the study area for these species is within the eastern section of the Proposed Development within and around Merlin Park. This area is suitable for all the species listed in Table 12-6. This area is, however, a popular dog walking area and any evidence that these species are present would have been removed or obscured by human / dog presence. There are, however, numerous pictures/ documented sightings of species within the area of Merlin Park. The area of Rosshill Park Woods, south of the Proposed Development, is also suitable for all the species listed in Table 12-6, but again is a popular area for walkers. Some mammal trails were noted to the rear of residential housing within the temporary construction compound area which is currently used and maintained as a sports pitch. These trails led into gardens of the houses and are expected to be a result of domesticated animals associated with the housing.

Evaluation: Due to the numerous documented sightings of non-volant mammals within the study area, the Site is assessed as being of ***Local Ecological Importance*** in relation to non-volant mammals.

12.3.3.2.2 Bats

All bat species in Ireland, and their breeding and resting places, are protected under the Wildlife Act 1976, as amended. All bat species are also listed on Annex IV of the Habitats Directive, with the lesser horseshoe bat also listed on Annex II.

Desk study

Bat records for the study area are outlined in Table 12-7 below. There were three records of Lesser Horseshoe Bat *Rhinolophus hipposideros* returned from the desk study grid square M32 (NBDC, 2023).

Table 12-7 Bat Species recorded within 10 km grid square M32 (NBDC, 2023)

Bat Name	Legal Protection	Year of Last Record	Record count	Conservation Status (Marnell et al. 2019)
Lesser Horseshoe Bat (*Rhinolophus hipposideros*)	EU Habitats Directive: Annex II, Annex IV. Wildlife Act 1976, as amended.	2015	3	Least Concern
Brown Long-eared Bat (*Plecotus auritus*)	EU Habitats Directive: Annex IV. Wildlife Act 1976, as amended.	2008	1	Least Concern
Lesser Noctule (Nyctalus leisleri)	EU Habitats Directive: Annex IV. Wildlife Act 1976, as amended.	1999	1	Least Concern
Pipistrelle (*Pipistrellus pipistrellus* sensu lato)	EU Habitats Directive: Annex IV. Wildlife Act 1976, as amended.	2009	2	Least Concern
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	EU Habitats Directive: Annex IV. Wildlife Act 1976, as amended.	2009	3	Least Concern

Previous surveys were also undertaken by RPS (Dublin Road Bus Corridor Environmental Feasibility Report 2020) in the study area. This involved a site walkover survey to assess habitats in Merlin Park. In relation to bats, the report notes the presence of Lesser Horseshoe Bat records within the 10 km grid square M32. RPS (2020) also state *'Lesser horseshoe bat are unlikely to utilise habitats within the proposed development footprint or its immediate environs as a breeding or roosting habitat. Some features such as established buildings, treeline and hedgerow habitats in the wider vicinity may be utilised as a summer roosting and foraging habitat'.*

Bat Landscape Suitability

The landscape suitability index, as generated by Lundy *et al* (2011) for bat species within the Site, is detailed in Figure 12-8 and Figure 12-9. The model suggests that the study area is of high landscape suitability for bat species on an average basis in the western section of the Proposed Development and moderate landscape suitability for bat species on an average basis in the eastern section of the Proposed Development.

Figure 12-8 Western section identifying High Landscape Suitability Index (NBDC, 2023).

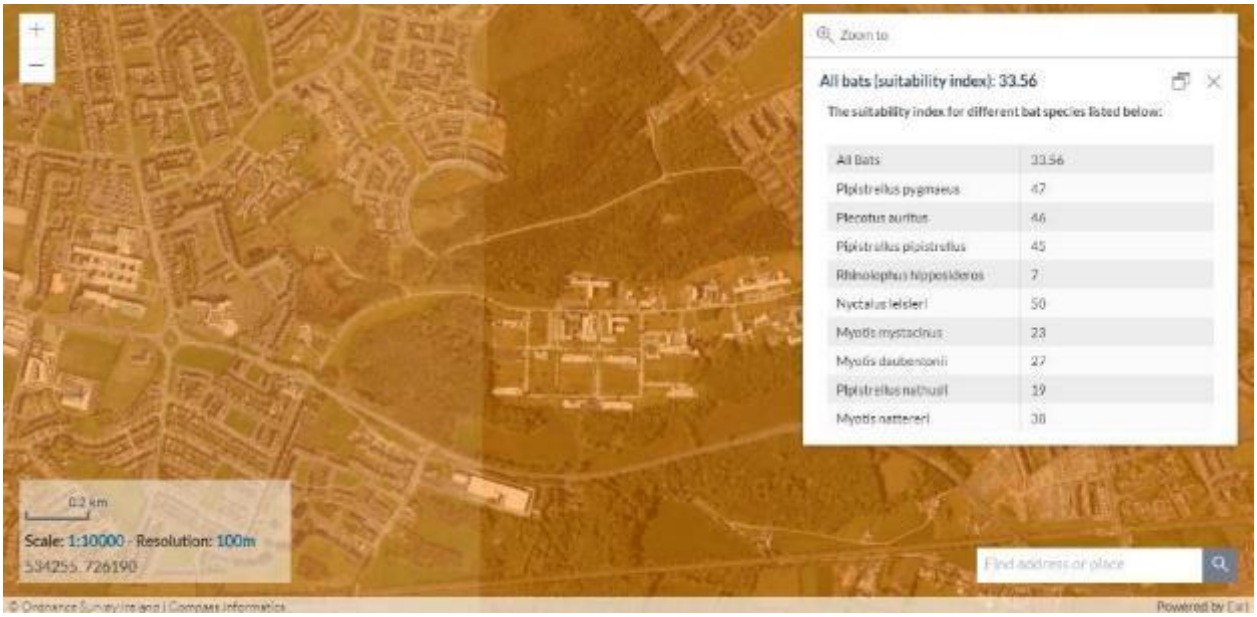

Figure 12-9 Eastern section identifying moderate Landscape Suitability Index (NBDC, 2023).

Field Survey

Buildings and Structures

There are buildings in the vicinity that comprise potential suitable roosting habitat for bat species. These areas are outside the study area and the footprint of the Proposed Development, which is confined to areas along the existing road infrastructure. Therefore, these buildings were removed from further assessment. Within the study area, the Proposed Development requires the demolition of two single storey buildings within the grounds of the Brothers of Charity to the eastern extent of the Proposed Development. These buildings are located immediately adjacent to the road and behind a stone wall. An external inspection was undertaken of these affected buildings on the 27th of March 2024. The buildings are single storey and have a flat felt roof. The buildings were found to be in generally good condition, well-sealed and no suitable potential entry / exit points were noted in the structures that could be used by bats. No droppings or other evidence of bat usage was found during the inspection. The buildings were assessed as having negligible potential for bat roosting and therefore were not required to be subject to further surveys.

Trees

There are multiple mature trees within the study area that have potential to be used by roosting bats. In general, the majority of these mature trees are located on the fringes of woodland habitat in Merlin Park south of the hospital. While there are some conifer species which are unsuitable, species such as oak, beech and some common ash covered in dense ivy were identified as having moderate potential for bats. Potential Roost Features (PRFs) identified include ivy, lifting bark, knotholes, and broken limbs. Much of these are located to the north of the middle and eastern Merlin Meadows fields. It is noted however that these trees are affected by some light spill from the existing R338, due to the lack of treeline along the boundary providing no barrier to light spill. Some trees along the R338 on the western field that will require felling to facilitate the Proposed Development were found to have low potential for bat roosting, but many of these trees are also in good condition and have a lack of PRFs. Artificial lighting does reduce the suitability of some mature trees along the road which were identified as having PRFs suitable for usage by bats. Some trees bounding the road along Rosshill Park Woods, located south of the existing road, were found to have some potential for bats. A small number of sycamores, common ash and horse chestnut trees were noted to have PRFs in the form of dense ivy, which may conceal further PRFs. However, due to their location along the busy R338 road and the presence of street lighting, these trees are considered unlikely to be used and are noted to have a low suitability for bats. Two Sycamore trees to the eastern boundary of the temporary construction compound were noted to have low potential for bats due to PRFs noted. Flood lighting is also present here as the area is currently used and maintained as a sports pitch, and this reduces the likelihood of these trees being used by bats to negligible potential.

Activity Surveys

Four bat activity surveys were undertaken as part of the field surveys as outlined in the methodology section.

Survey year 2023

The first activity survey on 13th June 2023 revealed that three species of bat use the study area for foraging and commuting. Transects were walked along the Meadows, fringes of Merlin Park woodland and along the eastern section of the existing R338. These areas were identified during the daytime walkover as having moderate to high potential habitat for bats and so the transects were focussed on these areas. Areas covered by the transects are illustrated in Figure 12-10. Species recorded include common pipistrelle, soprano pipistrelle and Leisler's bat. Leisler's bat were the first species recorded, which is typical of this species, being an early emerger. Leisler's bat were the most commonly recorded species foraging throughout the Meadows fields. Leisler's bats frequently roost in trees and so there is potential for a roost to be located within the area of Merlin Park due to the early recordings. Soprano pipistrelles were commonly recorded along the woodland edges north of the Meadows, as well as near streetlights on the eastern Meadows field southern treeline. Common pipistrelles were recorded mostly along the northern boundaries of the Meadow fields near the woodland. The most significant foraging corridor is along the woodland edges north of the Meadows fields. Activity was noted to be low-moderate within the first hour of the survey, with activity levels dropping significantly after this point. Very little activity was recorded along the eastern end of the R338 road. Light spill was noted to be significant from the road, affecting commuting and foraging corridors in the vicinity. The western Meadows field is the least affected, due to the dense mature treeline to the southern boundary providing a barrier to light spill. Lights are noted to be bright white LED streetlights.

The second activity survey on 2nd July 2023 revealed similar results to the initial survey in June. The transects walked were similar as those during the June surveys; along the Meadows, fringes of Merlin Park woodland and the eastern section of the R338. Species recorded include common pipistrelle, soprano pipistrelle and Leisler's bat. However, Soprano pipistrelle was noted to be more commonly recorded during the July 2023 survey when compared to the June 2023 survey. Activity levels were noted to be higher, in particular with regard to soprano pipistrelle, which may be due to the change of weather conditions. The July survey was conducted following a warm dry day, whereas the June survey was conducted following some thundery showers during the day. Activity was concentrated on the northern boundary of the meadows on the fringes of woodland. Similar to June's results, very little activity was recorded along the road, the

eastern end of the R338. Activity also dropped significantly after the first hour of the survey. Light spill was noted to be the same as the June survey.

Survey year 2024

The first activity survey in 2024 was undertaken on the 30th of July and results were considered to be similar to those in 2023. The transects walked were the same as those previously, along the Meadows, fringes of Merlin Park woodland and the eastern section of the R338. Species recorded include common pipistrelle, soprano pipistrelle and Leisler's bat. Weather conditions were warm, followed by a dry day. Activity levels were noted to be similar to those in the 2023 surveys, if slightly lower than previous, with activity focussed either on the northern boundary of the meadows on the fringes of woodland, or ad hoc commuting to the south of these fields. Again, very little activity was recorded along the road itself. No changes were noted with regards to the lighting regime. It is noted that the Meadows fields had been cut earlier that day, which could have resulted in lower abundances of prey items.

The second activity survey in 2024 was undertaken on the 20th of August. Transects walked were the same as those undertaken previously, along the Meadows, fringes of Merlin Park woodland and the eastern section of the R338. Species recorded include common pipistrelle and soprano pipistrelle, with no Leisler's bat recorded as before. This survey was undertaken following a period of unsettled wet and windy weather, but the night was dry with a light breeze. Activity during this survey was considered to be notably lower than previous surveys in 2023 and 2024, with only a few common or soprano pipistrelles recorded for the duration of the survey. This is considered likely to be due to weather conditions being unsettled, but also may be due to the lower prey abundance due to an earlier cut of the meadow fields than previous years. This may have resulted in some displacement. However, bats recorded were found to use the same areas of habitat as previous, with the main foraging / commuting corridor being towards the north of the meadow fields along the fringes of woodland, and very little activity recorded along the R338 road itself.

Evaluation: Due to the activity levels and species recorded, the Site is assessed as being of ***Local Ecological Importance*** in relation to bats.

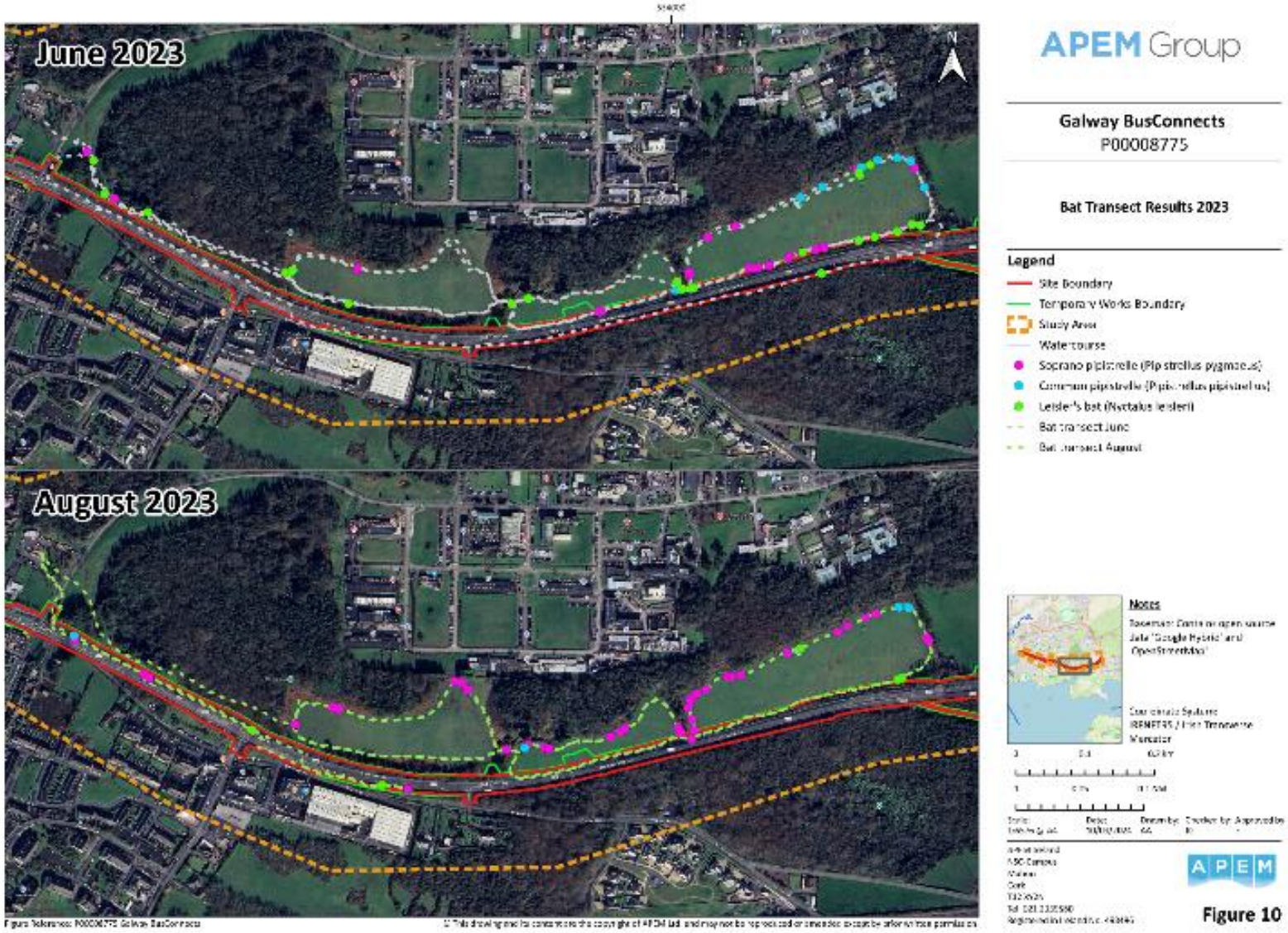

Figure 12-10 2023 Bat Survey Results.

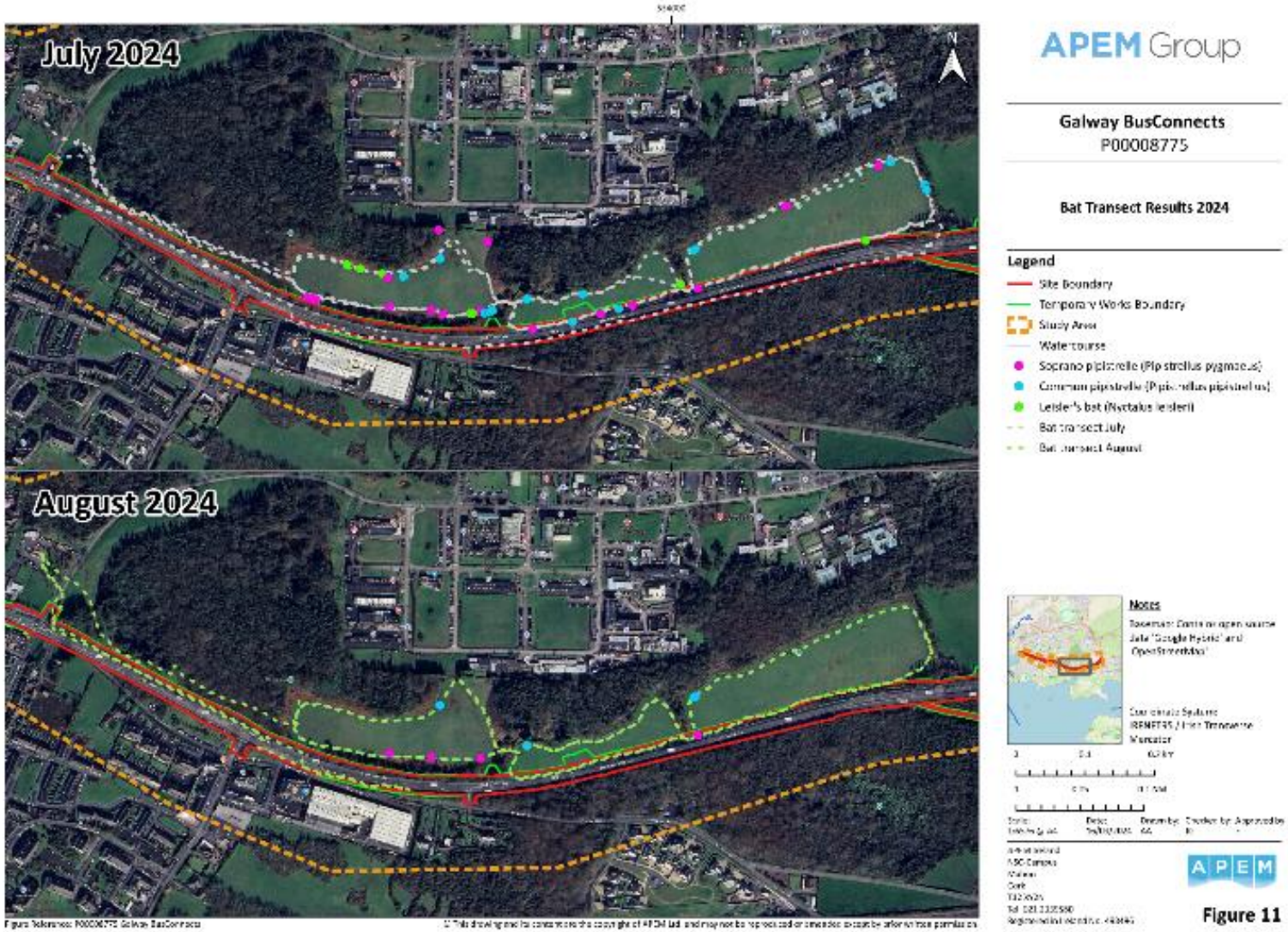

Figure 12-11 2024 Bat Survey Results.

12.3.3.2.3 Marine Mammals

Six marine mammal species were reported as present in the desk study grid square M32 records (NBDC 2023) (Table 12-8). This area covers Galway bay adjacent to the Proposed Development. Both Seal species (*Phoca vitulina* and *Halichoerus grypus*) are listed as Least Concern (Marnell et al. 2019). Other species listed were not assigned a conservation status. All marine mammal species recorded are listed as protected under the EU Habitats Directive and Wildlife Act 1976, as amended.

Table 12-8 Marine Mammal Species recorded within 10 km grid square M32 (NBDC, 2023)

Marine Mammal Name	Year of last record	Record count	EU HD*	WA**	Conservation Status
Bottle-nosed Dolphin (*Tursiops 36arina36a36*)	2020	158	II, IV	✓	
Common Dolphin (*Delphinus delphis*)	2019	5	IV	✓	
Common Porpoise (*Phocoena 36arina36a*)	2017	6	II, IV	✓	Threatened Species: OSPAR Convention
Common Seal (*Phoca vitulina*)	2020	775	II, V	✓	LC (Marnell et al. 2019)
Grey Seal (*Halichoerus grypus*)	2019	10	II, V	✓	LC (Marnell et al. 2019)
Striped Dolphin (*Stenella coeruleoalba*)	2014	3	IV	✓	

* European Council, Habitats Directive 92/43/EEC
** Wildlife Act 1976, as amended

Evaluation: the Site is assessed as being of ***No Ecological Value*** for marine mammal species. This is due to the footprint of the Proposed Development being outside of habitats used for these listed species.

12.3.3.2.4 Birds

All wild birds, and their nests and eggs, are protected under the Wildlife Act 1976, as amended. Some bird species are also listed in Annex I, II or IV of the Birds Directive, and / or as SCIs within designated European sites.

Desk Study

The full results of the desk study, including records of breeding and wintering bird species considered to be of conservation concern, are presented in the accompanying NIS (APEM, 2024). These species are considered to be KERs of the Proposed Development and include the following:

- Qualifying Interest of SPAs;
- Species listed under Annex I of the Birds Directive; and
- Red and Amber Birds of Conservation Concern in Ireland (BoCCI) species listed for their breeding populations (Gilbert *et al.* 2021).

A total of 44 currently Red and Amber listed Avifauna species as per Gilbert et al. (2021) have been recorded within the 10km grid square M32 (NBDC, 2023). These species and those protected under the EU Habitats Directive are detailed in Table 12-9.

Table 12-9 Avifauna Species recorded within 10 km grid square M32 (NBDC, 2023) identifying Red and Amber listed BoCCI species and species listed on an Annex of the Bird Directive

Name	Year of last record	BoCCI status	Annex List
Arctic Tern (*Sterna paradisaea*)	2016	Amber	No
Balearic Shearwater (*Puffinus mauretanicus*)	2018	Red	No
Barn Owl (*Tyto alba*)	2019	Red	No
Barn Swallow (*Hirundo rustica*)	2017	Amber	No
Barnacle Goose (*Branta leucopsis*)	2020	Amber	No
Bar-tailed Godwit (*Limosa lapponica*)	2020	Red	No
Black-headed Gull (*Larus ridibundus*)	2023	Amber	No
Black-tailed Godwit (*Limosa limosa*)	2020	Red	No
Brent Goose (Branta bernicla)	2020	Amber	No
Common Goldeneye (*Bucephala clangula*)	2011	Red	Annex II
Common Kestrel (*Falco tinnunculus*)	2022	Red	No
Common Kingfisher (*Alcedo atthis*)	2023	Amber	Yes
Common Linnet (*Carduelis cannabina*)	2023	Amber	No
Common Pheasant (*Phasianus colchicus*)	2022		Annex II, Annex III

Common name	Year of last record	BoCCI status	Annex List
Eurasian Teal (*Anas crecca*)	2023	Amber	Annex II, Annex III
Eurasian Wigeon (*Anas penelope*)	2022	Red	Annex II, Annex III
Eurasian Woodcock (*Scolopax rusticola*)	2001	Red	No
European Golden Plover (*Pluvialis apricaria*)	2020	Red	Annex I, Annex II, Annex III
European Shag (*Phalacrocorax aristotelis*)	2017	Amber	No
Gadwall (*Anas strepera*)	2022	Amber	Annex II
Great Cormorant (*Phalacrocorax carbo*)	2023	Amber	No
Great Crested Grebe (*Podiceps cristatus*)	2020	Amber	No
Herring Gull (*Larus argentatus*)	1991	Amber	No
House Martin (*Delichon urbicum*)	2011	Amber	No
House Sparrow (*Passer domesticus*)	2011	Amber	No
Mallard (*Anas platyrhynchos*)	2018	Amber	No
Mew Gull (*Larus canus*)	2011	Amber	No
Mute Swan (*Cygnus olor*)	2018	Amber	No

Name	Year of last record	BoCCI status	Annex List
Common Pochard (*Aythya 38arina*)	2020	Red	Annex II, Annex III
Common Redshank (*Tringa totanus*)	2023	Red	No
Common Shelduck (*Tadorna tadorna*)	2023	Amber	No
Common Snipe (*Gallinago gallinago*)	2023	Red	Annex II, Annex III
Common Starling (*Sturnus vulgaris*)	2023	Amber	No
Common Swift (*Apus apus*)	2022	Amber	No
Common Tern (*Sterna hirundo*)	2020	Amber	Annex I
Common Wood Pigeon (*Columba palumbus*)	2023		Annex II, Annex III
Corn Crake (*Crex crex*)	2014	Red	Annex I
Dunlin (*Calidris alpina*)	2020	Red	Annex I
Eurasian Curlew (*Numenius arquata*)	2023	Red	Annex II

Common name	Year of last record	BoCCI status	Annex List
Northern Lapwing (*Vanellus vanellus*)	2011	Red	No
Northern Shoveler (Anas clypeata)	2022	Red	Annex II, Annex III
Northern Wheatear (*Oenanthe oenanthe*)	2021	Amber	No
Peregrine Falcon (*Falco peregrinus*)	2022		Annex I
Red-breasted Merganser (*Mergus serrator*)	2020		Annex II
Rock Pigeon (*Columba livia*)	2022		Annex II
Sandwich Tern (*Sterna sandvicensis*)	2019	Amber	Annex I
Sky Lark (*Alauda arvensis*)	2021	Amber	No
Whooper Swan (*Cygnus cygnus*)	2021	Amber	Annex I
Yellowhammer (*Emberiza citrinella*)	2021	Red	No

Field Survey

The wintering bird surveys included a walked transect through the Meadow fields in Merlin Park, as well as a watch near Lough Atalia to the west of the Proposed Development. Species recorded during these surveys are included in Table 12-10 and Table 12-11 below. Activity along the Meadow fields included common passerine and corvid species, engaging in a range of behaviours including calling, foraging, flying and perching. Species recorded during the watches at Lough Atalia were as expected for the area, comprising gulls, ducks, and a variety of waders. All VP watches were undertaken from a VP location at Lat Long co-ordinates 53.28075128, -9.0323594. Lough Atalia is a popular foraging site for these birds, with roosting behaviour also noted. The most notable species during the course of surveys were kingfisher, snipe and little egret, which were all recorded at Lough Atalia during VP surveys.

Table 12-10 Bird species recorded during wintering bird surveys (Dec-Mar 2022/23).

Species	Conservation Concern (2020-2026)	Annex List
Blackbird *(Turdus merula)*	Green listed	Annex II
Black-headed Gull *(Chroicocephalus ridibundus)*	Amber-listed	No
Blue tit *(Cyanistes caeruleus)*	Green listed	No
Chaffinch *(Fringilla coelebs)*	Green listed	No
Coal tit *(Periparus ater)*	Green listed	No
Herring gull *(Larus argentatus)*	Amber-listed	No
Hooded crow *(Corvus cornix)*	Green listed	No
Northern Lapwing (*Vanellus vanellus*)	Red listed	Annex II
Little Egret (*Egretta garzetta*)	Green listed	Annex I
Magpie *(Pica pica)*	Green listed	No
Mistle thrush (*Turdus viscivorus*)	Green listed	Annex II
Redwing (*Turdus iliacus*)	Red listed	Annex II
Robin *(Erithacus rubecula)*	Green listed	No
Song thrush *(Turdus philomelos)*	Green listed	Annex II
Wood pigeon *(Columba palumbus)*	Green listed	Annex II, Annex III
Goldcrest (*Regulus regulus*)	Amber-listed	No
Great tit *(Parus major)*	Green listed	No
Long-tailed tit (*Aegithalus caudatus*)	Green listed	No
Treecreeper (*Certhia familiaris*)	Green listed	No
Pied wagtail (*Motacilla alba yarrellii*)	Green listed	No
Wren (*Troglodytes troglodytes*)	Green listed	No

Table 12-11 Bird species recorded at Lough Atalia during wintering bird surveys (Dec-Mar 2022/23).

Species	Conservation Concern (2020-2026)	Annex List
Black-headed Gull *(Chroicocephalus ridibundus)*	Amber-listed	No
Common gull *(Larus canus)*	Amber-listed	No
Gadwall (*Anas strepera*)	Amber-listed	Annex I
Great black-backed gull (*Larus marinus*)	Green listed	Annex II
Greenshank (*Tringa nebularia*)	Green listed	Annex II
Grey heron (*Ardea cinerea*)	Green listed	No
Herring gull *(Larus argentatus)*	Amber-listed	No
Mallard (*Anas platyrhynchos*)	Amber-listed	Annex II
Mute Swan (*Cygnus olor*)	Amber-listed	Annex II
Common Redshank (*Tringa totanus*)	Red listed	Annex II
Rock pipit (*Anthus petrosus*)	Green listed	No

Species	Conservation Concern (2020-2026)	Annex List
Common Shelduck (*Tadorna tadorna*)	Amber-listed	No
Eurasian Teal (*Anas crecca*)	Amber-listed	Annex I
Eurasian Wigeon (*Anas penelope*)	Red listed	Annex I
Cormorant (*Phalacrocorax carbo*)	Amber-listed	No
Kingfisher (*Alcedo atthis*)	Amber-listed	Annex I
Northern Lapwing (*Vanellus vanellus*)	Red listed	Annex II
Little Egret (*Egretta garzetta*)	Green listed	Annex I
Little grebe (*Tachybaptus ruficollis*)	Green listed	No
Oystercatcher (*Haematopus ostralegus*)	Red listed	Annex II
Common Snipe (*Gallinago gallinago*)	Red listed	Annex III
Stonechat (*Saxicola rubicola*)	Green listed	No
Turnstone (*Arenaria interpres*)	Amber-listed	No
Common sandpiper (*Actitus hypoleucos*)	Amber-listed	No
Curlew (*Numenius arquata*)	Red listed	Annex II
Lesser black-backed gull *(Larus fuscus)*	Amber-listed	Annex II

The breeding bird survey revealed that the majority of birds using the study area are small passerine species. Transects cover the fields south of Merlin Park and north of the R338. Activity was focussed along the woodland edges to the north of the Meadows fields towards Merlin Park, as well as on treelines separating these fields. Very little activity was noted towards the R338 side of the Meadows fields, which is to be expected due to the lack of treeline south of the middle and eastern fields. It's likely that the passerine species recorded to the north of the Meadows are nesting in the treeline and woodland habitats present. Species recorded are included in Table 12-12 below.

Also noted during the baseline surveys in June was a buzzard soaring overhead which flew in the direction of Merlin Park. During the bat survey, a grey heron was recorded flying south over the Meadow fields at Dusk. A long-eared owl was also recorded in the western Meadow field and was observed catching prey and flying over the R338 in the direction of Rosshill Park Woods.

Table 12-12 Bird species recorded during breeding bird surveys (June 2023).

Species	Conservation Concern (2020-2026)	Annex List
Wood pigeon *(Columba palumbus)*	Green listed	Annex II, Annex III
Wren *(Troglodytes troglodytes)*	Green listed	No
Blackcap *(Sylvia atricapilla)*	Green listed	No
Rook *(Corvus frugilegus)*	Green listed	No
Goldcrest *(Regulus regulus)*	Green listed	No
Hooded crow *(Corvus cornix)*	Green listed	No
Herring gull *(Larus argentatus)*	Amber-listed	No
Magpie *(Pica pica)*	Green listed	Annex II
Black-headed Gull *(Chroicocephalus ridibundus)*	Amber-listed	No
Bullfinch *(Pyrrhula pyrrhula)*	Green listed	No

Species	Conservation Concern (2020-2026)	Annex List
Blackbird *(Turdus merula)*	Green listed	Annex II
Dunnock *(Prunella modularis)*	Green listed	No
Chaffinch *(Fringilla coelebs)*	Green listed	No
Swallow *(Hirundo rustica)*	Amber-listed	No
Robin *(Erithacus rubecula)*	Green listed	No
Raven *(Corvus corax)*	Green listed	No
Song thrush *(Turdus philomelos)*	Green listed	Annex II
Great tit *(Parus major)*	Green listed	No
Blue tit *(Cyanistes caeruleus)*	Green listed	No
Goldfinch *(Carduelis carduelis)*	Green listed	No
Lesser black-backed gull *(Larus fuscus)*	Amber-listed	Annex II
Common gull *(Larus canus)*	Amber-listed	Annex II
Coal tit *(Periparus ater)*	Green listed	No

Table 12-13 Bird species recorded during breeding bird surveys (March 2024).

Species	Conservation Concern (2020-2026)	Annex List
Great tit *(Parus major)*	Green listed	No
Robin *(Erithacus rubecula)*	Green listed	No
Magpie *(Pica pica)*	Green listed	Annex II
Hooded crow *(Corvus cornix)*	Green listed	No
Wood pigeon *(Columba palumbus)*	Green listed	Annex II, Annex III
Lesser black-backed gull *(Larus fuscus)*	Amber-listed	Annex II
Goldcrest *(Regulus regulus)*	Green listed	No
Blackbird *(Turdus merula)*	Green listed	Annex II
Wren *(Troglodytes troglodytes)*	Green listed	No
Mistle thrush (*Turdus viscivorus)*	Green listed	No
Coal tit *(Periparus ater)*	Green listed	No
Redwing (*Turdus iliacus)*	Red-listed	No
Song thrush *(Turdus philomelos)*	Green listed	Annex II
Goldfinch *(Carduelis carduelis)*	Green listed	No
Blue tit *(Cyanistes caeruleus)*	Green listed	No

Vantage point surveys were also undertaken at two locations at Lough Atalia over the wintering and breeding surveys. Results from the breeding surveys in June 2023 are presented in Table 12-14 below.

Table 12-14 Bird records from Lough Atalia during breeding surveys (June 2023).

Species	Conservation Concern (2020-2026)	Annex List
Pied wagtail (*Motacilla alba yarrellii*)	Green listed	No
Wren *(Troglodytes troglodytes)*	Green listed	No

Species	Conservation Concern (2020-2026)	Annex List
House sparrow (*Passer domesticus*)	Amber-listed	No
Cormorant (*Phalacrocorax carbo*)	Amber-listed	No
Black-headed Gull *(Chroicocephalus ridibundus)*	Amber-listed	No
Herring gull *(Larus argentatus)*	Amber-listed	No
Rook *(Corvus frugilegus)*	Green listed	No
Sandwich Tern (*Sterna sandvicensis*)	Amber-listed	Annex I
Little Egret (*Egretta garzetta*)	Green listed	Annex I
Grey heron (*Ardea cinerea*)	Green listed	No
Song thrush *(Hirundo rustica)*	Green listed	No
Wood pigeon *(Columba palumbus)*	Green listed	Annex II, Annex III
Hooded crow *(Corvus cornix)*	Green listed	No
Goldfinch *(Parus major)*	Green listed	No
Great black-backed gull (*Larus marinus*)	Green listed	Annex II
Starling (*Sturnus vulgaris*)	Amber-listed	Annex II
Redshank (*Tringa totanus*)	Red listed	Annex II
Mallard (*Anas platyrhynchos*)	Amber-listed	Annex II

During the walkover surveys in June and July 2023 and March 2024, habitats in the study area were assessed for Barn Owl. The study area was assessed for Potential Nest Sites (PNS) and Active Nest Sites (ANS) to determine the need for further surveys. No PNS or ANS were recorded in the study area. No trees or structures in the study area were deemed suitable for barn owl nesting and no evidence of nesting activity was noted.

However, the meadow fields and surrounding habitats are suitable for foraging for owls. Similarly, some mature trees to the south of the western field do have suitable perch spots that may be used by owls. A long-eared Owl was recorded during two of the bat surveys. The first sighting in 2023 observed the bird catching prey in one of the meadow fields. The second sighting in 2024 was seen flying over the existing road towards Rosshill Park Woods. The meadow fields are suitable for small mammal species which would be suitable prey for Owls in the study area. There are confirmed breeding records for Barn owl to the north of Merlin Park Hospital, but this is outside the study area for the field surveys. The 10km grid square M32 which encompasses the site does have records of long-eared owl and is noted to be for confirmed breeding.

Evaluation: Due to the activity levels and species recorded, the Site is assessed as being of ***Local Ecological Importance*** in relation to birds. Lough Atalia, while immediately outside the Site, is designated as an SPA in the Inner Galway Bay SPA and would be assessed as being of ***International Importance***.

12.3.3.2.5 Amphibians / Reptiles

Common lizards, common frog and smooth newt are all legally protected under the Wildlife Act 1976, as amended. Common frog is also listed under Annex V of the Habitats Directive.

Desk Study

As displayed in Table 12-15 the common frog (*Rana temporaria*), common lizard (*Zootoca vivipara*) and smooth newt (*Lissotriton vulgaris*) were recorded within the 10 km grid square M32 (NBDC, 2023). All three species are protected under the Protected Species provisions of the Wildlife Act 1976, as amended.

Table 12-15 Amphibians / Reptile Species recorded within 10 km grid square M32 (NBDC, 2023)

Species	Conservation Status and Legal Protection	Year of last record
Common Frog (*Rana temporaria*)	EU Habitats Directive (92/43/EEC) Annex Common Frog (Rana temporaria), Wildlife Act 1976, as amended	2020
Common Lizard *(Zootoca vivipara)*	Wildlife Act 1976, as amended	2020
Smooth Newt *(Lissotriton vulgaris)*	Wildlife Act 1976, as amended	2016

Field Survey

No amphibians or reptiles were recorded during the multi-disciplinary surveys and no suitable habitat was identified within the footprint of the Proposed Development. There are no watercourses, drains or other suitable habitat types present within the study area for amphibians / reptiles.

Evaluation: Due to the lack of aquatic features and significant disturbance by dogs/ walkers within the study area, amphibians / reptiles is assessed as being of ***No Ecological Importance***.

12.3.3.2.6 Invertebrates and Other Fauna

Desk Study

Table 12-16 presents the findings for other fauna within the 10km grid square M32 (NBDC, 2023). Species with a an OSPAR Convention or Endangered status were included, excluding species with a Near Threatened or Vulnerable status.

Table 12-16 Other Faunal recorded within 10 km grid square M32 (NBDC, 2023)

Other Species	Conservation Status and Legal Protection	Year of last record
Common Oyster *(Ostrea edulis*)	OSPAR Convention	2023
Dog Whelk (*Nucella lapillus*)	OSPAR Convention	2023
Small Blue (*Cupido minimus*)	Endangered	2020
Wall (*Lasiommata Megara*)	Endangered	2013
Marsh fritillary (*Euphydryas aurinia*)	Annex II Habitats Directive	2018

Field survey

A Marsh fritillary survey was undertaken on 23rd August 2023. While no Devil's bit scabious was recorded during the habitat surveys of the site, field scabious (*Knautia arvensis*) was recorded in the western Meadows field and the desk study revealed recent records of this species in the immediate vicinity of the site. There is one location with 5 m^2 of field scabious and two locations with 1 m^2 of field scabious in the western Meadows field, as shown in Figure 12-12. No larval webs were found on any of these plants. The other meadows fields were walked, and no other instances of Field scabious were found. One adult Marsh fritillary was recorded to the north of the eastern Meadows field, basking on bramble at the edge of the woodland.

During the validation surveys on the 20th of July 2024, it was noted that the meadow fields had been cut that morning following arrival of the surveyors on site. In the morning, field scabious was observed in the same locations as in 2023 with no further coverage recorded. Shortly following this, the meadow fields were cut. This was noted to be cut much earlier than the year previous, and thus there was no field scabious present

after this for potential use by Marsh fritillary. If cutting is undertaken this early, this would rule out any potential for this species to breed on the meadow fields. Even so, foraging butterflies and invertebrates including Marsh fritillary, would not have access to these food sources with such an early cutting regime.

Evaluation: The study area does not include any suitable habitat for the above-mentioned species with the exception of Marsh fritillary. The desk study takes into account the full 10 km grid square, but the study area for field surveys is provided in Table 12-1 which includes the Proposed Development red line boundary, temporary works boundary and a buffer zone. While no breeding evidence was found, the Meadows, in 2023, were found to provide good foraging habitat for Marsh fritillary. Due to the early cut in 2024, no suitable habitat was present. For this reason, other fauna are assessed as being of ***National Ecological Importance***.

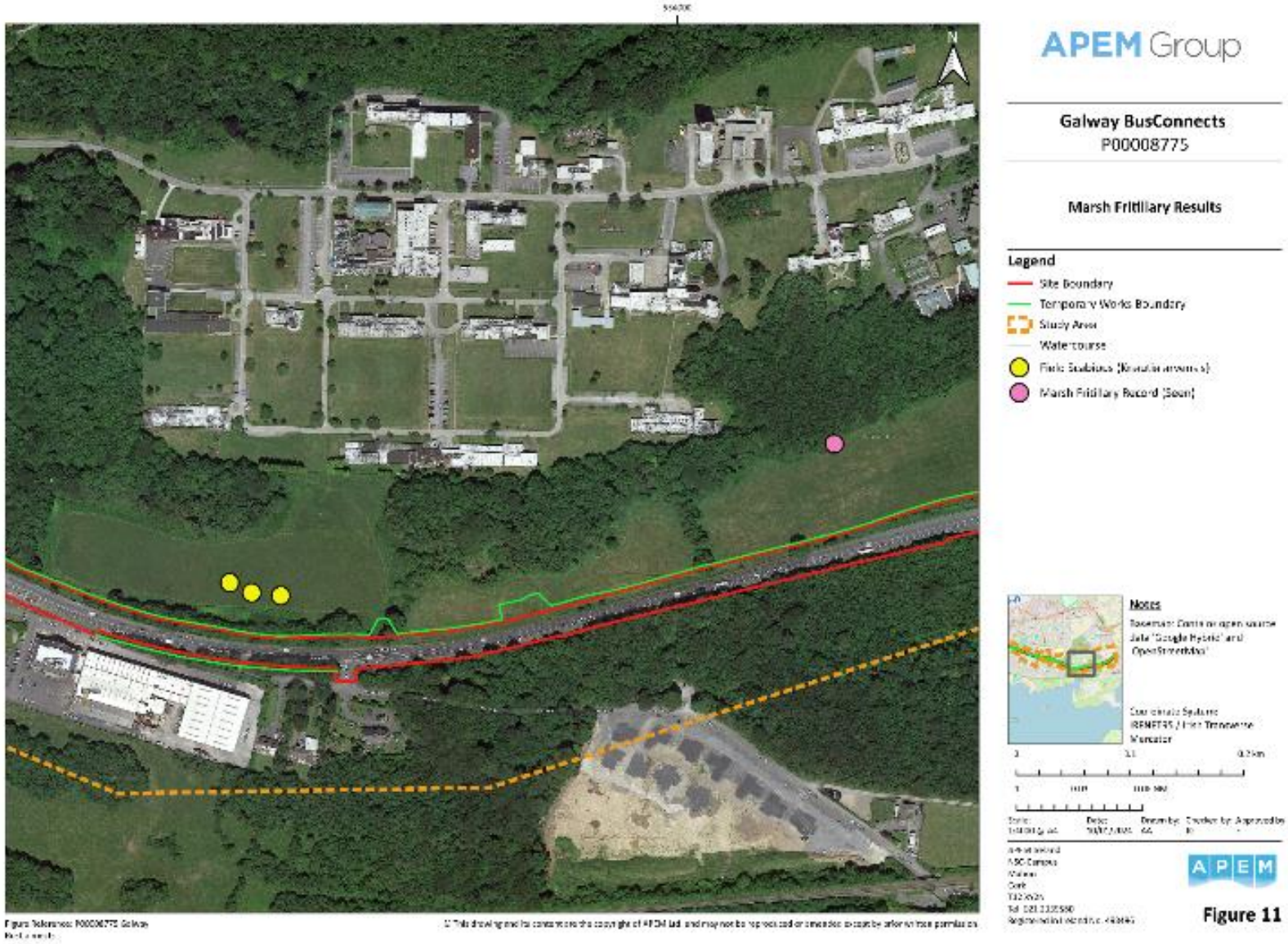

Figure 12-12 Marsh Fritillary Survey Results.

12.3.3.2.7 Aquatic Ecology

Two aquatic species were reported and recorded in the 10km grid M32 (NBDC, 2023). The European eel (*Anguilla anguilla*) which is a Critically Endangered species, and the thornback ray (*Raja clavata*) a threatened species under the OSPAR Convention (NBDC, 2023). There are no watercourses or drains located in the study area therefore it is not possible for the aquatic species records returned from the desk study to be found within the study area.

Evaluation: Due to the lack of aquatic/ marine habitats within the study area, aquatic ecology is assessed as being of ***No Ecological Importance***.

12.3.4 Summary of Ecological Receptors

Table 12-17 provides a summary of the evaluations of ecological receptors identified in sections 12.4.2 and 12.4.3 (including those requiring strict protection under Article 12 of the Habitats Directive (Regs 51 and 52 of SI 477/2011)). For the purposes of the current report, only ecological receptors evaluated as being higher than Site Ecological Importance are carried forward for assessment. In accordance with CIEEM (2018), impact assessment is only undertaken of Key Ecological Receptors (KERs). These are features within the zone of influence of the Proposed Development which are 'both of sufficient value to be material in decision making and likely to be affected significantly'.

Table 12-17 Summary of Evaluations of Ecological Receptors

Ecological Receptor	Evaluation
Designated Sites (Natura 2000 Sites)	International Ecological Importance
Designated Sites (Natural Heritage Areas and Proposed Natural Heritage Areas)	National Ecological Importance
Habitats and Flora (Mixed Broadleaved Woodland WD1)	Local Ecological Importance
Habitats and Flora (Scattered Trees and Parkland WD5)	Site Ecological Importance
Habitats and Flora (Oak-ash-hazel Woodland WN2)	Local Ecological Importance
Habitats and Flora (Scrub WS1)	Local Ecological Importance
Habitats and Flora (Hedgerows WL1)	Local Ecological Importance
Habitats and Flora (Treelines WL2)	Local Ecological Importance
Habitats and Flora (Improved Agricultural Grassland GA1)	Site Ecological Importance
Habitats and Flora (Dry Meadows and Grassy Verges GS2 - Lowland Hay Meadows [6510])	National Ecological Importance
Habitats and Flora (Dry Meadows and Grassy Verges GS2)	Local Ecological Importance
Habitats and Flora (Recolonising Bare Ground ED3)	Site Ecological Importance
Habitats and Flora (Dense Bracken HD1)	Local Ecological Importance
Habitats and Flora (Stone Walls and Other Stonework BL1)	Local Ecological Importance
Habitats and Flora (Buildings and Artificial Surfaces BL3)	Site Ecological Importance
Habitats and Flora (Protected Flora)	Site Ecological Importance
Habitats and Flora (Non-native Invasive Species)	Local Ecological Importance
Non-volant mammals	Local Ecological Importance

Ecological Receptor	Evaluation
Bats	Local Ecological Importance
Marine mammals	No Ecological Importance
Birds	Local Ecological Importance (International Importance at Lough Atalia outside site)
Amphibians and Reptiles	No Ecological Importance
Invertebrates and other fauna	National Ecological Importance
Aquatic Ecology	No Ecological Importance

12.4 Characteristics of the Proposed Development

A detailed description of the Proposed Development and its construction activities are provided in Chapter 4 (Proposed Development Description), and Chapter 5 (Construction) of this EIAR. The main characteristics of the Proposed Development of relevance to the ecological assessment are outlined below.

The Proposed Development has an overall length of approximately 3.9 km, the extent of which is set out in Figure 12-1. The Proposed Development comprises the provision of public transport facilities and active travel facilities from east of the Moneenageisha Junction to the Doughiska Junction. This route is a main arterial route into Galway City Centre for both commuters and tourists. It also runs adjacent to the Atlantic Technological University (ATU), Merlin Park Hospital, Bon Secours Hospital and a number of schools and other amenity locations. Throughout the Proposed Development, bus stops will be enhanced to improve the overall journey experience for bus passengers, and cycle facilities will be substantially improved with segregated cycle tracks provided along the links and protected junctions with enhanced signalling for cyclists.

Moreover, pedestrian facilities will be upgraded, and additional signalised crossings be provided. In addition, urban realm works will be undertaken at key locations with higher quality materials, planting and street furniture provided to enhance pedestrians' experience.

An overview of the likely Proposed Development construction phasing and the necessary construction works associated with each phase is outlined in Chapter 5 (Construction) of this EIAR. For the majority of the works associated with the Proposed Development, it is envisaged that normal working hours will be followed. In specific circumstances, such as road crossings or road resurfacing, the works will be carried out at night.

The works on the R338 Dublin Road comprise the installation of inbound and outbound bus lanes, raised adjacent cycle tracks and footpaths on both sides of the road. This is to be achieved via a combination of carriageway widening, repurposing of existing traffic lanes and setting back the existing footpath. Additional land will be required throughout the Proposed Development.

The Proposed Development ties in directly with the Galway BusConnects: Cross City Link Scheme at the western extremity. Additional land for the proposed cross-section widening and construction of new footpaths and cycleways is primarily to the south of the existing R338 towards the junction with Renmore Park. Two single storey buildings on the south of the existing R338 at the Brothers of Charity lands will require demolition to facilitate the widening at this point. A Temporary Construction Compound will be set up in the sports field immediately west of the Connacht Hotel. Between Renmore Park Junction and Ballyloughane Road junction, the additional land required is primarily to the north, with impacts on Galway City Council lands, the landscaped green area at the front of the Connacht Hotel, the green area at the front of Glenina Heights housing estate, the former Galwegians RFC sports grounds and the landscaped green area at the front of Flannery's Hotel. There is an impact to the south on the car park of a convenience store at the R338 junction with Renmore Road, where a property to the north of the road creates a pinch point.

The access to Belmont estate is proposed to be realigned to tie in with the Ballyloughane Road junction. Further east at ATU Galway City, the alignment of the cycle lane and footpath to the north is set behind the existing tree line. A new “cyclops” junction is proposed to replace the Skerritt roundabout. Between the Skerritt junction and the eastern extremity of the Proposed Development the additional required land is primarily to the north of the existing R338. This impacts the former Corrib Great Southern Hotel site (now demolished green space at the front of Woodhaven estate, agricultural land and HSE lands as part of Merlin Park Hospital including The Meadows which is being treated as a mosaic of an Annex I grassland habitat. At the eastern end beyond a realigned Doughiska Road junction, the Proposed Development ties in with the Martin junction.

Throughout the Proposed Development and where possible, existing signage will be retained or relocated. Additional new signage will also be required at locations throughout the Proposed Development. Typical excavation depths for installation of new signage will be approximately 1.0m.

New road markings will be applied throughout the Proposed Development following resurfacing works. Utility covers will be raised to match new ground heights where applicable.

Drainage gullies will be relocated to the new kerb edge and will connect back to existing drainage. Sustainable Urban Drainage Systems (SuDS) will be incorporated within hardscape areas to locally manage surface water run-off and reduce demand for piped surface water drainage infrastructure. Even though the drainage design will connect to existing outfalls, petrol interceptors / bypass oil separators are provided. The design will result in no increase in existing run-off rates from newly paved areas, and includes filter drains, swales, rain gardens and bioretention areas, tree pits, oversized pipes, silt traps and attenuation features where necessary to achieve this.

Works will involve the diversion of utilities where present. These will be either retained, protected or diverted as required. Carriageway widening works will require the existing footpath to be broken out, full road build-up to be constructed and jointed to the existing adjacent carriageway, and replacement footpath/raised adjacent cycle lane to be constructed.

In order to construct the Proposed Development, the appointed contractor will require Construction Compounds from which they can manage the delivery of the Proposed Development. The Construction Compound location has been selected due to the amount of available space and its locations relative to the Proposed Development major works and the access to the Regional and Local Road network. The compound will be located on Dublin Road (adjacent to The Connacht Hotel) and is shown in Figure 12-13 below.

Figure 12-13 Location of Proposed Compound

The Construction Compound will contain a site office, and welfare facilities for GCC personnel and contractor personnel. Limited car parking will be allowed at the Construction Compound. Materials such as topsoil, subsoil, concrete, rock etc., will be stored at the Construction Compounds for reuse as necessary. Items of plant and equipment will also be stored within the Construction Compounds.

The Construction Compound will be in place for the duration of the Construction Phase of the Proposed Development, estimated at approximately 24 months. The Construction Compounds will be engineered with appropriate services. Water, wastewater, power, and communications connections will be organised by the appointed contractor. Temporary welfare facilities will need to be used, for example, portable toilets in the vicinity of works. Wastewater from temporary welfare facilities will be collected and disposed of to a suitably licensed facility.

Appropriate environmental management measures will be implemented at the Construction Compounds for example, to minimise the risk of fuel spillage, and to ensure that the Construction Compounds and the approaches to it are appropriately maintained. Further information on the air quality, noise and vibration, and water related mitigation measures that will be implemented are described in Chapter 7 (Air Quality), Chapter 9 (Noise & Vibration) and Chapter 13 (Water) of this EIAR. Following completion of the Construction Phase, the Construction Compound area will be cleared and reinstated to match pre-existing conditions.

12.5 Potential Impacts

12.5.1 Do-Nothing Scenario

In the Do-Nothing scenario, the Proposed Development would not be implemented (discussed further in Chapter 6 (Traffic & Transport) in this EIAR. Thus, the existing corridors would remain with no immediate significant changes to the flora and fauna of the area, as there would be no significant Construction Phase impacts from the Proposed Development beyond roadside management of existing habitats.

In the absence of development, it is assumed that the habitat types present within the study area will not change. Amenity grassland and buildings and artificial surfaces will continue to be managed. Similarly, treelines and hedgerows within the study area will be managed where required, as usual for road safety and housing. Amenity grassland and scattered trees and parkland within the grounds of Merlin Park University Hospital will be managed as required. For Merlin Park grounds included in the study area, the meadows will continue to be managed on a low intensity basis, with mowing only once or twice a year. The R338 will continue to be used as normal with city traffic, lighting and untreated surface water discharge ongoing. The impact of no construction is neutral upon biodiversity along and adjacent to the Proposed Development.

12.5.2 Construction Phase

12.5.2.1 Designated Areas

There are no Natura 2000 sites within the Proposed Development area, therefore, no direct impacts are predicted during construction.

European sites hydrologically linked to the Proposed Development have the potential to be indirectly impacted. All surface water will be directed to the existing drainage network within the R338 road infrastructure. The drainage outfalls for the existing network associated with the Proposed Development are located at Lough Atalia, Mutton Island, Ballyloughane Beach and north of Rabbit Island. The outfalls at Lough Atalia and Mutton Island are treated at the Mutton Island wastewater treatment plant which includes a petrol / oil interceptor. There are some storm drain outfalls with no WWTP or oil interceptors and thus these have potential to act as a vector for surface water emissions to the Inner Galway Bay SPA and Galway Bay Complex SAC. There is also a risk that machinery and surface water could act as vectors for dispersal of invasive non-native flora species within and without the site.

The Appropriate Assessment Screening (AAS) report concluded that, in the absence of mitigation measures (which have not been considered at screening stage), likely significant effects on the qualifying interests of the Inner Galway Bay SPA and Galway Bay Complex SAC cannot be excluded on the basis of objective scientific information.

A Stage 2 NIS of the potential impact on the Inner Galway Bay SPA and Galway Bay Complex SAC was therefore required. The NIS concluded that:

"*It has been objectively concluded on the basis of the best scientific knowledge available and following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the Proposed Development and the effective implementation of the mitigation measures proposed, that the Proposed Development will not adversely affect the integrity of any European site, either alone or in combination with other plans or projects*."

The Lough Corrib SAC and Lough Corrib SPA are noted to be located upstream from the Proposed Development. The Stage 1 AAS report screened out these sites as there is no downstream hydrological connection, and any potential qualifying interests of these sites that may occur in the vicinity, are outside the zone of influence for potential significant effects. For this reason, these sites were not brought forward for assessment. Therefore, these sites will also not be taken further within this report.

Refer to the accompanying NIS (APEM, 2024) for the assessment of impacts on Natura 2000 sites.

Effects to Natura 2000 sites during construction are assessed as ***Negative, Imperceptible, Temporary and in the National Context.***

12.5.2.2 Habitats and Flora

12.5.2.2.1 Habitat Loss and Fragmentation

Land-take is required to facilitate the Proposed Development. Footpaths will need to be set back, and carriageways are required to be widened at various areas along the Proposed Development. The majority of these areas comprise amenity grassland and buildings and artificial surfaces, such as in front of the

Connacht Hotel, Flannery's Hotel and the former Corrib Great Southern Hotel (now demolished), Glenina Heights and Woodhaven housing estates, the former Galwegians RFC sports grounds and a car park in front of a convenience store at the R338 junction with Renmore Road. While habitat loss is inevitable in these locations and will occur, no significant impacts are envisaged to arise with respect to habitats and flora. The majority of habitat types affected comprise common urban habitat types and this development would be consistent with the habitats occurring in these areas. The total area of habitat loss, outside of existing buildings and artificial surfaces, is c. 64,787 m^2 (6.48 ha) during the construction phase, including temporary works areas and the temporary construction compound along the entire length. All of these areas are along the linear strips adjacent to the existing road. However, this total area does not include areas where trees will be retained, and habitats restored and enhanced. Additionally, much of this habitat loss is for temporary areas and will be reinstated once the construction phase is completed.

Habitats affected by land take include treelines (WL2), hedgerows (WL1), dry meadows and grassy verges (GS2), dense bracken (HD1), amenity grassland (GA2), stone walls and other stonework (BL1), buildings and artificial surfaces (BL3), scrub (WS1), scattered trees and parkland (WD5) and improved agricultural grassland (GA1). It is noted that an Arboricultural Impact Assessment has also been completed (Barton Hyett Associates, 2024). The Landscaping General Arrangement Drawings (BCGDR-BTL-ENV_LA-XX-DR-LL-00000_00011) also outline all trees to be retained / felled as required. All of these habitat types are of site or local ecological importance, and effects on these habitats are assessed as ***Negative, Not-Significant, Short term and in the Local Context*** for the areas impacted by temporary works and ***Negative, Not-Significant, Permanent and in the Local Context*** for the areas impacted by permanent works***.***

Dry meadows and grassy verges (GS2), which is evaluated as being of national ecological importance due to the potential affiliation of two fields to the Annex I Lowland Hay Meadows habitat type located within the HSE lands as part of Merlin Park Hospital. Approximately 4 m widening of the road will be required in this area to facilitate the construction of the footpath (maximum 2 m width) and cycle track (maximum 2 m width). The field surveys identified this 'Meadow' habitat as Dry Meadows and Grassy Verges (GS2) and corresponds with the Annex I habitat type 'Lowland Hay Meadows', considered to be of national importance. There are two northern fields that have been classified as such: the western and eastern fields.

The western field is protected by a buffer zone of fencing, scrub and treeline separating the grassland from the existing road edge. The boundary of the Annex I habitat type Lowland Hay Meadows in this field does not overlap with the predicted land-take required as part of the Proposed Development. The habitat types that will be affected by the additional land-take for footpaths and cycle lanes are scrub and treelines.

In the middle field, there is no treeline present as a buffer between the road and the Meadow. The buffer here comprises the fringe of the grassland habitat with some bramble scrub present in sections, but no buffer is present in other areas. The middle field is not classified as potential Annex I habitat due to a change in species dominance but does represent a semi-natural dry grassland.

On the eastern meadow field, again there is no treeline buffer but there are some sparse trees and scrub present of up to 5 m in places, and a minimum of 2 m from the roads edge. The eastern field is considered to be Annex I habitat.

The only overlapping area of required permanent land-take and Annex I habitat is a total area of approximately 110.31 m^2, at the southern edge of the field along the length. This area of land take is a strip closest to the existing road. The total area of temporary land-take is 436.74m^2. The total area of Annex I habitat in this easternmost field is c. 27,312.06 m^2. The area of Annex I habitat for the two fields combined is c. 46,653.52 m^2, with an expected permanent land-take of approximately 110.31 m^2 in the eastern field, which is 0.24% of the total area. Temporary land-take for the construction phase of 436.74m^2 is 0.94% of the total area. It is acknowledged that the removal of habitat on the fringe of the eastern field may push the unofficial dog walking paths here further into the meadow itself, if the new pathway inside the proposed treeline is not used, and so permanent habitat loss impacts may be higher than 0.24% but are still considered to be very minor.

Therefore, the habitat loss of Annex I Lowland Hay Meadows is considered to be minor, due to the buffer habitats present between the roads edge and the Meadows. The expected land-take of Annex I habitat is estimated to be less than 1% of the total area of Annex I habitat. This is not considered to be significant. The land-take required in the eastern field will mimic the road edges present along the other fields. Furthermore, as the land-take is along the fringes, where there is an existing road, no impacts in relation to habitat fragmentation are expected to arise. Additional planting in this area will also create a buffer zone between the Meadow fields and the busy road, which is currently not present in the middle and eastern fields.

Effects from habitat loss within the central field are assessed as ***Negative, Not-Significant, Permanent and in the Local Context***, while effects from habitat loss within the western and eastern fields are assessed as ***Negative, Slight, Permanent and in the National Context.***

12.5.2.2.2 Invasive species

Invasive species snowberry, sycamore, Himalayan knotweed, butterfly-bush, montbretia and winter heliotrope were noted to be present in the study area. Most notably, Himalayan knotweed is present in one area behind a stone wall to the south of Merlin Park and is likely to be affected by the footprint of the works. Snowberry is present along various points on the existing road boundary, primarily to the south of the road. Winter heliotrope is common along both the north and south sides of the road as well as within woodland habitat in Merlin Park.

Of these species, only Himalayan knotweed is a species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended.

Invasive species spread could affect other habitat types by out-competing species for light and nutrients, as well as contribute to habitat fragmentation in the area. Machinery and equipment used for the construction of the Proposed Development could result in further spread of these species outside of the study area. Mitigation measures will be required to ensure this risk is minimised insofar as possible.

Effects from invasive species during construction are assessed as ***Negative, Moderate, Short-term and in the Local Context***

12.5.2.2.3 Surface water

There are no watercourses along the length of the Proposed Development. Due to the close proximity of the construction works and temporary works areas, surface water run-off from the construction phase may occur and may run-off into the Annex I affiliated grassland habitats. This could increase nutrient / sediment loads on the grassland adjacent to the proposed route. During the construction phase, suspended solids, silt or accidental spillages of harmful substances may run-off into this sensitive habitat type. Soil structure and nutrient levels could be adversely affected, and this may affect the characteristic flora species present in the Meadow fields. Mitigation measures will be required to ensure this risk is minimised insofar as possible.

Effects from surface water within Annex I affiliated grassland habitats during construction are assessed as ***Negative, Moderate, Temporary and in the National Context.***

12.5.2.3 Fauna

During the construction phase, impacts affecting fauna are primarily in relation to disturbance. The construction phase of the Proposed Development, which is expected to take 24 months, will result in increased noise and human disturbance along the Proposed Development length. As the Proposed Development is situated along an existing and busy road, it is considered that fauna in the vicinity are accustomed to background levels of disturbance, from traffic, lighting and pedestrians as well as businesses, residential housing and regular dog walking.

12.5.2.3.1 Non-volant mammals

Mammals expected to use the footprint of the works areas would comprise foxes, which are likely to be present using the urban areas along the Proposed Development. Outside of this, tracks used within the Meadows south of Merlin Park Hospital are likely to also be used by foxes and potentially badger, and there is potential for badger setts to be present in the dense woodland both north and south of the Proposed Development outside of the study area. No mammal dwellings are expected to be present along the footprint of the Proposed Development, and none were identified during the baseline walkover surveys. However, it is likely that if dwellings are present outside the study area, these mammals would also use areas within the study area for commuting and foraging. The woodland habitat is also likely to be used by red squirrel. The Proposed Development is not expected to overlap or interact with these woodland areas. Construction has just been completed on the Martin junction to the east and numerous construction developments are present in the wider area outside Galway City. Despite this, there is potential for disturbance impacts to arise affecting non-volant mammals, with increased noise and human disturbance. Nocturnal mammals could also be affected by artificial lighting, potentially impacting commuting routes in the study area. It is noted that there is flood lighting present on the sports pitch that will be used as the temporary construction compound. Barriers to movement and habitat fragmentation is likely to arise during the construction phase due to site works, vehicles, noise and increased human activity. As this will be short-term during the works, and as there is an existing road here and background disturbance levels, this is unlikely to be significant.

Effects on non-volant mammals during construction are assessed as ***Negative, Slight, Short-term and in the Local Context.***

12.5.2.3.2 Bats

The bat surveys revealed that common bat species are using the fringes of Merlin Park to the south and along the existing road. Common and soprano pipistrelles use this area for foraging and Leisler's bats use Merlin Meadows for foraging in open habitat types. Artificial lighting is present on the site with light spill from the road affecting Merlin Meadows, and flood lighting present where the temporary construction compound will be located. Activity during the bat surveys was not considered to be high and appeared to be centred towards the woodland habitat north of the meadows, with lower activity levels towards the existing road. Foraging and commuting habitat for bats is likely to be lost due to vegetation clearance and tree felling required as part of the Proposed Development. However, trees will be retained where practicable for the Proposed Development and additional planting is included as part of the landscaping plan. Additional planting is also included for the eastern field boundary with the existing road, which will create additional linear features in this area and provide a barrier to disturbance and lighting from the road. Linear features such as the edge habitat to the south of the meadows may be set back due to the Proposed Development but will still serve the same functions for bats in this landscape and is unlikely to result in habitat fragmentation for these species.

Temporary lighting is required for the construction phase of the Proposed Development, particularly during the required works at night. These are stated in Chapter 5 of the EIAR to be tower mounted floodlights, which will be cowled and directed downwards to reduce light spill. The construction phase is also expected to take 24 months, and so will take place within sensitive times of the year for foraging and commuting bats. As activity is relatively low towards the existing road itself, this is unlikely to result in a significant impact. The temporary construction compound, where security lighting will be required, will be located in the sports field adjacent to the Connacht hotel, which is located as a distance of c. 1.3 km from the woodlands and Meadows of Merlin Park. Flood lighting is already present in this area and due to distance and barriers, no significant impacts on Merlin Park bat habitats are expected from this. As night work will be required, which may fall during the summer months when bats are most active, disturbance and displacement impacts from temporary lighting could result in significant impacts in the absence of mitigation. Mitigation measures will be required to reduce the magnitude of impact and are included in section 12.2.3.2.

Trees along the southern boundary of the Merlin Meadows were identified as having low potential for bat roosting. These trees are situated along the busy existing road and are affected by the existing artificial lighting along this stretch, thus reducing their suitability, but some PRFs were noted. Tree felling is required in this area of the Proposed Development, although many large trees will be retained. In the absence of

mitigation measures, if bats are present in these trees at the time of felling, this could result in direct harm and potentially mortality, as well as disturbance. Bats are transient creatures and can use trees at any time of year. Two Sycamore trees to the eastern boundary of the temporary construction compound were noted to have low potential for bats due to the presence of PRFs, however, large flood lights are present on this sports pitch and are likely to reduce suitability of these trees being used by bats. No tree felling is expected to be required for the use of this sports pitch as a temporary construction compound, so no potential roosting habitat loss is expected to arise.

Effects on bats during construction are assessed as ***Negative, Moderate, Short-term and in the Local Context.***

12.5.2.3.3 Birds

Vegetation clearance and tree felling required as part of the Proposed Development may also affect nesting birds. If these works are undertaken during the bird nesting season, this could result in mortality and / or disturbance impacts as well as loss of habitat and habitat fragmentation. This can also result in increased competition for resources among local bird species. The habitats that will be primarily affected by land-take are common habitat types in the urban context of the site. Reinstatement of these habitats, primarily hedgerows and treelines, as well as additional planting will ensure that these habitats will serve the same function for these bird species. However, in the absence of any mitigation measures, the effects of the Proposed Development are considered to be limited, as the Proposed Development is located along the existing busy road. Bird activity was noted to be highest on the woodland edge habitats of Merlin Park, and within Rosshill Park Woods. As for wintering bird species present in Lough Atalia, the existing road here is busy and the changes that will occur due to the Proposed Development are unlikely to result in any significant effect on the bird species using this area. There will be minor foraging and perching habitat loss for owls in the study area, due to the minor loss of grassland and mature trees along the southern boundary of the meadow fields. Significant supplemental tree planting is included as part of the landscaping plan and the loss of grassland foraging habitat is not considered to be significant. While the minor vegetation clearance required will reduce habitat suitability for potential owl prey, i.e. small mammals, this will be reinstated with buffer zones and planting. The buffer zone planting is likely to result in owls flying higher over the existing road than at present, with the supplemental planting of treelines likely to drive the species into a higher flight height than over the existing road, due to the lack of treelines in parts. Lighting mitigation will be included for the Proposed Development to ensure impacts on nocturnal birds are minimised insofar as possible. Owls are expected to continue to use the study area post-construction.

Effects on birds during construction are assessed as ***Negative, Slight, Short-term and in the Local Context.***

12.5.2.3.4 Invertebrates and Other Fauna

The current surveys showed no evidence of Marsh Fritillary breeding in the Meadow habitats in the study area. No devil's bit scabious was recorded during the habitat surveys. Limited areas of field scabious were observed, and no evidence of larval webs found. One record of an adult Marsh Fritillary was noted during the survey in 2023. During the validation surveys in 2024, the meadow fields were cut on the day of the survey 30th July. Therefore, no suitable breeding or foraging habitat for Marsh fritillary would be present at a sensitive time of year for the species. As there is no confirmed breeding evidence of Marsh fritillary from the limited suitable habitat in the study area, with no suitable habitat in 2024 due to early cutting, and the Proposed Development will largely follow the existing road, no significant impacts are expected to arise that could affect this Annex II species.

Effects on invertebrates and other fauna are assessed as ***Negative, Slight, Short-term and in the Local Context.***

12.5.3 Operational Phase

12.5.3.1 Designated Sites

An AAS and NIS (APEM, 2024) have been prepared for the Proposed Development addressing potential impacts on Natura 2000 sites.

The Appropriate Assessment Screening report concluded that, in the absence of mitigation measures (which have not been considered at this screening stage), likely significant effects on the qualifying interests of the Inner Galway Bay SPA and Galway Bay Complex SAC cannot be excluded on the basis of objective scientific information. A Stage 2 NIS of the potential impact on the Inner Galway Bay SPA and Galway Bay Complex SAC was therefore required. The NIS concluded that, "*It has been objectively concluded on the basis of the best scientific knowledge available and following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the Proposed Development and the effective implementation of the mitigation measures proposed, that the Proposed Development will not adversely affect the integrity of any European site, either alone or in combination with other plans or projects*."

The Lough Corrib SAC and Lough Corrib SPA are noted to be located upstream from the Proposed Development. The Stage 1 AAS report screened out these sites as there is no downstream hydrological connection, and any potential qualifying interests of these sites that may occur in the vicinity, are outside the zone of influence for potential significant effects. For this reason, these sites were not brought forward for assessment. Therefore, these sites will also not be taken further within this report.

Effects to Natura 2000 sites during operation are assessed as ***Negative, Imperceptible, Long-Term and in the National Context.***

12.5.3.2 Habitats and Flora

Impacts on habitats and flora are limited to regular maintenance of hedgerows and treelines along the road's edge for the purposes of safety, as required. The footprint of the Proposed Development largely follows the existing R388 road, with some additional land-take to the north and south side of the road in parts, to accommodate footpaths and cycle lanes. These additions are not expected to result in any significant landscape changes. No watercourses are present along the Proposed Development. Maintenance of habitats along the roads edge are not expected to be above regular ongoing maintenance present on site. Maintenance during the operational phase will also include the area of annex I habitat that will have been removed during the construction phase, which will be replaced by a buffer zone including a pathway, landscaping and tree planting separating the road from the remaining Annex I habitat in the Merlin Park meadow fields. This maintenance is not expected to be significant or result in operational phase impacts on the meadow fields. Potential operational invasive species and surface water impacts will be discussed below.

Surface water from the existing road is understood to be untreated prior to discharge at Lough Atalia. The drainage design for the Proposed Development includes a petrol interceptor and oil separator, which will be an improvement on existing conditions on site. The Proposed drainage design also includes no increase in existing run-off rates from newly paved areas, and filter drains, swales, rain gardens and bioretention areas, tree pits, oversized pipes, silt traps and attenuation features where necessary to achieve this. This design will ensure that surface water run-off will not affect habitats and flora in the study area and will improve conditions on the site.

The Proposed Development is also likely to ensure that any potential impacts relating to road spillages or accidents are minimised. This is due to the barrier or separation that will occur from the roads edge to sensitive habitat types. A cycle lane and bus lane will be present as a barrier, as well as additional landscaping, pathway and buffer zones included in the design, which is likely to reduce the potential for road spillages or accidents to affect the sensitive grassland habitat types in Merlin Meadows.

Effects on habitats and flora are assessed as ***Negative, Not Significant, Long-term and in the National Context.***

12.5.3.2.1 Invasive Species

Impacts relating to invasive species during the operational phase have the potential to occur during regular maintenance of vegetation along the road's edge. During clearance, there is the potential that machinery and personnel could act as vectors for the spread of invasive species. If machinery is not steam cleaned or checked for vegetation in between use from another site and commencement of maintenance on the Proposed Development, invasive species could be spread from other areas and colonise locations adjacent to the road. Existing invasive species recorded on the site are proposed to be eradicated and managed during the construction phase, and so the risk of invasive species is primarily related to introduction of species along the length of the Proposed Development.

Effects relating to invasive species are assessed as ***Negative, Slight, Long-term and in the Local Context.***

12.5.3.3 Fauna

12.5.3.3.1 Non-volant mammals

Impacts on non-volant mammals during the operational phase primarily concern disturbance, through use of the Proposed Development or from artificial lighting. Disturbance is likely to arise from increased human activity and vehicles, as well as a likely increase in cyclists. It must be noted that the R338 is an existing busy road however, the overall changes in traffic are not expected to be significant. As noted previously, fauna in the area will be accustomed to certain levels of disturbance with the urban area and existing R338.

Artificial lighting is also present along the route, with light spill primarily affecting the meadows to the north of the Proposed Development near Merlin Park Hospital as well as the sports pitch beside the Connacht Hotel which will be used as the temporary construction compound during the construction phase. Nocturnal non-volant mammals could be affected by artificial lighting in that it deters species from using their regular commuting and foraging routes in the study area. Effects can range from disturbance, displacement and reduce feeding successes for these mammals. The Lighting design shows that there will be no additional lighting along the southern edge of the Meadow habitat. Furthermore, the landscaping design includes for additional tree planting along currently bare edges of the meadow fields to the east, which would create a barrier effect, minimising light spill to the optimal foraging habitats the north of the meadow fields and Merlin Park woodland. Lighting drawings show that a maximum of 1 lux is expected along the fringes of the Meadow habitats to the south, with 6 lux at the edge near the road. However, this is unlikely to consider the trees in full leaf along this linear feature, separating the road from these habitats. For comparison, full moonlight is expected to be in the region of 0.5-2 lux (BCT, 2023). No significant effects are therefore expected in relation to lighting. Additional measures will be provided in the mitigation section.

Effects on non-volant mammals are assessed as ***Negative, Not Significant, Long-term and in the Local Context.***

12.5.3.3.2 Bats

Operational phase impacts on bats primarily concerns artificial lighting. Lighting can alter foraging regimes and commuting routes throughout the landscape, as well as affect predation levels for bats. It can delay emergence times and result in reduced feeding successes. Artificial lighting is already present along the route, with light spill primarily affecting the meadows to the north of the Proposed Development near Merlin Park Hospital. The lighting design, as well as landscaping, as noted above is likely to ensure that lighting is kept to a minimum and light spill in adjoining areas along the Proposed Development will be minimal. Lighting drawings show that a maximum of 1 lux is expected along the fringes of the Meadow habitats to the south, with 6 lux at the edge near the road. Again, full moonlight is expected to be in the region of 0.5-2 lux (BCT, 2023).

Effects on bats are assessed as ***Negative, Not Significant, Long-term and in the Local Context.***

12.5.3.3.3 Birds

Operational phase impacts on birds relate to maintenance of adjoining habitats along the road's edge for the purposes of safety, as required. Maintenance of habitats along the roads edge are not expected to be above regular ongoing maintenance present on site. However, if maintenance does occur during the bird nesting season, this poses a threat to bird populations in the study area. Nesting birds could be affected by way of disturbance, displacement or mortality as a result. This is not expected to be an additional risk to the existing management along the road, but is a potential impact for the operational phase, nonetheless. Mitigation measures will be included to ensure this risk is minimised. Operational phase impacts on nocturnal birds such as Owls present in the study area, include mortality impacts due to passing vehicles and loss of foraging habitat due to artificial lighting. Lighting impacts ensure that light spill is minimised, as discussed previously. Regarding mortality, the road is existing here and will continue to follow the same route as previous, which additional cycle and bus lanes. This is likely going to result in a slowing of general traffic which will result in reduced potential for mortality impacts. Furthermore, the additional tree planting will act as a height buffer for the birds flying over the road which is likely to reduce the potential for collisions.

Effects on birds during construction are assessed as ***Negative, Slight, Long-term and in the Local Context.***

12.5.3.3.4 Invertebrates and Other Fauna

Operational phase impacts on invertebrates and other fauna relate to maintenance of habitats as required for road safety and habitat degradation from potential road spillages or accidents. Maintenance of habitats can lead to removal of suitable habitat, such as mowing or cutting back vegetation, which can reduce food sources for invertebrates. This also reduces potential habitat for shelter and protection. Maintenance of habitats along the roads edge are not expected to be above regular ongoing maintenance present on site. This is not expected to an additional risk to the existing management along the road, but is a potential impact for the operational phase, nonetheless. Road spillages could leach into habitats used by invertebrates in the adjacent Merlin Meadows, and impacts would be the same as discussed in section 12.5.3.2 above. The addition of the buffer zone between the meadow fields and the road, including a pathway, landscaping and tree planting is likely to reduce the potential for invertebrate collisions with vehicles. Mitigation measures will be included to reduce potential impacts insofar as possible.

Effects on fauna are assessed as ***Negative, Not Significant, Long-term and in the Local Context.***

12.6 Mitigation Measures and Monitoring

12.6.1 Construction Phase

12.6.1.1 Designated Sites

The mitigation measures that are required to ensure that the Proposed Development will not adversely affect the integrity of the Natura 2000 sites within the ZoI are presented in the NIS and within Chapter 13 (Water). The following mitigation measures were developed to address the potential impacts identified in Section 12.5:

- Surface water quality and egress during construction; and
- Prevent the spread of non-native invasive species.

For clarity, mitigation measures listed are summarised here. Mitigation measures include general protection measures and good working practices, following guidance set out in:

- IFI (2010) *'Biosecurity Protocol for Field Survey Work';*
- TII (2020) 'Treatment of Otters - *Technical Guidance';*
- CIRIA C648 (2006) '*Control of Water Pollution from Linear Construction Projects'* – Guidance for consultants and contractors;
- CIRIA C811 (2023) '*Environmental Good Practice on Site Guide'; and*

- CIRIA C768 (2017) '*Guidance on the construction of SuDS'.*

During construction, water quality protection measures will be employed, including following the Surface Water Management Plan (SWMP) included in Appendix A5.1 CEMP in Volume 4 of this EIAR. An Environmental Incident Response Plan has been prepared and will be communicated to personnel prior to commencement of work. Existing surface water infrastructure will be inspected and deemed to be in good working order prior to works starting. All fuels, oils and construction fluids will be stored in the designated construction compound on lands adjacent to the existing Connacht Hotel and stored in bunds of 110% capacity in a secure area away from any drains or watercourses. All equipment and machinery will be checked for leaks prior to usage on site and on a daily basis. Any cement mixing where required will be undertaken away from surface water drainage systems, whether temporary during construction, or permanent and any washout from vehicles, machinery or tools will be stored securely in the construction compound and appropriately removed from site. Sediment barriers such as silt fencing will be used and checked daily for effectiveness. Construction will take cognisance of weather conditions and the duration that subsoil layers are exposed will be minimised. Waste will be managed appropriately on site. An Invasive Species Management Plan (ISMP) has been prepared and is included in Appendix A5.1 CEMP in Volume 4 of this EIAR. A pre-construction survey for invasives will be carried out to determine the status of invasives on site prior to commencement of works. High-risk species Himalayan knotweed will be removed and monitoring undertaken. All equipment will be steam cleaned prior to and after use on site.

During operation, for vegetation maintenance or management, any herbicide / weed killer used will be an ecologically safe product, including safe for pollinators and the aquatic environment. Waste from landscaping will also be appropriately dealt with away from any watercourse. The surface water drainage system, including petrol / oil separator will be regularly checked and maintained to ensure it is working appropriately and effectively. The emptying and maintenance of petrol interceptors will be the responsibility of Galway City Council. For invasive species, TII (2020) guidance for management of roads should be followed as appropriate. Checks should be made for invasive species during road maintenance, and if found, plans should be put in place for management and eradication of the invasive species recorded.

12.6.1.2 Habitats and Flora

12.6.1.2.1 Habitat Loss and Fragmentation

Where practicable, efforts have been made to reduce habitat loss and fragmentation through avoidance and design. The siting of the temporary construction compound, as well as land-take and tree felling, have been designed in such a way that habitat loss is kept to a minimum as required. No significant effects relating to fragmentation were identified, as land-take is primarily along the existing road.

Vegetation clearance will be kept to a minimum as required during the construction phase and in compliance with the conditions of any Derogation Licence, felling licence, statutory limits (including temporal) and the provisions of the Development plan on removing vegetation. Vegetation will only be cleared where required, and efforts made to retain vegetation wherever possible. Tree felling will also only be carried out where necessary to facilitate the development. Efforts will be made to retain trees where possible, and measures employed to limit any potential damage to retained trees, including root systems.

The landscaping plan includes for additional planting, as well as indicating any trees required to be felled. Planting schedule is included in Figure 16.2 of Volume 3 of this EIAR. Trees selected for planting include a mix of native and ornamental cultivars, as listed below:

- *Alnus glutinosa;*
- *Alnus glutinosa;*
- *Acer platanoides* 'Columnare'*;*
- *Acer platanoides* 'Fairview';
- *Acer platanoides* 'Globosum'*;*
- *Acer pseudoplatanus;*
- *Aesculus hippocastanum;*
- *Betula pendula;*

- *Betula pendula subsp. pendula Fastigiata;*
- *Fagus sylvatica;*
- *Pinus sylvestris;*
- *Populus nigra x deltoides;*
- *Prunus avium;*
- *Quercus petraea;*
- *Sorbus aria;*
- *Tilia cordata* 'Greenspire';
- *Ulmus glabra;*
- *Betula pendula; and*
- *Syringa vulgaris.*

Trees selected for planting have taken cognisance of existing species in the study area. A minimum height of 4 m will be achieved for all planted trees. Emphasis will be given to include a majority of native species, including pollinator-friendly and diverse plant species. The Landscaping Plan also includes for hedge and native shrub mixes, ornamental shrub planting, groundcover planting, seasonal bulbs and grassy verges. Other landscaping elements such as earth banks will also be considered which would improve insect production, to act as prey items for fauna. Care will be taken to ensure that plants and seed mixes used are regulated and quality controlled from the supplier to ensure no inadvertent non-native invasive species are present. Plants should be sourced from organic growers who produce stock free from insecticides and invasive species.

In areas where temporary works are required along the southern edge of the Meadow fields, it should be considered that reseeding be undertaken using seeds from the existing Meadows. Seeds from the Meadows could be harvested three years prior to year of opening (e.g., 2025) calendar year and stored for reseeding once temporary works areas are no longer needed. This would ensure that the species assemblage already present, including genetics, would be consistent. Further management measures are outlined in the operational mitigation measures section below.

The design of the Proposed Development is such that buffer zones are present between the new Proposed Development layout and existing baseline habitats, by way of additional planting and retention of existing trees and vegetation. This will ensure appropriate buffer zones and will mitigate fragmentation impacts. Linear features in the landscape will be set back from the existing layout but will exist post-development and no significant change is expected here. National Roads Authority *'Guidelines on the protection and preservation of trees, hedgerows and scrub prior to, during and post construction of national road schemes'* should be followed as relevant (NRA, 2005). The Landscaping General Arrangement Drawings (BCGDR-BTL-ENV_LA-XX-DR-CE-00001- 00011) also indicate Root Protection Areas (RPAs) for each tree to be retained, obtained from the Arboricultural Impact Assessment (Barton Hyett Associates, 2024). The temporary RPAs should be fenced off from the works where possible. No storage of materials, or vehicle access should be allowed within the RPAs. No storage of materials within 10m of any retained trees is permitted. Should works be required within an RPA, a qualified arborist will be consulted, and mitigation measures included in the Arboricultural Impact Assessment will be followed (Barton Hyett Associates, 2024).

The trees inside the construction compound area and their root zones will to be properly protected and no entry by individuals or machinery into the root protection zone will be permitted while the site is in use. The root protection area will not be used for storage of any kind. The tree protection fencing will be in place prior to commencement.

12.6.1.2.2 Invasive Species

Prior to the commencement of works, a pre-construction survey for invasive species should be carried out along the length of the Proposed Development. Due to the likely elapsed time between the current surveys and the start of the Proposed Development construction, there is potential for further spread of invasive species along the route. This should be undertaken to determine the extent of any invasive species present in the study area.

An Invasive Species Management Plan (ISMP) has been prepared and is included in Appendix A5.1 - CEMP of Volume 4 of this EIAR). Measures outlined in the ISMP will be implemented by a suitability qualified specialist prior to the commencement of construction to ensure non-native invasive species are controlled. The high-risk invasive species Himalayan knotweed should be appropriately removed to prevent further spread. While this is at a distance from the Natura 2000 network, this should be removed as best practice. When construction does commence, monitoring of these areas should be undertaken to ensure there is no regrowth or introduction of additional species via machinery and personnel once mobilised on Site. All equipment working on Site will be steam cleaned prior to and after use on Site and wastewater will be appropriately dealt with as in the Inland Fisheries Ireland (IFI 2010) '*Biosecurity Protocol for Field Survey Work*' and CIRIA C811 (2023) '*Environmental Good Practice on Site Guide'*. During works on Site, vehicles and machinery will be regularly inspected for plant material, such as roots or seeds, and if found, will be removed and safely disposed of in the construction compound.

12.6.1.2.3 Surface Water

Mitigation for surface water run-off is included in the Surface Water Management Plan (SWMP) in Appendix A5.1 - CEMP of Volume 4 of this EIAR), which includes general measures for the control and treatment of surface water during the construction phase of the Proposed Development. While there are no watercourses on the site, potential impacts were identified in relation to surface water run-off near the Meadow grassland fields in the HSE lands at Merlin Park. At a minimum, the works area will be fenced off from the Meadow fields during construction. Silt fences and sediment filter socks will be deployed along this fence to ensure no overland flows into the grassland. Monitoring of silt fencing and sediment filter socks will take place weekly and after heavy rainfall for the course of the works to ensure effectiveness. No storage of hazardous materials, fuel or stockpiling of materials should occur along this stretch, and ideally, will be kept to the temporary construction compound. No waste will be stored along this stretch and no refuelling should take place adjacent to the Meadow fields. Refuelling should only be undertaken in a designated area, with appropriate bunding, within the temporary construction compound.

12.6.1.3 Fauna

12.6.1.3.1 Non-volant mammals

While there are no guidelines for timeframes in Ireland, it is recommended in this case that surveys take place no later than 4 weeks prior to clearance works. This will be undertaken to ensure that no mammal dwellings are present immediately prior to construction, that may have been created in the time elapsed between the current surveys and the commencement of works. A pre-construction survey will be undertaken to determine if mammal dwellings have been created in the time elapsed from current surveys and the commencement of works. Nonetheless, all vegetation clearance works should follow the National Roads Authority guidance for badgers (NRA, 2006).

All vegetation clearance works should be undertaken slowly to allow mammals and other animals sufficient time to escape if needed. Any excavations will be covered when not in use and backfilled as soon as possible to reduce the potential for mammals to get trapped or potentially harmed. Excavations will also be covered at night where practicable. To reduce disturbance, vibration during the construction works will be regularly monitored and will comply with standards to ensure this is kept to a minimum.

12.6.1.3.2 Bats

No active bat roosts were identified during the bat surveys undertaken in the study area. However, a number of mature trees were identified with potential roost features (PRFs), some of which will be felled, and some retained. All trees should be endeavoured to be retained. However, a number of trees to the north side of the road adjacent to the Meadow fields will require felling to facilitate the works. In the absence of confirmation of these potential roost sites, it must be assumed that these roosts may be used by bats at any time of year.

A suitably qualified bat ecologist will be present on site for any tree felling works and setting up roost protection areas for retained trees with PRFs. This ecologist should undertake a pre-construction survey of the affected trees. This pre-construction survey may determine that further PRFs have formed in the interim

or give a confirmation of whether these trees are being used by bats. A derogation licence is required as there is potential for bats to be present in suitable trees at any point of time. While the Derogation Licence applied for is not a mitigation measure per se, it will have conditions attached to it which must be complied with. The Derogation licence application submitted on behalf of GCC committed to undertaking certain measures detailed in Section 12.6.1.3.2 in Chapter 12 (Biodiversity) of this EIAR. All bat species and their roost sites are strictly protected under both European and Irish legislation. It is an offence to kill a bat or to damage or destroy the breeding or resting place of any bat species, even if such harm is not deliberate. The suitably qualified bat ecologist in conjunction with the NPWS will ensure there are no bats in the trees prior to felling. Under Regulation 54, a successful planning outcome does not prejudice the derogation licence procedure.

National Roads Authority 'Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes' will be followed as relevant (NRA, 2006). Tree felling is best undertaken from late August to late October / early November, during which time all bats are capable of flight, but are not yet in hibernation. Therefore, bats would be more capable of escaping during felling. Trees with PRFs should be felled using a first warning, nudging the tree two or three times with a pause in between, to warn bats that may be present. Trees should be felled in sections, undertaken carefully, cutting from the canopy of the tree first and removing and checking each section for bats. As a precaution, cut tree sections should be left overnight before mulching. If any bats are found throughout this process, commitments provided in the application for the Derogation licence must be complied with, works must stop, NPWS will be notified. If bats are encountered in any trees or vegetation or over the course of the works, works must also stop and NPWS will be notified. Due to the required loss of some mature trees with PRFs for bats, alternative accommodations for bats should be provided. A bat box scheme will be included. The bat boxes will be erected on mature trees in the study area, a season prior to the felling of trees, ideally prior to construction. An ecologist will advise on the location and orientation of the bat boxes on site based on relevant guidelines. However, a minimum height of 4 m should be obtained and a preferred aspect of south-east or south-west and away from any light spill (Bat Conservation Ireland, 2015). A total of 3 boxes per PRF tree removed is recommended. Boxes suited for a range of species, that are also self-cleaning, are recommended. While boxes will be specified here, these brands or types may not be available at the time they are required, so if this must be deviated from, a suitably qualified bat ecologist will be consulted on an alternative. For each PRF tree felled, Standard Schwegler 2F (1 no.), 1FF (2 no.) bat boxes should be erected. Any bat boxes installed should be labelled and information supplied to Bat Conservation Ireland and the local NPWS ranger.

Artificial lighting has been designed to minimise lighting impacts on nocturnal fauna. The landscaping design also includes for additional planting along the southern boundary of the Meadow Park fields, which would act as a barrier to light spill from the road. However, during the construction phase, temporary flood lighting will be required. As outlined in the CEMP this will include tower mounted floodlights, which will be cowled and directed downwards to reduce light spill. Some night work is required, and works will take place over 24 months, which includes some sensitive times of year particularly for bat species. EUROBATS *'Guidelines for the consideration of bats in lighting projects'* will be used where relevant, as well as Bat Conservation Trusts' '*Bats and Artificial Lighting at Night: Guidance Note 08/23'* (EUROBATS, 2018; BCT, 2023) and lighting mitigation included in the '*Bat mitigation guidelines for Ireland v2'* by Marnell *et al.* (2022). Measures are proposed to reduce the potential for light spill impacts from temporary construction lighting, along hedgerows, treelines, scrub and grassland habitats:

- Motion sensors / timer triggers used where possible;
- Column heights kept to a minimum as practicable;
- Lighting directed only to areas where lighting is needed (avoid unnecessary light spill);
- Luminaires used to prevent light spill;
- Warm colour temperatures used where possible (2700K or less);
- Cowls, louvres, hoods or baffles used to direct lighting; and
- No upward facing lighting.

12.6.1.3.3 Birds

Vegetation clearance works should be undertaken outside the bird nesting season, from 1st March to 31st August (as per S40(1) Wildlife Act 1976, as amended (which prohibits cutting vegetation growing on land (not cultivated between) 1st March and 31st August). Birds are likely to nest in scrub, hedgerow and treeline habitats in the study area.

In areas where this cannot be observed, should S40(2)(e) not be applied (disapplies to the clearance of vegetation in the course of road or other construction works), a pre-construction survey of vegetation to be removed will be undertaken in advance of construction by a suitably qualified ecologist. If any active nests are identified, these areas will be appropriately fenced off and no vegetation removal will be undertaken in these areas until birds have fledged and nests are no longer in use. In areas where there are no active nests, or no potential disturbance to nesting birds, vegetation removal can be undertaken as this is exempt from the bird nesting season due to construction and road works.

Bird boxes should be installed within the study area prior to the clearance of vegetation. Generalist bird boxes of a durable material should be used, and an ecologist consulted prior to installation for location and orientation. A total of 446 number of trees are proposed to be felled along the length of the route. Many of these trees are immature and not suitable for bird nesting, however some larger trees are suitable for bird nesting and will be lost as a result of the Proposed Development. Based on the number of trees to be felled, and the consideration of significant additional planting of 408 number of trees, it is recommended that a total of 20 bird boxes be installed in the vicinity of Merlin Park, on mature trees that will be retained. An ecologist will specify the bird boxes to be used. A variety should be chosen to give opportunities for a number of species.

12.6.1.3.4 Invertebrates and Other Fauna

Mitigation for invertebrates and other fauna will be covered by mitigation for habitats and flora in relation to vegetation and road maintenance.

12.6.2 Operational Phase

12.6.2.1 Designated Sites

The mitigation measures that are required to ensure that the Proposed Development will not adversely affect the integrity of the Natura 2000 sites within the ZoI are presented in the NIS and within Chapter 13 (Hydrology) of this EIAR. The following mitigation measures were developed to address potential impacts that were identified:

- Measures to protect surface water quality and egress during construction; and
- Measures to prevent the spread of non-native invasive species.

12.6.2.2 Habitats and Flora

12.6.2.2.1 Habitat Loss and Fragmentation

The habitat management and maintenance regime should follow the All-Ireland Pollinator Plan 2021-2025 where relevant (National Biodiversity Data Centre, 2021) (and subsequent revisions). Vegetation clearance along the roads edge should only be undertaken where necessary for safety. The Annex I habitat at the HSE Merlin Park meadow fields currently undergoes management in the form of mowing twice a year. It should be ensured that this management is ongoing and maintained in its current frequency. However, it is noted that the 2024 cutting was undertaken too early in July and should be at the same time of year each year, i.e. end of September. Historically, lowland hay meadow habitat types were subject to low intensity grazing by livestock. In the absence of this, management of this habitat type will take cognisance of relevant sections of Natural England's (2007) *'Lowland Grassland Management Handbook (Section Edition)'.* NE (2007) states that for nutrient status, conservation management involves restricting the supply of nutrients to a grassland site, usually by preventing the use of fertilisers. The spread of Bracken on the fringes of the

meadows should be monitored to ensure its spread is controlled. This habitat is of ecological value to a variety of wildlife, including invertebrates and mammals, but should be maintained in its current abundance to ensure habitat loss of the meadow fields is managed. Due to the large rhizomes this species can spread rapidly, and it's naturally occurring toxins can prevent colonisation of other plant species (NE, 2007). Non-chemical control is recommended as in NE (2007) with cutting twice a year, which may be done at the same time as mowing of the meadow fields. Potential impacts on bird and mammal species must be considered for any vegetation management.

Further management of the middle Meadow field, which is not considered to be Annex I habitat, should be considered as enhancement, with proposed details included here. As per the NE (2007) handbook, investigations may be undertaken for soil testing, to determine structure, chemistry and organic content, which may explain the difference in species structure compared with the western and eastern fields. Enhancement measures will involve consultation with existing HSE Merlin Park management of these lands as well as with local community wildlife group Friends of Merlin Park to ensure details of historic and current management are aligned with proposed enhancements. Species such as common ragwort were noted in the middle field, which may be indicators of nutrient enrichment (NE, 2007). Ragwort is recommended to be mechanically removed (as there are no large areas this is feasible) to facilitate the increased abundance of Lowland Hay Meadow characteristic species. During the 2024 surveys, volunteers were observed manually removing ragwort from the fields and this should be continued. There was also a notable change of yellow rattle dominance in this field, compared with the western and eastern field. Yellow rattle seed could also be harvested from other fields, and reseeded here, to improve the balance of dominant grassland species such as cock's foot. This reseeding with species already present would also provide for an accelerated natural regeneration. Yellow rattle is a hemi-parasitic angiosperm that inhibits the growth of the surrounding grass species (NE, 2007). This would aid in allowing diversification of herb species in this middle field, which is dominated more by taller grass species than the eastern and western meadow fields. NE (2007) notes it is best to sow the seed of yellow rattle in late summer or autumn onto short grass, so this may be feasible after collecting seeds from the eastern or western meadow fields and subsequently mowing. This allows the yellow rattle seeds to overwinter and be subject to frost which encourages germination in the spring (NE, 2007).

12.6.2.2.2 Invasive Species

An Invasive Species Management Plan (ISMP) has been prepared and is included A5.1 - CEMP of Volume 4 of this EIAR. Guidance listed in the ISMP will be followed as relevant, including the Transport Infrastructure Ireland guidance (2020). Measures outlined in the ISMP will be implemented by a suitability qualified specialist prior to the commencement of construction to ensure non-native invasive species are controlled. The high-risk invasive species Himalayan knotweed should be appropriately removed to prevent further spread. While this is at a distance from the Natura 2000 network, this should be removed as best practice. When construction does commence, monitoring of these areas should be undertaken to ensure there is no regrowth or introduction of additional species via machinery and personnel once mobilised on Site. All equipment working on Site will be steam cleaned prior to and after use on Site and wastewater will be appropriately dealt with as in the IFI (2010) '*Biosecurity Protocol for Field Survey Work*' and CIRIA (2015) '*Environmental Good Practice on Site Guide'*. During works on Site, vehicles and machinery will be regularly inspected for plant material, such as roots or seeds, and if found, will be removed and safely disposed of in the construction compound. Post-construction monitoring should be undertaken along the length of the route, to ensure no introduction of invasive species occurred during the construction phase. Ongoing management of the Proposed Development should include regular checks for invasive species, and management employed where required. Should invasive species be found, appropriate signage should be erected, and treatment promptly undertaken. This will follow local authorities' management procedures.

12.6.2.2.3 Surface Water

Maintenance of new surface water infrastructure should be ongoing during the operational phase. Regular maintenance of petrol interceptors and oil separators, swales, tree pits, rain gardens and bioretention areas should be undertaken as standard to ensure appropriate effectiveness. Maintenance regimes will be carried out by local authorities as standard. The design of surface water infrastructure for the Proposed

Development will ensure that the environmental quality of discharges will be improved, above the current situation, which is understood to be untreated.

12.6.2.3 Fauna

12.6.2.3.1 Non-volant mammals

If fencing will be installed along the fringes of the route to provide a buffer zone between the road and adjoining habitats, this must be mammal-friendly and must not impede access and movement throughout the landscape.

Operational phase management of habitats as outlined above in section 12.6.2.2.1 will cover habitat loss and fragmentation mitigation required for non-volant mammals. Following implementation of landscaping and completion of the construction works, no additional mitigation measures are deemed necessary. Connectivity and habitat suitability is not expected to be affected.

12.6.2.3.2 Bats

Additional tree planting along currently bare edges of the meadow fields to the east, will create a barrier effect, minimising light spill to the optimal foraging habitats the north of the meadow fields and Merlin Park woodland during the operational phase. Lighting drawings show that a maximum of 1 lux is expected along the fringes of the Meadow habitats to the south, with 6 lux at the edge near the road. However, this is unlikely to take into account the trees in full leaf along this linear feature, separating the road from these habitats. For comparison, full moonlight is expected to be in the region of 0.5-2 lux (Bat Conservation Trust (BCT), 2023). Recommendations provided follow the EUROBATS, BCT and Marnell *et al*. guidance where relevant (EUROBATS, 2018; BCT, 2023; Marnell *et al*., 2022). Measures are included to ensure light spill is kept to a minimum along the route during the operational phase, particularly in areas close to hedgerows, treelines, scrub, woodland and grassland:

- During sensitive times of the year for bats, April-October, lighting should be dimmed, restricted or turned off during late hours of the night;
- Warm colour temperatures used where possible (2700K or less);
- Column heights kept to a minimum as practicable;
- Directional lighting used, assisted by cowls, louvres, hoods or baffles;
- Motion sensors / timer triggers used where possible;
- No upward facing lighting; and
- No lighting near any bat or bird box locations.

Using a precautionary approach, considering all identified roost features are a potential roost source, a derogation license has been applied for (Derogation licence number: Der-Bat-2025-33 included as part of Planning Submission Documents). The derogation is for any potential to impact the roost source within the Proposed Development.

Operational phase management of habitats as outlined above in section 12.6.2.2.1 will cover habitat loss and fragmentation mitigation required for bats. Following implementation of landscaping and completion of the construction works, no additional mitigation measures are deemed necessary. Connectivity and habitat suitability is not expected to be affected.

12.6.2.3.3 Birds

Vegetation clearance along the roads edge should only be undertaken outside of the bird nesting season, which runs from 1st March to 31st August. It is an offence to destroy an active bird's nest. If this is required to be undertaken during the bird nesting season, a bird survey will need to be undertaken to ensure no active nests are present. While mitigation is included to avoid any disturbance or impacts on any active nests, a derogation licence is required if vegetation clearance must be undertaken during the bird nesting season. However, due to the unknowns of species and location of the potential nests, derogation cannot be applied for prior to surveys being undertaken in the nesting season, should they be required.

The findings of the pre-construction survey will be reviewed with respect to the Proposed Development in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS. The need for derogation licensing will be determined by the ECoW in conjunction with the Project Ecologist. The need for derogation licences will be kept under review by the ECoW as the works progress based on the findings of the pre-construction surveys completed.

Operational phase management of habitats as outlined above in section 12.6.2.2.1 will cover habitat loss and fragmentation mitigation required for birds. Following implementation of landscaping and completion of the construction works, no additional mitigation measures are deemed necessary. Connectivity and habitat suitability is not expected to be affected.

12.6.2.3.4 Invertebrates and other fauna

Operational phase management of habitats as outlined above in section 12.6.2.2.1 will cover mitigation required for invertebrates and other fauna.

12.6.3 Monitoring

12.6.3.1 Monitoring During Construction

An Ecological Clerk of Works (EcOW) will be employed to ensure ecological mitigation measures are adhered to. All vegetation removal will be supervised by the EcOW.

An initial site environmental induction and ongoing training will be provided by the EcOW to communicate the main provisions of this environmental plan to all site personnel. Two-way communication will be encouraged to promote a culture of environmental protection.

The following outlines the information which must be communicated to site staff:

- Environmental procedures of the CEMP;
- Environmental buffers and exclusion zones;
- Housekeeping of materials and waste storage areas; and
- Environmental emergency response plan.

Prior to any works, all personnel will receive an on-site induction relating to operations adjacent to the environmentally sensitive areas and to re-emphasise the precautions that are required as well as the construction management measures to be implemented. Galway City Council will also ensure that the engineer setting out the works is fully aware of the ecological constraints and construction management requirements.

12.6.3.2 Designated Sites

Monitoring measures for designated sites is covered in the NIS prepared by APEM (2024). For clarity, these monitoring measures listed are summarised here. Monitoring measures include general protection measures and good working practices, following guidance set out in:

- IFI (2010) *'Biosecurity Protocol for Field Survey Work';*
- TII (2020) '*The Management of Invasive Alien Plant Species on National Roads - Technical Guidance';*
- CIRIA (2006) '*Control of Water Pollution from Linear Construction Projects – Site Guide';*
- CIRIA (2015) '*Environmental Good Practice on Site Guide'; and*
- CIRIA (2017) '*Guidance on the construction of SuDS'.*

During construction, water quality protection measures will be employed, including following the Surface Water Management Plan (SWMP) Appendix A5.1 CEMP in Volume 4 of this EIAR. An Environmental Emergency Response Plan will also be prepared and communicated to personnel prior to commencement of work. Existing surface water infrastructure will be inspected and deemed to be in good working order prior to works starting. All equipment and machinery will be checked for leaks prior to usage on site and on a daily basis. Sediment barriers such as silt fencing will be used and checked daily for effectiveness.

Construction will take cognisance of weather conditions and the duration that subsoil layers are exposed will be minimised. High-risk species Himalayan knotweed will be removed and monitoring undertaken.

The surface water drainage system, including petrol / oil separator will be regularly checked and maintained to ensure it is working appropriately and effectively. The emptying and maintenance of petrol interceptors will be the responsibility of Galway City Council. For invasive species, TII (2020) guidance for management of roads should be followed as appropriate. Checks should be made for invasive species during road maintenance, and if found, plans should be put in place for management and eradication of the invasive species recorded.

12.6.3.3 Habitats and Flora

Monitoring of the Annex I habitat in the HSE lands within Merlin Park will be undertaken annually, over a period of three years and will involve consultation with the HSE that undertake management of these lands. This should be undertaken by a suitably qualified ecologist / botanist. Any negative changes noted in the baseline of these fields should be recorded and mitigation amended (air quality and/ or surface water) to reduce further impacts. Measures are proposed in section 12.7.2.2.1 for the enhancement of the middle field in the Meadows, to improve habitat quality. Monitoring will be undertaken by way of habitat surveys to record vegetation structure and changes. This should be undertaken at least once a year, at the same period each year. This is to reduce seasonal variation effects on the results. The first visit should be undertaken to form a baseline prior to enhancement measures listed in section 12.7.2.2.1. Results will be analysed after each survey to compare with baseline results and indicator species targets in BSBI (2021) and O'Neill *et al*., (2013) to establish efficacy of enhancement measures. Areas used for temporary works will be allowed to naturally regenerate, to include reseeding with seed harvested from the existing fields, the success of which should be monitored to establish efficacy of seeding measures. Any additional measures deemed required by the ecologist after the first year of monitoring will be considered.

12.6.3.4 Fauna

Bat boxes installed as part of the construction phase of the Proposed Development, should be monitored according to guidelines 'Bat Mitigation Guidelines for Ireland - v2', (Marnell *et al.,* 2022). It is assumed that species that may use these bat boxes, would be those recorded during the bat surveys. In this case, monitoring should take place annually, for a period of five years, by a suitably qualified bat ecologist, with the appropriate licence to undertake an inspection. Where no evidence of usage is found within the first three years, the location of bat boxes may be relocated at the discretion of the ecologist. Details of monitoring will be communicated with the BCI and local NPWS ranger. Results of the monitoring of bat boxes will be communicated with the Friends of Merlin Park.

The bird boxes installed as part of the construction phase of the Proposed Development will also be monitored. Monitoring should include one check annually for two years. Similar to the bat boxes, if no occupancy is noted, or inadvertent use by other fauna is recorded, appropriate measures will be taken to increase likelihood of usage. This will be under advisement from an ecologist following monitoring. Results of the monitoring of bird boxes will be communicated with the Community Group Friends of Merlin Park.

12.7 Residual Effects

12.7.1 Residual Effects during Construction

Following implementation of the mitigation measures outlined in section 12.6, no significant residual effects on designated sites, habitats and flora or fauna are expected to arise. For this purpose, ecological receptors considered include those with an evaluation of Local Importance or higher.

Table 12-18 Summary of Construction Phase Significant Residual Impacts.

Ecological Receptor	Evaluation	Potential Impact	Potential Significance	Significant Residual Impacts (post mitigation and monitoring)
Designated Sites (Natura 2000 Sites, Natural Heritage Areas and Proposed Natural Heritage Areas)	National Importance	Surface water and invasive species	Negative, Imperceptible, Temporary and in the National Context	Imperceptible Mitigation measures set out in 12.6.1.1
(Mixed) Broadleaved Woodland (WD1)	Local Importance	Invasive species	Negative, Moderate, Long-term and in the National Context	Not Significant Mitigation measures set out in 12.6.1.2
Oak-ash-hazel woodland (WN2)	Local Importance	Invasive species		
Scrub (WS1)	Local Importance	Invasive species, Habitat loss and fragmentation		
Dense Bracken (HD1)	Local Importance	Invasive species, Habitat loss and fragmentation		
Hedgerows (WL1)	Local Importance	Invasive species, Habitat loss and fragmentation		
Treelines (WL2)	Local Importance	Invasive species, Habitat loss and fragmentation		
Dry Meadows and Grassy Verges (GS2) (Annex I Lowland Hay Meadows [6510])	National Importance	Invasive species, Habitat loss and fragmentation, surface water pollution		
Stone walls and other stonework (BL1)	Local Importance	Invasive species, Habitat loss and fragmentation		
Invasive Species	Local Importance	Impacts on other habitat types as above	Negative, Moderate, Short-term and in the Local Context	Not Significant Mitigation measures set out in 12.6.1.2.2
Non-volant mammals	Local Importance	Habitat loss and fragmentation, disturbance and displacement	Negative, Slight, Short-term and in the Local Context	Not Significant Mitigation measures set out in 12.6.1.3.1
Bats	Local Importance	Habitat loss and fragmentation, disturbance and displacement	Negative, Moderate, Short-term and in the Local Context	Not Significant Mitigation measures set out in 12.6.1.3.2

Ecological Receptor	Evaluation	Potential Impact	Potential Significance	Significant Residual Impacts (post mitigation and monitoring)
Birds	Local Importance	Habitat loss and fragmentation, disturbance and displacement	Negative, Slight, Short-term and in the Local Context	Not Significant Mitigation Measures set out in 12.6.1.3.3
Invertebrates and Other Fauna (Marsh Fritillary)	Local Importance	Habitat loss and fragmentation, disturbance and displacement	Negative, Slight, Short-term and in the Local Context	Not Significant Mitigation Measures set out in 12.5.2.3.4

12.7.2 Residual Effects during Operation

Following implementation of the mitigation measures outlined in section 12.6, no significant residual effects on designated sites, habitats and flora or fauna are expected to arise.

Table 12-19 Summary of Operational Phase Significant Residual Impacts.

Ecological Receptor	Evaluation	Potential Impact	Potential Significance	Significant Residual Impacts (post mitigation and monitoring)
Designated Sites (Natura 2000 Sites, Natural Heritage Areas and Proposed Natural Heritage Areas)	National Importance	Surface water runoff	Negative, Imperceptible, Long-Term and in the National Context.	Imperceptible Mitigation Measures set out in 12.6.2.1
(Mixed) Broadleaved Woodland (WD1)	Local Importance	None	Negative, Not Significant, Long-term and in the National Context	Not Significant Mitigation Measures set out in 12.6.2.2
Oak-ash-hazel woodland (WN2)	Local Importance	None		
Scrub (WS1)	Local Importance	Ongoing management (habitat loss)		
Dense Bracken (HD1)	Local Importance	Ongoing management (habitat loss)		
Hedgerows (WL1)	Local Importance	Ongoing management (habitat loss)		
Treelines (WL2)	Local Importance	Ongoing management (habitat loss)		
Dry Meadows and Grassy Verges (GS2)	National Importance	Surface water pollution		
Stone walls and other stonework (BL1)	Local Importance	None		

Ecological Receptor	Evaluation	Potential Impact	Potential Significance	Significant Residual Impacts (post mitigation and monitoring)
Invasive Species	Local Importance	Impacts on other habitat types as above	Negative, Slight, Long-term and in the Local Context	Not Significant Mitigation Measures set out in 12.6.2.2.2
Non-volant mammals	Local Importance	Disturbance and displacement	Negative, Not Significant, Long-term and in the Local Context	Not Significant Mitigation Measures set out in 12.6.2.3.1
Bats	Local Importance	Disturbance and displacement		Not Significant Mitigation Measures set out in 12.6.2.3.2
Birds	Local Importance	Disturbance and displacement		Not Significant Mitigation Measures set out in 12.6.2.3.3
Invertebrates and Other Fauna (Marsh Fritillary)	Local Importance	Disturbance and displacement		Not Significant Mitigation Measures set out in 12.6.2.3.4

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