Proposed Large Scale Residential Development at Rathgowan, Mullingar, Co. Westmeath

Applicant: Marina Quarter Ltd.

Volume II

Main Statement

CHAPTER 14

Biodiversity

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14 Biodiversity

14.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects of the proposed development on the biodiversity of the lands at Rathgowan, Mullingar, Co. Westmeath, hereafter referred to as the 'Proposed Development' or 'Site' when referring to the site area of the Proposed Development, and surrounding environs, with emphasis on habitats, flora and fauna, and details the methodology of assessment used in each case. It provides an assessment of the impacts of the Proposed Development on habitats and species, particularly those protected by national and international legislation, or considered to be of conservation importance; and proposes measures for the mitigation of these impacts, where appropriate. A description of residual effects that will remain following the implementation of mitigation is also outlined in this Chapter.

The Chapter has been completed having regard to the *Guidelines for Ecological Impact Assessment in the UK and Ireland*, by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018), together with the guidance outlined in the Environmental Protection Agency (EPA) documents *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (May 2022) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015). The value of the ecological resources, the habitats, and species present or potentially present, was determined using the ecological evaluation guidance given in the National Roads Authority's (NRA, now Transport Infrastructure Ireland) *Ecological Assessment Guidelines* (NRA, 2009).

14.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Rozalyn O'Hora, Project Ecologist with Enviroguide Consulting.

Rozalyn holds a M.Sc. (Hons) in Ecological Assessment from University College Cork and a B.Sc. (Hons) in Environmental Science from the University of Galway. ROH has a wealth of experience in desktop research, literature scoping review and report writing as well as practical field experience (habitat surveys, bat surveys, invasive species surveys, badger surveys and bird surveys). ROH has extensive experience in compiling Ecological Impact Assessments (EcIA), Stage I and Stage II Appropriate Assessment (AA) Reports and in the overall assessment of potential impacts to ecological receptors from a range of developments.

14.3 Proposed Development

The full description of the proposed development is outlined in Chapter 2 'Development Description' of this EIAR.

14.3.1 Aspects Relevant to this Assessment

The Construction Phase of the Proposed Development will require the removal of the majority of habitats at the Site and the addition of landscaped areas. This type of work has the potential to result in effects on biodiversity.

14.4 Methodology

14.4.1 Relevant Legislation & Guidance

14.4.1.1 Wildlife Act (1976) (as amended)

The Wildlife Act 1976 (as amended) was enacted to provide protection to birds, animals, and plants in Ireland and to control activities which may have an adverse impact on the conservation of wildlife. With regard to the listed species, it is an offence to disturb, injure or damage their breeding or resting place wherever these occur without an appropriate licence from the National Parks and Wildlife Service (NPWS). This list includes all birds along with their nests and eggs. Intentional destruction of an active nest from the building stage up until the chicks have fledged is an offence. This includes the cutting of hedgerows from the 1st of March to the 31st of August. The act also provides a mechanism to give statutory protection to Natural Heritage Areas (NHAs). The Wildlife Amendment Act 2000 widened the scope of the Act to include most species, including the majority of fish and aquatic invertebrate species which were excluded from the 1976 Act.

NHAs are designations under the Wildlife Acts to protect habitats, species, or geology of national importance. The boundaries of many of the NHAs in Ireland overlap with Special Areas of Conservation (SAC) and/or Special Protection Area (SPA) sites. Although many NHA designations are not yet fully in force under this legislation (referred to as 'proposed NHAs' or pNHAs), they are offered protection from the date they are formerly proposed for designation, under the Wildlife Amendment Act (2000).

14.4.1.2 EU Habitats Directive 1992 and EC (Birds and Natural Habitats) Regulations 2011

The Habitats Directive (92/43/EEC) seeks to conserve natural habitats and wild fauna and flora by the designation of SACs and the Birds Directive 79/409/EEC) seeks to protect birds of special importance by the designation SPAs. It is the responsibility of each member state to designate SPAs and SACs, both of which will form part of Natura 2000, a network of protected sites throughout the European Community. SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds). SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats. The annexed habitats and species for which each site is selected correspond to the Qualifying Interests (QIs) of the sites; from these the conservation objectives of the site are derived.

Annex IV of the EU Habitats Directive provides protection to a number of listed species, wherever they occur. Under Regulation 23 of the Habitats Directive, any person who, in regard to the listed species, "*Deliberately captures or kills any specimen of these species in the wild, deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration, deliberately*

takes or destroys eggs from the wild or damages or destroys a breeding site or resting place of such an animal shall be guilty of an offence."

In view of their sensitive status across Europe, all species of bat have been listed on Annex IV of the EC 'Habitats Directive and some, such as the lesser horseshoe bat, are given further protection and listed on Annex II of this Directive. The obligations of the Habitats Directive have been transposed into Irish law and. combined with the Wildlife Acts 1976 to 2018, ensure that individual bats and their breeding sites and resting places are fully protected. This has important implications for those who own or manage sites where bats occur.

14.4.1.3 Flora (Protection) Order, 2022

The Flora (Protection) Order affords protection to several species of plant in Ireland, including 89 vascular plants, 40 mosses, 25 liverworts, 2 stoneworts and 1 lichen. This Act makes it illegal for anyone to uproot, cut or damage any of the listed plant species and it also forbids anyone from altering, interfering, or damaging their habitats. This protection is not confined to within designated conservation sites and applies wherever the plants are found.

14.4.1.4 EU Birds Directive

The Birds Directive constitutes a level of general protection for all wild birds throughout the European Union. Annex I of the Birds Directive includes a total of 194 bird species that are considered rare, vulnerable to habitat changes or in danger of extinction within the European Union. Article 4 establishes that there should be a sustainable management of hunting of listed species, and that any large scale non-selective killing of birds must be outlawed. The Directive requires the designation of SPAs for: listed and rare species, regularly occurring migratory species and for wetlands which attract large numbers of birds. There are 25 Annex I species that regularly occur in Ireland and a total of 165 Special Protection Areas have been designated.

14.4.1.5 Habitats Directive

The Habitats Directive aims to protect some 220 habitats and approximately 1,000 species throughout Europe. The habitats and species are listed in the Directives annexes, where Annex I covers habitats and Annex II, IV and V cover species. There are 59 Annex I habitats in Ireland and 33 Annex IV species which require strict protection wherever they occur. The Directive requires the designation of SACs for areas of habitat deemed to be of European interest. The SACs together with the SPAs from the Birds Directive form a network of protected sites called Natura 2000.

14.4.1.6 Water Framework Directive

The EU Water Framework Directive (WFD) 2000/60/EC is an important piece of environmental legislation which aims to protect and improve water quality. It applies to rivers, lakes, groundwater, estuaries, and coastal waters. The Water Framework Directive was agreed by all individual EU member states in 2000, and its first cycle ran from 2009 – 2015. The Directive runs in 6-year cycles, the second cycle ran from 2016 – 2021 and the current (third) cycle runs from 2022 - 2027. The aim of the WFD is to prevent any deterioration in the existing status of water quality, including the protection of good and high-water quality status where it exists. The WFD requires member states to manage their water

resources on an integrated basis to achieve at least 'good' ecological status, through River Basin Management Plans (RBMP), by 2027.

14.4.1.7 Bern and Bonn Convention

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982) was enacted to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was introduced to give protection to migratory species across borders in Europe.

14.4.1.8 Ramsar Convention

The Ramsar Convention on Wetlands is an intergovernmental treaty signed in Ramsar, Iran, in 1971. The treaty is a commitment for national action and international cooperation for the conservation of wetlands and their resources. In Ireland there are currently 45 Ramsar sites which cover a total area of 66,994 Ha.

14.4.1.9 Westmeath County Development Plan

Objectives of the Westmeath County Development Plan 2021 – 2027 that are of relevance to this chapter are outlined below:

CPO 12.24 states:

It is a policy objective of Westmeath County Council to: *Protect and where possible enhance biodiversity and ecological connectivity, including woodlands, trees, hedgerows, semi-natural grasslands, rivers, streams, natural springs, wetlands, geological and geo-morphological systems, other landscape features, natural lighting conditions, and associated wildlife where these form part of the ecological network and/or may be considered as ecological corridors or stepping stones in the context of Article 10 of the Habitats Directive. Appropriate mitigation and/or compensation to conserve biodiversity, landscape character and green infrastructure networks will be required where habitats are at risk or lost as part of a development*.

CPO 12.39 states:

It is a policy of Westmeath County Council to: *Discourage the felling of mature trees and hedgerows, particularly species rich roadside and townland boundary hedgerows to facilitate development and seek Tree Management Plans to ensure that trees are adequately protected during development and incorporated into the design of new developments*.

CPO 12.40 states*:*

It is a policy objective of Westmeath County Council to: *Protect and preserve existing hedgerows in new developments, particularly species rich roadside and townland boundary hedgerows, and where their removal is necessary during the course of road works or other works seek their replacement with new hedgerows of native species indigenous to the area*.

CPO 12.58 states:

It is a policy objective of Westmeath County Council to: *Ensure that the County's watercourses are retained for their biodiversity and flood protection values and to conserve and enhance where possible, the wildlife habitats of the County's rivers and riparian zones, lakes, canals and streams which occur outside of designated areas to provide a network of habitats and biodiversity corridors throughout the county*.

CPO 12.60 states:

It is a policy objective of Westmeath County Council to: *Ensure that run off from a proposed development does not result in a deterioration of downstream watercourses or habitats*.

14.4.2 Study Methodology

This section details the steps and methodology employed to undertake the Ecological Impact Assessment (EcIA) of the Site of the Proposed Development.

14.4.2.1 Scope of assessment

The specific objectives of the study were to:

- Undertake baseline ecological surveys of the Site and evaluate the nature conservation importance of the Site;
- Identify and assess the direct, indirect and cumulative ecological implications of impacts of the project during its lifetime;
- Where possible, propose mitigation measures to remove or reduce those impacts at the Design, Construction and Operational Phases; and
- Achieve the best possible biodiversity outcome for the future of the Site.

14.4.2.2 Zone of influence

The 'zone of influence' (ZOI) for a project is the area over which ecological features may be affected by changes as a result of the Proposed Development and associated activities. This is likely to extend beyond the development site, for example where there are ecological or hydrological links beyond the site boundaries (CIEEM, 2018). The ZOI will vary with different ecological features, depending on their sensitivities to an environmental change. In this instance the ZOI is regarded to be relatively limited and within the red line boundary of the Site for most ecological receptors.

Furthermore, ZOI in relation to European sites is described as follows in the 'OPR Practice Note PN01 - Appropriate Assessment Screening for Development Management' (OPR, 2021):

"*The zone of influence of a proposed development is the geographical area over which it could affect the receiving environment in a way that could have significant effects on the Qualifying Interests of a European site. This should be established on a case-by-case basis using the Source-Pathway-Receptor framework and not by arbitrary distances (such as 15 km).*"

Thus, to identify the European sites that potentially lie within the ZOI of the Proposed Development, a Source-Path-Receptor (S-P-R) method was adopted, as described in OPR PN01 (OPR 2021). This note was published to provide guidance on screening for AA during the planning process, and although it

focuses on the approach a planning authority should take in screening for AA, the methodology is also readily applied in the preparation of Screening Reports and EIARs.

The relevant European sites were identified based on the following:

- Identification of potential sources of effects based on the Proposed Development description and details, including changes to potentially suitable ex-situ habitats at the Site (i.e., habitats utilised by SCI bird species outside of their designated SPAs);
- Use of up-to-date GIS spatial datasets for European designated sites and water catchments – downloaded from the NPWS website (*www.npws.ie*) and the EPA website (*www.epa.ie*) to identify European sites which could potentially be affected by the Proposed Development; and
- Identification of potential pathways between the Site of the Proposed Development and any European sites within the ZOI of any of the identified sources of effects.
    - The catchment data were used to establish or discount potential hydrological connectivity between the Proposed Development and any European sites.
    - Groundwater and bedrock information used to establish or discount potential hydrogeological connectivity between the Proposed Development and any European sites.
    - Air and land connectivity assessed based on Proposed Development details and proximity to European sites.
    - Consideration of potential indirect pathways, e.g., impacts to flight paths, *ex-situ* habitats, etc.
- Defining the likely ZOI based on the identified sources of effects and potential pathways between the Proposed Development and any European sites.

14.4.2.3 Identification of relevant designated sites

To determine the ZOI of the Proposed Development for designated sites, reference was made to the OPR Practice Note PN01 - Appropriate Assessment Screening for Development Management' (OPR, 2021), a practice note produced by the Office of the Planning Regulator, Dublin. This note was published to provide guidance on screening for AA during the planning process, and although it focuses on the approach a planning authority should take in screening for AA, the methodology is also readily applied in the preparation of reports such as this to identify all relevant designated sites potentially linked to the Proposed Development.

As noted above, the most recent guidance advises against the use of arbitrary distances that serve as precautionary ZOI (e.g., 15km), and instead recommends the application of the Source-Pathway-Receptor (S-P-R) model in the identification of designated sites, stating that "*This should avoid lengthy descriptions of European sites, regardless of whether they are relevant to the proposed development, and a lack of focus on the relevant European sites and issues of importance*". Although this statement refers to European sites, it is also applicable to other designated sites.

Thus, the methodology used to identify relevant designated sites comprised the following:

- Identification of potential sources of effects based on the Proposed Development description and details;
- Identification of potential pathways between the Site of the Proposed Development and any designated sites within the ZOI of any of the identified sources of effects;
    - Water catchment data from the EPA (www.epa.ie) were used to establish or discount potential hydrological connectivity between the Proposed Development and any designated sites;
    - Groundwater and bedrock information used to establish or discount potential hydrogeological connectivity between the Proposed Development and any designated sites;
    - Air and land connectivity assessed based on Proposed Development details and proximity to designated sites;
    - Consideration of potential indirect pathways, e.g., impacts to flight paths, *ex-situ* habitats etc.
- Review of Ireland's designated sites to identify those sites which could potentially be affected by the Proposed Development in view of the identified pathways, using the following sources;
    - European sites and nationally designated sites (e.g., NHAs and pNHAs) from the NPWS (www.npws.ie);
    - Ramsar sites from the Irish Ramsar Wetland Committee (https://irishwetlands.ie/irish-sites/); and
    - Other internationally designated sites e.g., UNESCO Biosphere's.
- Regional development plans to identify any remaining sites or areas designated for nature conservation at a local level.

14.4.3 Site Surveys

A range of field surveys have been carried out at the Site to inform this Biodiversity Chapter. The following sections provide details of the field surveys carried out.

14.4.3.1 Habitat surveying, mapping, and evaluation

A habitat survey of the Site was carried out by Enviroguide Ecologists on the 21st of April 2023 in optimal weather conditions (dry, calm and warm). Habitats were categorised according to the Heritage Council's '*A Guide to Habitats in Ireland*' (Fossitt, 2000) to Level 3. The habitat mapping exercise had regard to the '*Best Practice Guidance for Habitat Survey and Mapping'* (Smith *et al*., 2011) published by the Heritage Council. Habitat categories, characteristic plant species and other ecological features and resources were recorded on field sheets. Habitats within the surrounding area of the Site were classified based on views from the Site and satellite imagery where necessary (Google Earth, Digital Globe and OSI).

The habitat and flora surveys were conducted during the appropriate survey period as recommended in both Smith et al. (2011) and NRA (2009).

14.4.3.2 Invasive species survey

The Site was searched for invasive flora on the 21st of April 2023, with a particular focus on those listed on the Third Schedule of SI No. 477/2011, and their location and extent recorded. This included a detailed search for signs or any invasive flora or fauna, with any incidental observations of evidence for invasive species recorded when on Site.

14.4.3.3 Mammal survey

Mammal surveys of the Site were carried out in conjunction with other field surveys. The mammal surveys conducted as part of this assessment had regard to the survey guidelines contained in *Guidelines for the Assessment of Ecological Impacts of National Road schemes* (NRA, 2009). The Site was searched for signs of mammals such as burrows, setts, droppings, foraging signs and tracks as per Bang and Dahlstrom (2001). The habitat types recorded throughout the survey area were used to assist in identifying the fauna considered likely to utilise the area.

14.4.3.4 Bat survey

14.4.3.4.1 Habitat evaluation and bat landscape suitability

The Site was assessed during daytime walkover surveys on the 21st of April 2023 in relation to potential bat foraging habitat and potential bat commuting routes. Bat habitats and commuting routes identified were considered in relation to the wider landscape to determine landscape connectivity for local bat populations through the examination of aerial photographs. The Bat Conservation Trust (BCT, 2016) guidelines were followed for the assessment rating and classified using Table 4.1 of the same which is recreated in Table 14.1 of this report.

Table 14.1. Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of roost features within the landscape, to be applied using professional judgement (BCT, 2016).

Suitability	Description of roosting habitats	Commuting and foraging habitats
Negligible	Negligible roosting features on Site and therefore unlikely to be used by roosting bats.	Negligible habitat features on Site and therefore unlikely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[1] and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e., unlikely to be suitable for maternity or hibernation[2]).	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e., not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers or foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.

[1] For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.

[2] Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten et al., 2015). This phenomenon requires some research in the UK but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in large buildings in highly urbanised environments.

Suitability	Description of roosting habitats	Commuting and foraging habitats
	A tree of sufficient size and age to contain potential roost features (PRFs) but with none seen from the ground or features seen with only limited roosting potential[3].	
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions[1]. and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub of linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions[1] and surrounding habitat	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree lined watercourses and grazed parkland. Site is close to and connected to known roosts.

The National Biodiversity Data Centre (NBDC) online map viewer includes an interactive layer which displays geographical areas in terms of a 'habitat suitability' index for bats. The bat suitability index ranges from 0 to 100, with 0 indicating areas considered least favourable for bats and 100 indicating areas considered most favourable for bats, in terms of habitats present. Several factors are incorporated into the model to give an overall estimate of the suitability of an area for bats, including land cover, topography, climate, soil pH and riparian habitat (Lundy, et al., 2011). The suitability index is presented for all bat species overall, as well as by individual species The scores are divided into five qualitative categories of suitability, namely:

- 0.000000 - 13.000000: Low;
- 13.000001 - 21.333300: Low – Medium;
- 21.333301 - 28.111099: Medium;
- 28.111100 - 36.444401: Medium – High; and
- 36.444402 – 58.555599: High.

[3] This system of categorisation aligns with BS 8596:2015 Surveying for bats in trees and woodland (BSI, 2015)

14.4.3.4.2 Preliminary bat roost assessment

A preliminary bat roost assessment of Potential Roost Features (PRFs) within trees was completed on the 21st of April 2023, in adherence to best practice guidelines (Collins, 2016 and Marnell et al., 2022). This was undertaken to determine the suitability of the Site for roosting bats and the potential requirement for further surveys to be undertaken. PRF's can be defined in four broad terms of suitability as described in Table 14.1, negligible, low, moderate and high.

A Phase 1 inspection was undertaken to make a list of the trees within the Proposed Development Site that may be suitable as roosting sites for bats. Inspections were undertaken visually with the aid of a strong torch beam (AP Pros-Series 220 Lumens High Performance Spotlight) and Celestron12x56 Prism Binoculars during the daytime searching for PRFs, if visible. To aid this Phase 1 inspection, tree reports, where available, were consulted to supplement the data collected.

14.4.3.4.3 Dusk transect activity survey and analysis

The Site was assessed by experienced ecologists in relation to potential bat foraging habitat and commuting routes. Three dusk transect activity bat surveys were conducted on the 17th of May 2023, 28th of June 2023 and 18th of July 2023. All survey dates were undertaken at the appropriate time of year (April – October), in optimal weather conditions (i.e., calm, dry and warm) as per Bat Conservation Trust guidelines (Collins, 2016 and Marnell et al., 2022). The survey details are outlined in Table 14.2.

Table 14.2.Bat Activity Survey Conditions and Survey Details.

Survey Date	Time of Sunset	Survey Period	Weather Conditions			
			Precip.	Cloud	Wind	Temp
17/05/2023	21:26	21:26 – 23:26	None	0-25%	Calm	11-16°C
28/06/2023	22:02	22:02 – 00:02	None	0-25%	Light breeze	11-14°C
18/07/2023	21:47	21:47 – 23:47	None	25-50%	Calm	13-16°C

The surveyors were equipped with an Elekon Batlogger M2 detector, powerful L.E.D. torch and head torches. Surveys started at sunset and continued for 2 hours along a predesigned transect route with regular point counts as presented in Figure 14.1. The transect was walked in an anti-clockwise direction, with the order of which stopping point the survey started at on each of the survey dates changed. At each point count location, the surveyor stopped for eight minutes and used target notes for each bat recorded. The number of individual bats were counted where possible. The transect route was walked at a comfortable pace (approx. 5 km/hr) with target notes taken without stopping of any passing bats. This combination of stopping points and walked transects allowed any hotspots in bat activity at the site to be captured and compared and indicates areas of particular importance to the local bat population.

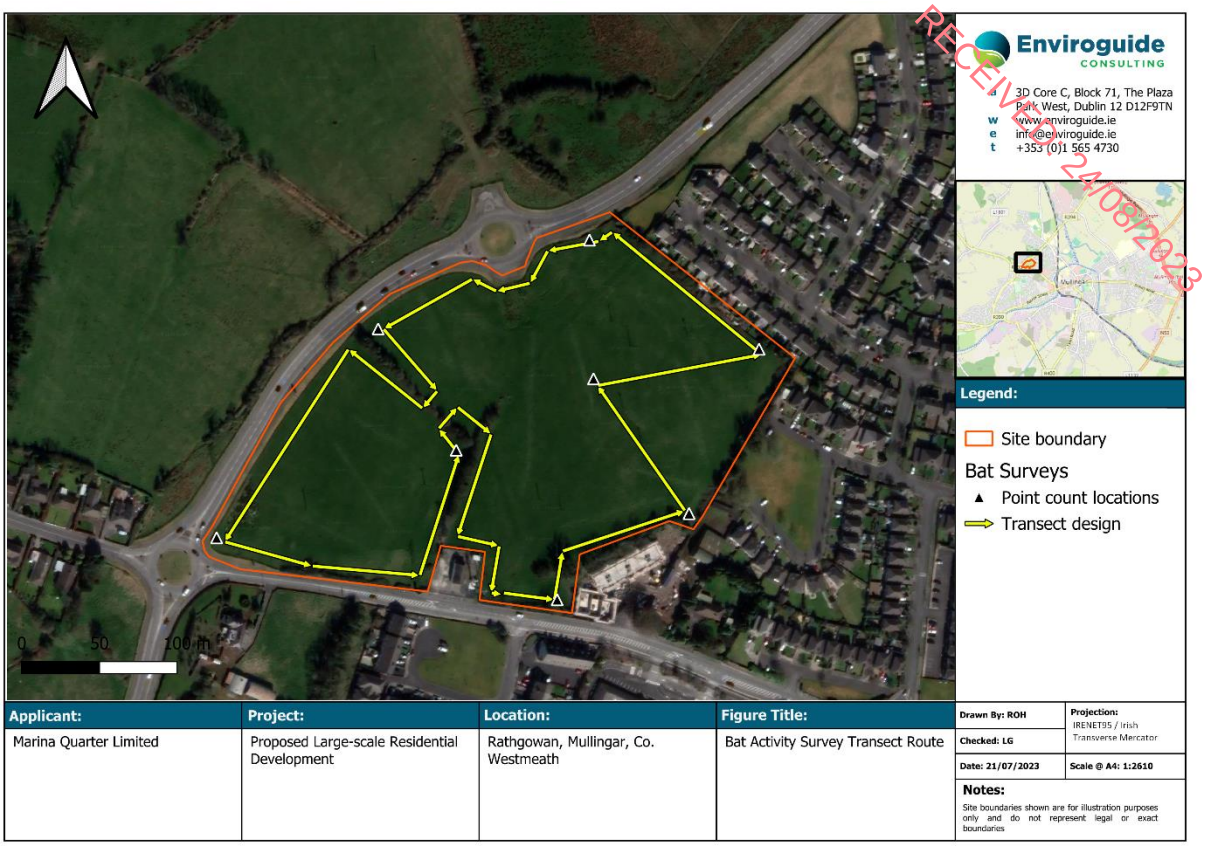

Figure 14.1.Bat Activity Survey Transect Route with point count locations.

The data collected was analysed and species assigned to each record with reference to species identification guides such as Russ (2012). Species were identified from recordings using Elekon's BatExplorer software (Version 2.1.10.1).

Each record i.e., a sequence of bat calls/pulses, is noted as a bat pass; to indicate the level of bat activity for each species recorded. Each bat pass does not correlate to an individual bat but is representative of bat activity levels. Some bats such as Pipistrelle species may continuously fly around a habitat or feature, therefore, it is possible that a series of bat passes within a similar time frame is representative of an individual bat. On the other hand, Leisler's bats (*Nyctalus leisleri*) tend to travel through an area quickly, and as such, an individual sequence or bat pass is more likely to be indicative of individual bats.

14.4.3.4.4 Previous bat activity surveys

A bat activity survey was undertaken at the Site of the Proposed Development and the adjacent Site within the applications landholding north of the C-link Road on the 15th of July 2022. The survey began at 21:05 and finished at 23:30 (sunset on the night was 21:37). Survey methodologies followed those of the Bat Conservation Trust Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016). Bat surveys were undertaken within the recommended survey period of May to September. The survey was undertaken in optimal conditions for bat surveys i.e., calm, dry and warm (temperature on the night was 14°C with a gentle breeze).

14.4.3.5 Bird survey

During the habitat survey in April 2023, a bird scoping survey was completed. A bird scoping survey was also undertaken at the Site of the Proposed Development in July 2022 by Enviroguide Consulting. The survey methodology employed was based on that recommended in standard literature used by for example the British Trust for Ornithology (BTO) (Gillings et al, 2007; Bibby et al, 1992 and Gilbert et al, 1998), which has subsequently been adapted into guidelines for ecological consultants by the Bird Survey & Assessment Steering Group. (2022). During the surveys, the Site was walked slowly, approaching all habitat within and adjacent to the Proposed Development and scanning and listening for birds.

14.4.3.6 Other fauna

A general fauna survey of the Site was carried out in conjunction with the other field surveys on the 21st of April 2023. The habitat types recorded throughout the survey area were used to assist in identifying the fauna considered likely to utilise the area. This survey considers protected or notable fauna that may occur within the Site or in the adjacent lands, but for which no historical records from the relevant grid square exists or no targeted surveys were carried out.

14.4.4 Ecological assessment

This ecological assessment has been undertaken following the methodology set out in Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018); and with reference to the National Roads Authority 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (NRA, 2009) and the Environmental Protection Agency (EPA) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (EPA, 2022) and BS 42020:2013 Biodiversity: Code of practice for planning and development (BSI, 2013).

The evaluation of significant effects should be based on available scientific evidence. Based on the precautionary principle, if the available information is not sufficient, then a significant effect may be assumed likely to occur.

14.4.4.1 Evaluation of ecological features

The value of ecological features, i.e., the habitats and species present or potentially present, was determined using the ecological evaluation at different geographical scales (NRA, 2009), presented in Appendix 14.1. This evaluation scheme, with values ranging from locally important to internationally important, seeks to provide value ratings for habitats and species present that are considered ecological receptors of impacts that may ensue from a proposal. Based on best practice (CIEEM, 2018), any features considered to be less than of local value are not assessed within this chapter.

14.4.4.2 Impact assessment

As per the NRA guidelines, impact assessment is only undertaken of Key Ecological Receptors (KERs). The assessment of the potential impact of the Proposed Development on the identified KERs was carried out with regard to the criteria outlined in the EPA Guideline (EPA, 2022), presented in Appendix 14.2. These guidelines set out a number of parameters that should be considered when determining

which elements of the Proposed Development could constitute impact or sources of impacts. These include:

- Positive, neutral or negative effect;
- Significance;
- Extent;
- Probability;
- Duration;
- Timing;
- Frequency; and
- Reversibility.

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. 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 an adverse effect of a sensitive habitat.

14.4.4.3 Assessment of cumulative impacts and effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects can occur where a Proposed Development results in individually insignificant impacts that, when considered in combination with impacts of other proposed or permitted plans and projects, can result in significant effects.

Relevant plans and policies (see section 14.4.1.9) were reviewed to identify any potential for negative cumulative impacts with the Proposed Development. Additionally, existing planning permissions from the past five years (from 2018 onwards) within the ZOI of the Proposed Development were reviewed, with particular focus on potential cumulative impacts on the identified KERs. Long-term developments were also considered where applicable.

14.4.5 Consultation

Consultations were not deemed necessary as part of this assessment.

14.5 Difficulties Encountered

An extensive search of available datasets for records of rare and protected species within proximity to the Proposed Development has been undertaken as part of this assessment. However, the records from these datasets do not constitute a complete species list. The absence of species from these datasets does not necessarily confirm an absence of species in the area.

No limitations were encountered which would prevent robust conclusions being drawn as to the potential impacts of the Proposed Development.

14.6 Baseline Environment

This section sets out the baseline conditions for the ecological features within the Site using the findings of the desk study and field surveys.

14.6.1 Site overview

The study area, which is 5.95 hectares in area, is located within the townland of Rathgowan within the development boundary of the town of Mullingar. The Site is located to the northwest of the town centre. It is located to the south of the R394 (known locally as the 'C-Link' Road) which connects to the N4 to the north and N52 to the south. The Site is accessible via the existing entrances off the roundabout on the R394.

The area surrounding the Site is characterised by a mix of uses. The lands immediately adjoining the Site to the east and south have been developed for residential use and generally comprise two storey detached and semi-detached dwellings. The R394 or C-Link bounds the Site to the north and Ashe Road and an ESB substation bound the Site to the south. The Site is relatively flat and comprises of agricultural fields currently in use for grazing livestock with boundary treelines and hedgerows.

Permission was previously granted by Westmeath County Council for Phase 1 and 2 of a residential development (Planning References: 21/97 and 21/139). Both planning applications are currently at appeal stage with An Bord Pleanála. The current proposed Large-scale Residential Development (LRD) scheme will replace these two previously permitted applications if granted.

Phase 3 of this residential development was granted planning permission in January 2023 by Westmeath County Council under the LRD system. This Phase is located northwest of the subject Site, on the opposite side of the R394. The Site location is shown in Figure 14.2.

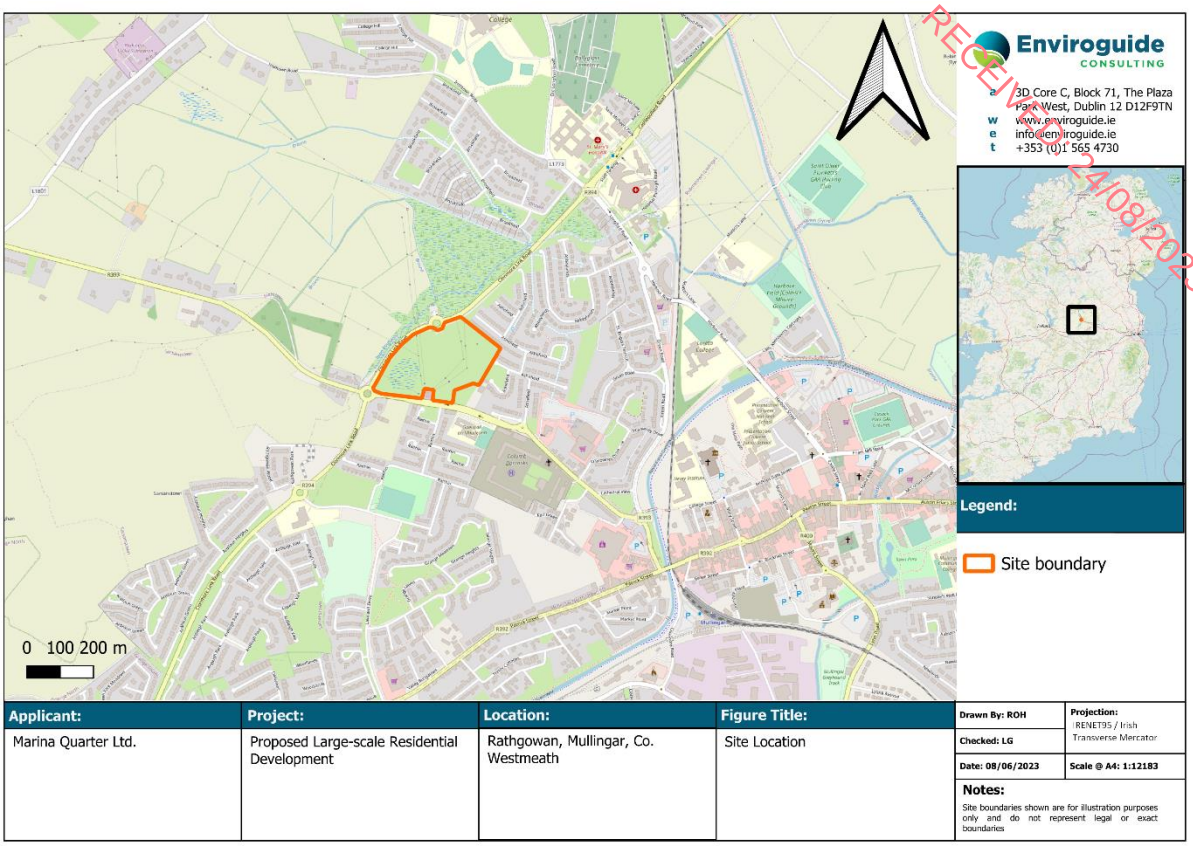

Figure 14.2. Site location.

14.6.2 Geology, Hydrology and Hydrogeology

The Site of the Proposed Development is within the Lower Shannon catchment and Brosna_SC_010 sub catchment (EPA, 2023).

The River Brosna lies 0.6km northeast of the Proposed Development. The River Brosna flows through Mullingar Town prior to discharging to Lough Ennell 3.9km south of the Proposed Development. The River Brosna (IE_SH_25B090006) was assigned a Water Framework Directive (WFD) status of Poor and the waterbody is At Risk of not achieving its status objectives under the WFD (EPA, 2023).

Downstream of the Proposed Development Site at two locations, the River Brosna was assigned a Q-Value of 3 (i.e., Poor quality) in the most recent EPA water quality assessment carried out (2021, station codes RS25B09004 and RS25B090100) (EPA, 20223). Lough Ennell was assigned a WFD status of Good and the waterbody risk of not achieving its status objectives under the WFD is currently under Review (EPA, 2023). The Royal Canal main line (Lower Shannon) lies 0.5km southeast of the Proposed Development. The Royal Canal (Code: IE_25A_AWB_RCMLW) has a WFD status of Good and is Not At Risk of not meeting its status objectives under the WFD (EPA, 2023).

The majority of the Site is situated on the Inny (IE_SH_G_110) groundwater body (GWB), a minor portion of the Site (in the southwest corner) is within the Clara GWB (IE_SH_G_240). Both groundwater bodies are assigned a status of Good and Not At Risk of not achieving their status objectives under the WFD. Groundwater flow paths in the Inny GWB will be short, in general between

30m and 300m with groundwater discharging locally to rivers and streams. The majority of groundwater flow is likely to circulate in the upper tens of metres of bedrock, recharging and discharging in local zones. The main discharges from the Inny GWB will be local, to the River Inny and its tributaries crossing the groundwater body. Groundwater flow paths in the Clara GWB are generally short, on the order of 30m to 300m, with groundwater discharging to the streams and rivers that traverse the aquifer and to small springs. Local groundwater flows are determined by the local topography. There is no regional flow system in these aquifers. The majority of groundwater flow is likely to circulate in the upper 15m metres of the bedrock aquifer. Based on the topography, regional groundwater flow in the vicinity of the Site of the Proposed Development is likely to flow in a north to northeast direction towards the River Brosna.

The aquifer type in the area is Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones (GSI, 2023). The groundwater rock units underlying the Site are classified as Dinantian Upper Impure Limestones. The level of vulnerability to groundwater contamination from human activities is High throughout the Site (GSI, 2023).

The quaternary sediments at the Site are comprised of Till derived from limestone. The majority of soils beneath the Site are mapped as grey brown Podzolics, brown Earths. The soils beneath a small area along the southwest boundary of the Site are mapped as surface water gleys (GSI, 2023). The bedrock beneath the Site is mapped as dark limestone and shale (‘calp) of the Lucan Formation (New Code: CDLUCN) (GSI, 2023).

14.6.3 Designated sites

All European sites potentially linked to the Proposed Development have been identified and full assessed in the AA Screening Report (Stage I AA) (Enviroguide, 2023) accompanying this submission under a separate cover. A summary of the AA conclusion is given below.

Other nationally or internationally designated sites potentially linked to the Proposed Development are identified in section 14.6.3.2.

14.6.3.1 European sites – Appropriate Assessment

The AA Screening identified four European sites with a S-P-R connection to the Proposed Development, namely Lough Ennell SAC, Lough Ennell SPA, Lough Owel SAC and Lough Owel SPA, however the potential for the Proposed Development to result in significant effects to the European sites was ruled out. The following conclusion is extracted from the AA Screening Report accompanying this application under a separate cover:

“*The Proposed Development at Rathgowan, Mullingar, Co. Westmeath has been assessed taking into account:*

- *The nature, size and location of the proposed works and possible impacts arising from the construction works associated with, and operation of, the Proposed Development.*
- *The QIs and conservation objectives of the European sites*
- *The potential for in-combination effects arising from other plans and projects.*

In conclusion, upon the examination, analysis and evaluation of the relevant information and applying the precautionary principle, it is concluded by the authors of this report that the possibility ***may be excluded*** *that the Proposed Development will have a significant effect on any of the European sites listed below:*

- *Lough Owel SAC (000688).*
- *Lough Owel SPA (004047).*
- *Lough Ennell SAC (000685).*
- *Lough Ennell SPA (004044).*

In carrying out this AA screening, mitigation measures have not been taken into account. On the basis of the screening exercise carried out above, it can be concluded, on the basis of the best scientific knowledge available and objective information, that the possibility of any significant effects on the above listed European sites, whether arising from the project itself or in combination with other plans and projects, can be excluded in light of the above listed European sites' conversation objectives. Thus, there is no requirement to proceed to Stage 2 of the Appropriate Assessment process; and the preparation of a NIS is not required."

14.6.3.2 S-P-R links to other designated sites

Potential impact pathways are discussed in the following sections in the context of the Proposed Development as described in section 14.4.2.

No NHAs are located within or directly adjacent to the Proposed Development. The nearest NHA is Wooddown Bog NHA, 4.1km east of the Site. The Proposed Development maintains no S-P-R connection with Wooddown Bog NHA.

14.6.3.2.1 Direct pathways

14.6.3.2.1.1 Hydrological pathways

The nearest pNHA to the Proposed Development is the Royal Canal pNHA, 0.5 km east of the Site. The Proposed Development maintains no hydrological connection with the Royal Canal.

Lough Ennell and Lough Owel pNHA are both also designated as pNHAs and Ramsar Sites. These sites overlap with the Lough Ennell and Lough Owel SACs and SPAs, for which a potential hydrological pathway from the Proposed Development has been assessed and ruled out as part of the AA Screening accompanying this application (Enviroguide, 2023). As such, the S-P-R connection to these other designated sites in Lough Ennell and Lough Owel can also be ruled out.

14.6.3.2.2 Hydrogeological pathways

The Proposed Development maintains a potential weak hydrogeological connection with the Royal Canal pNHA via the Inny and Clara GWB. While there are no surface water pathways, there is a potential for groundwater discharge to reach the GWB. During groundworks and other construction activities as a result of the Proposed Development, the ground may be exposed and any potential accidental discharges to ground could potentially migrate vertically downward to the underlying GWB and laterally to reach the Royal Canal pNHA.

14.6.3.2.3 Air and land pathways

The Construction Phase of the Proposed Development could introduce dust and noise impacts transferable via air and land pathways, as well as increased lighting and human activity at the Site and in the vicinity of the Site during the Construction and Operational Phases.

No designated sites are linked to the Site via air or land pathways due to the urban location of the Proposed Development and the distance between the Site and the nearest designated site.

14.6.3.2.4 Indirect pathways

No indirect pathways to any nationally or internationally designated sites were identified.

14.6.4 Habitats

The habitats present within the Site, as recorded during the field survey, are described in this section and summarised below. Site photographs of the habitats present are included in the following sections and a habitat map of the Site is presented in Figure 14.3.

There are no habitats on Site that are listed in Annex I of the Habitats Directive. The Site is dominated by species poor Improved Agricultural Grassland (GA1) habitat with boundary Treelines (WL2), Hedgerows (WL1) and areas of Scrub (WS1) habitat. A small area (approximately 1,280m^2) of Wet Grassland (GS4) habitat associated with a depression in the land lies at the southwest of the Site, scattered areas of Recolonising Bare Ground (ED3) were mapped throughout the Site. A section of Amenity Grassland (GA2) and Buildings and Artificial Surfaces (BL3) habitat associated with the C-link Road and Ashe Road are included within the Proposed Development Site boundary.

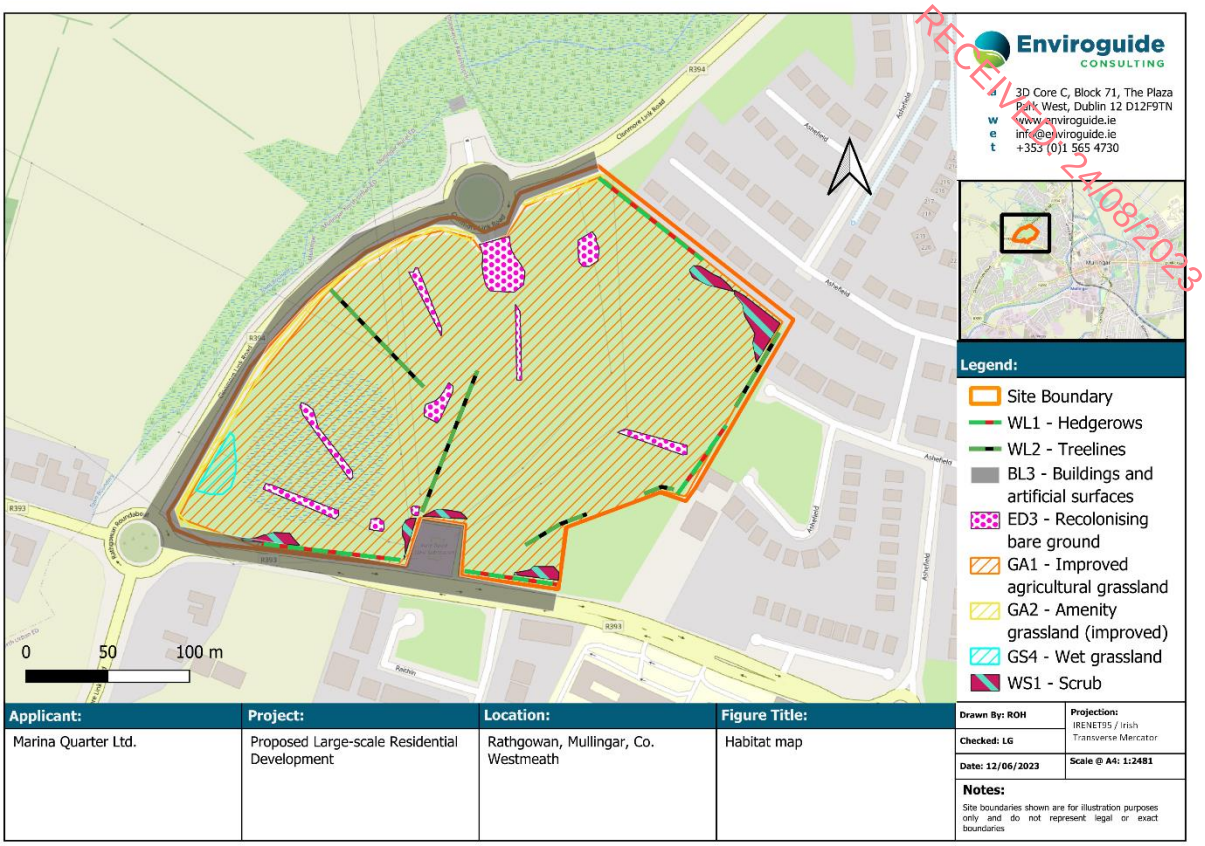

Figure 14.3. Habitat map of the Site.

14.6.4.1 Improved Agricultural Grassland (GA1)

This habitat dominates the Site of the Proposed Development and contains a low diversity of flora (Figure 14.4). Species recorded within this habitat include perennial rye grass *(Lolium perenne*), Yorkshire fog (*Holcus lanatus*), cock's foot (*Dactylis glomeratus*), meadow foxtail (*Alopecurus pratensis*), creeping buttercup (*Ranunculus repens*), daisy (*Bellis perennis*), dandelion (*Taraxacum vulgaria*), broadleaved dock (*Rumex obtusifolius*) and creeping thistle (*Cirsium arvense*).

Figure 14.4. Improved agricultural grassland (GA1) habitat on Site.

14.6.4.2 Wet grassland (GS4)

A small area of wet grassland (GS4) habitat lies at the southwest corner of the Site, typical species recorded here include soft rush (*Juncus effusus*), creeping bent-grass (*Agrostis stolonifera*), perennial rye grass, curled dock (*Rumex crispus*) and cuckoo flower (*Cardamine pratensis*) (Figure 14.5).

Figure 14.5. Wet grassland (GS4) habitat on Site.

14.6.4.3 Hedgerows (WL1) and treelines (WL2)

The Site boundaries are composed of hedgerows (WL1) and treelines (WL2) except for the Site boundary with the C-link Road which is fenced and bordered by amenity grassland (GA2) along the road. The southern boundary is composed of a fenced area to the south west and a managed hedgerow (WL1) dominated by hawthorn (*Crataegus monogyna*), elder (*Sambucus nigra*), bramble (*Rubus fruticosus*) and snowberry (*Symphoricarpos alba*) to the south east (Figure 14.6). The north eastern boundary contains a more natural hedgerow dominated by hawthorn and elder with an understorey of bramble.

Treeline (WL2) habitat lies along the eastern boundary of the Site bordering Ashfield residential estate. This treeline is dominated by hawthorn, ivy (*Hedera helix*), and occasional ash (*Fraxinus excelsior*) trees. Ground flora within this treeline is dominated by bramble, ivy, nettle (*Urtica dioica*), bush vetch (*Vicia sepium*), cleavers (*Galium aparine*), creeping buttercup and periwinkle (*Vinca major*).

A gappy treeline (WL2) lies along the south-eastern boundary of the Site, this treeline is along the Proposed Development Site boundary, however the majority of this treeline is within the boundary of the adjacent permitted planning application (Planning Reference: 196121). This treeline is dominated by hawthorn and ash.

The centre of the Site is traversed by two lines of overgrown hedgerows which are now best classified as a treeline (WL2) (Figure 14.7). These treelines are dominated by hawthorn with occasional blackthorn (*Prunus spinosa*) and elder. The base of these treelines were noted as gappy with a very sparse understorey dominated by bramble, nettle and wood avens (*Geum urbanum*).

Figure 14.6. Hedgerow (WL1) habitat on Site.

Figure 14.7. Treeline (WL2) habitat on Site.

14.6.4.4 Scrub (WS1)

Scrub habitat was identified adjacent to the various field boundaries at the Site. The scrub habitat was dominated by bramble with scattered immature hawthorn also present (Figure 14.8).

Figure 14.8. Scrub (WS1) habitat present on Site.

14.6.4.5 Amenity grassland (GA2)

A small strip of amenity grassland lies adjacent to the C-Link Road which is included in the Site boundary.

14.6.4.6 Buildings and artificial surfaces (BL3)

Buildings and artificial surfaces habitat within the Site boundary consists of sections of the C-Link Road and Ashe Road and associated footpaths.

14.6.4.7 Recolonising bare ground (ED3)

Scattered areas of recolonising bare ground were recorded throughout the Site consisting of a gravel substrate and early colonising vegetation such as dandelion and dock.

14.6.5 Species and species groups

14.6.5.1 Flora

14.6.5.1.1 Rare and protected flora

The Site of the Proposed Development is located within the Ordnance Survey 2km grid square N45G and 1km grid square N4253. Species records from the NBDC online database for these grid squares were studies for the presence of rara and/or protected species within the last 20 years. This database contained no records of protected flora within the last 20 years.

The FPO Bryophytes database was also checked for rare and protected flora records within the vicinity of the Proposed Development. No rare and/or protected bryophyte records exist within the immediate vicinity of the Proposed Development.

No rare or protected flora species were recorded on Site during the field surveys in April 2023.

14.6.5.1.2 Invasive plant species

There are records for five species of flora considered to be invasive within the grid squares which encompass the Site of the Proposed Development. Details of these records are listed in Table 14.3.

Table 14.3. Records of non-native flora species for the surrounding 2km grid square N45G.

Species	Grid square	Date of last record	Source	Designation
Sycamore (*Acer pseudoplatanus*)	N45G	16/07/2020	Community foundation for Ireland Records	▪ Medium impact invasive species
Himalayan honeysuckle (*Leycesteria Formosa)*	N45G	16/07/2020	Community foundation for Ireland Records	▪ Medium impact invasive species
Butterfly-bush (*Buddleja davidii)*	N45G	16/07/2020	Community foundation for Ireland Records	▪ Medium impact invasive species
Japanese knotweed (*Reynoutria japonica*)	N45G	30/01/2019	Vascular plats: online atlas of vascular plants 2012 onwards	▪ High impact invasive species ▪ Regulation S.I. 477/2011 (Ireland)
Canadian waterweed (*Elodea canadensis*)	N45G	08/10/2008	River biologists' database (EPA)	▪ High impact invasive species ▪ Regulation S.I. 477/2011 (Ireland)

No legally controlled invasive plant species listed on Schedule III of the Birds and Habitat Regulations (2011) were recorded during the field surveys in April 2023. Non-native species snowberry was recorded within the southern boundary hedgerow. Snowberry is considered a low risk of impact invasive species (NBDC, 2023).

14.6.5.2 Mammals (excl. bats)

Records for terrestrial mammals were obtained from the NBDC online database. Table 14.4 lists these species, their date of last record and summarises their protected status/designation. In total, two

mammal species were recorded within the grid squares which encompass the Proposed Development Site.

Table 14.4. Records of terrestrial mammals for the surrounding 2km grid square N45G

Species	Grid square	Date of last record	Source	Designation
European otter (*Lutra lutra*)	N45G	06/01/2015	Atlas of Mammals in Ireland 2010 - 2015	▪ Wildlife Act 1976 (as amended). ▪ EU Habitats Directive – Annex II & IV.
West European hedgehog (*Erinaceus europaeus*)	N45G	04/06/2021	Hedgehogs of Ireland	▪ Wildlife Act 1976 (as amended). ▪ Bern Convention Appendix III

There was no evidence of mammal use observed on Site during the ecological walkover. No badger (*Meles meles*) setts or signs of badger presence (e.g., snuffle holes, latrines, tracks) were recorded on or adjacent to the Site during the April 2023 survey. The treelines on Site were noted to be overgrown with a gappy understorey and the open nature is not considered optimal for badger setts. There is potential habitat for hedgehogs (*Erinaceus europaeus*) and pygmy shrew (*Sorex minutus*) within the treelines, hedgerows and areas of scrub.

The Proposed Development Site did not present as particularly suitable for any other protected mammal species other that bat species. It is surrounded by residential development and is very open in nature. There are no streams or wet drainage ditches on Site to attract otter (*Lutra lutra*) and no wooded areas extensive enough to attract other mammals such as red squirrel (*Sciurus vulgaris*) or pine marten (*Martes martes*).

14.6.5.3 Bats

Records for bat species recorded in the 2km grid square associated with the Site were retrieved from the NBDC online database. One species of bat has been recorded within the 2km N45G grid square. Table 14.5 lists the species, the date of last record and their protection status.

Table 14.5. Records of bats for the surrounding 2km grid square N45G

Species	Grid square	Date of last record	Source	Designation
Leisler's bat (*Nyctalus leisleri*)	N45G	19/05/2011	National Bat Database of Ireland	▪ Wildlife Act 1976 (as amended). ▪ EU Habitats Directive – Annex IV

The Proposed Development Site (indicated in Figure 14.9 in blue) is located in an area with an overall Medium-High (34.22) suitability for bats in general. The suitability index for specific bat species is presented in Table 14.6. The landscape suitability index is high for five species of bats; soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auritus*), common pipistrelle (*Pipistrellus pipistrellus*), leisler's bat and natterer's bat (*Myotis nattereri*).

Table 14.6. Landscape suitability index for individual bat species within the 2km grid square (source: NBDC).

Species	Suitability index
Soprano pipistrelle *(Pipistrellus pygmaeus)*	46 (High)
Brown longed-eared bat *(Plecotus auritus)*	39 (High)
Common pipistrelle *(Pipistrellus pipistrellus)*	55 (High)
Lesser horseshoe bat *(Rhinolophus hipposideros)*	1 (Low)
Leisler's bat *(Nyctalus leisleri)*	50 (High)
Whiskered bat *(Myotis mystacinus)*	12 (Low)
Daubenton's bat *(Myotis daubentonii)*	33 (Medium-High)
Nathusius' pipistrelle (*Pipistrellus nathusii*)	32 (Medium)
Natterer's bat *(Myotis nattereri)*	40 (High)

Figure 14.9. Bat landscape suitability model (All bats) surrounding the Proposed Development Site (Adapted from NBDC).

14.6.5.3.1 Habitat evaluation

The treelines and hedgerows at the Site provide potential commuting and foraging habitat for local bats. There is a good network of linear vegetation at the Site, however the treelines and hedgerows on Site are gappy and limited in their connection to the wider treeline/hedgerow network. There is a lack of woodland areas surrounding the Site with extensive housing to the north, east and south of the Site. The majority of habitats in the immediate vicinity of the Site are buildings and artificial surfaces and improved agricultural grassland. The Site is considered to provide low suitability for commuting and foraging bats as per Table 4.1 of the *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins, 2016).

14.6.5.3.2 Potential bat roost assessment

A daytime Potential Bat Roost (PBR) assessment of the trees within the Proposed Development Site was undertaken on the 21st of April 2023. The majority of the trees within the Proposed Development boundary held negligible bat roost potential as per Table 4.1 of the *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins, 2016). Two hawthorn trees within the treeline in the centre of the Site were identified as containing potential roost features (Ivy) however these trees were considered to hold low bat roost potential.

14.6.5.3.3 Dusk transect bat activity surveys

The results of the three survey dates conducted at the Site over the course of May, June and July 2023 are shown in Table 14.7 and shown in Figure 14.10, Figure 14.11 and Figure 14.12. The bat detector metadata is included in appendix 14.3. In total three bat species were detected during the 2023 surveys, common pipistrelle, soprano pipistrelle and leisler's bat. Common and soprano pipistrelle were the most abundant species recorded across the three nights, with occasional leisler's bat activity recoded during the June and July 2023 surveys. Bat activity was low along the C-Link Road, this boundary is subject to a high level of light disturbance and lacked linear vegetation. Very little activity was recorded along the southwestern Site boundary, the boundary vegetation here was generally short and well-maintained hedgerows which may not have supported the same levels of insect prey as the wilder native hedgerows and treelines throughout the Site.

The Site provides limited foraging / commuting habitat due to the isolated nature of the Site and high level of light disturbance due to the boundary street lighting and existing residential housing estates. As would be expected, activity was largely associated with the field boundaries and concentrated along the eastern Site boundary and the internal hawthorn dominated treelines. The highest level of bat activity recorded across the three nights was noted in the northeastern corner of the Site. Common pipistrelle and soprano pipistrelle were recorded foraging along the treeline and scrub at this location across the three 2023 surveys. Leisler's bat was predominantly recorded commuting along the boundary fence at Ashe Road and the C-Link Road.

Table 14.7. Bat results summary data – 2023 summer surveys.

Species Name (common)	Species Name (Latin)	Number of recordings	Number of calls	Peak frequency (kHz)
17/05/2023				
Common pipistrelle	*Pipistrellus pipistrellus*	6	98	46.5
Soprano pipistrelle	*Pipistrellus pygmaeus*	10	102	56.5
28/06/2023				
Common pipistrelle	*Pipistrellus pipistrellus*	20	1,073	46.5
Leisler's bat	*Nyctalus leisleri*	2	8	26.9
Soprano pipistrelle	*Pipistrellus pygmaeus*	35	919	56.5
18/07/2023				
Common pipistrelle	*Pipistrellus pipistrellus*	41	1,412	46.5

Species Name (common)	Species Name (Latin)	Number of recordings	Number of calls	Peak frequency (kHz)
Leisler's bat	*Nyctalus leisleri*	16	152	26.9
Soprano pipistrelle	*Pipistrellus pygmaeus*	33	1,064	56.5

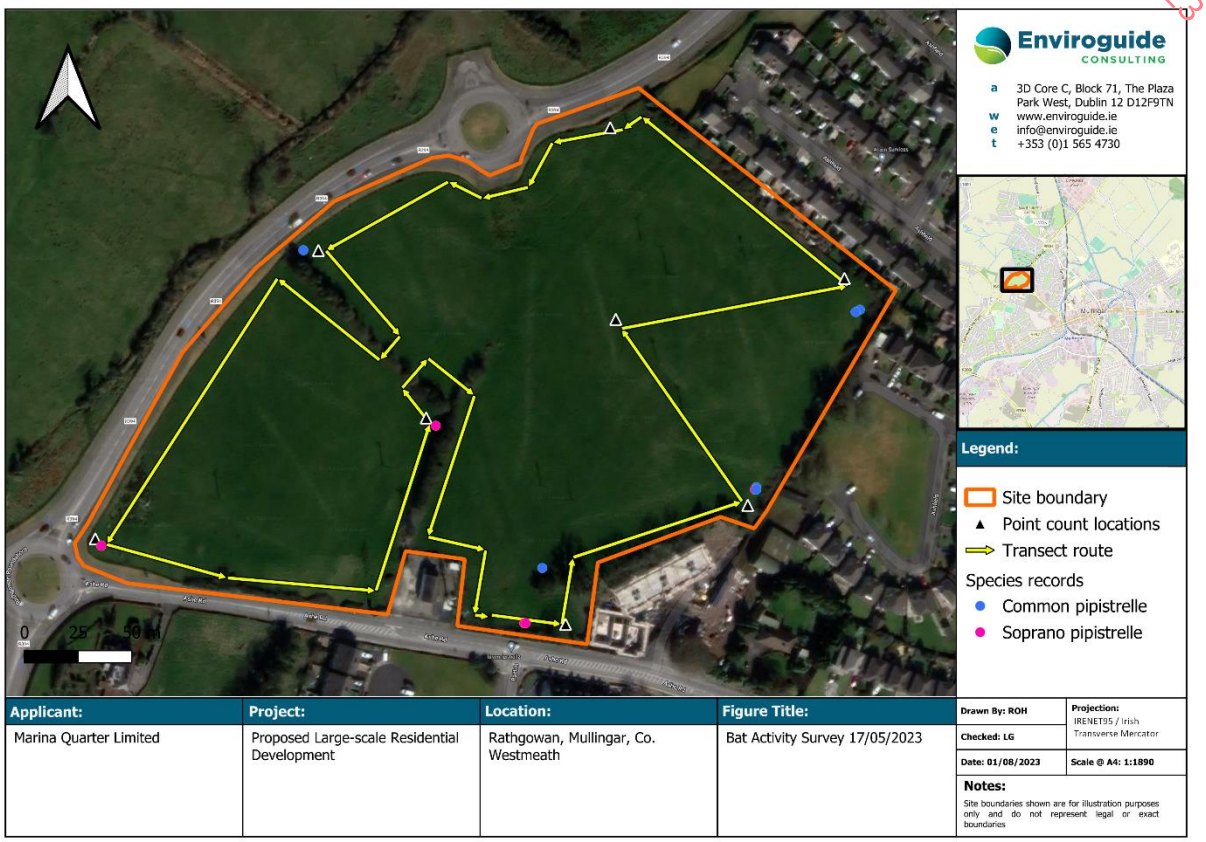

Figure 14.10. Bat activity survey with legend – May 17th, 2023.

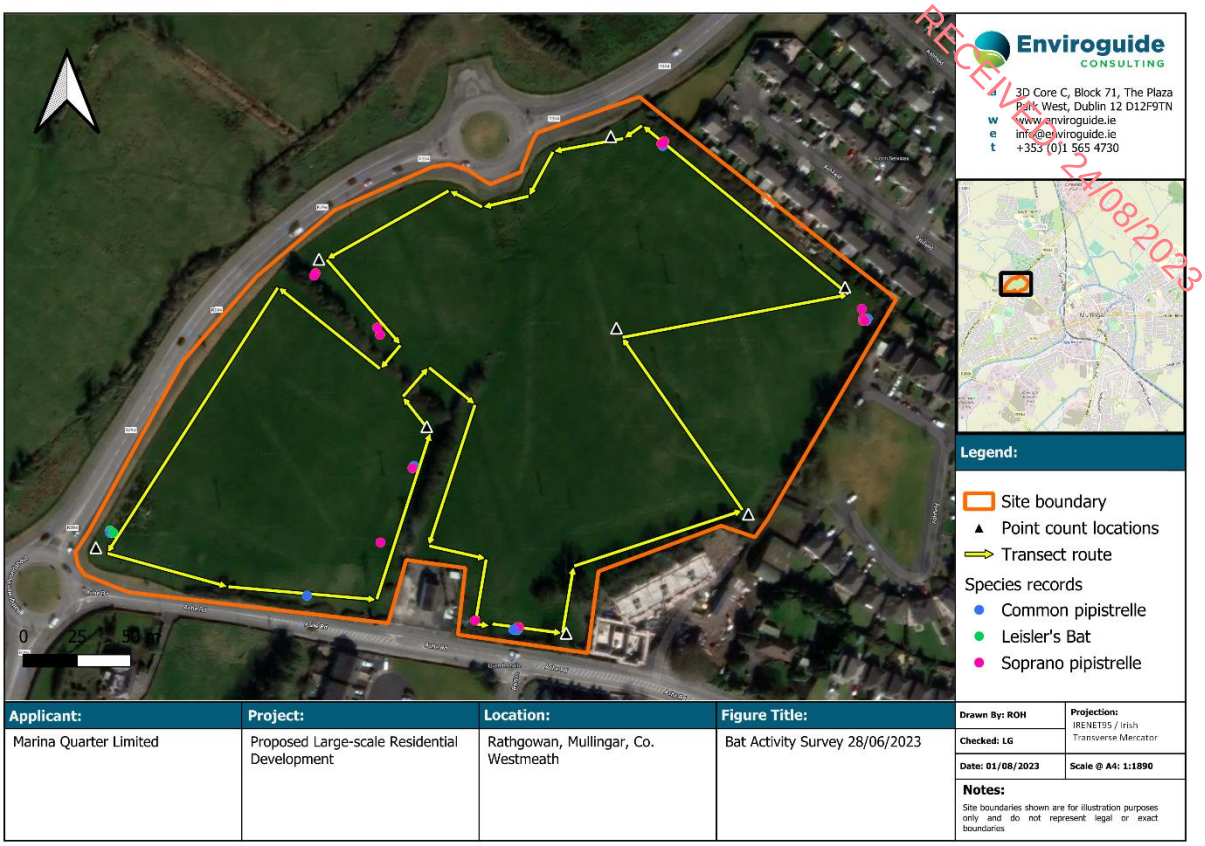

Figure 14.11. Bat activity survey with legend – June 28th, 2023.

Figure 14.12. Bat activity survey with legend - July 18th, 2023.

14.6.5.3.4 Previous bat activity surveys at the Site

A previous bat activity survey of the Site was undertaken in July 2022 in combination with a survey of the application's landholding north of the C-link Road. In total, three species of bat were detected in July 2022. The tabulated results are summarized in Table 14.8 and the visual results of the bat surveys are presented in Figure 14.13. The full report is attached in Appendix 14.4.

The passes are indicative of bat activity, and not absolute bat number. Bats tended to pass up and down repeatedly along a treeline which can suggest there are more bats present than is the case. It is noted that bat activity was generally restricted to the treeline / hedgerow in the centre of the Proposed Development Site with little activity noted within the treeline along the northern and north-eastern Site boundary. This may be due to increased lighting along these linear features due to the adjacent residential dwellings.

Table 14.8. Bat results summary data – July 25th, 2022, survey.

Species Name (common)	Species Name (Latin)	Number of passes	Peak frequency (kHz)
Common pipistrelle	*Pipistrellus pipistrellus*	43	46.5
Leisler's bat	*Nyctalus leisleri*	14	26.9
Soprano pipistrelle	*Pipistrellus pygmaeus*	19	56.5

Figure 14.13. Bat activity results with legend – July 25th 2022 survey (Ash Ecology, 2022).

14.6.5.4 Birds

A total of 42 bird species have been recorded within the 2km tetrad N45G by the NBDC. Of these, two are listed as Red, eleven as Amber and twenty-nine as Green in Birds of Conservation Concern in Ireland 2020-2026 (Gilbert et al., 2021).

Red-listed species include:

- Common swift (*Apus apus*)
- Meadow pipit (*Anthus pratensis*)

Amber listed species include:

- Barn swallow (*Hirundo rustica*)
- Black-headed gull (*Larus ridibundus*)
- Common linnet (*Carduelis cannabina*)
- Common starling (*Sturnus vulgaris*)
- European greenfinch (*Carduelis chloris*)
- Goldcrest (*Regulus regulus*)
- House martin (*Delichon urbicum*)
- House sparrow (*Passer domesticus*)
- Mute swan (*Cygnus olor*)

- Skylark (*Alauda arvensis*)
- Willow warbler (*Phylloscopus trochilus*)

During the bird scoping survey on the 21st of April 2023, fifteen species of birds were recorded at the Site (Table 14.9). Of these, three are Amber listed and twelve are Green listed as per The Birds of Conservation Concern in Ireland (Gilbert, et al. 2021).

The hedgerows, treelines and scrub at the Site provide suitable breeding, resting and foraging habitat for regularly occurring populations of bird species protected under the Wildlife Act. Any removal of the hedgerow, treeline and scrub habitat at the Site would need to adopt a precautionary approach and incorporate mitigation measures to avoid harm to any breeding bird species that could potentially be present.

Table 14.9. Bird species recorded during the bird scoping survey on the 21st of April 2023.

Species	Species Name (Latin)	BoCCI Status	Notes
Blackbird	*Turdus merula*	Green	-
Blue tit	*Cyanistes caeruleus*	Green	-
Chaffinch	*Fringilla coelebs*	Green	-
Coat tit	*Periparus ater*	Green	-
Collared dove	*Streptopelia decaocto*	Green	-
Dunnock	*Prunella modularis*	Green	
Goldfinch	*Carduelis carduelis*	Green	-
Hooded crow	*Corvus cornix*	Green	-
House sparrow	*Passer domesticus*	Amber	Observed foraging adjacent the Site.
Robin	*Erithacus rubecula*	Green	-
Rook	*Corvus frugilegus*	Green	-
Starling	*Sturnus vulgaris*	Amber	-
Swallow	*Hirundo rustica*	Amber	Foraging at the Site, likely nesting within the agricultural shed east of the Site.
Song thrush	*Turdus philomelos*	Green	-
Woodpigeon	*Columba palumbus*	Green	-

14.6.5.4.1 Previous bird scoping survey

A bird scoping survey was undertaken at the Site and the adjacent applicant's landholding north of the C-Link Road on the morning of the 8th of July 2022. A total of twenty-five bird species were recorded during the breeding bird scoping survey on July 22nd (Table 14.10). Two of which are listed as Red, six as Amber and seventeen as Green in the Birds of Conservation Concern in Ireland (Gilbert, et al., 2021).

Table 14.10. Bird species recorded during the bird scoping survey on the 22nd of July 2022.

Species	Species Name (Latin)	BoCCI Status	Notes
Blackbird	*Turdus merula*	Green	-
Bullfinch	*Pyrrhula pyrrhula*	Green	-
Blue tit	*Cyanistes caeruleus*	Green	Recently fledged young.
Chaffinch	*Fringilla coelebs*	Green	-
Chiffchaff	*Phylloscopus collybita*	Green	-
Collared dove	*Streptopelia decaocto*	Green	-
Dunnock	*Prunella modularis*	Green	Recently fledged young.
Goldcrest	*Regularis regularis*	Amber	-
Goldfinch	*Carduelis carduelis*	Green	-
Hooded crow	*Corvus cornix*	Green	-
House martin	*Delichon urbicum*	Amber	-
House sparrow	*Passer domesticus*	Amber	-
Lesser redpoll	*Acanthis flammea*	Green	-
Meadow pipit	*Anthis pratensis*	Red	-
Robin	*Erithacus rubecula*	Green	Recently fledged young.
Rook	*Corvus frugilegus*	Green	-
Starling	*Sturnus vulgaris*	Amber	-
Stonechat	*Saxicula torguatus*	Green	Recently fledged young.
Swallow	*Hirundo rustica*	Amber	-
Song thrush	*Turdus philomelos*	Green	Recently fledged young.
Swift	*Apus apus*	Red	-
Treecreeper	*Certhia familiaris*	Green	-
Woodpigeon	*Columba palumbus*	Green	-

14.6.5.5 Fish

There are no records of notable fish species within the relevant 2km grid square associated with the Site from the NBDC database. Additionally, there are no waterbodies within the Site of the Proposed Development that could support any fish species.

14.6.5.6 Amphibians

Common frog (*Rana temporaria)* was recorded within the 2km tetrad associated with the Proposed Development Site. Common frog is protected under the Wildlife Acts and Annex V of the Habitats Directive.

There are no watercourses or drainage ditches present on Site and no amphibians were recorded during the April 2023 survey. In addition, there were no bodies of standing water (e.g., puddles or pools) present on Site which would provide suitable habitat for amphibians. The area of wet grassland habitat was dry during the Site visit in April 2023 and July 2022. Although wet grassland habitat can provide potential habitat for amphibians, due to the isolated nature of the wet grassland at the Site and the up-built nature of the adjacent habitats, the Proposed Development Site is not considered to provide significant habitat for amphibians.

14.6.5.7 Reptiles

Common lizard (*Zootoca vivipara)* was recorded within the 2km tetra associated with the Proposed Development Site. The common lizard is protected in Ireland under the Wildlife Acts.

There was limited mosaics of suitable habitat present on Site for common lizard. The scrub habitat on Site may provide potential sheltering habitat for common lizard, however given the isolated nature of the habitats present the Site is highly unlikely to provide significant habitat for common lizard.

14.6.5.8 Other species / species groups

No other protected species are considered to be within the ZOI of the Proposed Development.

14.6.6 Designated sites, habitat and species evaluation

The ecological value of designated sites, habitats, flora and fauna associated with the Proposed Development Site are evaluated in Table 14.11. This evaluation follows the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009). KERs are those ecological receptors for which detailed assessment is required, on the basis of ecological value and likely significant impacts. The rationale behind these evaluations is also provided. Ecological resources of below 'Local Importance (higher value)' should not be selected as 'KER' for which detailed assessment is required (NRA,2009).

Table 14.11. Evaluation of designated sites, habitats, flora and fauna associated with the Proposed Development Site.

Designated sites / species / habitats	Evaluation	Key Ecological Receptor (KER)	Notes
Designated sites			
SACs & SPAs	International Importance	No	These sites have been assessed in detail in the AA Screening that accompanies this application under a separate cover. The Proposed Development will not result in significant effects to any European site.
pNHAs / NHAs	National Importance	Yes – Royal Canal pNHA	Lough Owel and Lough Ennell pNHA have been assessed by proxy in the AA Screening that accompanies this application, no significant effects impacts envisaged. An S-P-R connection between the Site and the Royal Canal pNHA was identified via the underlying GWB.
Lough Owel and Lough Ennell Ramsar Sites	International Importance	No	These sites have been assessed by proxy in the AA Screening that accompanies this application. No significant impacts envisaged.
Habitats			
BL3 – Buildings and artificial surfaces	Local importance (lower value)	No	Artificial habitat of little biodiversity value
ED3 – Recolonising Bare Ground.	Local importance (lower value)	No	Artificial habitat of little biodiversity value
GA1 – Improved Agricultural Grassland	Local importance (lower value)	No	Moderately intensively managed agricultural grassland with a low level of plant diversity. Provides some foraging resource for birds and pollinating insects, but not considered of conservation value due to the abundance of similar habitat in the local area.
GA2 – Amenity Grassland	Local importance (lower value)	No	Small area of managed amenity grassland on roadside verge with a low level of plant diversity.
GS4 - Wet Grassland	Local importance (lower value)	No	Small area of wet grassland present on Site with a low level of plant diversity recorded. Not considered of conservation value at the Site scale.
WS1 – Scrub	Local importance (lower value)	No	Small areas of this habitat present throughout the Site. May provide some shelter/foraging habitat for local fauna, but not considered of conservation value due to the small area of habitat and abundance of similar habitat in the local area.

Designated sites / species / habitats	Evaluation	Key Ecological Receptor (KER)	Notes
WL1 – Hedgerow	Local importance (higher value)	**Yes**	May provide important nesting, resting and foraging habitat for local birds and bats.
WL2 – Treeline	Local importance (higher value)	**Yes**	May provide important nesting, resting and foraging habitat for local birds and bats.
Fauna			
Small mammals e.g., Eurasian pygmy shrew and hedgehog	Local importance (higher value)	**Yes**	No evidence of these species recorded during the field survey; however these small mammals may utilize the habitats at the Site which will be affected by the Proposed Development, namely the grassland, hedgerow and small areas of scrub habitats.
Badger	Local importance (lower value)	No	The badger is an adaptable species of lowland grassland and woodland habitats (Marnell et al., 2009). No setts or tracks were identified during the surveys, and the habitats at the Site have limited suitability for badger.
Red squirrel and pine marten	Local importance (lower value)	No	No wooded areas extensive enough to attract these mammals.
Otter	Local importance (lower value)	No	No suitable habitat present within the Site for otter, the Site does not contain any flowing waterbodies or drainage ditches.
Bat Assemblage	Local importance (higher value)	**Yes**	Three species of bat recorded in the Site environs. The Site provides low suitability foraging and commuting habitat for local bats due to its isolated nature and high levels of light disturbance.
Bird Assemblage	Local importance (higher value)	**Yes**	Red, Amber and Green-listed species recorded on Site, as well as in the NBDC data for the general area. Suitable breeding and foraging habitat for a range of common and widespread bird species.
Amphibians	Local Importance (lower value)	No	NBDC records for common frog in the 2km Grid Square encompassing the Site however no suitable habitat such as drainage ditches or standing water for common frog or smooth newt noted during the field surveys.
Reptiles	Local importance (lower value)	No	NBDC records for common lizard in the 2km Grid Square encompassing the Site. No evidence of common lizard on Site. The Site is not expected to hold a provide significant habitat of common lizard due to the limited resources available for the species. For the

Designated sites / species / habitats	Evaluation	Key Ecological Receptor (KER)	Notes
			most part, the Site of the Proposed Development is composed of grazed and managed grassland of uniform short sward height.
Fish	Local importance (lower value)	No	No potential habitat on Site to support these species.

14.7 The 'Do nothing' Scenario

Should the Proposed Development not go ahead, the Site would continue to be used as grazing pasture for livestock. The treelines, hedgerows and areas as scrub would continue to serve as ecological corridors providing nesting, commuting and foraging habitat for local fauna. The grassland would continue to offer limited resources to local pollinators.

14.8 Potential Significant Effects

As per the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009), likely effects have been assessed for KERs only, as listed in Table 14.11 above. All impacts are described in the absence of mitigation.

The following were identified as KERs:

Designated sites:

- Royal Canal pNHA

Habitats;

- WL1 hedgerows and WL2 treelines.

Species / species groups;

- Small mammals (hedgehog &pygmy shrew).
- Bird assemblage.
- Bat assemblage.

14.8.1 Construction Phase

The construction phase of the Proposed Development will involve Site preparation works, the establishment of construction services and the construction of the proposed units. Site preparation works will involve Site clearance, establishing entranceways and haul roads for vehicles, surveying and setting out, setting up the construction Site fencing and compounds etc.

14.8.1.1 The Royal Canal pNHA

The Proposed Development maintains a potential weak hydrogeological connection with the Royal Canal pNHA via the Inny and Clara GWB. During groundworks and other construction activities as a result of the Proposed Development, the ground may be exposed and any potential accidental discharges to ground could potentially migrate vertically downward to the underlying GWB and laterally to reach the Royal Canal pNHA. The potential impact to the Royal Canal pNHA via groundwater flows from the Site is considered to be *negative, short-term, slight* in the absence of suitable mitigation. The nature of the hydrogeological connection and the distance of 0.5km between the Site and the pNHA have been taken into account when categorising the potential impact of the Construction Phase on the designated site.

14.8.1.2 Habitats and flora

The treeline in the centre and the treelines and hedgerows along the majority of the Site boundaries will be lost, this will result in the loss of twelve trees and approximately 83m of overgrown hedgerow in the centre of the Site and approximately 78m of overgrown hedgerow and scrub at the northern boundary of the Site (Arbo Care, 2023). Seven mature trees, approximately 57.3m of hedgerow along the eastern Site boundary, 38m of scrub along the northwestern Site boundary and 95m of scrub at the Site will be retained and has been incorporated into the Site layout and landscape design. The existing trees on the eastern Site boundary with Ashefield residential development will be retained and enhanced with native planting. The loss of these KER habitats on Site is considered unavoidable due to spatial constraints.

The hedgerow and treeline habitats are gappy with a sparse understorey, however they provide potential nesting, resting, foraging and commuting habitat for local bird and bat populations as well as small mammals (hedgehog and pygmy shrew). The loss of these KER habitats will be offset to a degree by the provision of new, predominantly native hedge and tree planting in the landscape plan for the Proposed Development. However, it will take several years before the newly planted hedges and trees provide the same level of support to local fauna as the existing habitats. Therefore, the loss of these habitats represents a *negative, long-term, moderate* impact at the Site scale.

14.8.1.3 Mammals (excl. bats)

The Site of the Proposed Development contains habitat suitable for small mammals such as hedgehog and pygmy shrew (hedgerow, scrub). Clearance of vegetation may put these species at risk of injury or death if present when clearance is taking place. These species are all highly mobile and would be able to move away from the area of works during vegetation clearance, however when rearing young (typically during spring and summer months) or hibernating (in the case of hedgehogs), these species will have reduced mobility. This risk constitutes a potential *negative, short-term, significant* impact on the local populations of these species.

Small mammals such as hedgehog have the potential to become trapped in excavations or become entangled in construction materials such as netting and plastic sheeting, as well as other waste materials, causing entrapment and injury or death. This constitutes a *negative, short-term, significant* impact at a local scale. Noise and dust generated during the Construction Phase has the potential to cause a disturbance impact on small mammals, in the absence of appropriate mitigation this represents a *negative, short-term, slight* impact.

14.8.1.4 Bats

The Proposed Development will result in the removal of potential commuting and foraging habitat for local bats in the form of linear scrub, hedgerows and treelines. The treeline at the northeast corner of the Site which recorded the highest level of bat commuting and foraging habitat will be retained and protected and has been incorporated into the project design. It is noted that the Site is currently isolated in nature due to the existing residential developments and road networks. None the less, the loss of potential foraging and commuting habitat at the Site represents a *negative, long-term, moderate* impact at a local scale.

Increased construction phase lighting at the Site could impact on bats using the Site during this period, if not maintained in a bat-friendly manner. This represents a *negative, short-term, slight* impact at a local scale given the well illuminated nature of the Site currently.

14.8.1.5 Birds

Several bird species were recorded utilising the habitats on Site. Should vegetation be cleared or cut back during the breeding bird season (March 1st to August 31st); there is the potential for nesting birds to be harmed and nests destroyed. This would be in contravention of the Wildlife Act 1976 (as amended) which provides protection to breeding bird species and their nests and young. In the absence of mitigation or preventative measures, this risk constitutes a *negative, permanent, significant* impact on local bird populations.

The Construction Phase will impact local birds through the loss of suitable foraging/nesting habitat in the form of areas of grassland, treelines, hedgerows and scrub. This will be offset to a degree by the proposed landscape design for the Site. The habitat loss at the Site represents a *negative, permanent, moderate* impact to birds at the Site scale, as the habitats on Site become more anthropogenic and managed in nature.

The increased noise and dust levels associated with the Construction Phase of the Proposed Development may have the potential to cause *negative, short-term, slight* impacts to local bird populations in the absence of mitigation.

14.8.2 Operational Phase

The Operational Phase of the Proposed Development will consist of the normal day to day operations necessary for the management of a residential development and the ongoing maintenance of the dwelling units, operational infrastructure and landscape features.

14.8.2.1 Designated sites

No impacts on any designated sites during the Operational Phase of the Proposed Development are anticipated.

14.8.2.2 Habitats and flora

No further removal of habitats on Site will occur during the Operational Phase of the Proposed Development. Habitats on Site will be managed for ecological and amenity purposes.

14.8.2.2.1 Landscape design

There is opportunity for the Operational Phase of the Proposed Development to offset some of the habitat loss as a result of the Construction Phase. The landscape plan proposes to incorporate pollinator friendly species with a strong emphasis on native species and includes wildflower meadows and bulb planting with a view to successional blooming which prolongs flowering across the Spring, Summer and Autumn, providing cover and foraging for invertebrates and birds, while the wildflower mix provides resources for pollinators. Treelines and hedgerows proposed will provide a reasonable degree of instant maturity to the Site and act to replace the loss of the existing linear features. The

treeline at the northeastern boundary of the Site will be retained and enhanced with native species. Direction lighting is included in this area to ensure the boundary habitat continues to provide foraging habitat for local bats.

The planting palette has been specifically chosen for its pollinator friendly species as well as the overall aesthetic value of the trees, shrubs, and perennials. The landscaped green spaces framed by native trees create a natural link throughout the Proposed Development Site and are anchored by the central green open space. The landscaped areas of the Site provide both active and passive areas for residents to enjoy with an objective to create a natural environment within the Site to invite interaction and communication.

Pollinator friendly species incorporated in the landscape design include robin hill (*Amelanchier x grandiflora*), wild cherry (*Prunus avium*), bird cherry (*Prunus padus*), rowan (*Sorbus aucuparia*), honey suckle (*Lonicera periclymenum*), guelder rose (*Viburnum opulus*), purple sensation (*Allium hollandicum*), karl foerster (*Calamagrostis acutiflora*) and lambs ear (*Stachys byzantina*).

Overall, the landscape design will have a *positive, permanent, significant* impact at a local scale to the Site, replacing a Site dominated by low biodiversity improved agricultural grassland habitat with a variety of pollinator friendly species.

14.8.2.3 Mammals (excl. bats)

The Operational Phase of the Proposed Development has the potential to result in a disturbance impact to local mammals utilising the Site in general through night-time light pollution. This represents a *negative, permanent, moderate* impact in the absence of suitable mitigation.

14.8.2.4 Bats

The Operational Phase of the Proposed Development has the potential to result in a disturbance impact to local bat populations utilising the Site in general through night-time light pollution. This represents a *negative, permanent, moderate* impact in the absence of suitable mitigation.

14.8.2.5 Birds

No significant effects on bird species are anticipated during the Operational Phase of the Proposed Development.

14.8.3 Cumulative Effects

If the Proposed Development and the existing or proposed projects or plans impact on the same KERs, there is potential to lead to cumulative impacts which could be of a higher level of significance. This applies to potential impacts on birds and small mammals due to the combined loss of nesting or foraging habitat in the locality of the Site, and potential impacts on bats and mammals due to the combined loss of suitable foraging and commuting habitat in the locality. The below listed planning applications were all accompanied by the relevant environmental assessments that detail the potential impacts and the mitigation measures required to ensure the developments do not have a significant effect on local biodiversity, alone or in-combination with other developments. Once the

mitigation measures for each of the below projects and this planning application are adhered to, the potential for likely significant cumulative impacts **can be ruled out**.

14.8.3.1 Existing granted planning permissions

A search of planning applications located within a 2km radius of the Proposed Development was conducted using online planning resources including the National Planning Applications Database (MyPlan.ie) and Westmeath County Council's online planning database. Any planning applications listed as granted, application registered or application pending from within the last five years were assessed for their potential to act in-combination with the Proposed Development and cause likely significant effects on local biodiversity. Long-term developments granted outside this time period were also considered where applicable. The larger-scale developments identified within the vicinity of the Site of the Proposed Development are identified below in Table 14.12.

Table 14.12. Nearby permitted or pending planning applications

Planning reference	Location relative to the Proposed Development	Development description
22515	North of the C-Link Road	Permission for the following Large-Scale Residential Development comprising of the construction of 213 no. residential units, 1 no. creche, 1 no. pumping station and all associated ancillary development works including 2 no. ESB sub-stations, footpaths, cycle lane, car and bicycle parking, drainage, bin storage, landscaping/amenity areas and the undergrounding of existing 38KV overhead electricity lines at Rathgowan, Mullingar, Co. Westmeath. Access will be via the existing roundabout on the R394 (C-Link). This development will form Phase 3 of a larger (three-phase) residential development at this location.
Part 8 Application	0.3km east of the Proposed Development.	Part 8 application for the construction of 22 no. dwelling units adjacent to Ashfield/Abbeylands/Green Road and St. Bridget's Terrace, Mullingar, Co. Westmeath.
Part 8 Application	2km east of the Proposed Development	The construction of 17 no. dwelling units on a site at the junction of Delvin & Robinstown Road, Springfield TD, Mullingar, Co. Westmeath.
Part 8 Application	0.8km south of the Proposed Development.	The construction of 15 no. single storey houses on four separate sites at Ennell Court and Trinity Cottages, Mullingar, Co. Westmeath.
Part 8 Application	1.3km east of the Proposed Development.	Proposed Housing Development of 32 no. dwelling units consisting of 19 no. 2 bed units and 13 no. 1 bed units at Friar's Mill Road / Canal Avenue, Mullingar, Co. Westmeath.
21568	0.6 km northwest of the Proposed Development Site.	An extension of duration was sought for 16/6001: planning reference no: 11/5121 for the construction of a new housing development, consisting of 28 no. houses to be constructed in 3 phases made up of a combination of 26 no. detached 2 storey houses (as per condition no.5 of outline permission planning ref. no. 11/4121) with associated services.

Planning reference	Location relative to the Proposed Development	Development description
196159	This site lies 1.8km south of the Proposed Development.	Planning permission was sought for the construction of 98 no. residential units consisting of 14 no. 2 bed terraced houses, 10 no. 3 bed end-terraced houses, 12 no. 3 bed semi-detached houses, 8 no. 4 bed semi-detached houses and 54 no. duplex units (comprising 27 no. 1 bed units and 27 no. 3 bed units). Provision of a creche and community facility, 142 no. car parking spaces, 8 no. motorcycling spaces and 102 no. bicycle spaces. Access from the R390. All site development and servicing works, bin stores, ESB substation, pumping station, open space, landscaping and boundary treatments.
196121	Directly east of the Proposed Development.	Planning permission was sought for the construction of 18 Apartment units in 2 Blocks (Block A & B). Block A consists of 1 no. 1 bedroom units, 3 no. 2 bedroom units and 2 no. 3 bedroom duplex apartment units in 2 and 3 storey high building with private balconies and patios. Block B consists of 6 no. 1 bedroom units and 6 no. 2 bedroom duplex apartment units in 3 storey high building with private balconies and patios. The proposed development will also consist of a new site entrance, shared access road, footpaths, car parking spaces, boundary wall and fence, covered cycle rack, recycling bin storage area, public and private open spaces, partial removal and trimming of existing hedgerows to accommodate proposed site entrance, landscaping and all associated site works and services.

14.9 Mitigation

14.9.1 Construction Phase Mitigation

14.9.1.1 Protection of habitats

Trees that are proposed to be retained on Site (as per the tree protection plan accompanying this application, Drg. No. M-TS-001) will be protected for the duration of the Construction Phase by protective fencing, signage and/or ground protection prior to any materials or machinery being brought on Site and prior to any development or soil stripping taking place. Areas that are designated for new planting will be protected where possible. Barriers will be fit for the purpose of excluding construction activity. In most cases barriers will consist of a scaffold framework comprising a vertical and horizontal framework, well braced to resist impacts. To ensure the protective barriers are respected, clear concise signage will be affixed to the barrier in an unrestricted easily viewer location. The protective barriers will remain in place in an undisturbed condition and only removed on completion of all construction activity. Any breach of the protective fencing will be reported to the consulting arborist.

During the course of the Construction Phase the integrity of the protective fencing must be respected and remain in place at all times. No building materials or soil heaps will be stored within this area.

Should essential works need to take place within the root protection area, the project arborist must be informed in advance and any necessary mitigation measures will be put in place. The protective fencing will remain in situ for the duration of the project and will only be removed upon completion of all works. Construction will only commence once the protective barriers and/or ground protection have been erected.

Further information on Tree Protection measures can be found in the Arboricultural Impact Assessment accompanying this application (Arbo Care, 2023).

14.9.1.1.1 Invasive species

No species of plant listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 were recorded at the Site during surveys. As such, no significant risk of impacts relating to the spread of invasive plant species exists at the Site. Nevertheless, efforts should be made to remove the non-native plants on Site and minimise any risk of spread off-Site. The distribution of the non-native species recorded on Site (snowberry) is not significant and its removal will not be an issue.

Transport Infrastructure Ireland (2020) guidance 'The Management of Invasive Alien Plant Species on National Roads – Technical Guidance' will be consulted with regards the treatment, removal and disposal of invasive flora at the Site.

The following measures will be adhered to, to avoid the introduction or dissemination of invasive species to and from the Site of the Proposed Development:

- Validation that all machinery / vehicles are free of Invasive Alien Plant Species (IAPS) prior to their first introduction to Site.
- Certification from the suppliers that all imported soils and other fill/landscaping materials are free of IAPS.
- A regular schedule of Site inspections across the IAPS growing season, for the duration of the construction works.
- Validation that all machinery / vehicles are free of IAPS, prior to leaving the Site.
- Appropriate and effective Site biosecurity hygiene.

14.9.1.2 Surface and ground water protection measures

The Proposed Development includes a detailed drainage plan that is assessed in full In Chapter 6 – Hydrology & Hydrogeology of this EIAR. This drainage plan and all associated measures have been taken into account in this Biodiversity Chapter but are not included in full (to avoid repetition). The drainage design for the Proposed Development will minimise surface water runoff arising at the Site, to adequately control and manage surface water runoff from the Site containing suspended solids and to ensure that the hydrological function of the waterbodies in the vicinity of the Site are not affected by the Proposed Development.

There are no drainage ditches or watercourses within or immediately adjacent to the Proposed Development Site however the public surface water network lies adjacent to the Site along the C-Link Road. This public surface water network eventually discharges to the River Brosna north east of the

Site. As such, standard best practice surface water management measures will be implemented on Site to ensure surface water runoff from the Site containing suspended solids does not reach the public surface water network along the C-Link Road or impact the local underlying groundwater body.

A number of pollution-prevention measures for the Construction Phase of the Proposed Development are described in the outline Construction Environmental Management Plan (CEMP) accompanying this application under a separate cover. All measures outlined in the CEMP are established measures that are widely used in construction projects, and there is a high degree of confidence in their success. The contractor will be required to employ an Environmental Manager to assist with preparing a detailed CEMP and its implementation.

The following pollution prevention measures will be implemented on Site to protect surface water and ground water in the vicinity of the Proposed Development:

- The main compound on Site will include a bunded area for the storage of pollutants, with additional areas for stockpiling of materials.
- There will be no cement washout on Site except for washout of chutes, the washings of which will be collected into an appropriate container for compliant off-Site management.
- Where cast-in-place concrete is required, all work will be carried out in the dry.
- All plant machinery required on Site will be serviced before being mobilised to Site.
- Refuelling of plant during the Construction Phase will only be carried out at designated refuelling stations located on Site. Each station will be fully equipped for spill response and a specially trained and dedicated Environmental and Emergency Spill Response team will be appointed before the commencement of works on Site. The plant refuelling procedures will be detailed in the contractor's method statement.
- Spill kits will be made available in each item of plant required on Site.
- A regular review of the weather forecast for extremely heavy rainfall will be conducted, and a contingency plan will be prepared for before and after such events to minimise any potential nuisances. As the risk of the break-out of silt laden run-off is higher during these weather conditions, no work will be carried out during such periods where possible.
- Only emergency breakdown maintenance will be carried out on Site. Drip trays and spill kits will be available on Site to ensure that any spills from vehicles are contained and removed off Site.
- All personnel working on Site will be trained in pollution incident control response.
- Any other diesel fuel or hydraulic oils stored on Site will be stored in bunded storage tanks. The bunded area will have a volume of at least 110% of the volume of the stored materials as per best practice guidelines (Enterprise Ireland, BPGCD005).
- All associated waste from portaloos and/or containerised toilets and welfare units will be removed from the Site by a licenced waste disposal contractor.
- Where there is a requirement to collect and treat surface water within the Site during the Construction Phase, run-off from the working Site or any areas of exposed soil will be channelled and intercepted at regular intervals via perimeter swales. The swales will be installed at low points around the construction areas. If required, water will be pumped from

the swales into sediment bags with overflows directed to land rather than to the public surface water sewer.

- Discharge to land will be via a silt bag which will filter any remaining sediment from the pumped water. The entire discharge from the silt bag will be enclosed by a perimeter of double silt fencing.
- No pumped construction water will be discharged directly to the public surface water network along the C-Link Road.

14.9.1.3 Protection of fauna

14.9.1.3.1 Site lighting

Site lighting may be required during the Construction Phase, to protect bats and other nocturnal fauna from excess night-time lighting, the following luminaire specifications, taken from the latest guidance (ILP, 2018) will be adhered to during the Construction Phase:

- Retained trees will not incur an increase in the current lux level due to Construction Phase lighting.
- All luminaires will lack UV/IR elements to reduce impact.
- LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.
- A warm white spectrum (<2700 Kelvins) will be sued to reduce the blue light component of the LED spectrum.
- Column heights will be carefully considered to minimise light spill, the shortest column height allowed will be used.
- Only luminaires with an upward light ration of 0% and with good optical control will be used.
- Luminaries will be mounted on the horizontal i.e., no upward tilt.
- External security lighting will be set on motion-sensors and short timers.

14.9.1.3.2 Small mammals

As best practice, all construction related waste on Site e.g., plastic sheeting, netting etc. will be kept in designated areas on Site and kept off ground level to protect hedgehogs from entrapment and possible death. These measures will also act to mitigate potential negative impacts on any other small mammal species potentially utilising the Site.

Trenches/ pits must be either covered at the end of each working day or include a means of escape for any animal falling in e.g., a plank or object placed in the corner of the excavation. Any temporarily exposed open pipe system will be capped in such a way as to prevent fauna gaining access as may happen when contractors are off Site.

14.9.1.3.3 Vegetation clearance

Any clearance of vegetation will be carried out outside the main bird breeding season i.e., outside of the period of 1st of March to 31st of August, in compliance with the Wildlife Ace 1976 (as amended). Should any vegetation removal be required during this period, the precise location within the

hedgerow/trees will be checked for birds or nests by a suitably qualified Ecologist. If encountered, the precise location with the hedgerow/treeline and the species of bird present will be recorded. The area will be protected, and the Site manager will be informed of the presence of nesting birds and advised that no works can commence in this area until further notice. Appropriate protection measures will be implemented in consultation with the project ecologist and a timeline for further surveys will be agreed based on the bird species present.

Table 14.13 provides guidance for when vegetation clearance is permissible. Information sources include the Herpetological Society of Ireland, British Hedgehog Preservation Society's *Hedgehogs and Development and the Wildlife (Amendment) Act*, 2000. The preferred period for vegetation clearance is within the months of late **September and October**. Vegetation will be removed in sections working in a consistent direction to prevent entrapment of protected fauna potentially present (e.g., hedgehog, pygmy shrew). Where this seasonal restriction cannot be observed, a check for active roosts, nests and small mammals will be carried out immediately prior to any Site clearance by an appropriately qualified ecologist/ ornithologist and repeated as required to ensure compliance with legislative requirements.

Table 14.13. Seasonal restrictions on vegetation removal. Orange boxes indicate periods when clearance / works are not permissible.

Ecology Feature	January	February	March	April	May	June	July	August	September	October	November	December
Breeding birds	Vegetation clearance permissible (Sept – Feb).		Nesting bird season. No clearance of vegetation unless confirmed to be devoid of nesting birds by an ecologist (Mar – Aug).						Vegetation clearance permissible (Sept – Feb).			
Bats	Tree felling to be avoided unless confirmed to be devoid of bats by an ecologist (Nov – Aug).								Preferred period for tree-felling		Tree felling to be avoided unless confirmed to be devoid of bats by an ecologist (Nov – Aug).	
Small mammals (e.g., hedgehog & pygmy shrew)	Mammal hibernation season. No clearance of vegetation unless confirmed to be devoid of hibernating mammals by an ecologist (Nov – Mar).			Vegetation clearance permissible (April – Oct)							Mammal hibernation season. No clearance of vegetation unless confirmed to be devoid of hibernating mammals by an	

Ecology Feature	January	February	March	April	May	June	July	August	September	October	November	December
											ecologist (Nov – Mar).	

14.9.1.4 Reduction of noise and dust related impacts

14.9.1.4.1 Reduction of noise related impacts

Short-term increases in disturbance levels as a direct result of human activity and through increased generation of noise during the Construction Phase can have a range of impacts depending upon the sensitivity of the ecological receptor, the nature and duration of the disturbance and its timing.

Noise generated during the Construction Phase of the Proposed Development could cause temporary disturbance to a number of faunal species in the vicinity of the Site of the Proposed Development. The following best practise measures will be put in place to ensure the minimisation of potential impacts on fauna as a result of the Proposed Development. Limiting the hours during which Site activities likely to create high levels of noise are permitted.

- Establishing channels of communication between the contractor/developer, local authority and residents.
- Appointing a Site representative responsible for matters relating to noise.
- Selection of plant with low inherent potential for generating noise.
- Siting of plant as far away from sensitive receptors as permitted by Site constraints.
- Avoidance of unnecessary revving of engines and switch off plant items when not required.
- Keep plant machinery and vehicles adequately maintained and serviced.
- Proper balancing of plant items with rotating parts.
- Keep internal routes well maintained and avoid steep gradients.
- Minimise drop heights for materials or ensure a resilient material underlies.
- Use of alternative reversing alarm systems on plant machinery.
- Monitoring typical levels of noise during critical periods and at sensitive locations.

These measures will ensure that any noise disturbance to nesting birds or any other fauna species in the vicinity of the Site of the Proposed Development will be reduced to a minimum.

14.9.1.4.2 Reduction of dust related impacts

The following general dust control measures will be followed for the duration of the Construction Phase and will ensure no significant dust related impacts occur on nearby sensitive receptors including local faunal species:

- Haulage vehicles transporting gravel and other similar materials to Site will be covered by a tarpaulin or similar.

- Bowsers will be available during periods of dry weather throughout the construction period.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil thereby reducing the amount of dust.
- Stockpiles will be stored in sheltered areas of the Site, covered, and watered regularly or as needed if exposed during dry weather.
- Gravel will be used at Site exit points to remove caked-on dirt from tyre tracks.
- Equipment will be washed at the end of each workday.
- If practical, wheel-washing facilities will be located at all exits from the Construction Site.
- Dust production as a result of Site activity will be minimised by regular cleaning of the Site access roads using vacuum road sweepers and washers. Access roads will be cleaned at least 0.5km on either side of the approach roads to the access points.
- Public roads outside the Site shall be regularly inspected for cleanliness, as a minimum daily, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.
- The frequency of cleaning will be determined by the Site agent and is weather and activity dependent.
- The height of stockpiles will be kept to a minimum and slopes should be gentle to avoid windblown soil dust.
- The following will be dampened during dry weather:
    - Unpaved areas subject to traffic and wind
    - Stockpiles
    - Areas where there will be loading and unloading of dust-generating materials.

14.9.2 Operational Phase Mitigation

14.9.2.1 Wildlife friendly lighting

To minimise disturbance to bats in the immediate vicinity of the Site, the lighting and layout of the Proposed Development has been designed to minimise light spill. This will be achieved by ensuring that the design to minimise light spill. This will be achieved by ensuring that the design of lighting accords with guidelines presented in the Bat Conservation Trust & Institute of Lighting Engineers 'Bats and Lighting in the UK - Bats and Built Environment Series', the Bat Conservation Trust ‘Artificial Lighting and Wildlife Interim Guidance’ and the Bat Conservation Trust 'Statement on the impact and design of artificial light on bats'.

Bat-friendly lighting measures have been incorporated into the Proposed Development design and associated lighting plan. Dark buffer zones can be effectively used to separate important habitats or features from lighting by forming a dark perimeter around them (ILP, 2018). Buffer zones rely on ensuring light levels within a certain distance of features do not exceed certain defined limits, generally 1 lux or less. The buffer zone can be further subdivided into zones of increasing illuminance limit radiating away from the feature.

It is noted that the Site is currently well illuminated due to the adjacent street and residential lighting, however the inclusion of wildlife friendly lighting measures in the Proposed Development design will have a considerable input in mitigating the potential impact of additional night-time lighting on local bats. Based on the above guidance documents, the lighting scheme for the Proposed Development, as confirmed by Morley Walsh has incorporated the following measures:

- Luminaires will have zero upward light ratio, to minimize light pollution, energy waste and impact on wildlife.
- Lighting will be directional on to the roadways and footways only with minimal spillage onto the adjoining habitats.
- LED luminaries are utilised where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- Narrow spectrum bulbs will be used to lower the range of species affected by lighting. Light sources that emit minimal ultra-violet light and avoid the white and blue wavelengths of the light spectrum will be utilised to avoid attracting lots of insects. Lighting regimes that attract lots of insects result in a reduction of insects in other areas like parks and gardens that bats may utilise for foraging.
- Motion sensor and timer activated lighting will be in place at the Site to ensure minimal light spill occurs during the hours of darkness.
- Planting will provide areas of darkness suitable for bats to feed and commute.
- Reflective surfaces will not be placed under lights.

14.9.2.2 Protection and enhancement of habitats

The landscaped sections of the Proposed Development will be managed in a way so as to mitigate the loss of the existing hedgerows and treelines as much as is possible. In this way new hedgerows and treelines will be maximised in the ecological value they provide at the Site, with habitat connectivity ensured along the margins of the Proposed Development. This connectivity is vital for wildlife such as birds, bats, mammals, and insect pollinators in a human landscape such as that which will be provided by the Proposed Development. Additionally, by managing hedgerows and treelines in a more natural way, they will provide more in terms of biodiversity; through increased plant diversity, increase provision of food resources and higher quality shelter to wildlife inhabiting and commuting through the area.

This low intervention approach may not be suitable for the more landscaped areas of the Site, which may need to be maintained to a higher degree for health and safety or aesthetic reasons. However, a high quantity of native species is included in the landscape design in these locations to maximise the biodiversity value of these internal landscaped parts of the Site.

For the hedgerows running along the margins of the Site, the following management approach is proposed to maximise their biodiversity value and offset the loss of existing hedgerows and treelines at the Site:

- Hedgerows will be maintained with a natural meadow strip of 1-2m at their base wherever possible. Hedges with plenty of naturally occurring flowers and grasses at the base support will provide higher quality habitat for local wildlife using the hedges.
- The 1-2m strip at the base of the hedgerow will be cut on a reduced mowing regime to encourage wildflower growth and maximise the value of the hedgerow for pollinators. A two-cut management approach is ideal for suppressing coarse grasses and encouraging wildflowers. Cut the hedgerow basal strip once during February and March (this is before most verge plants flower and it will not disturb ground-nesting birds). Cut the verge once again during September and October (this slightly later cutting date allows plants that were cut earlier in the year time to grow and set seed).
- N.B. Raising the cutter bar on the back cut will lower the risk to amphibians, reptiles and small mammals.
- Hedgerows, where possible, should be allowed to reach at least 2.5m in height, and should be trimmed in an A-shape; maintaining a wider base to compliment the natural meadow strip at their base.
- Where hedgerow trimming needs to occur delay trimming as late as possible – until January and February as the surviving berry crop will provide valuable food for wildlife. The earlier this is cut; the less food will be available to help birds and other wildlife survive through the winter. Any hedgerow cutting should be done outside of the nesting season and due consideration of the Wildlife Act 1976 (as amended) needs to be taken.
- Where possible, cut these outer boundary hedgerows on a minimum 3-year cycle (cutting annually stops the hedgerow flowering and fruiting), and cut in rotation rather than all at once - this will ensure some areas of hedgerow will always flower (blackthorn in March, hawthorn in May).
- Where they occur naturally, bramble and ivy should be allowed grow in hedgerows, as they provide key nectar and pollen sources in summer and autumn.

<u>Methods to Avoid</u>

- Hedgerows will not be over-managed. Tightly cut hedges mean there are fewer flowers and berries, thus reducing available habitats, feeding sources and suitable nesting sites.
- Hedgerows will not be cut between March 1st and August 31st inclusive. It is both prohibited (except under certain exemptions) and very damaging for birds as this is the period they will have vulnerable nests containing eggs and young birds.
- Do not use pesticide/ herbicide sprays or fertilisers near hedgerows, scrub or areas of wildflower meadows as they can have an extremely negative effect on the variety of plants and animals that live there.

14.9.2.3 Bird and bat box scheme

14.9.2.3.1 Birds

It is recommended that 10 no bird boxes will be installed as part of the landscape plan, the placement of the bird boxes will be overseen by an appropriately qualified ecologist. The boxes will be durable and will be firm and secure to their supports, and only placed on trees that are robust and large enough to support the bird box.

- There are various standard bird box options and at least two of each of the following box types will be installed:
- 'Hole type' bird box (32mm hole) – for example the rookery nest box, which can be found at the following link - https://birdwatchireland.ie/product/tom-chambers-rookery-nest-box/.
- 'Hole type' bird box (32mm hole) for example the Schwegler nest box, which can be found at the following link - https://www.nhbs.com/1b-schwegler-nest-box?bkfno=174761
- Eco Starling Nest Box – which can be found at the following link - https://www.nestbox.co.uk/products/eco-starling-nest-box.
- 'Hole type' bird box (28 mm hole) – for example the Eco Small Bird Box, which can be found at the following link - https://www.vivara.ie/woodstone-seville-28mm-nest-box-brown.

Hole type bird boxes should be positioned 2-4m off the ground, with good-visibility, a clear flight line and away from the prevailing wind direction. Unless the areas are very sheltered, bird boxes should be fixed facing between north and south-east to avoid the hot sun and the wettest winds. Bird box placement will be directed by an ecologist and amended as appropriate.

14.9.2.3.2 Bats

It is recommended that 10 Schwegler bat boxes will be erected on suitably large trees along the Site boundaries to provide future roosting opportunities. The guidance of a suitably qualified ecologist will be sought in the selection of bat box type and placement; to avoid disturbance from lighting generated by the Proposed Development and maximise the likelihood of their uptake by local bats. Bat boxes will be placed over 4m high (if possible) onto mature trees, the trees in which they are placed will not be illuminated. A group of 3 bat boxes facing in different directions will provide a variety of micro-habitats.

14.9.2.4 Hedgehog highways

By creating a number of separate private dwellings and associated gardens at the Site, large areas of the Site ultimately become fragmented and potentially inaccessible to species such as hedgehogs, which like to roam each night in search of food (garden pests e.g., slugs). This can be mitigated by ensuring that the boundaries and barriers within and surrounding the Site i.e., garden fencing, railings and gates are permeable for hedgehogs (Figure 14.14). This can be done by:

- The use of fence panels with 13 x 13 cm holes at ground level (hedgehog holes).
- Leaving a sufficient gap beneath gates.
- Leaving brick spaces at the base of brick walls.

A variety of fence suppliers' stock specific hedgehog-friendly fencing options, which can be easily incorporated at little to no additional costs. These simple measures will provide habitat connectivity at the Site for small mammals and reduce the impact of the land-use change on these species. Including details of hedgehog-friendly features in the new homeowner's welcome pack will raise awareness and prevent homeowners from reversing these features, for instance blocking fence holes.

Figure 14.14. Example of 'hedgehog highway' that can maintain habitat connectivity for hedgehogs in residential developments (image: BHPS guidance document).

14.10 Residual Impact Assessment

Residual impacts are defined as '*effects that are predicted to remain after all assessments and mitigation measures'*. They are the remaining 'environmental costs' of a project and are the final or intended effects of a development after mitigation measures have been applied to avoid or reduce adverse impacts. Potential residual impacts from the Proposed Development were considered as part of this environmental assessment. Table 14.14 provides a summary of the impact assessment for the identified KERs and details the nature of the impacts identified, mitigation proposed and the classification of any residual impacts.

The hedgerow and treeline habitats on Site were noted to be gappy with a sparse understorey, however they provide potential nesting, resting, foraging and commuting habitat for local bird and bat populations as well as small mammals (hedgehog and pygmy shrew). The loss of these KER habitats will be offset to a degree by the provision of new, predominantly native hedge and tree planting in the landscape plan for the Proposed Development.

All mitigation measures detailed in this Chapter will be implemented in full and will remain effective throughout the lifetime of the Proposed Development. Therefore, **no significant negative residual impacts** on the local ecology or on any designated nature conservation sites will result from the Proposed Development.

Table 14.14. Summary of potential impacts of KERs, mitigation measures and residual impacts.

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation/ Compensation/ Enhancement measures; Mitigating Factors	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
Designated sites								
Royal Canal pNHA	Local Importance (higher value)	Potential impacts to underlying groundwater body during the Construction Phase	Negative	Site scale	Short-term	Slight	Surface water protection measures outlined in Section 14.9.	No impact
Habitats								
Hedgerows (WL1) & treelines (WL2)	Local Importance (higher value)	Loss of habitats at the Site, offset to a degree by the landscaping plan (incl. green spaces with mix of native and non-native planting). Trampling and damage of retained habitats during the Construction Phase.	Negative	Site scale	Long-term	Moderate	No further mitigation proposed for loss of habitat. With time, the maturing planted trees and hedgerows will neutralise the effects of habitat loss. Retention and protection of seven trees, 95.3m of hedgerow and 95m of scrub at the Site. Tree protection measures as outlined in Section 14.9.1.1.	*Negative, permanent, Slight* impact at a local scale. Imperceptible.

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation/ Compensation/ Enhancement measures; Mitigating Factors	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
Fauna								
Small mammals (hedgehog and pygmy shrew)	Local Importance (higher value)	Risk of injury and/or death as a result of vegetation clearance works and Site management. Disturbance during the Construction Phase. Disturbance during the Operational Phase.	Negative	Site scale	Short-term Short-term Long-term	Significant Slight Moderate	Vegetation clearance to take place between September and October and working in consistent manner. Good Site hygiene and tidiness to ensure no entrapment of small mammals. Wildlife friendly lighting measures as outlined in Section 14.9. The inclusion of hedgehog highways (Section 14.9.2.4).	Imperceptible.
Bird assemblages	Local Importance (higher value)	Disturbance/harm as a result of vegetation clearance during the breeding bird season Loss of suitable foraging/nesting habitat at the Site offset to some	Negative	Site scale	Permanent	Significant	No removal of vegetation to be carried out during the breeding bird season. 10 bird boxes will be erected in suitable areas throughout the Site.	Imperceptible.

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation/ Compensation/ Enhancement measures; Mitigating Factors	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
		degree by the Proposed Landscape design. Disturbance during the Construction Phase.			Permanent Short-term	Moderate Slight	No further mitigation proposed for loss of habitat. With time, the landscape design will neutralise the effects of habitat loss. Construction related noise and dust control/minimisation measures to be implemented.	
Bat assemblages	Local Importance (higher value)	Loss of suitable foraging / commuting habitat at the Site offset to some degree by the Proposed Landscape design and the retention of the treeline at the northeast of the Site. Disturbance to commuting / foraging routes due to increased lighting at the Site.	Negative	Site scale	Long-term Short-term	Moderate Slight	10 bat boxes will be erected on Site. No further mitigation proposed for loss of habitat. With time, the landscape design will neutralise the effects of habitat loss. Bat friendly lighting measures to be implemented.	Imperceptible.

14.11 Significant Interactions

This chapter pertaining to the ecological and biodiversity aspects of the Proposed Development, has the potential to interact with aspects of the following chapters of this EIAR.

14.11.1 Chapter 5 – Land, Soils & Geology

An assessment of the potential impact of the Proposed Development on the existing land, soils and geological environment; with emphasis on the impact of the Proposed Development on the receiving soils underlying the Site during the Operational Phases of the Proposed Development, is described in Chapter 5 - 'Land and Soil' of this EIAR. These impacts are considered to be relevant to the ecological sensitivities associated with the Site of the Proposed Development discussed in this Chapter; and mitigation measures addressing these potential impacts are described in full in Chapter 5. The bulk removal of soils, sands and gravel at the Site can have implications for biodiversity. Natural regeneration of native and local seeds is the preferred option for re-vegetating areas to be retained for biodiversity.

14.11.2 Chapter 6 - Hydrology & Hydrogeology

The key environmental interaction with biodiversity is water. An assessment of the potential impact of the Proposed Development on the hydrological and hydrogeological environment is described in Chapter 6 - 'Hydrology' of this report as well as in his Chapter, to ensure the quality (pollution and sedimentation) and quantity (surface water run-off) of water is of appropriate standard. Interactions between hydrology and biodiversity can occur through impacts to water quality, arising, for example from an accidental pollution event during the Construction and Operational Phase.

14.11.3 Chapter 7 - Air Quality

An assessment of the potential impact of the Proposed Development on air quality is included in Chapter 7 of this EIAR. Dust emissions arising from the Construction Phase of the Proposed Development were identified as having potential impacts on local biodiversity. Once dust minimisation measures are implemented, impacts to biodiversity are not predicted to be significant.

14.11.4 Chapter 9 - Noise & Vibration

An assessment of the potential impact of the Proposed Development in the form of excess noise and vibrations associated with the Proposed Works are laid out in Chapter 9 - 'Noise and Vibrations'. These impacts are considered to be relevant to the ecological sensitivities associated with the Site of the Proposed Development discussed in this Chapter; and mitigation measures addressing these potential impacts are both referenced in this Chapter and described in full in Chapter 9. There is potential for interactions between noise and sensitive fauna, e.g., birds, that occur in adjacent habitats from increased noise levels during the Construction Phase. However, as described, noise related impacts are not deemed to be significant.

14.11.5 Chapter 10 - Landscape and Visual Impact Assessment

An assessment of the potential impacts of the Proposed Development on the surrounding landscape character is outlined in Chapter 10 – Landscape and Visual. These impacts are considered to be relevant to the ecological sensitivities associated with the Site of the Proposed Development discussed in this Chapter; and mitigation measures addressing these potential impacts are both referenced in this Chapter and described in full in Chapter 10. Landscaping at a development site can have significant implications for biodiversity. The landscape plan for the Proposed Development includes a high quantity of native species including hedgerows, treelines and wildflower meadows. The lighting plan for the Site has also been sensitively designed to protect bats from light pollution. Significant negative effects are not predicted.

14.11.6 Chapter 11 - Material Assets: Waste

Construction waste arising from Site operations could negatively affect local fauna through entrapment, for example. However, appropriate waste management practices on Site will ensure no significant effects occur on local biodiversity.

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