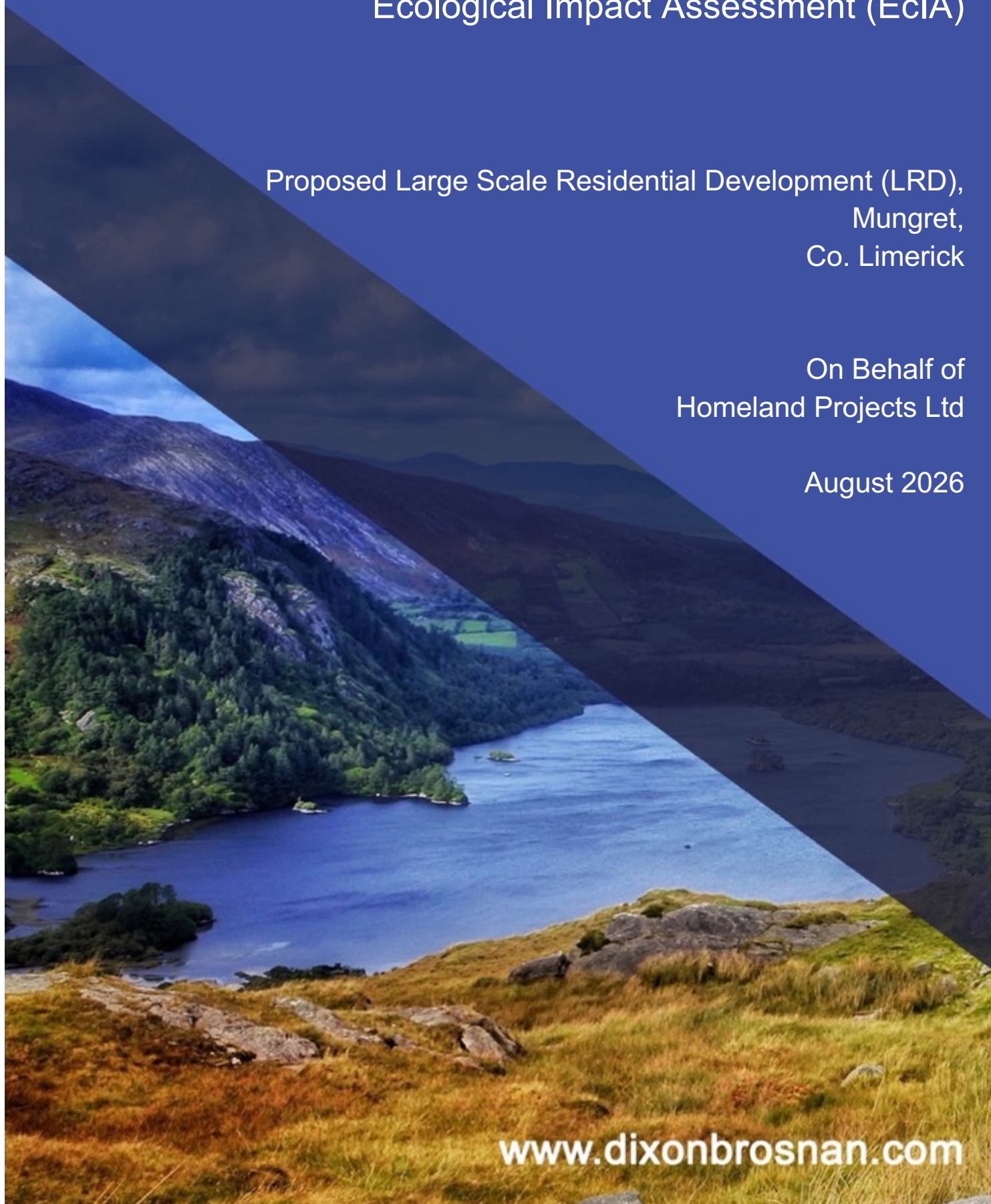


Ecological Impact Assessment (EcIA)

Proposed Large Scale Residential Development (LRD),
Mungret,
Co. Limerick

On Behalf of
Homeland Projects Ltd

August 2026



DixonBrosnan

environmental consultants

Project	Ecological Impact Assessment (EclA) for Proposed Residential Development at Mungret, Co. Limerick	
Client	Homeland Projects Ltd	
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1. Introduction

DixonBrosnan Environmental Consultants were commissioned to assess the potential impacts of a proposed large scale residential development (LRD) at Caherdanish, Mungret, Co. Limerick, and all associated site works on flora and fauna. This report describes and evaluates the habitats with their representative flora and fauna and addresses the potential impacts of the development on the ecology of the site and the surrounding area.

Following submission of this planning application to Limerick City and County Council (LCCC), the applicant received the following request for further information (Planning reference 26/60396).

I refer to the above planning application and in accordance with the provisions of Article 33(3A) of the Planning and Development Regulations 2001 (as amended) you are hereby requested to submit following further information, accompanied by a cover letter:

1. (a) Carry out and submit additional bat surveys over the summer months with an emphasis on the Lesser Horseshoe Bat, through the use of static and manned surveys. The resulting report should contain measures designed to retain and enhance landscape features such as trees and hedgerows and a lighting plan to continue to allow movement of the Lesser Horseshoe Bat and other bat species across the development site and local landscape.

(b) Carry out emergence surveys during the summer months at the three trees proposed for removal that were identified as having moderate roosting potential (T16, T17 and T20), and the results, together with a Regulation 54 derogation licence from NPWS if evidence of roosting bats is found, submitted as further information.

(c) Two potential Barn Owl breeding sites have been identified to the east and west of the site respectively. It is recommended that the proposed buffer zone (currently 50m) within which no work will be carried out if breeding Barn Owls are confirmed, is increased to 100m (the upper limit of the NatureScot recommended range), according to the precautionary principle as advised in the same guidance. You are requested to submit information which confirms the presence or absence of breeding barn owls and if necessary how the 100m no work buffer area will be implemented. This might be achieved by avoiding work in this area during the breeding season for instance.

(d) The EcIA shall be updated accordingly taking the above into account.

2. Submit a revised hydrogeological assessment report which clarifies in particular the basis for the mapped extent of groundwater supplying Loughmore Common Turlough from the north. In addition, the assessment should take into account any potential disturbance to the assumed south – north movement of groundwater (due to dewatering in the Mungret Quarry) as a result of existing development and infrastructure (including the Mungret Link Road) between the proposed development site and the quarry; and to examine any potential local influence on groundwater flow direction from the Loughmore Canal or the Barnakyle Stream which may alter the predicted flowpath.

3. It is noted that it is proposed to discharge excess stormwater from the site to ground (at an existing discharge point), apparently in the vicinity of the Mungret Link Road. Please clarify that there is sufficient capacity in this outfall to discharge the additional loading without adversely affecting groundwater flow pattern or quality.

This report has been updated to address the queries raised by LCCC. This report should be read in conjunction with updates on IE consulting hydrology/hydrogeology report, Molloy Consulting Engineers lighting report updates and the OSL Butler engineering report/drawings.

2. Methodology

2.1 Introduction

This appraisal is based on surveys of the proposed development site and a review of desktop data. Although not part of an environmental impact assessment report (EIAR) this report follows the structure and protocols detailed in *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA 2022).

2.2 Desktop Review

A desktop study was carried out to identify features of ecological value occurring within the proposed development site and in close proximity to it. A desktop review also allows the key ecological issues to be identified early in the appraisal process and facilitates the planning of surveys. Sources of information utilised for this report include the following:

- National Parks & Wildlife Service (NPWS) - www.npws.ie
- Environmental Protection Agency (EPA) – www.epa.ie
- National Biodiversity Data Centre (NBDC)– www.biodiversityireland.ie
- Limerick Biodiversity Action Plans 2025-2030
- Limerick Development Plan 2022-2028
- Bat Conservation Ireland – <http://www.batconservationireland.org>
- Birdwatch Ireland - <http://www.birdwatchireland.ie/>
- Invasive Species Ireland - <http://www.invasivespeciesireland.com/>
- National Parks & Wildlife Service – Scientific Unit and
- Limerick D0013-01 Wastewater Treatment Plant (WWTP) Annual Environmental Report 2024.

Although not forming part of an EIAR, this report generally follows the Environmental Protection Agency's *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA 2022). It also takes account of the Draft Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Environment, Community and Local Government, August 2018), Assessment of Ecological Impacts of National Road Schemes (Transport Infrastructure Ireland, 2009) Chartered Institute of Ecology and Environmental Management Guidelines on Ecological Impact Assessment in the UK and Ireland, 2nd edition (CIEEM 2016) and Guidelines for

Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, Version 1.3 (CIEEM, 2024).

Reference was also made to the following key documents where relevant:

- *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011)
- *A Guide to Habitats in Ireland* (Fossitt, 2000)
- *Guidelines for the treatment of Badgers prior to the construction of National Road Schemes. Transport Infrastructure Ireland, Dublin* (Transport Infrastructure Ireland (TII) 2005a)
- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* (Transport Infrastructure Ireland (TII) 2005b)
- *Guidelines for the treatment of bats during the construction of national road schemes* (Transport Infrastructure Ireland (TII) 2005c)
- *Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post construction of national road schemes.* (Transport Infrastructure Ireland (TII) 2006)
- *Guidelines for the treatment of Otters prior to the construction of National Road Schemes* (Transport Infrastructure Ireland (TII) 2008)
- *Survey and Mitigation Standards for Barn Owls to inform the Planning, Construction and Operation of National Road Projects* (Transport Infrastructure Ireland (TII) 2021)
- *Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edn)* (Collins, J. (ed.), 2023)
- *Bat mitigation guidelines for Ireland v2. Marnell, F., Kelleher, C. & Mullen, E. (2022) Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland*
- *NPWS & VWT (2022) Lesser Horseshoe Bat Species Action Plan 2022-2026. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.*
- *Bird Census Techniques* Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S.H. (2000) and
- *Bird Monitoring Methods - a Manual of Techniques for Key UK Species.* Gilbert, G., Gibbons, D.W. & Evans, J. (1998)
- *Biodiversity Net Gain Good practice principles for development* (CIEEM 2019)
- *Biodiversity Net Gain. A practical guide.* (CIEEM 2016).

2.3 Legislative Context

Flora and fauna in Ireland are protected at a national level by the Wildlife Act 1976, as amended, and the European Communities (Birds and Natural Habitats) Regulations 2011. They are also protected at a European level by the EU Habitats Directive (92/43/EEC) and the EU Birds Directive 2009/147/EC.

Under this legislation, sites of nature conservation importance are designated in order to legally protect faunal and floral species and important/vulnerable habitats. The relevant categories of designation are as follows:

- Special Areas of Conservation (SACs) are designated under the European Communities (Birds and Natural Habitats) Regulations 2011 to comply with the EU Habitats Directive (92/43/EEC);
- Special Protection Areas (SPAs) are designated under the EU Birds Directive (79/409/EEC) amended in 2009 as Directive 2009/147/EC; and
- Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) are listed under the Wildlife (Amendment) Act, 2000, as amended. A NHA is designated for its wildlife value and receives statutory protection. A list of pNHAs was published on a non-statutory basis in 1995, but these have not since been statutorily designated. Consultation with the NPWS is still required if any development is likely to impact on a pNHA.

2.3.1 Relevant European Legislation

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive);
- Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (The Birds Directive);
- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (The Water Framework Directive);
- Directive 2006/44/EC of the European Parliament and of the Council of 6 September 2006 on the quality of fresh waters needing protection or improvement in order to support fish life (The Fish Directive (consolidated)).

2.3.2 Relevant Irish Legislation

- Wildlife Act 1976 as amended by Wildlife Act 1976 (Protection of Wild Animals) Regulations 1980, Wildlife (Amendment) Act 2000, Wildlife (Amendment) Act 2010, Wildlife (Amendment) Act 2012, European Communities (Wildlife Act, 1976) (Amendment) Regulations 2017 (The Wildlife Act);
- European Communities (Conservation of Wild Birds) Regulations 1985 (S.I. No. 291/1985) as amended by S.I. No. 31/1995 (The Wild Birds Regulations);

- European Communities (Natural Habitats) Regulations 1997 (S.I. No. 94/1997 as amended by S.I. No. 233/1998 and S.I. No 378/2005) (The Habitats Regulations);
- Fisheries (Consolidation) Act, 1959 (as amended) (The Fisheries Act);
- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (The Habitats Regulations); and
- The Flora (Protection) Order 2022 (S.I. No. 235 of 2022).

2.4 Survey Overview

This assessment is based on surveys at the proposed development site. Site surveys were carried out on the 4th September 2025, 5th September 2025, 9th October 2025, 17th October 2025, 25th November 2025, 11th December 2025, 19th February 2026 and 5th March 2026.

Following this request for further information additional site visits were completed on the 15th of May 2026, 21st of May 2026, 25th of June 2026, 27th of June 2026, 3rd of July 2026, 16th of July 2026, 9th of July 2026 and 15th of July 2026.

The following surveys were conducted:

- **Habitat surveys:** Habitats were mapped according to the classification scheme outlined in the Heritage Council publication *A Guide to Habitats in Ireland* (Fossitt, 2000) and following the guidelines contained in *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011). Habitats were cross referenced with Habitats Directive Annex I habitats. The site was also surveyed for invasive species and rare floral species (Wyse *et al.*, 2016; Stace 2019). Habitat surveys were completed on the 5th September 2025 and 5th March 2026.
- **Non-volant mammals:** A general mammal survey was carried out in conjunction with the habitat survey following TII guidelines (TII 2005b, TII 2005c, TII 2008). General mammal surveys were completed between September 2025 and March 2026. Surveys for mammals rely on detecting signs of their presence. These include burrows, spraints, tufts of hair, anal gland secretions, paths, slides, footprints and remains of prey items. Trail camera surveys were conducted around a woodland copse within the site. Trail cameras left in-situ between the 9th and 17th October 2025.
- **Volant mammal surveys (bat surveys):** A dusk bat emergence/activity survey was carried out on the 5th and 9th of September 2025 using Elekon batloggers (x 2), Echotouch Touch 2 PRO bat detector and a Pulsar Helion 2 XP50 Pro Thermal Imaging Camera. Surveyors walked along linear features and other habitat features within the proposed development site concentrating on areas which might support bats. The surveys were carried out 15 minutes before sunset. A daytime assessment of buildings and tree suitability for roosting bats and Potential Roost Features (PRFs) was carried out. Surveys followed the guidelines set out in Collins (2023). All surveys were carried out during favourable weather conditions. Following the request for further information, details bat activity (static and dusk walkover surveys) as well as emergence surveys were completed within the proposed development site. The following equipment was used Elekon Batlogger, Pulsar thermal imaging camera,

Nova nightfox infra-red camera. Bat surveys were completed on 15th of May 2026, 21st of May 2026, 25th of June 2026, 27th of June 2026, 3rd of July 2026, 16th of July 2026, 9th of July 2026 and 15th of July 2026.

All data collected during bat activity surveys (transects) was downloaded and analysed using BatExplorer software. Each bat sequence (series of echolocation pulses starting with a search phase and ending with the catch phase) is noted as a bat pass. Each bat pass does not correlate to an individual bat, but is representative of bat activity levels. Some species such as the pipistrelles will continuously fly around a habitat, and therefore, it is possible that a series of bat passes within a similar time frame is one individual bat. On the other hand, Leisler's bats tend to travel through an area quickly and therefore an individual sequence or bat pass, is more likely to be indicative of individual bats.

- **General bird surveys:** General bird surveys, based on the BTO Common Bird Census (CBC) methodology (Bibby *et al.* 2000 and Gilbert 1998) which aims to capture a snapshot of bird activity within the study area, were completed. It is noted that these were completed between August and March and specific breeding bird survey was not completed. The aim of the bird surveys was to identify any valuable bird habitats within the site boundary. Following this request for further information dusk watches of the Black poplar trees (c.25m west of the proposed development site) were completed (as per Gilbert 1998) on the 15th of May and 25th of June 2026.
- **Wintering Birds.** Winter bird surveys were carried out in winter 2025/2026 between October and March (see dates above). These surveys focused on grassland habitats within the proposed development site as well as grassland habitats on the boundary of the site which could provide potential foraging or roosting habitats for wintering waterbirds and waders. The survey methodology was based on that used by the British Trust for Ornithology (BTO), Wetland Bird Survey (WeBS) and also that for the Irish Wetland Bird Survey (I-WeBS), as outlined in Gilbert *et al.* (1998). The winter bird survey was undertaken using 8.5×45 binoculars and a Hawke Endurance Ed Spotting Scope 15-45×60 spotting scope, using a combination of transect and vantage point counts.

The potential Barn Owl site identified at Mungret College is located approximately 750m east of the proposed development and is outside the ownership and control of the applicant. This location was not identified through surveys undertaken for the current application and has not formed part of the application-specific survey programme. Its identification is based on the consultant's previous background knowledge of the wider Mungret area, including a probable roost or breeding site recorded during earlier ecological work.

Given the substantial separation distance, the absence of any physical or functional connection to the proposed works and the fact that all construction activity will be confined to the application site, there is no credible pathway by which the proposed development could disturb, damage or otherwise affect a Barn Owl breeding site at Mungret College. Confirmation of its current breeding status is therefore not required to inform the impact assessment or mitigation for the proposed development. The application-specific Barn Owl assessment has appropriately focused on the confirmed breeding site approximately 25m west of the

development, where a potential disturbance pathway exists and where a 100m active-nest protection zone will be implemented.

2.5 Report authors

This report was prepared by Dr. Sorchá Sheehy PhD (Ecology/ornithology) and Carl Dixon MSc (Ecological monitoring). Surveys were carried out by Carl Dixon MSc (Ecological monitoring) and Mark Donnelly BSc (Forestry). Additional field surveys were completed by Sophie Knightley BSc and Carl Dixon.

Carl Dixon holds an Honours Degree (BSc) in Ecology and a Masters (MSc) in Ecological Monitoring from UCC. He is a senior ecologist who has over 25 years' experience in ecological assessment. Prior to setting up DixonBrosnan Environmental Consultants in 2000, Carl set up and ran Core Environmental Services which included REPS planning for landowners and ecological assessments. Carl has particular experience in freshwater ecology, including electrofishing fish stock assessments and water quality assessments. He also has considerable experience in habitat mapping and mammal ecology including survey work and reporting in relation to Badgers and bats.

We note that Carl Dixon has considerable experience in bat survey and bat mitigation measures/roost design. Carl was the primary coordinator and surveyor for a heritage council-funded project serving all the river bridges in County Waterford for bats. He has designed bat roosts for Lesser horseshoe in conjunction with the NPWS for sites in West Cork and is currently designing a dedicated bat roost for a large pharmaceutical plant in County Limerick. Carl has completed specialized training courses relating to bats in Ireland and the UK and has considerable experience in using a variety of bat survey equipment and subsequent software analysis of data.

Other competencies include surveys for invasive species and bird surveys. Carl has extensive experience with regards to EIAR and NIS mitigation and impact assessment. He has experience in large-scale industrial developments with extensive experience in complex assessments as part of multi-disciplinary teams. Such projects include gas pipelines, incinerators, electrical cable routes, oil refineries and quarries.

Sorchá Sheehy PhD (Ecology/ornithology) is an ecologist and ornithologist who has worked for 15 years in environmental consultancy. She has worked on Screening/NISs for a range of small and large-scale projects with expertise in assessing impacts on birds. Sorchá's PhD research focused on bird behaviour at airports, where she studied bird avoidance behaviour and collision risk to aircraft. Her research involved field observations, post-mortem analysis and radar surveys. Sorchá has worked on bird collision risk assessments at airports throughout Ireland including Dublin airport, Cork airport, Shannon airport and Kerry airport. During her consultancy work Sorchá carried out field-based surveys and environmental reports including NIS, AA screening and EIARs. Notable projects include the Arklow Bank Wind Park, Indaver Ireland Waste Management Facility at Ringaskiddy, Irving Oil Whitegate Refinery (IOWR), Shannon LNG and Greenlink Interconnector.

Mark Donnelly, holds a BSc. Hons. in Forestry from Bangor University, Wales, and is a member of the Institute of Chartered Foresters. He worked as a lecturer in Forest Ecology at Bangor University and as an arboricultural consultant for the National Trust in Wales for 22 years. In Ireland he has undertaken a range of arboricultural and ecological surveys for

projects including wind farms, quarries, local authorities, housing developments, roads and pipelines.

Sophie Knightly is an ecologist with approximately four years' experience in ecological consultancy and environmental assessment in Ireland and the United Kingdom. She holds a BSc in Wildlife Biology from Munster Technological University and has developed experience across a range of ecological survey, assessment and reporting disciplines associated with forestry, infrastructure and land-use projects.

Sophie's work has primarily focused on ecological assessment within the forestry sector, including habitat surveys, breeding wader surveys, wintering bird surveys, Hen Harrier surveys and Badger surveys associated with afforestation and felling applications throughout Ireland. She has also worked extensively in the United Kingdom undertaking ecological clerk of works (ECoW) duties together with mammal, amphibian, reptile and ornithological surveys. Sophie has experience preparing Appropriate Assessments, Natura Impact Statements, ecological survey reports and biodiversity enhancement plans, with a strong practical background in ecological field survey and environmental assessment.

2.6 Survey limitations

Standard survey methods were followed to ensure that surveys were completed within the appropriate season. However, any biases or limitations associated with these methods could potentially affect the results collected. Although every effort was made to provide a full assessment and comprehensive description of the study area, natural fluctuations in populations may not be fully reflected due to the instantaneous nature of the field surveys. However, the field surveys together with the background knowledge provided by the desk study, provides a robust representation of the baseline for the habitats and species within the zone of influence.

A dedicated breeding bird survey was not undertaken for the site during the optimal survey period (April–June). However, the habitats present within the site, including improved agricultural grassland, hedgerows, and treelines, are typical of the wider agricultural landscape in the area and are considered to support common and widespread bird species. No evidence of habitats suitable for rare or specially protected breeding species was identified during within the proposed development site boundary. It is noted that Dusk Barn Owl surveys were completed in an area to the west of the proposed development site following the request for further information in May and June 2026.

3. Receiving Environment

3.1 Existing site

The proposed development site covers an area of 5.66ha and is located in Mungret c.6km southwest of Limerick City Centre (**Figure 1**). The site itself is located approximately 1km south of Mungret village.

The Mungret Park Road provides access to the site from the east and Mungret College is located to the east of the site. Lands in the vicinity are largely agricultural, with some areas of scattered residential development along the northeastern boundary. St. Paul's GAA club ground is located along the northern boundary of the site.

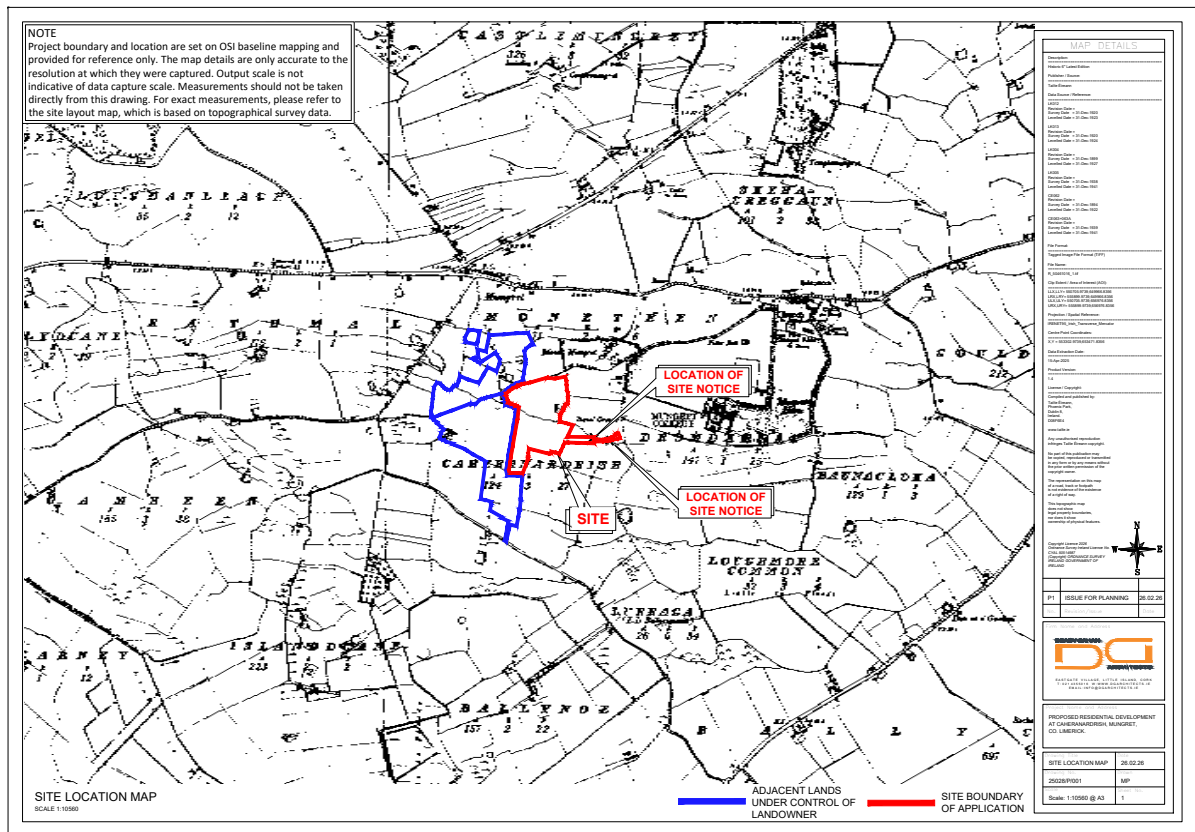


Figure 1. Proposed development site location | Source Deady Gahan

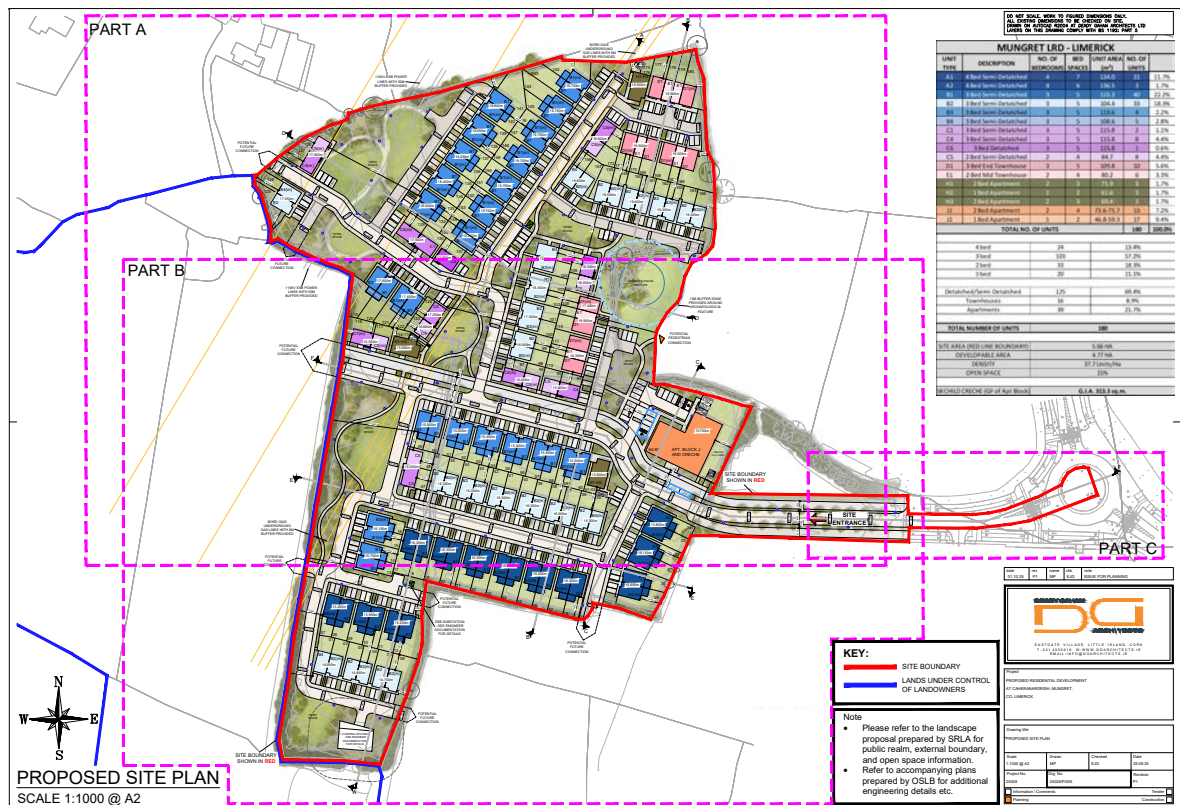


Figure 2. Proposed site layout | Source Deady Gahan Architects

3.2 Proposed development

The development will consist of a Large-scale Residential Development (LRD), comprising of 182no. residential dwellings as follows: 141no. houses consisting of 104no. detached/semi-detached dwellings (24no. 4-beds, 78no. 3-beds and 2no. 2-beds), 37no. townhouses (18no. 3-beds and 19no. 2-beds) and 41no. apartment units across 1no. triplex unit (2no. 2-beds and 1no. 1-bed) and a five-storey apartment building (13no. 2-beds and 25no. 1-beds) with a crèche with capacity to accommodate 70no. children at ground floor level.

The proposed development will include the provision for car parking, including EV charging points and bicycle parking. The proposed development will also include the provision of private, communal, and public open spaces; internal roads and pathways; pedestrian and cyclist routes; hard and soft landscaping and boundary treatments; waste storage; plant; signage; a new vehicular and pedestrian access onto the Mungret Park Road; public lighting; substations; all associated site development works; and all drainage and foul sewer infrastructure and network works including connections to the existing networks and nature-based suds measures.

The proposed site layout is included in **Figure 2**.

3.3 Wastewater

There is an existing 225mm diameter foul line located within the Mungret Link Road to the southeast of the subject site. This foul sewer was installed as part of the Mungret Park Road works (Mungret LIHAF Road) and services the lands adjacent to the Mungret Park Road (Mungret LIHAF Road).

This existing foul line and receiving network eventually discharges to the Limerick Wastewater Treatment Plant.

A pre-connection feasibility enquiry was made to Uisce Éireann to confirm whether there is adequate capacity in the public network to accommodate the proposed Large-scale Residential Development (CDS 25001670). The proposed connection was deemed feasible without upgrades.

It is proposed that this development will be serviced internally by 150mm and 225mm diameter foul sewers and will include the provision of services connections, inspection chambers etc. throughout the site. Due to the topography of the site, and invert levels of the existing foul sewer infrastructure mentioned above, it is not possible to connect to the existing infrastructure by means of gravity. It is thus proposed to include a foul sewer pump station within the development in order to lift foul sewer through pumping to the existing foul sewer. The proposed foul sewer pumping station has been designed in accordance with Uisce Éireann's Code of Practice for Wastewater Infrastructure. The design incorporates dual submersible pumps operating on a duty/standby arrangement, with ductile iron pipework to IS EN 598. Adequate emergency storage has been provided in line with development scale, together with odour and septicity control measures. A dedicated metered power supply, automated controls, and provision for telemetry/remote monitoring have been included, alongside appropriate alarm and call-out systems. Safe vehicular access for maintenance, tanker removal of wet well contents, and lifting/handling equipment have been integrated.

Flood risk, site security, fencing, and odour setback requirements have also been addressed to ensure the pumping station is fit for purpose and fully compliant with Uisce Éireann standards. Foul sewers have been designed in accordance with the Uisce Éireann 'Standard Details for Wastewater infrastructure' and 'Code of Practice for Wastewater Infrastructure'. In addition, foul sewers have been designed to the Building Regulations 1997, as amended, (referred to within as 'the Building Regulations') and specifically in accordance with the principles and methods set out in EN 752:2008 and DOE 'Recommendations for Site Development Works' (1998).

In addition, HR Wallingford 'Tables for the Hydraulic Design of Pipes, Sewers and Channels' and Water UK/WRc 'Sewers for Adoption – 6th Edition' have been applied. Values for roughness of uPVC pipes were obtained from Wallingford "Tables for the Hydraulic Design of Pipes, Sewers and Channels" and Wavinsewer systems catalogue.

Using the Uisce Éireann guidelines and parameters, the estimated peak discharge from the development has been calculated as 5.82 l/s with the average discharge being 0.97 l/s.

Foul sewer shall be constructed to comply with the requirements of the Building Regulations 1997 in accordance with the recommendations contained in the Technical Guidance Documents, Section H (revised 2005) and the Uisce Éireann Code of Practice and Standard Details for Wastewater Infrastructure.

Refer to drawing no. 24051-OSL-11-DR-C-1130 to 1134 for further details.

3.4 Surface Water

There is an existing 300mm diameter surface water sewer located within the Mungret Park Road to the southeast of the subject site. This surface water sewer was installed as part of the Mungret Park Road works (Mungret LIHAF Road) and services the lands adjacent to the Mungret Park Road (Mungret LIHAF Road).

This surface water sewer drains northwards, continuing within the Mungret Park Road, and was designed, as part of the Mungret LIHAF Extension works, to accommodate future development of the lands adjacent to the Mungret Link Road.

There is no other existing surface water infrastructure within the subject site.

The proposed development will be served by a new internal surface water collection, attenuation and infiltration system that is entirely independent of the existing public surface water network. Interception, treatment, attenuation, infiltration and internal flow control of surface water runoff are described in the sections that follow.

Surface water management for the proposed development is designed to comply with the 'Greater Dublin Strategic Drainage Study (GDSDS) Regional Drainage Policies Technical Document - Volume 2, New Developments, 2005' and the 'Greater Dublin Regional Code of Practice for Drainage Works, V6.0 2005' including the Limerick City and County Council Surface Water/SuD's Specification 2022. CIRIA Design Manuals C753, C697 and C609 have also been consulted to design the surface water drainage system within the site.

The GDSDS guidelines require the following 4 main criteria to be provided by the development's surface water design;

- Criterion 1: River Water Quality Protection - satisfied by providing interception storage and treatment of run-off within the SuDS features e.g. permeable paving, tree pits, swales and detention basins.
- Criterion 2: River Regime Protection – satisfied by providing zero surface water discharge to a public sewer or watercourse.
- Criterion 3: Level of Service (flooding) for the site – satisfied by the site being outside the 1000 year coastal and fluvial flood levels. Pluvial flood risk addressed by development designed to accommodate a 100-year storm as per GSDSDS. Planned flood routing for storms greater than 100-year level considered in design and development run-off contained within site.
- Criterion 4: River flood protection – satisfied by providing infiltration storage at least equal to the calculated Long-Term Storage Volume, thereby retaining the additional development runoff volume on site without discharge to the public drainage network or a receiving watercourse.

Surface water run-off from roof areas and hardstanding areas are designed to be collected by gravity pipe network. Surface water will be collected and managed through a combination of conventional drainage infrastructure and Sustainable Drainage Systems before being attenuated and infiltrated to ground within the site. Due to the site topography and the invert levels of the existing public surface water infrastructure, a gravity connection to the public network is not feasible. The proposed development will therefore be drained entirely by infiltration, with no permanent or routine surface water discharge to the public drainage network or a receiving watercourse. Runoff will pass through the proposed SuDS treatment train, attenuation tanks and, where applicable, Class 1 bypass separators before infiltration to ground.

The minimum diameter of the mainline surface water sewers is 225mm and minimum horizontal and vertical separation distances between proposed drainage and other services are as per the Uisce Éireann Code of Practice and Standard

The surface water drainage network has been analysed for the risk of flooding for the 1 in 5-year, 1 in 30-year and 1 in 100-year rainfall events by means of simulating such events through hydraulic modelling in InfoDrainage. The InfoDrainage Simulation uses the Wallingford Procedure, time/area full hydrograph methodology, including energy and momentum equations for dynamic analysis of surface water networks. The site drainage network is modelled as one system where all flows, capacities, water levels, surcharged manholes etc are determined throughout the network for each critical storm duration.

An increase of 30% in rainfall has been included to account for climate change and 10% for urban creep.

The hydraulic analysis of the proposed surface water network as designed confirmed;

- No surcharging or flooding in the 1 in 5-year rainfall event
- No flooding in the 1 in 30-year rainfall event
- No flooding, and protection of properties in the 1 in 100-year rainfall event

4. Designated Conservation Areas

4.1 European (Natura 2000) Sites

Special Areas of Conservation (SACs) and candidate SACs are protected under the Habitats Directive 92/43/EEC and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Special Protection Areas (SPAs) are protected under the Birds Directive 2009/147/EC and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Collectively, these sites are referred to as European sites or Natura 2000 sites.

The proposed development site does not form part of any SAC or SPA. The potential Zone of Influence of the proposed development was determined by examining the nature, scale and location of the proposed works, the ecological receptors that could potentially be affected and the presence of any source–pathway–receptor relationships. The Zone of Influence therefore extends beyond the application boundary where ecological receptors could potentially be connected to the development through hydrological, hydrogeological, wastewater, habitat or disturbance pathways.

The proposed development site is located within the River Shannon catchment. There are no watercourses within the proposed development site. The closest watercourse is the Barnakyle Stream, located approximately 1.5 km southwest of the site. The Shannon Estuary, including areas within the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA, is located c. 2.1km north of the site.

During construction, an indirect water-quality pathway could via contaminated runoff from construction works entering the soil or groundwater. The underlying aquifer is classified as having high to extreme vulnerability in places. Groundwater beneath the site forms part of the wider regional groundwater system, which is interpreted to flow generally northwards towards the River Shannon. A precautionary indirect pathway to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA through groundwater is therefore considered in the assessment.

Operational surface water will be collected, treated, attenuated and infiltrated within the proposed development through an onsite SuDS system.

Wastewater generated by the proposed development will be conveyed through the public foul sewer network to the Limerick Wastewater Treatment Plant (WWTP) for treatment prior to discharge to the Shannon Estuary. A potential indirect pathway through treated wastewater is therefore considered in the assessment.

Habitats within or adjoining the proposed development site could also potentially provide *ex situ* foraging or resting habitat for SCI and QI species associated with the River Shannon and River Fergus Estuaries SPA and Lower River Shannon SAC. The potential for habitat loss, displacement and disturbance of SCI and QI species is considered on the basis of the site surveys and the habitats present within the site.

On a precautionary basis, the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are therefore considered to lie within the potential Zone of Influence of the proposed development.

The location, qualifying interests and potential source–pathway–receptor relationships for the European sites considered in the assessment are presented in **Table 1** and **Figure 3**.

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

This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry. This SPA has vast expanses of intertidal flats which contain a diverse macro- invertebrate community, e.g. *Macoma*-*Scrobicularia*-*Nereis*, which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches.

The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Table 1. Designated sites and their location relative to the proposed development site

Natura 2000 Sites	Site Code	Distance at closest point and potential source-pathway-receptor link	Qualifying Interests (* denotes a priority habitat)
Special Area of Conservation (SAC)			
Lower River Shannon SAC	002165	2.2km north Although unlikely given the absence of a direct hydrological connection, a source-pathway-receptor link has been identified between the source (proposed development) and the receptor (Lower River Shannon SAC) via a potential pathway (impacts on water quality, loss of/disturbance to <i>ex situ</i> habitats, disturbance or spread of invasive species during construction or operational phase and wastewater discharges during operation).	Habitats 1110 Sandbanks which are slightly covered by sea water all the time 1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1150 Coastal lagoons* 1160 Large shallow inlets and bays 1170 Reefs 1220 Perennial vegetation of stony banks 1230 Vegetated Sea cliffs of the Atlantic and Baltic coasts 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) 1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>) 3260 Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and Callitricho-Batrachion vegetation 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>)

Natura 2000 Sites	Site Code	Distance at closest point and potential source-pathway-receptor link	Qualifying Interests (* denotes a priority habitat)
			91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)* Species 1029 Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>) 1099 River Lamprey (<i>Lampetra fluviatilis</i>) 1349 Common Bottlenose Dolphin (<i>Tursiops truncatus</i>) 1355 Otter (<i>Lutra lutra</i>) 1096 Brook Lamprey (<i>Lampetra planeri</i>) 1095 Sea Lamprey (<i>Petromyzon marinus</i>) 1106 Salmon (<i>Salmo salar</i>)
Tory Hill SAC	000439	9.4km south. No hydrological or other connection identified. No likely significant pathway for impact	Habitats 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) 7210 Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>* 7230 Alkaline fens
Askeaton Fen Complex SAC	002279	10.2km southwest. No hydrological or other connection identified. No likely significant pathway for impact	Habitats 7210 Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>* 7230 Alkaline fens

Natura 2000 Sites	Site Code	Distance at closest point and potential source-pathway-receptor link	Qualifying Interests (* denotes a priority habitat)
Curraghchase Woods SAC	000174	12.1km southwest. No hydrological or other connection identified. There are no known Lesser Horseshoe Roosts in the vicinity of Mungret. The populations in Curraghchase SAC will not be impacted following the 2.5km Zone of Influence for foraging and commuting routes.	Habitats 91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)* 91J0 <i>Taxus baccata</i> woods of the British Isles* Species 1016 Desmoulin's Whorl Snail (<i>Vertigo moulinsiana</i>) 1303 Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>)
Special Protection Area (SPA)			
River Shannon and River Fergus Estuaries SPA	004077	2.1km north. A source-pathway-receptor link has been identified between the source (proposed development) and the receptor River Shannon and River Fergus Estuaries SPA) via a potential pathway (impacts on water quality, loss of/disturbance to <i>ex situ</i> habitats, disturbance or spread of invasive species during construction or operational phase and wastewater discharges during operation).	Birds A017 Cormorant (<i>Phalacrocorax carbo</i>) A038 Whooper Swan (<i>Cygnus cygnus</i>) A046 Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) A048 Shelduck (<i>Tadorna tadorna</i>) A050 Wigeon (<i>Anas penelope</i>) A052 Teal (<i>Anas crecca</i>) A054 Pintail (<i>Anas acuta</i>) A056 Shoveler (<i>Anas clypeata</i>) A062 Scaup (<i>Aythya marila</i>) A137 Ringed Plover (<i>Charadrius hiaticula</i>) A140 Golden Plover (<i>Pluvialis apricaria</i>) A141 Grey Plover (<i>Pluvialis squatarola</i>) A142 Lapwing (<i>Vanellus vanellus</i>) A143 Knot (<i>Calidris canutus</i>) A149 Dunlin (<i>Calidris alpina</i>) A156 Black-tailed Godwit (<i>Limosa limosa</i>) A157 Bar-tailed Godwit (<i>Limosa lapponica</i>) A160 Curlew (<i>Numenius arquata</i>) A162 Redshank (<i>Tringa totanus</i>) A164 Greenshank (<i>Tringa nebularia</i>) A179 Black-headed Gull (<i>Chroicocephalus ridibundus</i>) Habitats

Natura 2000 Sites	Site Code	Distance at closest point and potential source-pathway-receptor link	Qualifying Interests (* denotes a priority habitat)
			Wetlands

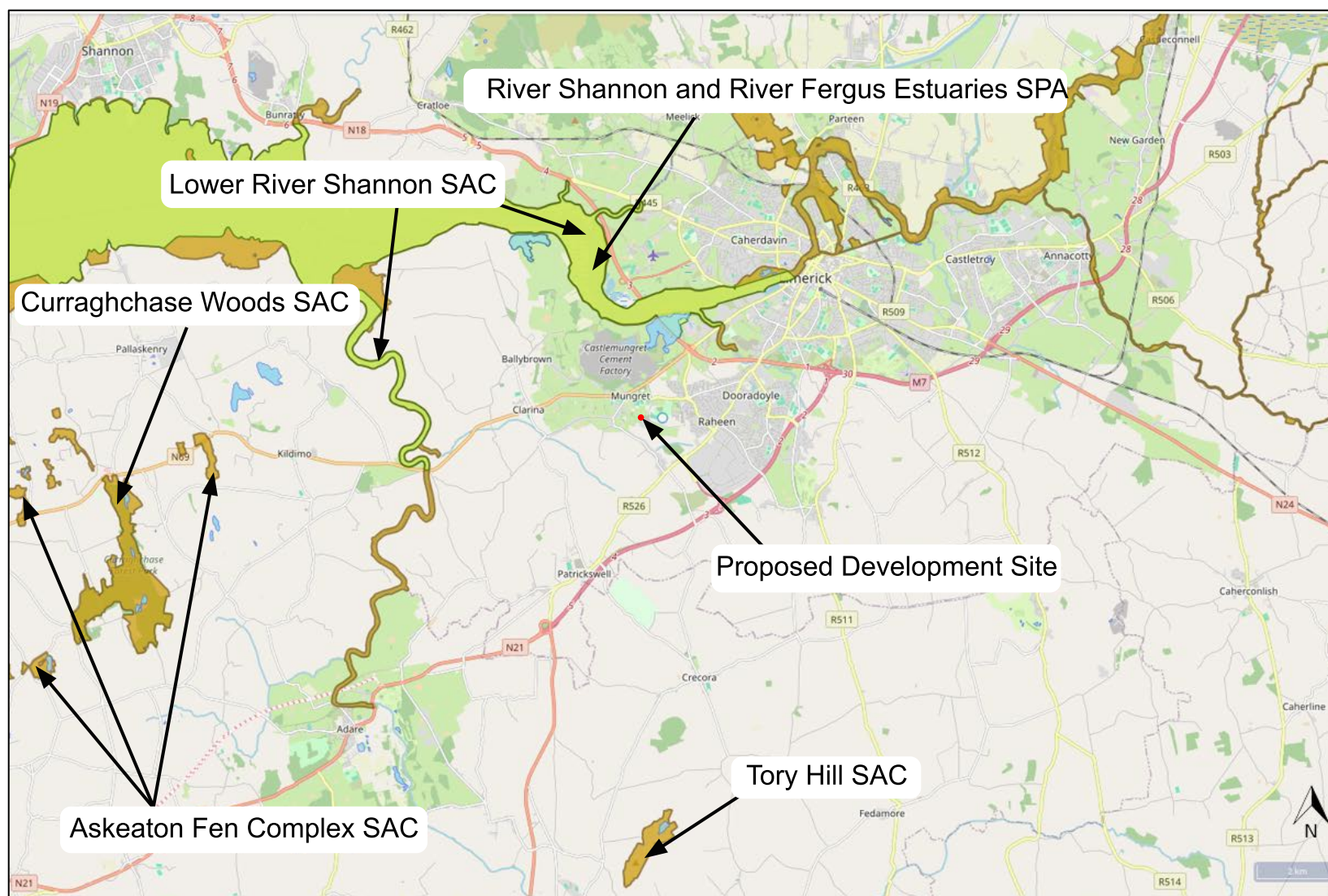


Figure 3. Location of the development site boundary and European sites located within potential likely zone of impact of the site | Source: EPA Envirovision mapping <https://gis.epa.ie/EPAMaps/> | Not to scale

4.2 National sites

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) are national designations under the Wildlife Act 1976, as amended. A Natural Heritage Area (NHA) is designated for its wildlife value and receives statutory protection. These areas are considered nationally important for the habitats present or which holds species of plants and animals whose habitats needs protection. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation.

Proposed Natural Heritage Areas (pNHA) were published on a non-statutory basis in 1995 and have not since been statutorily proposed or designated. These sites are also of significance for wildlife and habitats. Prior to statutory designation, pNHAs are still subject to limited protection, in the form of:

- Agri-environmental farm planning schemes support the objective of maintaining and enhancing the conservation status of pNHAs;
- There is a requirement for the Forest Service to gain NPWS approval before they will pay afforestation grants on pNHA lands; and,
- A recognition of the ecological value of pNHAs by Planning and Licencing Authorities.

The NHAs and pNHAs located in the vicinity of the development site are listed in **Table 2** and are shown in **Figure 4** and **Figure 5**.

IE Consulting was requested by Homeland Projects Ltd. to undertake a hydrological and hydrogeological study for a proposed development site. The study is required to investigate the risk that activities associated with the proposed development, during construction and operation might impact the nearby proposed Natural Heritage Area (pNHA) of Loughmore Turlough.

The revised assessment identifies a local hydrological and hydrogeological connection between the southern part of the development site and Loughmore Common Turlough through surface-water runoff, shallow interflow and groundwater recharge.

During construction, an indirect water-quality pathway could arise where uncontrolled pollutants entering local groundwaters. During operation, surface water will be treated and infiltrated within the site through the proposed SuDS system. Therefore, contaminated surface water run-off and groundwater during the construction or operational phases could potentially impact on water quality within the Inner Shannon Estuary - South Shore pNHA and Fergus Estuary And Inner Shannon, North Shore pNHA.

Table 2. Natural Heritage Areas (NHA) and proposed Natural Heritage Areas (pNHAs) in the vicinity of the development site

NHAs & NHAs/pNHAs	Site Code	Overlaps with European site	Overlapping European site	Distance at closest point and potential source-pathway-receptor link
Loughmore Common Turlough pNHA	000438	No	NA	c.440m southeast. Turloughs are a rare habitat in Europe, and in Ireland are under threat from agricultural intensification. Although affected by drainage, Loughmore is an unusual example of this habitat type. Due to the site's southerly location, its shallowness, its proximity to the sea and some calcium enrichment, the flora of Loughmore includes some unique elements, which enhance the conservation value of this turlough. IE Consulting have completed a revised hydrological and hydrogeological assessment of the proposed development site. The revised hydrogeological report states that approximately 0.044 km², or 3.4% of the development site, lies within the delineated surface-water catchment of the turlough. Under existing conditions, this area contributes through local runoff and groundwater recharge. The design maintains infiltration at source and is not expected to significantly change the quantity of water reaching the turlough. Surface water runoff from the south of the site could potentially impact on the Turlough. Therefore, a source-pathway-receptor link has been identified between the source (proposed development) and the receptor (Loughmore Common Turlough pNHA) via a potential pathway (impacts from surface water runoff).
Inner Shannon Estuary - South Shore pNHA	000435	Yes (partially)	River Shannon and River Fergus Estuaries SPA	1.3km north Both the Fergus and inner Shannon Estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. The smaller estuaries also feature mudflats, but have their own unique characteristics, e.g. Poulmasherry Bay is stony and unusually rich in species and biotopes. Plant species are typically scarce on the mudflats, although there are some eelgrass (<i>Zostera</i> spp.) beds and patches of green algae (e.g. <i>Ulva</i> sp. and <i>Enteromorpha</i> sp.). The main macro-invertebrate community which has been noted from the inner Shannon and Fergus estuaries is a <i>Macoma-Scrobicularia-Nereis</i> community.

NHAs & NHAs/pNHAs	Site Code	Overlaps with European site	Overlapping European site	Distance at closest point and potential source-pathway-receptor link
				See River Shannon and River Fergus Estuaries SPA for site details. A source-pathway-receptor link has been identified between the source (development) and the receptor (Inner Shannon Estuary - South Shore pNHA) via a potential pathway (impacts on water quality).
Fergus Estuary And Inner Shannon, North Shore pNHA	002048	Yes.	River Shannon and River Fergus Estuaries SPA	2.2km north. See River Shannon and River Fergus Estuaries SPA for description. A source-pathway-receptor link has been identified between the source (development) and the receptor (Inner Shannon Estuary - South Shore pNHA) via a potential pathway (impacts on water quality).
Dromore & Bleach Loughs pNHA	001030	No	NA	7.5km west No hydrological or other connection identified. No likely significant pathway for impact

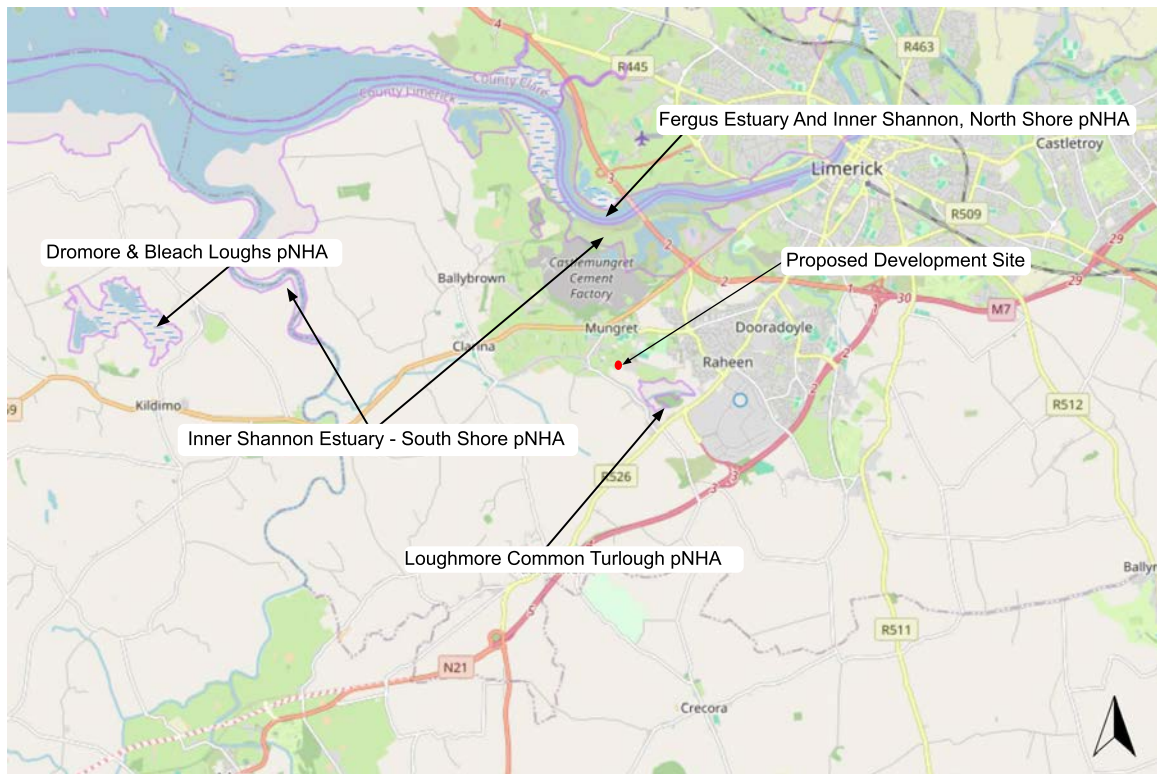


Figure 4. Natural Heritage Areas (NHA) and proposed Natural Heritage Areas (pNHAs) in the vicinity of the development site | Source EPA envision mapping | Not to scale



Figure 5. Location of Loughmore Common Turlough pNHA relative to proposed development | Source EPA envision mapping | Not to scale

5. Flora

5.1 Habitats

Habitat mapping was carried out in line with the methodology outlined in the Heritage Council Publication, *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011). The terrestrial and aquatic habitats within or adjacent to the proposed development site was classified using the classification scheme outlined in the Heritage council publication *A Guide to Habitats in Ireland* (Fossitt, 2000) and cross referenced with Annex I Habitats where required.

A current overview of habitats recorded within the site is shown in **Figure 7** and the habitats recorded on site are described in **Table 3**. Photographs of the site are also included below. The ecological value of habitats has been defined using the classification scheme outlined in the *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (Transport Infrastructure Ireland, 2009) which is included in **Appendix 1**. It should be noted that the value of a habitat is site specific and will be partially related to the amount of that habitat in the surrounding landscape. Habitats that are considered to be good examples of Annex I and Priority habitats are classed as being of International or National Importance. Semi-natural habitats with high biodiversity in a county context and that are vulnerable, are considered to be of County Importance. Habitats that are semi-natural, or locally important for wildlife, are considered to be of Local Importance (higher value) and sites containing small areas of semi-natural habitat or maintain connectivity between habitats are considered to be of Local Importance (lower value).

A review of 1st edition historical mapping (1829-1842) shows that most of the field boundaries are visible (**Figure 6**) and have therefore been present since at least the early nineteenth century.

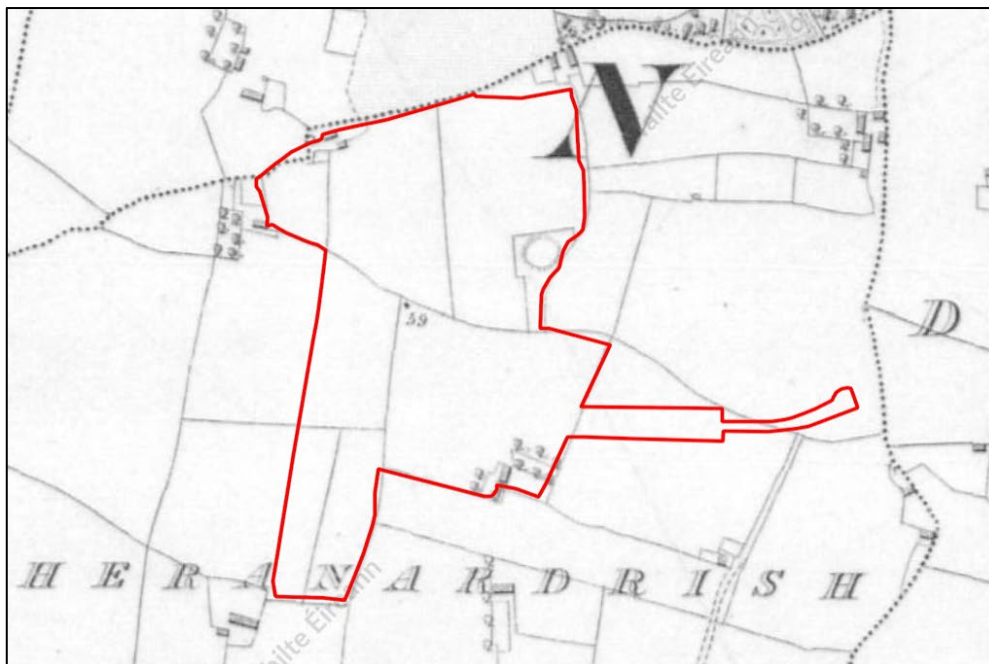


Figure 6. Overview of proposed development site boundary on 1st edition historical mapping | Not to scale | Source DHHLG

Table 3. Habitat present within proposed development site and their relative value

Habitats (CF with Figure 7)	Comments	Ecological value (TII guidelines)
Hedgerow WL1/Treeline WL2 H01	The hedgerow is quite overgrown and with a number of taller Hawthorn. Includes dense, mature Hawthorn but parts of the boundary have become gappy in the absence of management. Blackthorn and Hawthorn are the dominant species with occasional mature Ash. This hedgerow is visible on the 1st edition mapping and the layout remaining largely unchanged since that period. Burdock noted along this boundary. There are some sections of old stone wall remaining at the base of the hedgerow although this is largely in poor condition. Understorey species include Ivy, Herb Robert, Field thistle, Cow parsley, Hogweed, Bramble, Meadowsweet, Cocksfoot, False oat grass.  Plate 1. Crumbling stone wall along base  Plate 2. Mature Ash along this boundary	Local importance (Higher value)

Habitats (CF with Figure 7)	Comments	Ecological value (TII guidelines)
Hedgerow WL1 H02 and H03	The hedgerow is quite overgrown and with a number of taller, mature Hawthorn. Parts of the boundary have become gappy in the absence of management. Blackthorn and Hawthorn are the dominant species with occasional semi-mature Sycamore and Elder. Understorey species include Field thistle, Cow parsley, Hogweed, Bramble, Cocksfoot, False oat grass, Ivy, Cleavers, Nettle, Sorrell, Knapweed, Hogweed. The northern part of this hedgerow (H02) is visible on the 1st edition mapping. The full hedgerow (H02 and H03) is visible on the 2nd edition mapping (1888-1915)  Plate 3. Hedgerow 6 along western site boundary	Local importance (Higher value)
Hedgerow WL1 H05	This is a moderate to high quality hedgerow consisting of a slightly overgrown hedge with some dry meadows and grassy verge habitat along its periphery. This hedgerow is visible on the 1st edition mapping and the layout remaining largely unchanged since that period. Blackthorn and Hawthorn are the dominant species. Understorey species include Field thistle, Cow parsley, Hogweed, Bramble, Meadowsweet, Cocksfoot, False oat grass, Ivy, Woodrush, Cleavers, Wild rose, Nettle, Sorrell, Knapweed, Hogweed, Bindweed. A number of the Hawthorn are quite old with some deadwood standing at the base. The hedgerow is under managed and the Hawthorn have become overmature.	Local importance (Higher value)

Habitats (CF with Figure 7)	Comments	Ecological value (TII guidelines)
	 Plate 4. Hedgerow 1 runs through the centre of proposed development site	
Hedgerow WL1 H07	Species mix is broadly similar to H05 but not as well developed. Hawthorn are the dominant species with a number of overmature Hawthorn present. Blackthorn also present. Understorey species include Field thistle, Cow parsley, Hogweed, Bramble, Meadowsweet, Cocksfoot, False oat grass, Ivy, Woodrush, Cleavers, Wild rose, Nettle, Sorrell, Knapweed, Hogweed, Bindweed. This hedgerow is visible on the 1st edition mapping, the layout remaining largely unchanged since that period. Fertiliser drift evident.  Plate 5. Hedgerow 2 runs along southern boundary	Local importance (Higher value)
Hedgerow WL1 H06 AND H08	This hedgerow runs through the centre of the proposed development site and is visible on the 1st edition mapping with the layout remaining largely unchanged since that period. The western side of this hedgerow is not well developed and is dominated by Hawthorn and Bramble with a proportion of Blackthorn. Dry meadows and grassy verge habitat runs along the base. Understorey species include Bent grass, Ribwort plantain, Meadow grass and Yarrow.	Local importance (Higher value)

Habitats (CF with Figure 7)	Comments	Ecological value (TII guidelines)
	The eastern side of the boundary is better quality with dense Hawthorn and Blackthorn. Immature Elm are present in the understory. In some areas, Hawthorn scrub is encroaching into the adjoining grassland.  Plate 6. Western side of H3 at centre of the site  Plate 7. Eastern side of H3 at centre of the site	
Hedgerow WL1 H09	This is an overgrown hedgerow dominated by Blackthorn. Other tree species include Hawthorn, Wild rose and Hazel. Understorey species include Field thistle, Cow parsley, Hogweed, Bramble, Meadowsweet, Cocksfoot, False oat grass, Ivy, Woodrush, Cleavers, Wild rose, Nettle, Sorrell, Knapweed, Hogweed, Bindweed. This hedgerow is visible on the 1st edition mapping and the layout remaining largely unchanged since that period.	Local importance (Higher value)

Habitats (CF with Figure 7)	Comments	Ecological value (TII guidelines)
	 Plate 8. Hedgerow 4 located along north-eastern boundary	
Treeline WL2 T1 GROUP 2 ON TREE SURVEY	This group of mature trees is located at the east of the site and consists primarily of Ash and Sycamore. A number of the Ash are severely affected by Ash dieback. Some of the more mature Ash are in fairly good condition. This hedgerow is visible on the 1st edition mapping and the layout remaining largely unchanged since that period.  Plate 9. Treeline along eastern boundary	Local importance (Higher value)
Treeline T2 Group 2-9 (Tree Survey)	Broad band of scrub dominated by Blackthorn in particular which forms dense thickets. Occasional Sitka spruce along its length. Occasional Hawthorn. Understorey includes Lesser celandine, Lords and ladies, Cleavers, Wood rush.	Local importance (Higher value)

Habitats (CF with Figure 7)	Comments	Ecological value (TII guidelines)
	 Plate 10. Treeline running along northern boundary of access track	
Improved agricultural grassland GA1	Improved agricultural grassland covers most of the site. This is intensively managed and dominated by common grassland and herbaceous species. A slightly more diverse grassland has developed adjoining the field margins, with characteristics of dry meadows and grassy verge GS2. Species recorded include Broadleaved dock, Buttercup, Sorrel, Field thistle, Creeping buttercup, Silverweed, Great plantain, Curled dock, Willowherb, Yorkshire fog and Yarrow. It is noted that GS2 has links with the Annex I: Corresponds to the annexed habitat, 'lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) (6510)'. However, the habitat mosaic within the proposed development site is not an example of this Annex I habitat.  Plate 11. Improved agricultural grassland covers much of the site	Local importance (Lower value)

Habitats (CF with Figure 7)	Comments	Ecological value (TII guidelines)
	 Plate 12. More diverse grassland in some parts of site.	
Mixed broadleaved woodland WD1	A small copse of broadleaved woodland dominated by Ash and Sycamore has developed around an archaeological features (enclosure LI013-005). The woodland has developed on a raised embankment which is heavily overgrown with Hawthorn and Blackthorn understorey is shaded with Umbellifers, Nettle, Wood avens, Cow parsley, Primrose, Wild rose, Herb Robert, immature Sycamore.  Plate 13. Woodland copse at east of site	Local importance (Higher value)
Buildings and artificial surfaces BL1	Footpaths and access roads associated with Mungret Community College are located along the eastern boundary of the site. Small areas of amenity grassland GA2 are present along the road boundary. A short section of fencing is located at the northeast corner of the site adjoining a playing pitch. The grassland along the base of the fence is slightly overgrown and more diverse than the adjoining grassland.	Local importance (Lower value)

Habitats (CF with Figure 7)	Comments	Ecological value (TII guidelines)
	 Plate 14. Roads and footpaths associated footpaths  Plate 15. Metal fence at northeast of site	



Figure 7. Habitat recorded within proposed development site boundary (Fossitt 2000)

5.2 Rare Flora

The site of the proposed development lies within Ordnance Survey (OS) National Grid 10km square R55 (hectad). The National Biodiversity Data Centre (NBDC) online database provides data on the distribution of mammals, birds, and invertebrates within the 10 km grid squares.

A review of the NBDC database for flowering plants recorded within R55 was carried out on the 21/11/25. Two flowering plants recorded within this hectad are protected by the Flora Protection Order 2022 (S.I. 235 of 2022). The NBDC has recorded a number of threatened species within R55 as listed in **Table 4**. However, no rare, uncommon or red list species were recorded during the site survey.

Table 4. Rare and threatad plant species recorded in R55

Species name	Date of last record	Title of dataset	Designation
Corn Marigold (<i>Glebionis segetum</i>)	27/07/2024	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	Threatened Species: Near threatened
Greater Knapweed (<i>Centaurea scabiosa</i>)	16/08/2021	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	Threatened Species: Near threatened
Green Field-speedwell (<i>Veronica agrestis</i>)	24/08/2013	Local BioBlitz Challenge 2013	Threatened Species: Near threatened
Opposite-leaved Pondweed (<i>Groenlandia densa</i>)	31/12/1999	BSBI tetrad data for Ireland	Protected Species: Flora Protection Order (FPO) Protected Species: Flora Protection Order (FPO) >> FPO 2022 Schedule A (Vascular Plants) Threatened Species: Near threatened
Triangular Club-rush (<i>Schoenoplectus triqueter</i>)	31/12/2010	BSBI tetrad data for Ireland	Protected Species: Flora Protection Order (FPO) Protected Species: Flora Protection Order (FPO) >> FPO 2022 Schedule A (Vascular Plants) Threatened Species: Near threatened

Source NBDC 02/03/26

5.3 Invasive Species

Non-native plants are defined as those plants which have been introduced outside of their native range by humans and their activities, either purposefully or accidentally. Invasive non-native species are so-called as they typically display one or more of the following characteristics or features: (1) prolific reproduction through seed dispersal and/or re-growth from plant fragments; (2) rapid growth patterns; and, (3) resistance to standard weed control methods.

Where a non-native species displays invasive qualities and is not managed it can potentially: (1) out compete native vegetation, affecting plant community structure and habitat for wildlife; (2) cause damage to infrastructure including road carriageways, footpaths, walls and foundations; and, (3) have an adverse effect on landscape quality. The NBDC lists a number of high impact invasive species which have been recorded within grid square R55 (**Table 5**).

Table 5. High impact invasive species recorded in R55

Species group	Species name
Bird	Ring-necked Parakeet (<i>Psittacula krameri</i>)
Flatworm (Turbellaria)	New Zealand Flatworm (<i>Arthurdendyus triangulatus</i>)
Flowering plant	Canadian Waterweed (<i>Elodea canadensis</i>)
Flowering plant	Giant Hogweed (<i>Heracleum mantegazzianum</i>)
Flowering plant	Japanese Knotweed (<i>Fallopia japonica</i>)
Flowering plant	Nuttall's Waterweed (<i>Elodea nuttallii</i>)
Mollusc	Quagga Mussel (<i>Dreissena rostriformis bugensis</i>)
Mollusc	Zebra Mussel (<i>Dreissena polymorpha</i>)
Terrestrial mammal	American Mink (<i>Neovison vison</i>)
Terrestrial mammal	Brown Rat (<i>Rattus norvegicus</i>)
Terrestrial mammal	Fallow Deer (<i>Dama dama</i>)
Terrestrial mammal	Grey Squirrel (<i>Sciurus carolinensis</i>)
Terrestrial mammal	House Mouse (<i>Mus musculus</i>)

Source NBDC 21/02/26

Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 make it an offence to plant, disperse, allow dispersal or cause the spread of certain

species e.g. Japanese knotweed and Rhododendron. The control of invasive species in Ireland comes under the Wildlife (Amendment) Act 2000, where it states that

‘Any person who— [...] plants or otherwise causes to grow in a wild state in any place in the State any species of flora, or the flowers, roots, seeds or spores of flora, [‘refers only to exotic species thereof’][...] otherwise than under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence.’

The Birds and Natural Habitats Regulations 2011 (SI 477 of 2011), Section 49(2) prohibits the introduction and dispersal of species listed in the Third Schedule, which includes Japanese Knotweed and Himalayan Balsam *Impatiens glandulifera*, as follows: “any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [...] shall be guilty of an offence.”

No third schedule or other invasive species were recorded within the proposed development site

6. Fauna

6.1 Otter

Otters, along with their breeding and resting places are protected under the provisions of the Wildlife Act 1976, as amended by the Wildlife (Amendment) Act, 2000. Otters have additional protection because of their inclusion in Annex II and Annex IV of the Habitats Directive which is transposed into Irish law in the European Communities (Natural Habitats) Regulations (S.I. 94 of 1997), as amended. Otters are also listed as requiring strict protection in Appendix II of the Berne Convention on the Conservation of European Wildlife and Natural Habitats and are included in the Convention on International Trade of Endangered species (CITES).

Although rare in parts of Europe they are widely distributed in the Irish countryside in both marine and freshwater habitats. Otters are solitary and nocturnal and as such are rarely seen. Thus, surveys for Otters rely on detecting signs of their presence. These include spraints (faeces), anal gland secretions, paths, slides, footprints and remains of prey items. Spraints are of particular value as they are used as territorial markers and are often found on prominent locations such as grass tussocks, stream junctions and under bridges. In addition, they are relatively straightforward to identify.

Otters occasionally dig out their own burrows but generally they make use of existing cavities as resting places or for breeding sites. Suitable locations include eroded riverbanks, under trees along rivers, under fallen trees, within rock piles or in dry drainage pipes or culverts etc. If ground conditions are suitable the holt may consist of a complex tunnel and chamber system. Otters often lie out above ground especially within reed beds where depressions in the vegetation called “couches” are formed (TII, 2008). Generally, holts or resting areas can be located by detecting signs such as spraints or tracks.

In contrast natal holts which are used by breeding females can be extremely difficult to locate. They are often located a considerable distance from any aquatic habitats and Otters may also use habitats adjoining small streams with minimal or no fish populations. In addition, natal holts are usually carefully hidden and without obvious sprainting sites. Otters do not have a well-defined breeding season. It is noted that Otters are largely nocturnal, particularly in areas

subject to high levels of disturbance as evidenced by the presence of Otters in the centre of Cork City (Sleeman and Moore 2005).

A review of existing records showed that Otter or signs of Otter have been recorded on 11 occasions within grid square R55, the most recent being in January 2023 (Source NBDC November 2025). There are no mapped watercourses within or in the vicinity of the proposed development site. The closest stream/river is the Barnakyle Stream located c.1.5km south of the proposed development site. As discussed in **Section 4.2**, the Loughmore Common Turlough is located c.440m southeast. A road kill survey in the vicinity of the site had two records of dead Otters along nearby roads (2008 and 2009), suggesting that Otters use habitats in the wider area. However, there are no watercourses within the proposed development site and no wetland habitats which could provide potential foraging habitat for Otter.

Site surveys were carried out to identify any signs of Otter within 150m of the proposed development site i.e. holts, couches, burrows, spraints, tufts of hair, anal gland secretions, paths, slides, footprints and remains of prey items. No signs of Otter recorded within 150m of the proposed development site.

A trail camera survey was carried out to identify which species were using this area over a 9-day period between the 9th and 17th of October 2025. Otter were not recorded in any of the trail camera surveys. No signs of Otter were recorded during any of the site surveys. Overall the proposed development site is of low value for Otter.

6.2 Bats

6.2.1 Bat Background Data

In Ireland, nine species of bat are currently known to be resident. These are classified into two Families: the *Rhinolophidae* (Horseshoe bats) and the *Vespertilionidae* (Common bats). The Lesser Horseshoe Bat *Rhinolophus hipposideros* is the only representative of the former Family in Ireland. All the other Irish bat species are of the latter Family and these include three pipistrelle species: Common *Pipistrellus pipistrellus*, Soprano *Pipistrellus pygmaeus* and Nathusius' *Pipistrellus nathusii*, four *Myotis*: Natterer's *Myotis nattereri*, Daubenton's *Myotis daubentonii*, Whiskered *Myotis mystacinus*, Brandt's *Myotis brandtii*, the Brown Long-eared *Plecotus auritus* and Leisler's *Nyctalus leisleri* bats.

Whiskered and Natterer's bats are listed as '*Threatened in Ireland*', while the other species are listed as 'Internationally Important' in the Irish Red Data Book 2: Vertebrates (Whilde, 1993). The population status of both Whiskered and Natterer's bats was considered '*indeterminate*' because of the small numbers known of each, a few hundred and approximately a thousand respectively. Ireland is considered to be an international stronghold for Leisler's bat, whose global status is described as being at '*low risk, near threatened*' (LR; nt) by the IUCN (Hutson *et al.*, 2001).

Near threatened status is applied to those taxa that are close to being listed as vulnerable (facing a high risk of extinction in the wild in the medium-term future on the basis of a range of criteria defined by the IUCN). The Irish population of the Lesser Horseshoe Bat is estimated at 14,000 individuals and is considered of International Importance because it has declined

dramatically and become extinct in many other parts of Europe. Data collected shows that the species increased significantly between from the early 1990's to present.

A review of existing bat records within R55 shows that seven Irish bat species recorded within this hectad (**Table 6**). It is noted that other species which have not been included within this database could potentially occur.

Table 6. Presence of Irish bat species within grid squares R55.

Common name	Scientific name	Present/Absent
Lesser Noctule	<i>Nyctalus leisleri</i>	Present
Pipistrelle	<i>Pipistrellus pipistrellus sensu lato</i>	Present
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	Present
Daubenton's Bat	<i>Myotis daubentonii</i>	Present
Natterer's Bat	<i>Myotis nattereri</i>	Absent
Brown Long-eared Bat	<i>Plecotus auritus</i>	Present
Whiskered Bat	<i>Myotis mystacinus</i>	Absent
Lesser Horseshoe	<i>Rhinolophus hipposideros</i>	Present
Nathusius's Pipistrelle	<i>Pipistrellus nathusii</i>	Present

NBDC 04/11/25

Lesser Horseshoe Bat is the only species of bat listed on Annex II of the Habitats Directive (Directive 92/43/EEC). The closest recorded records for Lesser horseshoe bat is approximately 8km southeast of the proposed development site (NBDC records). Lesser Horseshoe Bats normally forage in woodlands/scrub within 2.5km of their roosts (Bontadina *et al.* 2002). A sensitive data request to the NPWS confirmed there are no known roosts and no NPWS records of Lesser Horseshoe Bats within 5km of the site. However, it is noted that Lesser Horseshoe bat was recorded on a passive detector as part of a residential development application at Dromdarrig, Mungret (Planning reference 2561231). This assessment noted that Lesser horseshoe bat was recorded in relatively low numbers across this site in both May 2024 and June 2025.

While the remaining Irish bat species; Nathusius' pipistrelle, Natterer's Bat and Brandt's bats have not been recorded in the local area to date, Natterer's Bat could potentially occur. Nathusius' pipistrelle and Brandt's bat are rarer Irish species, which are less likely to occur.

A study by Lundy *et al.* (2011) examined the relative importance of landscape and habitat associations across Ireland. Maximum Entropy Models (MEM) were constructed for each bat species using records from the National Bat Database from 2000-2009. This method allows species' records that have not been collected in a systematic survey to be analysed. The results help explain patterns of species' occurrence and predict where species might occur. Landcover (CORINE), topography, climate, soil pH, riparian habitat and human bias factors were incorporated into the models. The analyses provide a picture of the broad scale geographic patterns of occurrence and local roosting habitat requirements for Irish bat

species. This also provides a 'habitat suitability' index. The index ranges from 0 to 100, with 0 being least favourable and 100 most favourable for bats.

The habitat indices for all Irish bats for the landscape in the vicinity of the proposed development site is shown in **Table 7**. This suggests that they are of moderate suitability for Soprano pipistrelle, Brown long-eared, Common pipistrelle, Leisler's and to a lesser extent Daubenton's and Natterer's bat.

Table 7. Model Predicted Habitat suitability indices for All Irish bat species

Bat species	Common Name	Habitat indices
All Bats		37.11
<i>Pipistrellus pygmaeus</i>	Soprano pipistrelle	50
<i>Plecotus auritus</i>	Brown long-eared bat	58
<i>Pipistrellus pipistrellus</i>	Common pipistrelle	52
<i>Rhinolophus hipposideros</i>	Lesser horseshoe	21
<i>Nyctalus leisleri</i>	Leisler's bat	53
<i>Myotis mystacinus</i>	Whiskered bat	16
<i>Myotis daubentonii</i>	Daubenton's bat	37
<i>Pipistrellus nathusii</i>	Nathusius' pipistrelle	10
<i>Myotis nattereri</i>	Natterer's bat	37

Source: NBDC 04/11/25

6.2.2 Bat Tree Survey

A ground level tree assessment (GLTA) on all trees within the proposed development site, with binoculars used where required utilising guidelines set out in '*Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th ed)*' (Collins 2023). This is a ground level inspection of the exterior of the trees to look for features that could be used by roosting bats i.e. potential roost features (PRFs). The aim of this survey is to determine the available roosting resources and the need (if any) for further survey and/or mitigation. This survey was carried out on the 15th of January 2025.

Evidence indicating bat presence within trees, includes dark stains running below holes or cracks, bat droppings, odours, or scratch marks. PRFs that can occur in trees as detailed in Collins (2023) include the following:

- rot holes
- hazard beams
- other vertical or horizontal cracks and splits (such as frost cracks) in stems or branches

- partially detached/loose bark
- knot holes arising from naturally shed branches, or branches previously pruned back to the branch collar
- man-made holes (e.g. cavities that have developed from flush cuts) other cavities created by branches tearing from the parent stems
- cankers (caused by localised bark death) in which cavities have developed
- other hollows or cavities including butt rot
- double-leaders forming compression forks which included bark and potential cavities
- gaps between over lapping stems or branches
- partially detached ivy with stem diameters in excess of 50mm bat or bird boxes.

A ground level tree assessment (GLTA) on all trees within the proposed development site, with binoculars used where required, was carried out using the guidelines set out in '*Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th ed)*' (Collins 2023). A description of trees within the proposed development site and their potential value for roosting bats is included in **Table 8**. No signs of roosting bats were recorded in any of the trees onsite. All other trees onsite have been classified as no to negligible potential for roosting bats.

There are no buildings within the proposed development site and no suitable roosting habitat for Lesser Horseshoe Bats. T16, T17 and T20 were identified in the RFI as trees proposed for removal. This was a typographical error in the EclA report. As outlined in the SRLA landscape plan, these trees will be retained.

Table 8. Trees with PRFs within the proposed development site (CF with Tree Survey for details on tree removal)

Tree number/group	Photographs	Description
T01 To be retained		327 Mature Ash from a large base. Multiple stems. Ivy covering limited. No significant cracks or crevices No signs of roosting bats. Low potential for roosting bats.
T09 To be removed		335 Mature Ash. Ivy dense coverage. Some damage at base of tree. No signs of roosting bats. Low potential for roosting bats.

Tree number/group	Photographs	Description
T10 To be removed		336 Mature Ash. Some scars from previous historic broken off limbs but no significant cracks. Not particularly old tree. No signs of roosting bats. Low potential for roosting bats.
T11 To be retained		337 mature Ash branching at approximately 8ft. One broken limb creates slight hollows No signs of roosting bats. Low potential for roosting bats.

Tree number/group	Photographs	Description
T12 To be retained		338 mature Sycamore. Very limited. ivy. No signs of roosting bats. Low potential for roosting bats.
T13 To be removed		339 mature Ash two main stems one subsidiary. Ivy patchy and confined to one of the main stems. No signs of roosting bats. Low potential for roosting bats.

Tree number/group	Photographs	Description
T14 To be removed		340 Large base with seven large stems. Moderate Ivy coverage. Some small knot holes but nothing significant. No signs of roosting bats. Low potential for roosting bats.
T15 To be removed		341 multi-stem Ash. Ivy from 1 ft up to crown. Immature tree or semi-mature. No significant crack to crevices. No signs of roosting bats. Low potential for roosting bats.

Tree number/group	Photographs	Description
T16 To be retained		342 Mature Ash with older base. Four stems. Moderate Ivy coverage with stem diameter relatively low. Crevice at two feet searched. No evidence. No signs of roosting bats. Low to moderate potential for roosting bats. Emergence surveys completed on this tree (see Section 6.2.4)
T17 To be retained		Tag 343 Large mature Ash. One crack checked with endoscope and no evidence of bats. Limited ivy coverage. Low potential for roosting bats. Emergence surveys completed on this tree (see Section 6.2.4)

Tree number/group	Photographs	Description
T18 To be retained		00334 Mature ash. Limited ivy covering none in the lower sections. Multi-stemmed from approximately 1 ft. Some scar tissue but no obvious cracks or crevices No signs of roosting bats. Low potential for roosting bats.
T20 To be retained		Large multi-stemmed Sycamore. Complex structure with multiple boughs and broken limbs. Ivy covering moderate No signs of roosting bats. Low to moderate potential for roosting bats. Emergence surveys completed on this tree (see Section 6.2.4) No evidence of bats was identified during the initial ground-level assessment. A single bat of unidentified species was subsequently recorded emerging from T20 on 25th June 2026. T20 is therefore treated as a confirmed bat roost. The species, roost type and level of use could not be conclusively determined from the single emergence event.

Tree number/group	Photographs	Description
Woodland copse To be retained		Small copse of woodland. Generally, the trees are not particularly old. Mixture of ash and sycamore. Limited ivy covering on any of the trees. No trees considered of significant potential as bat roosts. Negligible potential for roosting bats.
Mature sycamore in T2 Outside red line boundary		Mature Sycamore some loose bark. No significant cracks. No signs of roosting bats. Low potential for roosting bats.

Tree number/group	Photographs	Description
Not numbered		Immature Ash between T15 and T16. Moderate ivy coverage to crown from base No signs of roosting bats. Low potential for roosting bats.
Not numbered		Between T13 and T14 Semi-mature Ash growing at an awkward angle. Ivy covering low and quite patchy. No cracks or crevices. No signs of roosting bats. Low potential for roosting bats.

6.2.3 Bat Activity Survey (2025)

Dusk bat emergence/activity surveys were carried out on the 5th and 9th of September 2025 using Elekon batloggers (x 2), Echotouch Touch 2 PRO bat detector and a Pulsar Helion 2 XP50 Pro Thermal Imaging Camera. The aim of these surveys was to identify if any bats were roosting within the site and to identify the importance of foraging/commuting habitat. Site surveys following guidelines outlined in Collins (2023). Weather conditions were suitable during both surveys.

The trees within the proposed development site boundary are generally of insufficient age and structural complexity to support bat roosts. A short section of treeline (T1 in **Figure 7**) consisting of mature Ash and Sycamore is located along the eastern boundary and the emergence survey focused on these trees. A small woodland copse is also located around an archaeological feature (WD1 in **Figure 7**). While these habitats create sheltered conditions, suitable for commuting and foraging bats, over-mature trees which could provide significant roosting habitat for bats are absent from the site. In general the site is dominated by improved agricultural grassland used for cattle with dense native hedges located along most internal and external boundaries.

The emergence survey did not record any bats emerging from the mature trees along the eastern boundary (T1). Activity surveys detected three species namely Common Pipistrelle, Soprano Pipistrelle and Leisler's bat, however no emergence was detected. This group of mature trees consists primarily of Ash and Sycamore and in general lack the structural elements (i.e. cracks crevices etc) are generally considered of low value as potential bat roosts.

Activity surveys recorded moderate levels of bat foraging activity post emergence. The most common species recorded were Soprano and Common Pipistrelle. These two species are generally the most common species within this type of agricultural landscape. Bat activity commenced with Soprano Pipistrelle at approximately 7.15pm. This species was less numerous than Common Pipistrelle with activity concentrated in more sheltered fields in the southern section of the site. Common pipistrelle activity was more intense with activity more widely distributed along internal and external boundaries.

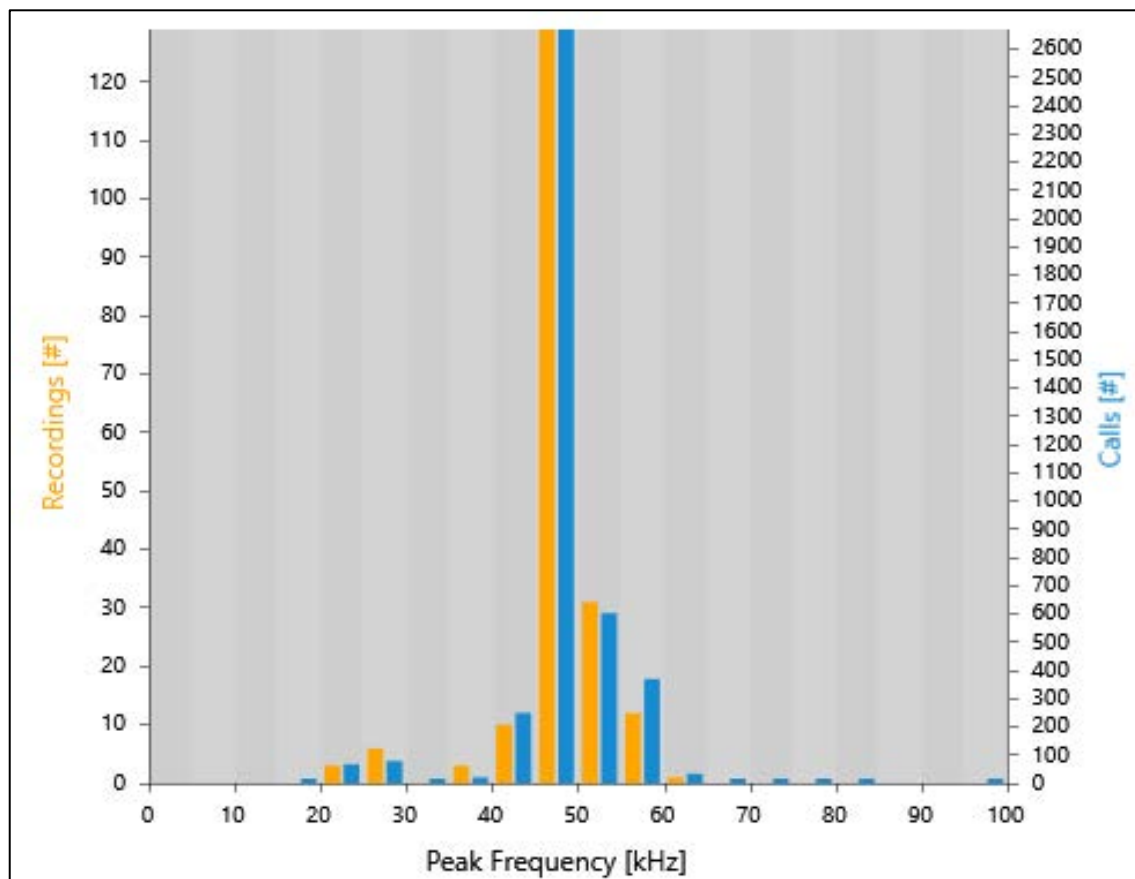


Figure 8. indicates dominance by Pipistrelle species (40-60khz approx.) with activity by Leisler's also evident (20-30khz approx.) Survey Date 9th October 2025.

Sporadic signals for Leisler's bat were recorded with a scattered distribution with activity concentrated close to and outside the southern boundary early in the survey period (See **Figure 8**). Otherwise activity was sporadic and indicative of bats foraging at height over the site and surrounding landscape.

One recording for a myotis bat (most probably Natterer's Bat) was recorded in the northwest corner of the site (west of H02 **Figure 7**) and is indicative of a single bat foraging in scrub/woodland outside the site boundary. Two brief signals for Brown Long Eared bat were also recorded along the eastern boundary treeline which as indicative of temporary foraging by one bat (H03 of **Figure 7**).

Overall, the site is of moderate value for bats at a local level with a mixture of improved agricultural grassland grazed by cattle and very good quality hedgerows. There are also small sections of woodland and occasional mature trees which provide additional foraging resources. In general activity was dominated by the more common species namely Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat. Brief foraging by Brown Long Eared bat and by Natterers Bat (outside the site boundary) was also recorded.



Plate 16. Bat foraging along treelines at northwest of site

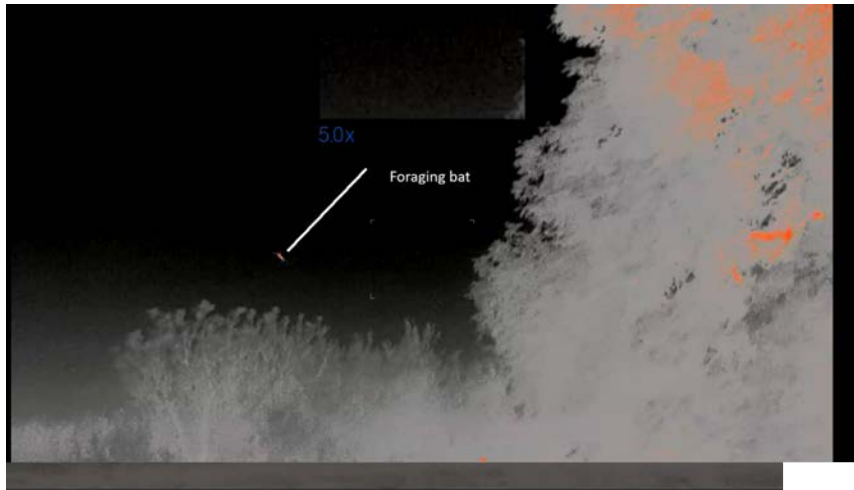


Plate 17. Bat foraging along treeline

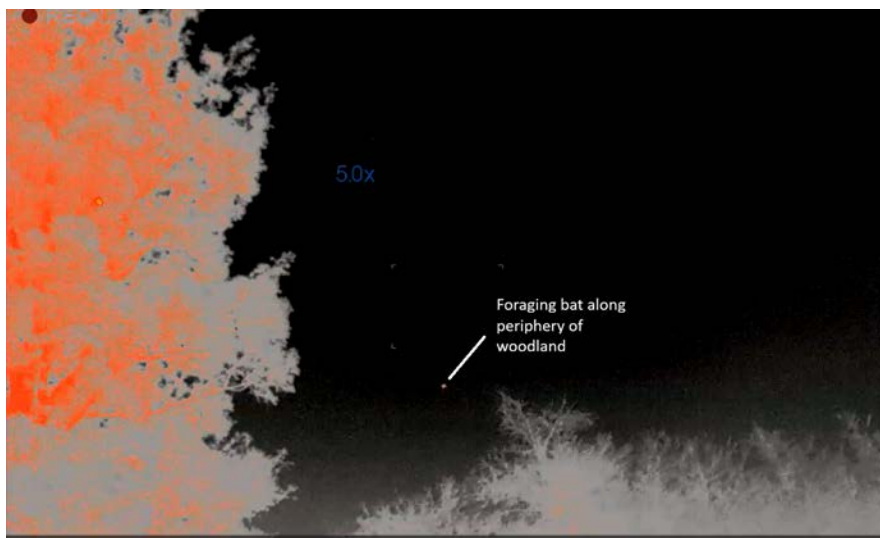


Plate 18. Bat foraging along woodland

6.2.4 Bat Activity and Emergence Survey (2026)

Bat surveys were conducted on the proposed development site in May, June and July 2026. Two bat activity surveys were conducted, throughout June and July. Passive bat statics were installed onsite, for a total of seven nights each throughout May, June and July.

May 15th 2026 – Emergence survey

A bat emergence survey was conducted on May 15th 2026 to detect if two hollow Poplar trees, outside of the site boundary, were being utilised as a bat roost. One Batlogger M2 bat static, one Pulsar thermal imagery camera and one Nova Nightfox infrared camera were used. No emergence activity was detected throughout the survey. Footage from the emergence activity was analysed and showed no evidence of emergence events.

Bat static data from the emergence survey was analysed using BatExplorer software. The majority of bat activity was from Common Pipistrelle, with smaller numbers of Soprano

Pipistrelle, Leisler's bat, and an unidentified Pipistrelle species. There were no records of Lesser Horseshoe.

15th to 21st of May 2026 - Passive Static

One Elekon Batlogger S2 was installed and active onsite from the 15th to the 21st of May 2026. The location of this detector, along the western boundary of the site is shown in **Figure 9**. Bat static data from the passive bat static was analysed using BatExplorer software. Most of the bat activity was from Common Pipistrelle and Soprano Pipistrelle, with smaller numbers of Leisler's bat, an unidentified Myotis species, an unidentified Pipistrelle species, Brown long-eared bat and Lesser Horseshoe Bat. There were four recordings of Lesser Horseshoe, with 15 calls recorded at this location.

Bat species utilizing this section of the proposed development site for commuting or foraging activity included Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat, an unidentified Myotis species, an unidentified Pipistrelle species, Brown Long-eared bat and Lesser Horseshoe bat. No emergence activity was detected.



Figure 9. Passive detector locations

Activity	Frequencies	Frequencies/Time	Species
Species		#	# Calls
● Myotis spec.		27	42
● Nyctalus leisleri		158	480
● Pipistrellus pipistrellus		287	1352
● Pipistrellus pygmaeus		222	1044
● Pipistrellus spec.		19	67
● Plecotus auritus		11	22
● Rhinolophus hipposideros		4	15

Figure 10. Species Table (S2) 15th to 21st May 2026

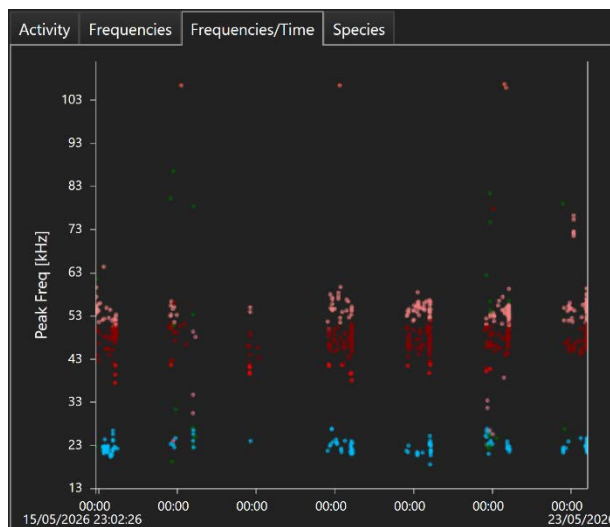


Figure 11. Frequencies/Times Diagram (S2) 15th to 21st May 2026

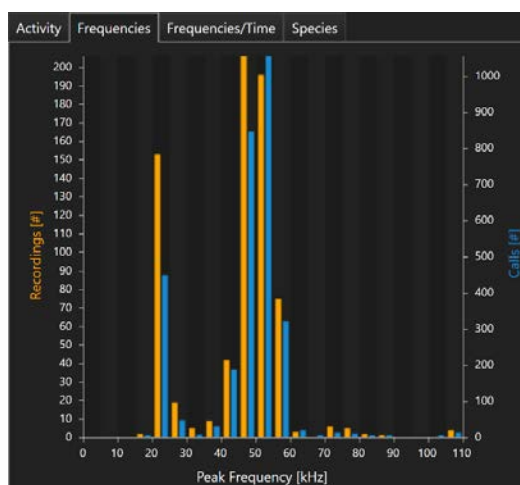


Figure 12. Frequencies Histogram (S2) 15th to 21st May 2026

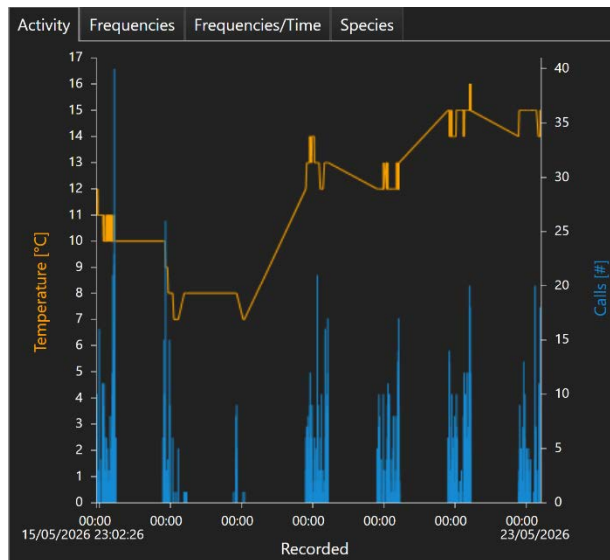


Figure 13. Activity Histogram (S2) 15th to 21st May 2026

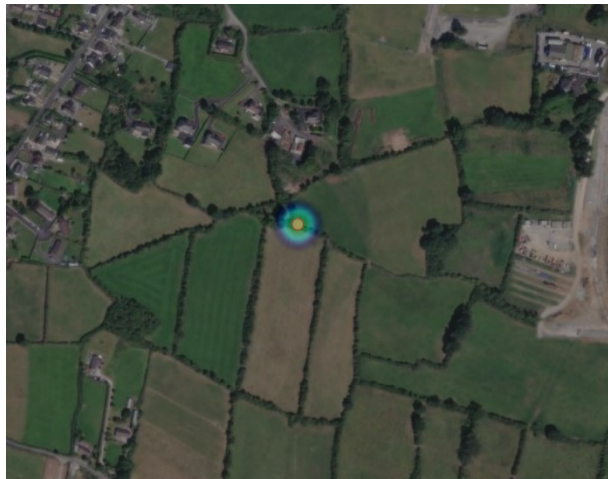


Figure 14. Heatmap (Passive static location) (S2) 15th to 21st May 2026

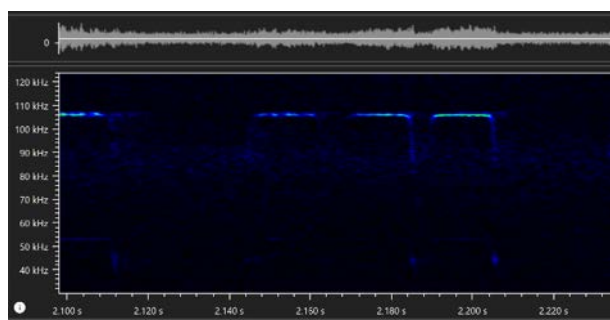


Figure 15. Example of one of the Lesser Horseshoe calls recorded (S2) 15th to 21st May 2026

June 25th - Emergence and night-time walkover survey T17 and T20

Bat emergence surveys were conducted on T17 and T20 on the 25th of June 2026, with one surveyor and one camera for each tree. One Batlogger M2 bat static and one Pulsar thermal imagery camera was used to conduct the emergence survey on T20. One Batlogger M2 bat static and one Nova Nightfox infrared camera was used to conduct the emergence survey on

T17. No emergence activity was detected throughout the survey. However, upon analysis of the footage from the emergence survey, one bat was observed emerging from tree T20. No bats were observed emerging from tree T17.

Bat static data from the emergence survey was analysed using BatExplorer software. Most of the bat activity was from Leisler's bat, with smaller numbers of Soprano Pipistrelle, Common Pipistrelle, and an unidentified Pipistrelle species. There were no records of Lesser Horseshoe.

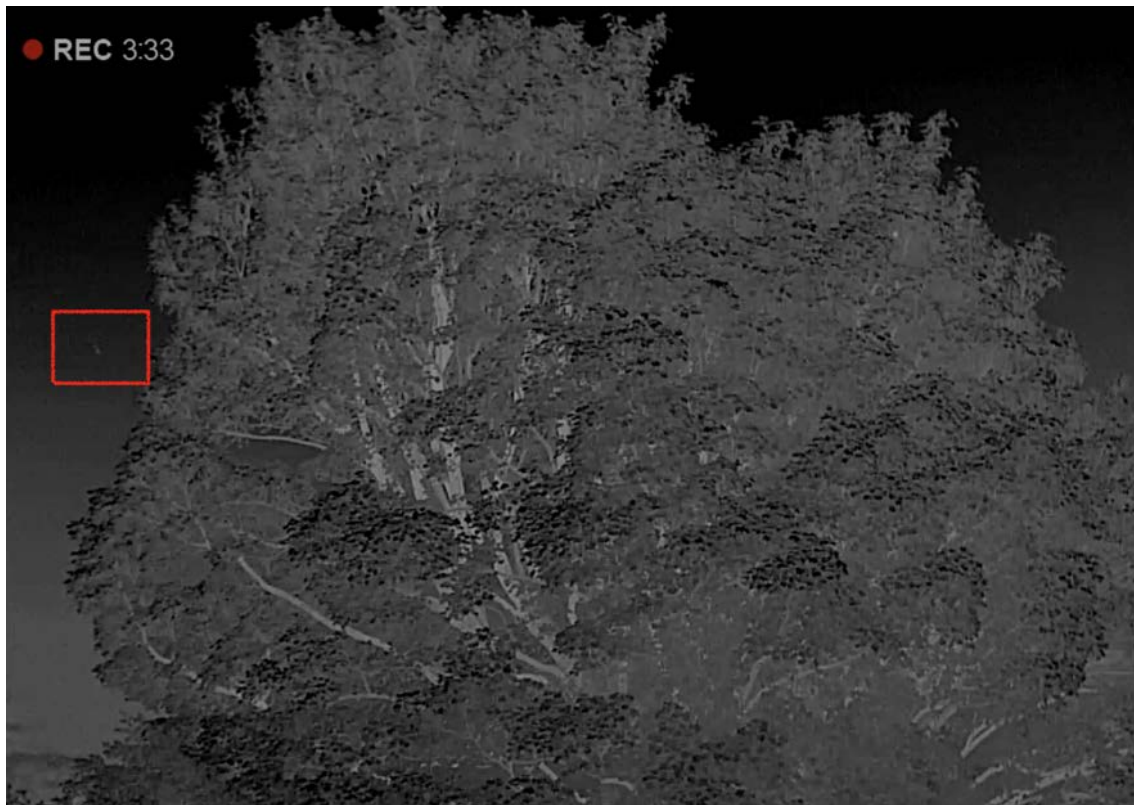


Figure 16. T20 – Bat emergence on Pulsar thermal camera



Figure 17. Location in tree where the previously mentioned bat emerged from



Figure 18. T17 - View of infrared above, no bat activity visible in footage

Activity	Frequencies	Frequencies/Time	Species
Species		#	# Calls
○ Noise		3	8
● Nyctalus leisleri		92	1146
● Pipistrellus pipistrellus		33	571
● Pipistrellus pygmaeus		43	514
● Pipistrellus spec.		1	22

Figure 19. Species Table

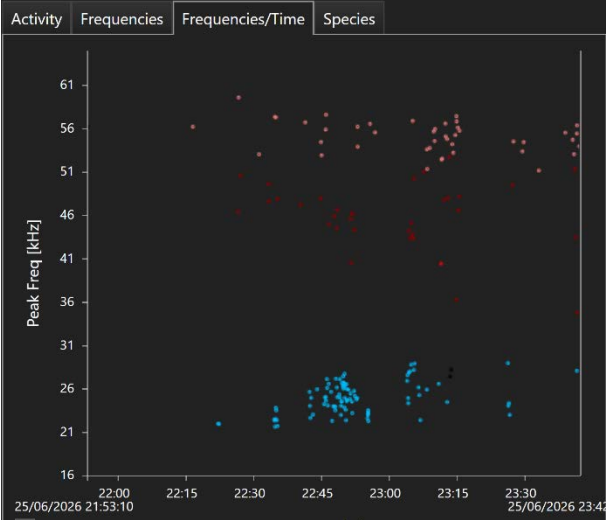


Figure 20. Frequencies/Times Diagram

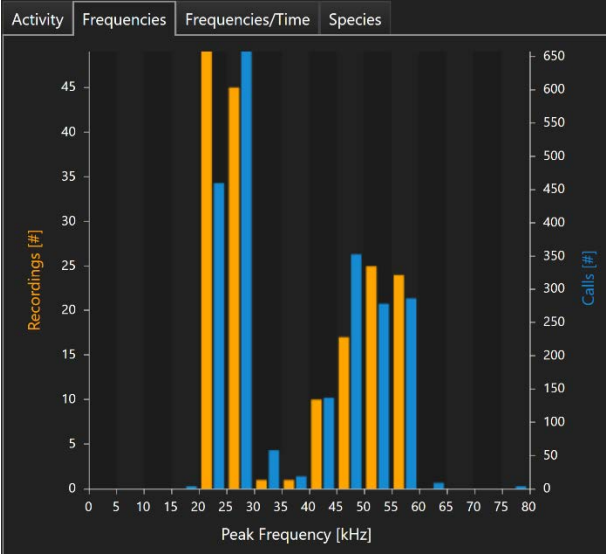


Figure 21. Frequencies Histogram

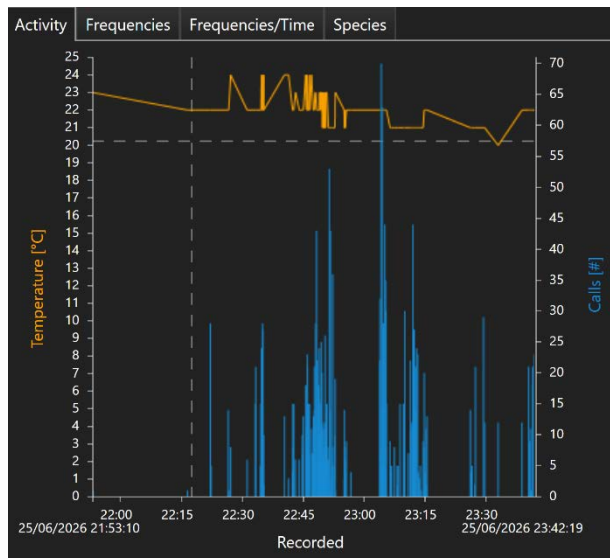


Figure 22. Activity Histogram



Figure 23. Heatmap. Walkover survey June 25th

27th of June to 3rd of July - Passive Static

Two Elekon Batlogger S2's were installed and active onsite from 27th of June to 3rd of July 2026. Bat static data from the passive bat statics were analysed using BatExplorer software. Most of the bat activity was from Common Pipistrelle and Soprano Pipistrelle, with smaller numbers of Leisler's bat, an unidentified Myotis species, Brown Long-eared bat and an unidentified Pipistrelle species. There were no records of Lesser Horseshoe bat.

Bat species utilising this section of the proposed development site for commuting or foraging activity included Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat, an unidentified Myotis species, an unidentified Pipistrelle species, and Brown Long-eared bat. No emergence activity was detected.

Activity	Frequencies	Frequencies/Time	Species
Species		#	# Calls
● Myotis spec.		73	639
● None		3144	26456
● Nyctalus leisleri		351	2779
● Pipistrellus pipistrellus		2020	47405
● Pipistrellus pygmaeus		770	9977
● Pipistrellus spec.		14	126
● Plecotus auritus		15	93

Figure 24. Species Table (S2) June 27th to July 3rd

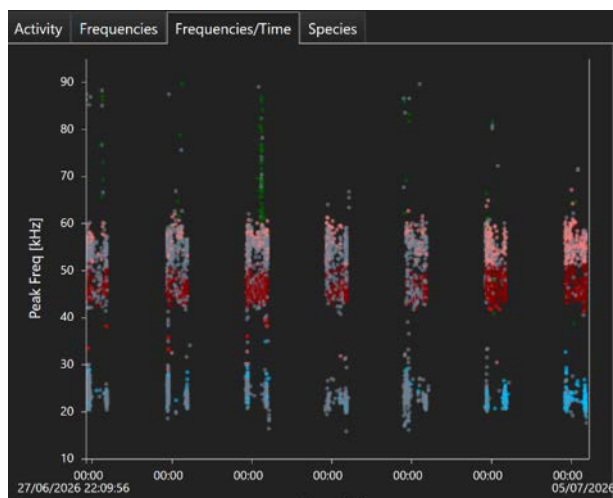


Figure 25. Frequencies/Timetable (S2) June 27th to July 3rd

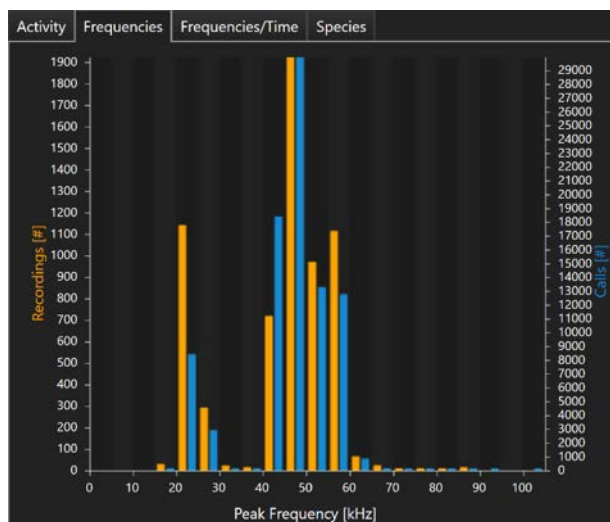


Figure 26. Frequencies Histogram (S2) June 27th to July 3rd

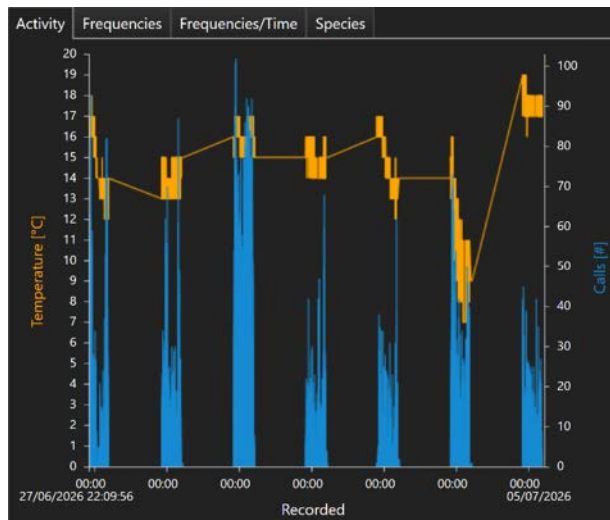


Figure 27. Activity Histogram (S2) June 27th to July 3rd

July 16th - Emergence and night-time walkover survey – T16

A bat emergence survey was conducted on 16th of July 2026 to detect if T16 was being utilised as a bat roost, using one Pulsar thermal imagery camera and one Batlogger M2. No emergence activity was detected throughout the survey. Footage from the emergence activity was analysed and showed no evidence of emergence events.

Bat static data from the emergence survey was analysed using BatExplorer software. The majority of bat activity was from Soprano Pipistrelle, with smaller numbers of Common Pipistrelle and Leisler's bat. There were no records of Lesser Horseshoe.

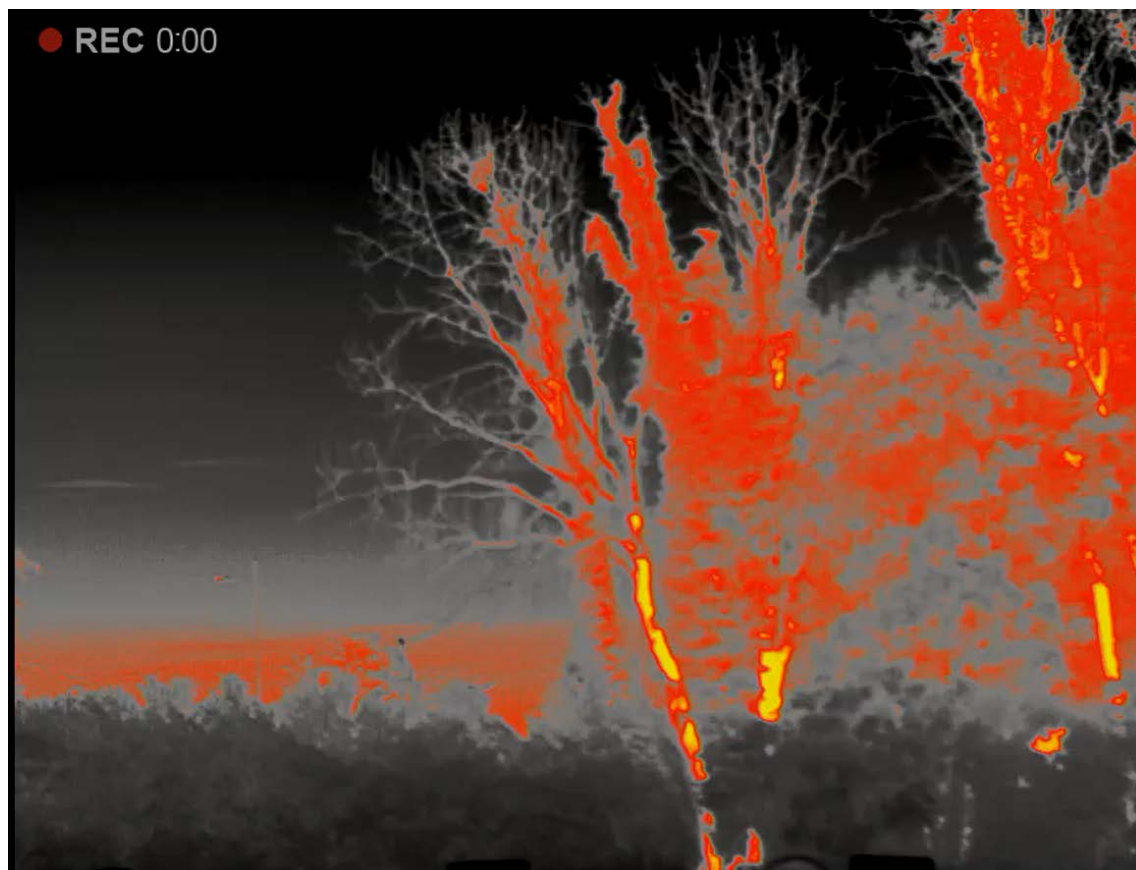


Figure 28. Pulsar thermal camera view of T16 - no emergence

Activity	Frequencies	Frequencies/Time	Species
	Species	#	# Calls
●	Nyctalus leisleri	14	94
●	Pipistrellus pipistrellus	28	492
●	Pipistrellus pygmaeus	57	1053

Figure 29. Species Table July 16th survey

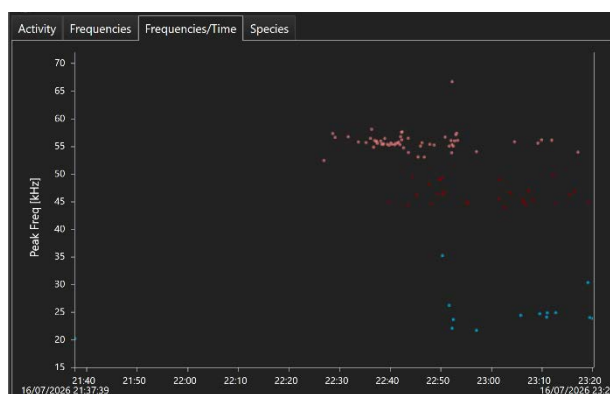


Figure 30. Frequencies/Time Diagram July 16th survey

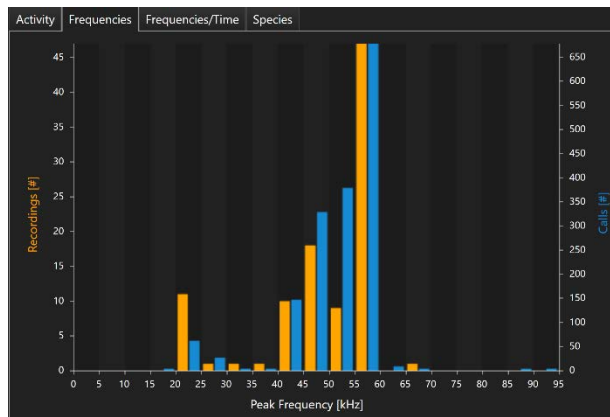


Figure 31. Frequencies Histogram July 16th survey

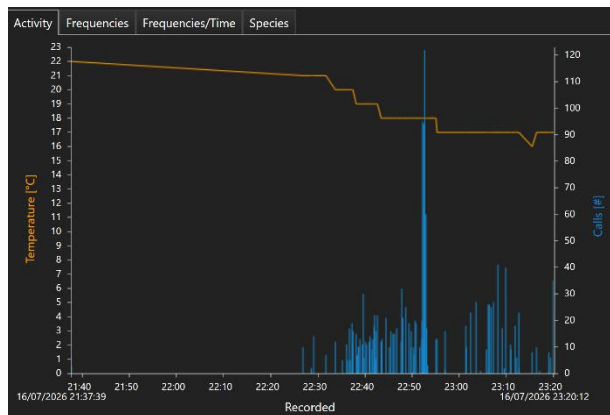


Figure 32. Activity Histogram July 16th survey



Figure 33. Heatmap July 16th survey

July 9th to 15th - Passive Static

Two Elekon Batlogger S2's was installed and active onsite from 9th to 15th of July 2026. Bat static data from the passive bat static was analysed using BatExplorer software. The majority of bat activity was from Common Pipistrelle, with smaller numbers of Soprano Pipistrelle, Leisler's bat, Lesser Horseshoe bat, an unidentified Pipistrelle species, an unidentified Myotis species, and Brown long-eared bat. There were 15 recordings of Lesser Horseshoe, with 41 calls recorded at this location.

Bat species utilising this section of the proposed development site for commuting or foraging activity included Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat, Lesser Horseshoe bat, an unidentified Pipistrelle species, an unidentified Myotis species, and Brown Long-eared bat.

Activity	Frequencies	Frequencies/Time	Species
Species		#	# Calls
● Myotis spec.		6	21
● None		2883	24696
● Nyctalus leisleri		135	402
● Pipistrellus pipistrellus		1209	9787
● Pipistrellus pygmaeus		286	3180
● Pipistrellus spec.		14	46
● Plecotus auritus		3	4
● Rhinolophus hipposideros		15	41

Figure 34. Species Table (S2) 9th to 15th of July

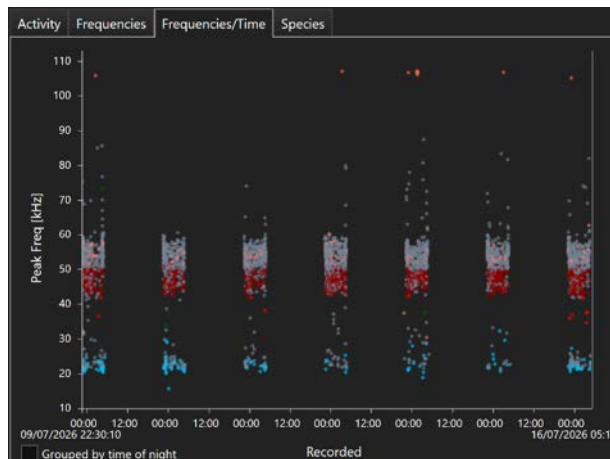


Figure 35. Frequencies/Time Diagram (S2) 9th to 15th of July

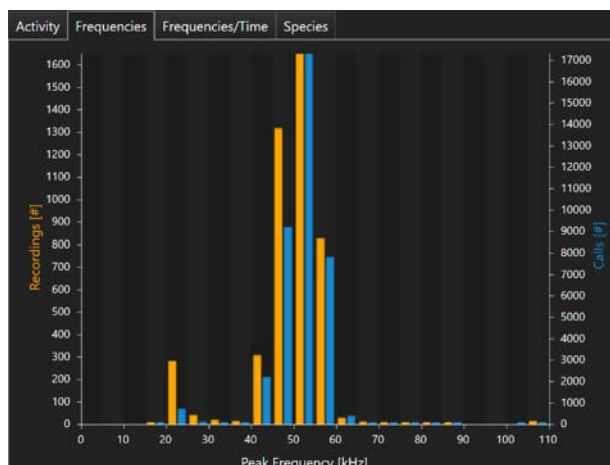


Figure 36. Frequencies Histogram (S2) 9th to 15th of July

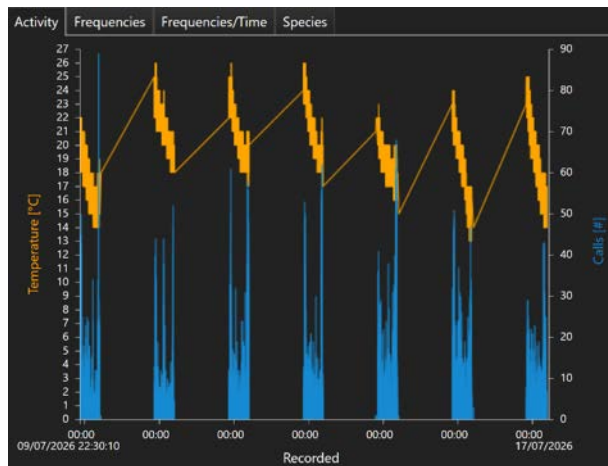


Figure 37. Activity Histogram (S2) 9th to 15th of July



Figure 38. Heatmap (S2) 9th to 15th of July

Lesser Horseshoe Bat Analysis

Four records of Lesser Horseshoe bat, with 15 calls in total were recorded throughout the May static surveys (15th to 21st of May). One Lesser Horseshoe recording was detected on the 17th of May at 01:08. One Lesser Horseshoe bat recording was detected on the 19th of May at 01:23. Two Lesser Horseshoe bats recordings were detected on the 21st of May at 03:38 and 04:07. Calls recorded during the May static were short, ranging from 2.67 to 4.51 seconds. The data indicate suggest overnight foraging activity but do not provide a count of individual bats.

No Lesser Horseshoe bat calls were recorded during the June statics. Fifteen recordings of Lesser Horseshoe bat, with a total of 41 calls were recorded throughout the July statics. One Lesser Horseshoe recording was detected on the 10th of July at 02:27. Two Lesser Horseshoe recordings were detected on the on the 13th of July at 23:09 and 03:34. Ten Lesser Horseshoe bats recordings were detected on the 14th of July, with two recorded at 01:39, 01:41, 01:42, two recorded at 01:45, 01:46, 01:52, and two recorded at 01:53. Two Lesser Horseshoe bats were recorded on the 15th of July at 23:20 and 03:17. Calls recorded during the July statics were short ranging from 2.01 to 4.49 seconds. All Lesser Horseshoe bat activity recorded during July were recorded late in the night considerably after dusk emergence window.

Throughout the 2026 survey period, Lesser Horseshoe activity was sporadic with calls recorded from 23:09 to 04:07. Call records are not indicative of bat emergence activity. Based on the recording, Lesser Horseshoe bats appear to be utilising the proposed development site for sporadic foraging. It should be noted that although Lesser Horseshoe bat was recorded 19 times with 56 calls in total, this may not be an accurate depiction of the number of Lesser Horseshoe bat utilising the site. Foraging behaviour can cause repeat recordings of an individual bat.

Conclusion 2026 surveys

One emergence event was recorded on the 25th of June from tree T20. As noted in the landscape plan and **Table 8**, this tree is proposed for retention. T16 and T17 were surveyed and no emergence events were recorded. Two bat walkover surveys were conducted throughout June and July. These recorded a range of species including Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat as well as occasional Myotis and Brown long-eared bats.

Passive static data collected from May, June and July identified the following species utilising the site; Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat, Lesser Horseshoe bat, an unidentified Pipistrelle species, an unidentified Myotis species, and Brown Long-eared bat.

Lesser Horseshoe bat was recorded 19 times, with 56 calls in total. These were generally late in the night/early morning.

6.3 Badger

Badgers are omnivorous, feeding on a wide variety of food from invertebrates, small mammals and birds to plant foods such as fruit, nuts and crops. The distribution and abundance of these food resources can have a profound influence on Badger ecology. For example, the size of a Badger social group territory is dependent upon the distribution of key food resources such as earthworms. The density of these key food resources within the territory determines the number of animals within each social group. The sensitive management of these key resources can therefore be a useful tool in mitigating the adverse effects of development.

Improved grasslands and deciduous woodlands are therefore favoured by Badgers, the former habitat being of particular importance, especially when grazed by livestock or mown for amenity purposes. In the latter context sports fields and golf courses can provide a rich source of earthworms, but only in the absence of the use of vermicides (chemicals which kill worms). Grazing or mowing produces a short sward from which earthworms can easily be predated. Longer swards, such as those associated with rough un-grazed grasslands are of relatively less value: worm biomass is reduced and the worms are more difficult to predate.

Badgers and their setts are protected under the provisions of the Wildlife Acts 1976, as amended. It is an offence to intentionally kill or injure a protected species or to wilfully interfere with or destroy the breeding site or resting place of a protected wild animal. The density of Badgers in Ireland is approximately one social group per km² in lowland areas with a high component of pasture. In upland areas where feeding is scarce Badgers are generally found at lower densities. Overall the average density in Ireland is approximately one social group per 2km².

Badger surveys were carried out with regard to Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (TII 2009) and included surveys for breeding and resting places of protected mammal species and survey for direct evidence of mammals.

The methodologies and assessment criteria used were based on current published guidance. Badger survey followed Surveying Badgers (Harris *et. al.* 1984) Signs of badger were searched for which included:

- Latrines and dung pits
- Hair
- Path and footprints
- Scrapes
- Snuffle holes
- Setts including:
 - o A description of the sett location: hedgerows, earth banks, woodland or scrub habitat
 - o Type of sett and level of usage: main, maternity, ancillary, abandoned etc.
 - o Signs of activity: discarded bedding, spoil heaps etc.)

Badger has been recorded 26 times in R55, with the most recent record in April 2017. There are no NBDC records of Badger in the vicinity of the proposed development site.

One large mammals hole was recorded in the woodland copse during initial site surveys. However, no signs of Badgers including bedding at the entrance, latrines, snuffle holes etc were recorded. A trail camera survey was carried out to identify which species were using this area over a 9-day period between the 9th and 17th of October 2025. Two trail cameras were positioned near the hole entrance and along the boundary of the woodland.

The trail cameras recorded a number of species including Rabbit and Red fox (as well as Woodpigeon, Pheasant, Rook and Magpie). Rabbits were recorded entering the hole on two dates on the 12th and 13th of October. No signs of Badger were recorded on any of the trail cameras.



Plate 19. Photos of trail camera A



Plate 20. Trail camera B



Plate 21. Rabbit entering hole on 12th October



Plate 22. Rabbit entering hole on 13th October

6.4 Other terrestrial mammals

Sixteen other species of terrestrial mammal have been recorded within grid square R55 of the proposed development site, eight of which are protected under the Irish Wildlife Act (as amended); namely Pygmy Shrew *Sorex minutus*, Red Squirrel *Sciurus vulgaris*, Fallow Deer *Dama dama* and Irish Hare *Lepus timidus subsp. hibernicus*, Hedgehog *Erinaceus europaeus*, Irish stoat *Mustela erminea hibernica* and Pine marten *Martes martes*.

Rabbit and Red fox were recorded during trail camera surveys. No other signs of non-volant mammals were recorded within the site.

6.4.1 Pygmy Shrew

Pygmy Shrew is common throughout Ireland and prefers habitats such as hedgerows and grasslands; they have also been found utilizing stone walls. There are two records of Pygmy Shrew in R55, the most recent from April 2017. The hedgerow/treeline and woodland habitats within the proposed site, provide potential cover for small mammal species and Pygmy Shrew could use habitats on the boundary of the site. The habitats within the site are of low to moderate local value for this species.

6.4.2 Red Squirrel

Red Squirrel is listed on Appendix III of the Berne Convention can be found throughout Ireland. There are 12 records of Red Squirrel in the 10km grid square R55, the most recent from March 2023. While in theory the woodland habitat within the proposed development site could provide habitat for Red Squirrel, this is a small and isolated pocket of woodland which is unlikely to support this species. No signs of Red Squirrel were recorded during the site survey. The habitats within the site are of low to negligible value for Red Squirrel.

6.4.3 Pine Marten

Pine Marten is protected in Ireland by both national and international legislation. Under the Irish Wildlife Acts it is an offence, except under licence, to capture or kill a Pine Marten, or to destroy or disturb its resting places. The European Union's Habitats & Species Directive further obliges Ireland to maintain the favourable conservation status of the Pine Marten throughout its range. There are four records of Pine Marten in R55 (NBDC), the most recent

from August 2021. Pine Marten is found mainly in deciduous and coniferous woodland, but has also adapted to scrubland. While Pine Marten could potentially use woodland within the site boundary this area is isolated and unlikely to be of value for this species. The habitats within the site are of low to negligible value for Pine Marten.

6.4.4 Hedgehog

Hedgehog is protected under the Wildlife Act and is also listed on Appendix III of the Berne Convention. Hedgehogs can be found throughout Ireland, with male Hedgehogs having an annual range of around 56 hectares. This species has been recorded 83 times on R55, the most recent record in September 2023. The hedgerow/treeline and woodland habitats within the proposed site, provide potential cover for small mammal species and Hedgehog are likely to use habitats on the boundary of the site. The habitats within the site are of low to moderate local value for this species.

6.4.5 Irish Hare

Irish Hare is one of three lagomorphs found on the Island of Ireland and the only native lagomorph. It is listed on Appendix III of the Berne Convention, Annex V(a) of the EC Habitats Directive (92/43/EEC) and as an internationally important species in the Irish Red Data Book.

The Irish hare is adaptable and lives in a wide variety of habitats. It typically reaches its highest densities on farmland, particularly where there is a mix of grassland and arable fields along with hedgerows and other cover. According to the NBDC, hares have been recorded in R55 on five occasions, the most recent record in April 2021. The managed grasslands at the site are sub-optimal for Irish hare. No signs of this species were recorded and this site is of low to negligible value for Irish Hare.

6.4.6 Fallow Deer

Fallow deer are Ireland's second largest deer species and are the most widespread of the deer, found in nearly every county of the island. In Ireland the fallow deer mainly resides in mature deciduous or mixed woodlands which are close to open grassland. The pattern of habitat use can vary throughout the year depending on the season or the particular area in which the deer are located providing different foraging opportunities.

Fallow deer are classified as grazers or non-selective bulk feeders, although they will browse on trees and shrubs. The species has become almost nocturnal in their grazing habits in areas of high disturbance. The woodland habitats within the site could potentially provide habitat for deer. However, there is no valuable habitat for this species within the proposed development site boundary. The habitats within the site are of low to negligible value for Fallow Deer.

6.4.7 Irish Stoat

Irish Stoat is one of the species protected under regulations (Protection of Wild Animals) in 1980 which enabled Ireland to comply with the provisions of the Bern Convention of European Wildlife and Natural Habitats, which was ratified by Ireland in April 1982. Given its broad habitat use, Irish Stoat could potentially occur in the vicinity of the proposed development site. The habitats within the site are of low to moderate local value for this species.

6.5 Reptiles and Amphibians

According to records held by the NBDC, Common Frog and Smooth Newt have been recorded within R55.

Common Frog is listed on Annex V of the EU Habitats Directive and is protected under the Wildlife Acts. The Smooth Newt is the only member of the Urodela (the tailed amphibians) found in Ireland. While commonly encountered near water bodies, adult newts are actually terrestrial, only returning to water bodies to breed. There is no suitable habitat for amphibians within the site boundary. The habitats within the site are of negligible value for amphibians.

Common Lizard (*Zootoca vivipara*) is Ireland's only native terrestrial reptile and is so protected under the Wildlife Act. Ideal habitats for the species are south-facing, damp tussocky grassland, scrub covered hillsides, dunes or banks, and woodland tracks, and it also resides in peat bogs, dry grasslands and heathlands. This species is unlikely that the species occurs within or in proximity to the proposed development site. The site is of negligible value for reptiles.

6.6 Birds

6.6.1 General bird surveys

The NBDC lists the following Annex I bird species for hectad R55, Corncrake (*Crex crex*), Golden Plover (*Pluvialis apricaria*), Hen Harrier (*Circus cyaneus*), Kingfisher (*Alcedo atthis*), Little Egret (*Egretta garzetta*), Mediterranean Gull (*Ichthyophaga melanocephalus*), Merlin (*Falco columbarius*), Peregrine (*Falco peregrinus*), Red-necked Phalarope (*Phalaropus lobatus*), Red-throated Diver (*Gavia stellata*), Sandwich Tern (*Thalasseus sandvicensis*), Short-eared Owl (*Asio flammeus*) and Whooper Swan (*Cygnus cygnus*). The proposed development site does not contain habitats suitable for Annex I bird species.

General bird surveys were carried out at the proposed development site. During the survey, all birds seen or heard within the development site were recorded. Certain bird species are listed by BirdWatch Ireland as Birds of Conservation Concern in Ireland (BOCCI). These are bird species suffering declines in population size. BirdWatch Ireland and the Royal Society for the Protection of Birds have identified and classified these species by the rate of decline into Red and Amber lists (Gilbert *et al.* 2021). Red List bird species are of high conservation concern and the Amber List species are of medium conservation. Green listed species are regularly occurring bird species whose conservation status is currently considered favourable. Species recorded during the site visits are shown in **Table 9**.

Table 9. Bird Species recorded during site survey

Species		Birds Directive Annex	BOCCI	
			Red List	Amber List
Barn owl	<i>Tyto alba</i>		x	
Blackbird	<i>Turdus merula</i>			
Blue Tit	<i>Cyanistes caeruleus</i>			

Species		Birds Directive Annex	BOCCI	
		I	Red List	Amber List
Bullfinch	<i>Pyrrhula pyrrhula</i>			
Buzzard	<i>Buteo buteo</i>			
Chaffinch	<i>Fringilla coelebs</i>			
Goldcrest	<i>Regulus regulus</i>			x
Goldfinch	<i>Carduelis carduelis</i>			
Great Tit	<i>Parus major</i>			
House martin	<i>Delichon urbicum</i>			x
Jackdaw	<i>Corvus monedula</i>			
Magpie	<i>Pica pica</i>			
Pheasant	<i>Phasianus colchicus</i>			
Redwing	<i>Turdus iliacus</i>		x	
Robin	<i>Erithacus rubecula</i>			
Rook	<i>Corvus frugilegus</i>			
Song thrush	<i>Turdus philomelos</i>			
Sparrowhawk	<i>Accipiter nisus</i>			
Swallow	<i>Hirundo rustica</i>			x
Woodpigeon	<i>Columba palumbus</i>			
Wren	<i>Troglodytes troglodytes</i>			

Two Red list species were recorded during the site surveys i.e. Barn owl and Redwing. A Barn Owl was recorded overflying the site in October 2025, during dusk activity bat surveys. During the site surveys, an area of Black poplar trees c.25m west of the proposed development site was identified as providing potential a nesting site for Barn owl. No other suitable nesting sites were observed within or in the vicinity of the proposed development site. During the March 2026 surveys, a number of fresh Barn owl pellets were recorded around the base of these trees indicating that birds are actively nesting in this area. Breeding was confirmed during June 2026 (25th June) during which adults and chicks were heard within the probable nest site. While the proposed development site itself does not provide nesting habitat, the grassland onsite is likely to provide foraging habitat for Barn Owl. Barn Owl (*Tyto alba*) is a Red-listed Bird of Conservation Concern in Ireland due to extensive population declines over recent decades (Gilbert *et. al.* 2021). The intensification of agriculture, in particular the reduction of prey rich foraging habitat, is likely to be the main driver of long-term Barn Owl

population declines in Ireland. The loss of nesting sites, increases in the use and exposure to rodenticides, and the expansion of road networks have also been recognised as factors which are impacting on Barn Owl populations. Barn Owls experienced significant decline in population in Ireland in recent decades with the losses attributed to loss of habitat, changes in farming practices and the use of rodenticides (Lusby and O'Clery 2014). Recent research has confirmed that Barn Owls may be benefitting from the introduction of Greater White-toothed Shrew, *Crocidura russula*, a non-native mammal species which has spread rapidly since its discovery in Ireland in 2008 (e.g. Smiddy, 2018). Barn Owl numbers and breeding range both seem to have improved somewhat in the past decade (Birdwatch Ireland).



Plate 23. Fresh Barn owl pellets recorded (near proposed development site) in March 2026

During Ecofact surveys at Mungret College in 2020 (located c.750m east of the proposed development site), a roost site and probable breeding site for Barn Owl was discovered under a stone archway, although breeding was not confirmed (Arup 2023). We understand that this is the eastern nesting site to which the RFI refers. DixonBrosnan surveyed this Mungret College site in December 2023 and did not record any new evidence of usage. However this survey was conducted outside the breeding season for this species and therefore breeding was not directly assessed. However, no evidence such as pellets were recorded.

Redwing are facing significant pressures from habitat loss and climate-driven migration changes. They rely on Irish farmland and hedgerows for survival during winter, making them vulnerable to urban expansion and environmental changes. While Redwing populations have fluctuated in the past, including a notable decline between 2008-2014. However, over the past ten years (three generations), the well-monitored European breeding population has increased by 12% (Birdlife.org). Native species, such as Hawthorn and Blackthorn, within the proposed development site, are likely to provide wintering foraging habitats for Redwing.

Three other BOCCI species i.e. the amber list species House martin, Swallow and Goldcrest, were recorded during site surveys. It is noted there are no buildings suitable for nesting Swallow or House martin within the proposed development site.

The proposed development site also supports a range of common bird species i.e. Blackbird, Wren, Robin, Song thrush etc. High quality, largely native treelines and hedgerows along the site boundary provide high value nesting and foraging habitats for birds.

Overall the proposed development site provides locally valuable habitat for a range of bird species.

6.6.2 Winter bird surveys

The proposed development site is located in proximity to a number of areas potentially important for wintering birds. The Loughmore Common Turlough pNHA is located c.440m southeast, the Inner Shannon Estuary - South Shore pNHA is located 1.3km north and the River Shannon and River Fergus Estuaries SPA is located 2.1km north. The primary purpose of the winter bird surveys were to assess usage of pastureland within the proposed development site by wintering wading birds and waterfowl.

Most species recorded during the winter bird surveys were common, passerine species such as Wren, Robin, Blackbird, Stonechat etc. These species were recorded within the grassland and hedgerow/treelines within the proposed development site. Redwing (a red list species) was recorded foraging at the site during the winter months. Gulls were occasionally recorded overflying the site. However, no wading birds or waterfowl were recorded within the proposed development site.

No SCI bird species for the River Shannon and River Fergus Estuaries SPA were recorded during the winter surveys. There is no habitat within the red line boundary which would be considered of high value for wintering birds.

Loughmore Common Turlough provides suitable winter habitat for Lapwing and Golden Plover, and Snipe breed here (See NPWS **Appendix 2**). It is noted that DixonBrosnan previously carried out winter bird surveys at the pNHA in 2023. The conclusions of this survey noted the following:

A total of nineteen species were recorded from the site visits during the DixonBrosnan winter bird surveys.

One Annex I bird species was recorded i.e., Little Egret. Three red list species were recorded i.e., Snipe, Meadow Pipit and Redwing were recorded as well as a number of amber list species i.e., Black-headed Gull, Cormorant, Goldcrest, Greenfinch, Lesser Black-backed Gull, Linnet and Starling.

Birds recorded were typical of the grassland mosaic and hedgerow habitat within the study site. The site does not appear to be an important feeding or roosting site for qualifying interests of the nearby River Shannon and River Fergus Estuaries SPA and, with the exception of overflying Cormorant, no SCI species were recorded at Loughmore Common Turlough during site visits.

The semi-natural grassland provides valuable habitat for the red list species Meadow Pipit and Snipe. Both species are suffering significant declines due to reduction in habitat. The site also supports a range of common bird species.

Following site surveys, there is nothing to indicate that the proposed development site is of value for wintering wading birds and waterfowl.

6.7 Other species

A search of the NBDC database was carried out to determine if any protected, rare or notable species of invertebrates within 2km of the proposed development site (R55G).

One threatened invertebrate species has been recorded within these 2km grid squares i.e. Red-tailed Bumblebee (*Bombus lapidarius*). The native hedgerow and treelines within the site are likely to provide locally valuable habitat for common terrestrial invertebrates. It is considered unlikely, given the managed agricultural grassland which dominates the site, that the proposed development site would provide valuable habitat for rare invertebrate species.

There are no watercourses within the proposed development site. The closest stream/river is the Barnakyle Stream located c.1.5km south of the proposed development site. This stream is tributary of the River Maigue. An assessment of the Maigue Catchment recorded Brown trout, European eel, Lamprey sp. and stickleback within the Barnakyle Stream.

7. Water Quality

7.1 River Basin Management Plan for Ireland 2022-2027 (3rd Cycle)

The Water Framework Directive (WFD) sets out the environmental objectives which are required to be met through the process of river basin planning and implementation of those plans. Specific objectives are set out for surface water, groundwater and protected areas. The challenges that must be overcome in order to achieve those objectives are very significant. Therefore, a key purpose of the River Basin Management Plan (RBMP) is to set out priorities and ensure that implementation is guided by these priorities.

The EPA has published an updated draft Catchment Assessment for each of our 46 catchments. These assessments provide an overview of the situation in the catchment, draw comparison between Cycle 2 and Cycle 3, and will help support the draft River Basin Management Plan 2022-2027 public consultation process. The third cycle RBMP, which was published in September 2024, aims to build on the progress made during the second cycle. Key measures during the first cycle included the licensing of urban waste-water discharges (with an associated investment in urban waste-water treatment) and the implementation of the Nitrates Action Programme (Good Agricultural Practice Regulations). The former measure has resulted in significant progress in terms both of compliance levels and of the impact of urban wastewater on water quality. The latter provides a considerable environmental baseline which all Irish farmers must achieve and has resulted in improving trends in the level of nitrates and phosphates in rivers and groundwater. It is acknowledged, however, that sufficient progress has not been made in developing and implementing supporting measures during the first and second cycles.

Overall, RBMP assesses the quality of water in Ireland and presents detailed scientific characterisation of our water bodies. The characterisation process also takes into account wider water quality considerations, such as the special water-quality requirements of protected areas. The characterisation process identifies those water bodies that are *At Risk* of not meeting the objectives of the WFD, and the process also identifies the significant pressures

causing this risk. Based on an assessment of risk and pressures, a programme of measures has been developed to address the identified pressures and work towards achieving the required objectives for water quality and protected areas. Data relating to the watercourses in the vicinity of the proposed development site are provided in **Table 10** and the location of these shown in **Figure 9**.

Table 10. WFD Status

Catchment: Shannon Estuary South (HA 24) Subcatchment			
Ballynaclogh_SC_010 subcatchment			
This catchment includes the area drained by the Rivers Deel and Mague and all streams entering tidal water in Shannon Estuary between Kilconly Point and Thomond Bridge, Limerick, draining a total area of 2,033km². The largest urban centre in the catchment is the southern part of Limerick City. The other main urban centres in this catchment are Newcastle West, Charleville, Kilmallock Rathkeale and Mungret. The total population of the catchment is approximately 112,430 with a population density of 55 people per km². This catchment is predominantly lowlying, flat and underlain by limestones with the exception of a few isolated hills. This geology provides a significant groundwater resource in the catchment. The steep scarp delineating the western edge of the catchment denotes an abrupt change in geology to shales, which are found on the high ground along the catchment boundary. <i>2nd Cycle summary</i> There are four river water bodies in this sub-catchment. East Carrig_010 and Ballynaclogh_010 are under REVIEW due to their unassigned status. The remaining two water bodies are AT RISK: Barnakyle_ 010 and Barnakyle_020. The Barnakyle_010 is at Poor ecological status (2013-2015) with the likely driver being nutrients from agricultural activities and also the groundwater influence. IFI note that they have had some small fish kills on Barnakyle_010 which they suspect resulted from the use of herbicides. The Barnakyle_020 is also at Poor ecological status. There was historically an issue with municipal wastewater however this has been remedied through pumping the wastewater to the town. However both baseline concentration and annual average phosphate concentrations remain elevated above the EQS for Good. The significant pressure(s) is unknown and further characterisation is required. Groundwater is likely to be At Risk in central Limerick, so the groundwater risk will need to be reviewed with potential for local catchment assessment. 3rd Cycle Summary			
Waterbody	River Waterbody WFD Status 2019-2024	River Waterbodies Risk	Significant issues (significant pressures)
BARNAKYLE_020	Moderate	At risk	None listed
Mague Estuary	Moderate	At risk	Nutrients (Agriculture)

Source: EPA envision mapping and www.catchments.ie

7.2 Urban Wastewater Treatment Directive

The Wastewater Discharge (Authorisation) Regulations 2007 (S.I. 684 of 2007) gives effect to the requirements of the Urban Wastewater Treatment Directive (Directive 91/271/EEC) and the Water Framework Directive (2000/60/EC) in Ireland. The Urban Wastewater Treatment Directive (UWWTD) lays down the requirements for the collection, treatment and discharge of

urban wastewater and specifies the quality standards which must be met — based on agglomeration size — before treated wastewater is released into the environment.

The priority objective for this river basin planning cycle is to secure compliance with the Urban Wastewater Treatment Directive and to contribute to the improvement and protection of waters in keeping with the water-quality objectives established by this Plan. Achieving this objective entails addressing waste-water discharges and overflows where protected areas (i.e., designated bathing waters, shellfish waters and Freshwater Pearl-Mussel sites) or high-status waters are at risk from urban waste-water pressures.

As part of the proposed development wastewater discharging from the proposed development will be conveyed to the Limerick WWTP (D0013) for treatment prior to discharging into the Shannon Estuary.

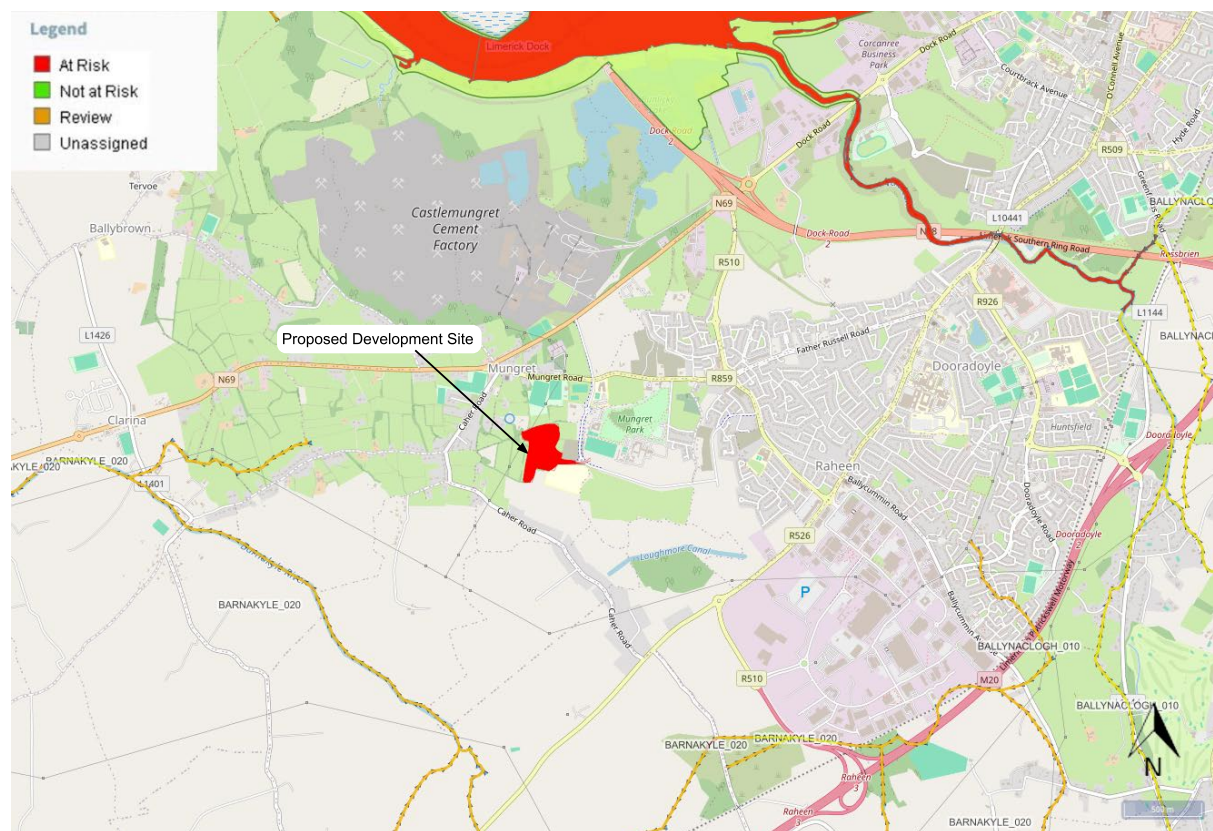


Figure 39. WFD waterbodies in the vicinity of the proposed development WFD Status | Source: EPA Envirovision mapping <https://gis.epa.ie/EPAMaps/> | not to scale

7.3 Hydrological assessment

IE Consulting completed an updated hydrological assessment for the proposed development following this RFI. This considered the existing surface and groundwater water regime of the proposed development site and the wider area, with particular focus on the hydrological and hydrogeological functioning of Loughmore Common Turlough. Following the Request for Further Information, a conceptual cross-section has been developed, extending from the northern boundary of the proposed development site, across the southern part of the site, Loughmore Common Turlough and Loughmore Canal in the south-east.

The interpreted groundwater flow system comprises both local and regional components. Local groundwater gradients suggest groundwater movement towards Loughmore Common Turlough from its immediate surroundings, whereas the broader regional groundwater system is interpreted to flow northwards towards the River Shannon, with this regional gradient likely to be enhanced by the ongoing dewatering of Mungret Quarry.

As part of the proposed development, the existing ground levels will be locally modified and areas of impermeable surface introduced. Consequently, the natural partitioning of rainfall between infiltration and surface runoff would be altered in the absence of appropriate mitigation. To maintain the existing hydrological regime as closely as possible, the proposed development incorporates a comprehensive surface water management strategy based on Sustainable Urban Drainage Systems (SuDS) including permeable paving, swales, tree pits, cellular attenuation, detention basins and other nature-based solutions. These measures are designed to attenuate surface water runoff close to source, promoting infiltration, evaporation and temporary storage, with infiltration to ground continuing as the primary means of stormwater disposal. By promoting infiltration at source, the proposed drainage strategy has been designed to maintain the site's natural hydrological response and groundwater recharge processes. Additionally, the SuDS measures provide water quality treatment and biodiversity benefits.

Groundwater beneath the site is expected to be at approximately 10m OD based on the available monitoring data, which will be at least 4m below ground level at the lowest point. This means that groundwater levels will not interfere with infiltration, even with winter groundwater levels. The revised conceptual understanding indicates that groundwater recharge from the proposed development site may contribute to the local groundwater system associated with the turlough. However, the proposed drainage strategy has been designed to maintain existing groundwater recharge processes. Accordingly, there will be no adverse effect on the hydrological functioning of Loughmore Common Turlough because of the proposed development.

7.4 Hydrogeological assessment

The interpreted groundwater flow system comprises both local and regional components. Local groundwater gradients suggest groundwater movement towards Loughmore Common Turlough from its immediate surroundings, whereas the broader regional groundwater system is interpreted to flow northwards towards the River Shannon, with this regional gradient likely to be enhanced by the ongoing dewatering of Mungret Quarry.

A regional conceptual hydrogeological model, as shown in **Figure 40**, has been developed to illustrate the relationship between the proposed development site, Loughmore Common Turlough, the quarry, and the River Shannon. Following the Request for Further Information, the conceptual hydrogeological model has been revised to reflect the updated understanding of groundwater flow derived from the desk study and the available groundwater monitoring data.

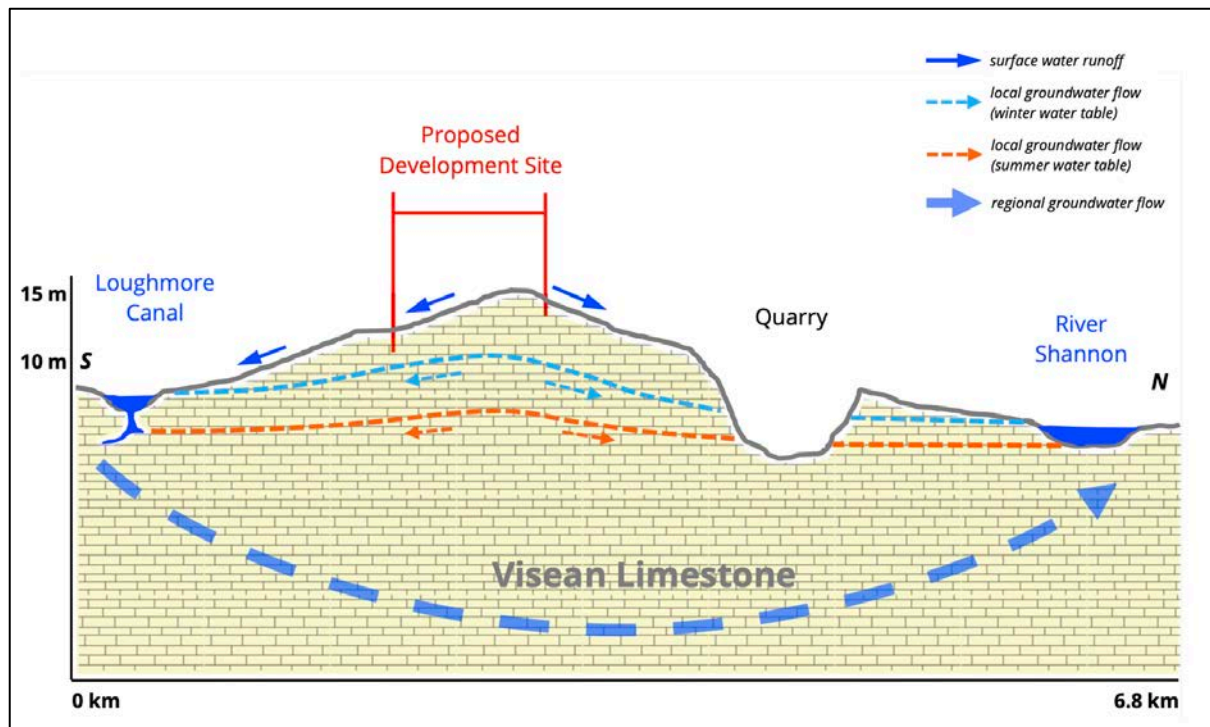


Figure 40. Regional Conceptual Hydrogeological Model | Source IE Consulting

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8. Evaluation of Potential Impacts

8.1 Do Nothing' Impact

The habitats to be affected have been significantly modified from the natural state by human activity. No change of use is predicted in the absence of development. The continued use of the site for agriculture in the absence of the development means that the site would continue to provide locally valuable treelines/hedgerows and woodland areas alongside lower value agricultural habitats. Treelines, hedgerow and woodland would continue to provide locally valuable habitats for fauna.

8.2 Impact Appraisal

When describing changes/activities and impacts on ecosystem structure and function, important elements to consider include positive/negative, extent magnitude, duration, frequency and timing, and reversibility (IEEM, 2018).

Section 3.7 of the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, (EPA 2022) provides standard definitions which have been used to classify the effects in respect of ecology. This classification scheme is outlined below in **Table 10**.

Table 10. EPA Impact Classification

impact characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment.
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative	A change which reduces the quality of the environment.
Significance	Imperceptible	An effect capable of measurement but without significant consequences.
	Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging trends.
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound	An effect which obliterates sensitive characteristics.
Duration	Momentary Effects	Effects lasting from seconds to minutes.

impact characteristic	Term	Description
	Brief Effects	Effects lasting less than a day.
	Temporary Effects	Effects lasting less than a year.
	Short-term	Effects lasting one to seven years.
	Medium-term	Effects lasting seven to fifteen years.
	Long-term	Effects lasting fifteen to sixty years.
	Permanent	Effects lasting over sixty years.
	Reversible Effects	Effects that can be undone.
	Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents.
	'Worst Case'	The effects arising from a development in the case where mitigation measures substantially fail.

According to the EPA (2022), significance of effects is usually understood to mean the importance of the outcome of the effects and is determined by a combination of objective (scientific) and subjective (social) concerns.

The EPA further notes that:

“While guidelines and standards help ensure consistency, the professional judgement of competent experts plays a role in the determination of significance. These experts may place different emphases on the factors involved. As this can lead to differences of opinion, the EIAR sets out the basis of these judgements so that the varying degrees of significance attributed to different factors can be understood”.

With this in mind, the geographic frame of reference applied to determining impact significance by the TII (2009) in Ireland and CIEEM (2024) in Ireland and the UK, has been adopted in this report in tandem with the EPA’s qualitative significance criteria. **Table 11** compares the qualitative versus geographic approaches to determining the significance of effects.

Table 11. Equating the Definitions of Significance of Effects Using a Geographic vs. Qualitative Scale of Reference

Geographic Scale of Significance	Qualitative Scale of Significance of Effects
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(TII, 2009; CIEEM, 2024)	(EPA 2022)
Negligible or Local Importance (Lower Value). No significant effects predicted to significant ecological features.	Imperceptible. An effect capable of measurement but without significant consequences. Not significant. An effect which causes noticeable changes in the character of the environment but without significant consequences.
Local Importance (Higher Value), County, National, Regional, or International.	Slight / Moderate / Significant / Very Significant / Profound i.e. effects can be slight, moderate, significant, very significant, or profound at Local scale, subject to the proportion of the local population/habitat area affected.

The geographic frame of reference can be a good fit to assessments of biodiversity impacts because it allows clear judgements to be made about the scale of significance, with reference to published estimates for the population size of a given species at county, national and / or international scales or areas of habitats at such scales.

The proportion of a known feature impacted at county scale (i.e., 1% of the known or estimated population in a given county) is measurably different from that impacted at national scale (i.e., 1 % of the known or estimated national population).

A non-geographic qualitative approach can be a poor fit to assessments of biodiversity, since the definitions provided for the different qualitative terms do not relate to measurable units of space such as a county or national boundary. For instance, a significant effect is defined by the EPA as “an effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment without affecting its sensitivities”, whilst a very significant effect is that which “by its character, magnitude, duration or intensity significantly.

8.3 Potential Impacts on Designated Sites

8.3.1 European sites

DixonBrosnan prepared a screening for Appropriate Assessment (AA) and Natura Impact Statement (NIS) report (which accompanies this planning application). This report investigated the potential for the proposed development to have significant effects on European sites (SAC/cSAC/SPA) either alone or in combination with other plans or projects. As described in **Section 4.1**, there is no direct natural hydrological connection between the site and the European sites. However, an indirect pathway exists via contaminated runoff or groundwater, onsite infiltration during operation, as well as wastewater discharges. The Stage 1 AA screening report identified the potential for significant effects on Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA arising from the proposed development in the absence of mitigation via impacts on water quality during construction and operation.

A Stage 2 NIS has been prepared to inform and assist LCCC to assess, in view of best scientific knowledge, if the proposed development, individually or in combination with another

plan or project is likely to have a significant effect on the European sites, Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

Mitigation measures are set out in the NIS and they ensure that any effects on the conservation objectives of Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA will be avoided during the proposed development such that there will be no risk of adverse effects on the integrity of these European sites.

It has been objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted effects from the proposed development and with the implementation of the mitigation measures proposed, that the construction and operation of the proposed development will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plans or projects. There is no reasonable scientific doubt in relation to this conclusion. The competent authority will make the final determination in this regard.

8.3.2 National sites

IE Consulting prepared a revised Hydrological and Hydrogeological Assessment to investigate whether the construction or operation of the proposed development could affect Loughmore Common Turlough pNHA. The assessment incorporates a revised delineation of the turlough's surface-water catchment, updated groundwater-flow interpretation and local and regional conceptual hydrological models.

Loughmore Common Turlough is located approximately 440m southeast of the proposed development. The turlough occupies a low-lying topographic depression that is hydraulically connected to the underlying karstified limestone aquifer. It receives water through a combination of direct surface-water runoff, shallow subsurface flow and local groundwater inflow. At a regional scale, deeper groundwater is interpreted to flow generally northwards towards the River Shannon, with this regional gradient likely to be influenced by the ongoing dewatering of Mungret Quarry.

Approximately 0.044 km², equivalent to 3.4% of the proposed development site, lies within the delineated surface-water catchment of Loughmore Common Turlough. Under existing conditions, this area contributes to the turlough through local surface-water runoff and groundwater recharge. Local groundwater gradients beneath the southern part of the development site may also contribute towards the local groundwater system associated with the turlough. The proposed development therefore has the potential, in the absence of appropriate design measures, to alter the existing partitioning of rainfall between surface-water runoff, shallow subsurface flow and groundwater recharge.

The proposed surface-water drainage system has been designed to maintain the existing hydrological response of the site as closely as practicable. Surface water will be managed through an internal collection, treatment, attenuation and infiltration system that will operate independently of the public surface-water network. Runoff will be managed through a SuDS treatment train comprising green roofs, swales, tree pits, permeable paving, raingarden planters, detention basins, attenuation and infiltration tanks and, where required, Class 1 bypass separators.

Infiltration to ground will remain the principal means of surface-water disposal. There will be no permanent or routine surface-water discharge from the proposed development to the public surface-water network or to any watercourse, and the proposed operational discharge rate will be 0 l/s. The closed-ended stand-off manhole will be provided solely to facilitate temporary emergency over-pumping by LCCC during an exceptional emergency and will not form part of the normal operation or design capacity of the drainage system.

Site-specific infiltration testing has confirmed that the underlying soils are suitable for infiltration-based drainage. The attenuation and infiltration system has been hydraulically assessed for the relevant design storm events, incorporating allowances of 30% for climate change and 10% for urban creep. The assessment demonstrates that runoff can be retained and infiltrated within the site without flooding of buildings or transfer of flood risk to adjoining lands.

The aquifer underlying the site is classified as having high to extreme vulnerability in places. Accordingly, surface-water runoff will pass through the required stages of interception, sedimentation, filtration, biological treatment and pollutant removal before infiltration. The Simple Index Approach undertaken for the drainage design demonstrates that the proposed SuDS treatment train provides appropriate treatment for the identified residential land uses. The surface-water infrastructure will also be subject to an inspection and maintenance programme to ensure its continued operation.

During construction, there is potential for accidental releases of suspended solids, hydrocarbons, cementitious materials or other pollutants to enter surface-water runoff or infiltrate to groundwater. The sediment and water-pollution controls specified in the CEMP will prevent uncontrolled discharges and protect the quality of water entering the local hydrological and hydrogeological systems. Wastewater generated during the operational phase will be fully contained within the foul sewer network and conveyed to the public foul sewer for treatment.

The revised hydrological assessment concludes that the proposed infiltration-based drainage strategy will maintain the site's existing groundwater-recharge processes and will not result in a significant change to the quantity of surface water reaching Loughmore Common Turlough. The proposed development is therefore not expected to result in any significant alteration of groundwater-flow patterns, groundwater-recharge processes, water quality or the hydrological functioning of Loughmore Common Turlough pNHA.

The Inner Shannon Estuary – South Shore pNHA and Fergus Estuary and Inner Shannon, North Shore pNHA are associated with the wider River Shannon system. There will be no permanent or routine operational surface-water discharge from the development to the public drainage network or local watercourses. Surface water will instead be treated and infiltrated within the site. Construction-phase pollution controls (as outlined in **Section 11**) the operational SuDS treatment train and the contained foul drainage system will prevent significant deterioration in downstream water quality. Consequently, no significant adverse effects on these nationally designated sites are predicted to arise from the construction or operation of the proposed development.

8.4 Potential Impacts on Flora

8.4.1 Habitats/Rare Species

Impacts on terrestrial habitats are generally restricted to direct removal of habitats. Indirect impacts may occur via damage and disturbance arising from vehicular activities and storage of overburden and materials. Levels of dust during construction are predicted to be low and effectively managed by mitigation. The impact on vegetation in adjoining habitats from wind-blown dust is predicted to be imperceptible. No rare floral species were recorded within the study area. Based on the criteria outlined by EPA (2022) and CIEEM (2024), as described above, the predicted impacts are detailed in **Table 12**.

No Annex I terrestrial habitats or other high value terrestrial habitats will be directly or indirectly impacted. The floral species recorded during the site surveys are common species which are typical of managed grassland and treeline/hedgerow present at the site. No rare species were recorded. The habitats earmarked for removal do not contain specialist flora.

Table 12. Predicted impacts as a result of the proposed development

Habitats	Ecological value (TII guidelines)	Predicted impacts
Hedgerow WL1/Treeline WL2 H01	Local importance (Higher value)	This habitat will be retained as part of the landscape masterplan (SRL). Currently there are gaps along this boundary, in particular along the eastern side where areas have been cleared near an adjoining sports pitch. Existing trees will be retained and protected throughout construction works (See Section 11.5.1). Additional planting will also be included to create a continuous linear feature along the northern boundary. Positive, slight, long-term
Hedgerow WL1 H02 and H03	Local importance (Higher value)	This habitat will be retained as part of the landscape masterplan (SRL). Existing trees will be retained and protected throughout construction works (See Section 11.5.1). Additional tree planting adjoining these areas will also be included to enhance this continuous linear feature along the western boundary. Positive, slight, long-term
Hedgerow WL1 H05	Local importance (Higher value)	This hedgerow will be removed to facilitate site development. This is mature, native hedgerow which provides locally valuable habitat for mammals, birds and invertebrates. Negative, slight, long-term.
Hedgerow WL1 H07	Local importance (Higher value)	This habitat will be retained as part of the landscape masterplan (SRL). Existing trees will be retained and protected throughout construction works (See Section 11.5.1). Neutral, imperceptible, long-term

Habitats	Ecological value (TII guidelines)	Predicted impacts
Hedgerow WL1 H06 AND H08	Local importance (Higher value)	This hedgerow will be removed to facilitate site development. This is mature, native hedgerow which provides locally valuable habitat for mammals, birds and invertebrates. Negative, slight, long-term.
Hedgerow WL1 H09	Local importance (Higher value)	This habitat will be retained as part of the landscape masterplan (SRL). Existing trees will be retained and protected throughout construction works (See Section 11.5.1). Neutral, imperceptible, long-term
Treeline WL2 T1 GROUP 2 ON TREE SURVEY	Local importance (Higher value)	A short section of this treeline will be removed to facilitate site access. This is mature, native hedgerow which provides locally valuable habitat for mammals, birds and invertebrates. Negative, slight, long-term.
Treeline T2 Group 2-9 (Tree Survey)	Local importance (Higher value)	This treeline will be largely retained. A small area of trees will be removed. Negative, slight, long-term.
Improved agricultural grassland GA1	Local importance (Lower value)	This habitat will be removed to facilitate development. Negative, slight, long-term
Mixed broadleaved woodland WD1	Local importance (Higher value)	This habitat will be retained as part of the landscape masterplan (SRL). Existing trees will be retained and protected throughout construction works (See Section 11.5.1). Neutral, imperceptible, long-term
Buildings and artificial surfaces BL1	Local importance (Lower value)	No impact

8.4.2 Invasive Species

No invasive species were recorded during the site survey and no impact from the spread of invasive species is predicted to occur.

8.6 Potential Impacts on Fauna

8.6.1 Bats

During preliminary roost assessment, no trees with potential to support significant bat roosts were recorded within the site boundary. However, emergence surveys were subsequently completed on three trees i.e. T16, T17 and T20. During the emergence surveys of T20, a single bat (most likely Pipistrelle) was recorded emerging from the tree. It is noted that T20 and its adjoining hedgerow (H09) and nearby woodland (WD1) will be retained within the landscape masterplan. As outlined in the Molloy Consulting Engineers plan, PL2534-MEC-

HIG-SWI-DE-EO-00002, there is no lighting proposed in the vicinity of T20 and no light spillage is predicted on this roost location. The adjoining hedgerow will also be retained and protected as part of the project design.

Whilst no bat roosts were detected in any other tree, the presence of occasional bats in semi-mature trees and buildings earmarked for removal cannot altogether be excluded and in the absence of mitigation and therefore direct impacts on bats cannot be ruled out. Mitigation measures during tree felling will avoid direct injury/mortality to bats (See **Section 11.5**). Linear features within the proposed development site boundary provide high value local habitat for foraging and commuting bats. These habitats are also important for linking roost sites outside the site to foraging areas and facilitating the dispersal of bats into the wider landscape. Loss of such habitats affects the ability of bats to travel safely from roosting sites to foraging areas.

During construction, the internal treelines will be removed (H05, H06, H08 and small area of T1). It is noted that Lesser Horseshoe Bat was recorded along H05 during the static bat surveys. This (and other records along H03) appear to indicate occasional foraging of this species within the proposed development site boundary. The proposed development has the potential to result loss of sections of hedgerow used for commuting and foraging, fragmentation of linear features and disruption of ecological connectivity, disturbance and displacement due to increased artificial lighting and increased human activity within the site. In the absence of mitigation, these impacts are considered to be negative, of low to moderate magnitude, and permanent at a local level.

In order mitigate against significant effects over 800m of treelines and hedgerows will be retained. While there will be a loss of habitat for bats in the short-term, the retention of external treeline/hedgerow and the woodland habitat will retain large areas of bat foraging/commuting habitat as well as retain connectivity with the wider landscape. While 257.3 linear metres of hedgerow will be removed, additional planting of 585m² of trees will mitigate against this loss and ensure that a nett biodiversity gain is achieved for foraging/commuting in the medium to long term.

Lighting deters some bat species in particular *Myotis* species and Lesser Horseshoe Bats, from foraging (Azam *et al.* 2018). Studies have shown that illumination levels as low as 0.06 lux can influence the behaviour of bats. Even a full moon night (0.02 lux) can reduce bat activity within more sheltered, darker wildlife corridors and foraging areas (e.g., woodlands). It is noted that *Pipistrelle* species appear to be more tolerant of light and disturbance (Speakman 1991; Stones *et al.* 2009; Haffner 1986). *Leisler's* Bats will also opportunistically feed on such insect gatherings in lit areas (Bat Conservation Ireland 2010). However, it is noted that more recently research suggests that even in light opportunistic foraging species such as Common *Pipistrelle*, foraging activity may be impacted by increased lighting (Hooker *et al.* 2022). The bats which use the proposed development site in greater numbers are more light-tolerant species i.e. *Pipistrelle* and *Leisler's*.

As construction works will largely be confined to daytime hours, lighting during the construction phase will be minimal and there will no impact on foraging bats. However, as a precautionary measure construction lighting mitigation measure have been specified in **Section 11.4** of this report.

Lesser horseshoe bat activity recorded within the site was low, with no suitable roosting sites, no concentrated activity indicative of an important foraging area or regularly used commuting route. While internal hedgerow/treelines will be removed, the existing boundary treelines and hedgerows, which provide one of the suitable linear habitats for this species, will be retained and enhanced as outlined in the SRLA Tree planting plan. The lighting scheme has been designed to avoid direct illumination of boundary vegetation, with illuminance maintained below 1 lux and as close to existing background levels as practicable. Luminaires will be directional, fully shielded and of a warm colour temperature, with lighting confined to those areas where it is required. These measures will retain a continuous, sheltered, low-light corridor around the site. In view of the low level of recorded activity, retention of the principal foraging and commuting habitat and control of artificial light spill, the proposed development is not expected to result in a significant reduction in habitat availability or significantly increase habitat fragmentation for Lesser Horseshoe Bat.

The lighting plan has been designed to ensure there is no significant light spillage outside the site boundary (See Molloy Lighting contour drawing submitted with this application). Lighting levels along retained ecological corridors will be designed to achieve minimal illumination (less than 1 lux), where feasible, in accordance with best practice guidance. Following the low number of Lesser Horseshoe records along the western site boundary, the lighting plan has been redesigned to further reduce light spillage along the western boundary and to retain dark corridors along boundary hedgerows and treelines. These measures will facilitate bat movement and avoid direct illumination of retained habitats, including hedgerows, treelines, and potential commuting routes. This includes avoiding lighting the area of retained woodland and the bat foraging habitat along the western site boundary. Further detail on operational lighting is included in **Section 11.4**.

The impact of the proposed development will be negative and slight in the short to medium term and negative slight to imperceptible in the long-term.

8.6.2 Otter

While Otters are known to wider landscape around Mungret, there are no habitats of value for Otter within the proposed development site. There are no wetland habitats within the site. The onsite treatment, attenuation and infiltration system will avoid routine operational surface-water discharge and will not increase downstream flood risk or result in cumulative deterioration of water quality. Therefore, there will be no impacts on prey availability for Otter as a result of the proposed development.

The proposed development will result in an increase in noise and disturbance during the construction phase during daytime hours. However, given Otter's largely nocturnal habits, ability to move away from short-term disturbance and ability to habituate to anthropogenic noise and disturbance, the impact on Otter during construction will not be significant. The proposed development site is located within an urban edge setting. During operation and occupancy of the dwellings, noise and disturbance is likely to increase. However, given the distance of the proposed from valuable Otter habitats no significant impact to local Otter populations is predicted to occur.

Overall, the impact on Otter is predicted to be neutral, imperceptible and long-term.

8.6.3 Other Mammals

Although the habitats to be directly affected may form part of the territories of various mammal species, they do not provide critical resources and direct impacts on these habitats will be localised and temporary. Increased noise and disturbance is predicted to occur during construction and to a lesser degree during operation. The predicted noise level will not be excessive in the context of normal domestic and road traffic levels.

The proposed development will result in the loss of native treeline/hedgerow habitat and agricultural grassland. However, large areas of the native hedgerows at the site will be retained. Landscape planting includes native hedgerow/treeline planting. As these habitats mature, they will provide alternative foraging and commuting habitat for small mammals such as Hedgehog and Pygmy Shrew. Lighting has been designed to minimise impacts on nocturnal foraging mammals (See **Section 11.4**). The impact on other mammals is predicted to be negative and slight in the short-term, reducing to imperceptible in the long-term at a local level.

8.6.4 Birds

The terrestrial bird species recorded within the proposed development site are typical of the terrestrial habitats onsite and are generally common. A number of rarer species i.e. Barn Owl and Redwing, were recorded overflying/foraging onsite but there is no nesting habitat for these species within the proposed development site.

There will be a loss of hedgerow/treeline habitat and agricultural grassland in the short-term which is likely to increase disturbance and reduce the numbers of birds breeding within the site boundary during the construction works. Some displacement of feeding birds may occur during construction due to increased noise and disturbance. Mitigation measures will be implemented to ensure there is no direct injury/mortality to breeding birds.

Visible human presence and increased noise and lighting may prevent birds from nesting or foraging in retained habitats within or adjacent to the proposed development site. In areas where nesting habitat is retained within the site, operational lighting may impact on breeding birds. During operation, lighting at the site will increase from current levels. However, operational lighting has been designed in line with wildlife lighting guidelines (in compliance with lighting requirements) to minimise impacts of operation lighting on local wildlife.

While the proposed development site is located in proximity to urban areas, existing disturbance levels onsite are currently low. The changes of use of the site, alongside increased disturbance is likely to alter the range and types of birds which use this site. The retention of large areas of treeline/hedgerow and woodland habitat will mean that common urban edge species such as Blackbird, Blue tit, Bullfinch, Chaffinch, Wren etc are likely to continue to use the site during operation. However, more sensitive/specialist species such as Barn owl, Pheasant and Redwing are unlikely to use the site. It is noted that these species are not breeding within the site and therefore, the impacts will be through the loss of foraging habitats only.

Based on winter birds surveys completed in 2025/2026, the proposed development site is not of value for wintering waders and waterfowl and no impact on these species is predicted to occur.

The retention of large areas of native hedgerow/treeline and woodland alongside additional landscape planting will retain and create nesting and foraging habitat for breeding birds in the medium to long-term. While 257.3 linear metres of hedgerow will be removed, additional planting of 585m² of trees will mitigate against this loss and ensure that a nett biodiversity gain is achieved for breeding birds in the medium to long term. Landscape planting includes native hedgerow/treeline and meadow/pollinator friendly planting. As these habitats mature, they will provide alternative foraging and nesting habitat for birds.

Mitigation measures have been specified to ensure there will be no direct or indirect disturbance to nesting Barn owl during construction works. Additional planting along the western boundary will create an additional buffer between the Barn owl nest location and the proposed development site during operation. No potentially disturbing construction activity will be undertaken within 100m of the confirmed Barn Owl breeding site while the nest is active. Full details for mitigation details are included in **Section 11.5.4**.

The impact on terrestrial birds is therefore predicted to be negative and slight in the short-term reducing to negative and slight to imperceptible in the long-term at a local level.

8.6.5 Other species

No signs of amphibians were recorded and there are no wetland habitats within the site boundary. The site is negligible value for amphibians and reptiles. It is noted that swales, which have been included within the surface water design measures, may potentially create habitat for Common frog in the medium to long-term. This would represent an increase in habitat for this species have a positive, slight and long-term impact on Common frog.

The proposed development area is only likely to support common invertebrate species. The use of native tree and meadow planting will encourage invertebrate use of newly planted areas during the operational phase of the development. Given that the habitats which will be affected are relatively common in the surrounding landscape, any impact on these species will be positive, slight and long-term.

9. Potential impact on water quality

9.1 Surface Water Runoff/infiltration

During the construction phase, potential effects on water quality could arise from sediment-laden runoff or accidental releases of cementitious materials, fuels, oils, hydraulic fluids or other construction-related substances. Such pollutants could enter groundwater through infiltration or be transported in surface-water runoff, with potential effects on aquatic and groundwater-dependent habitats.

There are no watercourses within the proposed development site. Loughmore Common Turlough pNHA is located approximately 440m southeast of the site, while the Barnakyle Stream is located approximately 1.5km southwest.

The revised IE Consulting Hydrological and Hydrogeological Assessment identifies both local and regional groundwater-flow components. Local surface-water runoff, shallow subsurface flow and groundwater recharge from the immediate surroundings contribute to Loughmore

Common Turlough, while the deeper regional groundwater system is interpreted to flow generally northwards towards the River Shannon.

Approximately 0.044 km², equivalent to 3.4% of the proposed development site, lies within the delineated surface-water catchment of Loughmore Common Turlough. Under existing conditions, this area contributes to the turlough through local surface-water runoff and groundwater recharge. In the absence of an appropriate drainage strategy, the introduction of impermeable surfaces could alter the existing partitioning of rainfall between runoff and infiltration.

As detailed in **Section 3.4**, the proposed surface-water drainage system has been designed to maintain the existing hydrological response and groundwater-recharge processes of the site as closely as practicable. Surface water will be treated, attenuated and infiltrated within the site through the proposed SuDS system. There will be no permanent or routine surface-water discharge to the public surface-water network or to any watercourse.

Construction-phase sediment and pollution-control measures are set out in **Section 11.1** and the CEMP. These measures will prevent uncontrolled releases of sediment, hydrocarbons, cementitious materials or other pollutants to ground, groundwater or adjoining land. During operation, surface-water runoff will receive treatment through the permanent SuDS treatment train before infiltration.

The proposed infiltration-based drainage strategy is not expected to result in a significant change to the quantity or quality of water contributing to Loughmore Common Turlough. The proposed development will therefore not significantly alter groundwater-flow patterns, groundwater-recharge processes or the hydrological functioning of the turlough.

Subject to implementation of the specified mitigation measures, the effect on water quality and associated ecological receptors is assessed as negative, slight and temporary during construction and neutral to imperceptible and long-term during operation.

9.2 Wastewater Discharges

The proposed development could potentially result in an increase in nutrients discharging to the Shannon Estuary via the Limerick Wastewater Treatment Plant (WWTP). Increased nutrients can potentially impact on estuarine habitats by changing baseline ecological conditions and increasing algal growth, which in turn could impact on feeding success for birds and mammals listed as qualifying interests for the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

Wastewater from the proposed development will be conveyed for treatment to Limerick WWTP. The Limerick agglomeration is served by a wastewater treatment plant with a Plant Capacity Population Equivalent (P.E.) of 186,233. The agglomeration consists of one primary discharge point which discharges to the Shannon Estuary, within the Lower River Shannon SAC.

The WWTP obtained a discharge licence (Reg: D0013-01) from the EPA and has assigned emission limit values (ELV's) for a range of parameters to ensure a high degree of protection to surrounding waters. The discharge licence assigns ELV's for chemical oxygen demand (COD), total suspended solids (TSS), biological oxygen demand (BOD), total nitrogen,

Ammonia, pH and orthophosphate. The ELVs are set based on the full design capacity (P.E. 186,233) and are aimed at providing a high degree of protection to the receiving waterbody and to ensure the receiving waterbody is capable of accommodating the proposed discharge without causing or exacerbating a breach in the relevant standards.

The most recent Annual Environmental Report (AER) for Limerick WWTP was reviewed (AER 2024). The annual mean hydraulic loading is less than the peak Treatment Plant Capacity. The annual maximum hydraulic loading is less than the peak Treatment Plant Capacity.

In relation to ongoing monitoring of water quality, the 2024 AER also noted the following:

- The coastal/transitional ambient monitoring results meet the required EQS. The EQS relates to the Oxygenation and Nutrient Conditions set out in the Surface Water Regulations 2009. The WWTP discharge was compliant with the ELV's set in the wastewater discharge licence.
- Based on ambient monitoring results a deterioration in BOD, E. Coli, Enterococci (Intestinal), ortho-phosphate, and Total Phosphorus concentrations downstream of the effluent discharge is noted.
- A deterioration in water quality has been identified, however it is not known if it or is not caused by the WWTP.
- Other causes of deterioration in water quality in the area are unknown.
- The discharge from the wastewater treatment plant does not have an observable negative impact on the Water Framework Directive status.
- The discharge from the wastewater treatment plant does not have an observable impact on the coastal/transitional water quality.

It is noted that the proposed occupancy of the housing development is approximately 527 PE. In 2024 the agglomeration PE for Limerick WWTP was 141,439PE with remaining capacity of 44,794PE. The additional effluent of the proposed development would increase the agglomeration PE to 141,966PE with a headroom of 44,270PE. A Pre-Connection Enquiry was submitted to Uisce Eireann for the proposed development. The response noted the following on connection to wastewater infrastructure was feasible without infrastructural upgrade.

The addition of the effluent discharge from the proposed development to the Limerick WWTP is well within the operational design capacity. The current discharge does not have an observable negative impact on the Water Framework Directive status of surrounding waterbodies/watercourses.

No significant effects on local water quality from the increased wastewater discharges have been identified and no impact on Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA and Inner Shannon Estuary - South Shore pNHA are predicted to occur.

10. Cumulative Impacts

Cumulative impacts on fauna chiefly relate to increased noise and activity levels and potential impacts on water quality. A planning search Limerick County Council planning portal and An Coimisiún Pleanála was conducted to identify permitted projects in the vicinity of the proposed

development site (August 2026). Projects which, due to their nature or scale were unlikely to result in an in-combination impact, or to which there was no pathway, were excluded.

The following developments were noted. Smaller developments, including one off houses, changes to existing dwellings etc are not listed here.

2660173 Mungret Link Road. Caheranardrish, Mungret A new athletics facility comprising an indoor running track, gymnasium, changing rooms and associated ancillary spaces, along with an outdoor running track, astro-turf pitches with fencing, a car parking area, together with all associated site development works and services such as; appropriate lighting, floodlighting, regrading and landscaping. The proposal also includes the installation of roof-mounted solar photovoltaic panels on the athletics building. This application is currently at Further Information stage.

2561231 Dromdarrig, Mungret Large-scale Residential Development (LRD) comprising of the construction of 169 no. residential units (comprising of 145 no. houses and 24 no. apartments), 1 no. creche, 1 no. pumping station, 3 no. ESB substations and all associated development works including footpaths, cycle paths, car and bicycle parking, drainage, fencing, bicycle and bin stores, lighting and landscaping/amenity areas at Dromdarrig, Mungret, Co. Limerick. Planning permission was granted on the 30th July 2026

- 2660050 Bunlickey, Castlemungret Construction of 5 standalone warehouse blocks with 1 block subdivided into 2 warehouses, 3 blocks subdivided into 3 warehouses and 1 standalone warehouse, ESB Substation, new entrance to existing access roadway, internal roadway network and car parking, Foul and Storm water networks, connection to necessary services and all associated and ancillary site works Further Information Requested 13th March 2026
- 22471 (APB-314013-22) Rathmale Mungret Construction of 21 no. dwellings Granted by ABP 22nd January 2024
- 2360662 (ABP-318797-24) Rathmale Mungret
- Limerick Redevelopment of an existing grass club pitch to provide a synthetic all-weather pitch with associated surface water attenuation, lighting, facility fencing, netting and all associated site development works. Granted by ABP 1st October 2024
- 238004 (Part 8) Loughanleagh Rathmale and Castlemungret Improvement works that comprise of 550m of revised road layout on the N69 and 90m of realigned side road L1403 Decided on 18th September 2023
- 2461282 (ABP-322851-25) Lands at Rathmale Mungret Large-Scale Residential development of 139no. residential units along with the provision of a creche. Granted by ACP 24th September 2025
- 257025 Skehacreggaun Mungret EOD for Planning ref. 20/1115: construction on SITE 2 of 96no. residential units Granted 26th November 2025
- 257026 Skehacreggan Mungret EOD for Planning ref. 20/1115: construction on SITE 2 of 96no. residential units. The modification results in a total of 69 units on the wider site as permitted under ref. no. 20/1115. Modifications to the

permitted scheme under Reg. Ref. 20/1115. No changes are proposed to the permitted entrance, Block 1 apartment block, the creche and associated areas. Granted 26th November 2025

- 267014 Ballykeeffe, Raheen 5-year permission for the construction of 384no. residential units (202no. houses, 182no. apartments), creche and associated site works. Original Planning Ref. No. 22/313124 Granted on 19th March 2026
- 2660245 Ballykeeffe Raheen Co. Limerick Modifications to development previously granted planning permission under Reg. Ref. ABP-313124-22. The modifications for permission consist of development of 58 no. 2 bedroom apartment units, an increase of the overall apartment units within the subject apartment block from 42 no. apartments as permitted previously. Planning permission was granted on the 4th August 2026
- 2561246 Regeneron Ireland DAC, Raheen Business Park Refurbishment and extension of existing outbuildings and construction of an Event Centre building within the associated courtyard, located on the campus of the existing production facility. Planning permission was granted on the 4th August 2026
- 2660084 The IDA Business & Technology Park, Raheen Additions, modifications and alterations to previously permitted Biopharmaceutical Manufacturing Campus (Planning Register Reference Number 22190 and as amended by planning reference 23152 and 2461160). Planning permission was granted on the 25th March 2026.
- 25323893 (ABP-323893-25) Roches Avenue, Raheen Business Park, Limerick. The construction of a new 110/38kV/MV electrical substation and various related elements. Decision due 1st June 2026 The Adare Bypass Phase 1A of the overall Foynes to Limerick Road (including Adare Bypass) Project, will extend between the new interchange junctions at Adare and Croagh (Currently under construction). The Project was awarded to Sisk Sorensen Joint Venture in December 2024, works commenced in January 2025 and the project completion is scheduled for June 2027, ahead of the Ryder Cup at Adare Manor.
- 2660284 the purposes of extraction, conditioning and storage of raw water from Uisce Eireann. 1) Construct a Pumphouse building (ground storey with Internal mezzanine floor) Dimensions - c.12m (W) x 19.9m (L) x 11.2m (H) 2) 2 No. 2000cu.m capacity Purified Water tanks (c.18.0m high x 12.10m diameter) with associated guardrails, external stair access and bridge link across top of tanks 3) 2 No. salt saturation tanks (c.4.85m high x 3.05m diameter) 4) Pipe bridge from proposed Pumphouse to the existing manufacturing facilities 5) Associated site works. Further information was requested on the 22nd May 2026. A range of mitigation measures will be implemented during construction to prevent adverse effects on water quality during construction. The measures to be implemented will effectively prevent any significant runoff of hydrocarbons or excess levels of silt from the individual elements of the project thus ensuring that no in-combination impacts will occur. Furthermore, operational design measures, including SuDS measures will avoid routine operational surface-water discharge and will not increase downstream flood risk or result in cumulative

deterioration of water quality.. No cumulative effects on the Loughmore Common Turlough pNHA or other protected sites have been identified.

- Increases in lighting around the site from other developments (including adjoining playing pitches and schools) can have a negative effect on local wildlife. The lighting plan for the proposed development has considered the location of sensitive ecological receptors in its design i.e. retained areas of trees and woodland within and around the site, to minimise cumulative light spillage within these habitats.

As this proposed development is not predicted to significantly increase long term noise and disturbance levels or impact significantly on water quality, no significant cumulative impacts have been identified.

11. Mitigation Measures

The mitigation measures have been drawn up in line with current best practice and include an avoidance of sensitive habitats at the design stage and mitigation measures will function effectively in preventing significant ecological impacts. The following mitigation measures will be implemented:

An outline Construction Environmental Management Plan (oCEMP) has been prepared (by OSL-Butler Consulting Engineers) for the proposed development and this contains construction mitigation measures, which are also set out in this report.

11.1 Sediment and water pollution control plan

An outline Construction Environmental Management Plan (oCEMP) has been prepared (by OSL-Butler Consulting Engineers) for the proposed development and this contains construction mitigation measures, which are also set out in this report.

All works carried out as part of these works will comply with all Statutory Legislation including the Local Government (Water Pollution) acts, 1977 and 1990. This standard is extremely strict, allowing any entry onto water of deleterious material or polluting matter is an offence. The contractor will co-operate in-full with the Environmental Department of the local authority.

As part of the overall construction methodology, the following issues will be addressed and have been identified as being of particular risk and/or concern to pollution.

Contamination of Watercourse / Groundwater

Although the proposed excavation works will temporarily increase the vulnerability of the underlying aquifer, the thickness of the low permeability subsoil and the shallow depths of excavation involved will minimise the risk to groundwater. There is a risk that ground water could become contaminated with lime from cement which subsequently finds its way into the local adjacent watercourses. The measures proposed to be put in place to mitigate any potential damage from the effluent of contaminated ground water would be to create an exclusion zone, as far as reasonably practicable. Concrete batching will take place off site and wash down and wash out of concrete trucks will take place off site (at authorized concrete batching plant in full compliance with relevant planning and environmental consents).

Concrete trucks, cement mixers or drums/bins are only permitted to wash out in designated wash out area greater than 50m from sensitive receptors including drains and drainage ditches. Abstraction of water from watercourses will not be permitted. Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds.

Sediment & Erosion

Similar to the above, adjacent watercourses/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary positive drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff by the site during construction. A series of geotextile lined cascading, high level outfall, settling basins will be installed upstream of an agreed discharge point (as would be agreed with local authority during construction if and when required) by the appointed contractor. Alternatively, a 'siltbuster' silt control unit can be used on the outfall. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed before water is discharged in a controlled manner an agreed outfall (as would be agreed with local authority during construction if and when required). All inlets to the cascading settling basins will be riprapped to prevent scour and erosion in the vicinity of the inlet. There will be:

- Minimisation of site disturbance
- Implementation of sediment control (as outlined above) audits. This programme and locations of sampling will be agreed with the local authority prior to the commencement of the proposed development.

Discharge Licences

It will not be permitted to discharge into any newly constructed storm water systems or watercourse without adhering to the conditions of the discharge licence and agreeing the same with the Site Manager and Local Authority Area Engineer for implementation.

Over Ground Oil / Diesel Storage

Appropriate safe storage of all by-product and waste materials shall be implemented during the construction works in accordance with this Outline Construction and Environmental Management Plan and the Resource and Waste Management Plan for the works. Only approved storage system for oil / diesel within the site will be permitted, (i.e. all oil / diesel storage to be located within a designated area placed furthest away from adjacent watercourses and contained within constructed bunded areas e.g. placed on 150mm concrete slab with the perimeter constructed with 225mm solid blockwork rendered internally). The bunded area will accommodate the relevant oil / diesel storage capacity in case of accidental spillage. Any accidental spillages will be dealt with immediately on site however minor by containment /removal from site. Surface water runoff from this bunded hardstanding area will discharge to a drain (subject to obtaining an approved discharge license) via a full retention petrol interceptor or to the on-site WWTP. Prior to the interceptor, a silt trap will be installed in order to remove the majority of suspended solids.

Disposal of Wastewater off Site

The construction compound will include adequate staff welfare facilities including foul drainage. Foul drainage discharge from the construction compound will be removed off site to a licensed facility until a connection to the public foul drainage network has been established. The Site Management Team will maintain a record of all receipts for the removal of toilet or interceptor waste off site to ensure its disposal in a traceable manner to an authorised facility. These will be available for inspection by the Environment Section of the local authority at all times.

Road Sweepers / Cleaning

The cleaning of public roads in and around the subject site will be undertaken to reduce environmental impacts and care will be taken to prevent any pollution of watercourses from this activity.

Waste Arisings

Appropriate safe storage of all by-product and waste materials shall be implemented during the construction works in accordance with this Outline Construction and Environmental Management Plan and the Resource and Waste Management Plan for the works.

Construction Stage Dewatering

Appropriate monitoring of groundwater levels during site works shall be undertaken. Standard construction phase filtering of surface water for suspended solids will be carried out. Unfiltered surface water discharges or runoff shall not be permitted

- Minimisation of the potential for erosion
- Prevention of sediment-contaminated water leaving the site

Such measures shall be undertaken as part of the site's discharge licence, when acquired. Temporary mounding and sediment control will be implemented to ensure silts do not enter the existing ditch during the construction stage.

Water quality monitoring

It is proposed to implement a programme for monitoring water quality at the outfall as part of the construction of this development, in agreement with the Planning Authority. Monitoring prior to, during and post construction works of surface water quality shall be undertaken to ensure minimum disturbance of water quality in the receiving environment.

During the construction phase, the monitoring programme will include daily checks, weekly inspections and monthly audits. This programme and locations of sampling will be agreed with the local authority prior to the commencement of the proposed development.

Discharge Licences

It will not be permitted to discharge into any newly constructed storm water systems or watercourse without adhering to the conditions of the discharge licence and agreeing the same with the Site Manager and Local Authority Area engineer for implementation.

Over Ground Oil / Diesel Storage

Appropriate safe storage of all by-product and waste materials shall be implemented during the construction works in accordance with this Outline Construction and Environmental Management Plan and the Resource and Waste Management Plan for the works. Only approved storage system for oil / diesel within the site will be permitted, (i.e. all oil / diesel storage to be located within a designated area placed furthest away from adjacent watercourses and contained within constructed bunded areas e.g. placed on 150mm concrete slab with the perimeter constructed with 225mm solid blockwork rendered internally). The bunded area will accommodate the relevant oil / diesel storage capacity in case of accidental spillage. Any accidental spillages will be dealt with immediately on site however minor by containment /removal from site. Surface water runoff from this bunded hardstanding area will discharge to a drain (subject to obtaining an approved discharge license) via a full retention petrol interceptor or to the on-site WWTP. Prior to the interceptor, a silt trap will be installed in order to remove the majority of suspended solids.

Disposal of Wastewater off Site

The construction compound will include adequate staff welfare facilities including foul drainage. Foul drainage discharge from the construction compound will be removed off site to a licensed facility until a connection to the public foul drainage network has been established. The Site Management Team will maintain a record of all receipts for the removal of toilet or interceptor waste off site to ensure its disposal in a traceable manner to an authorised facility. These will be available for inspection by the Environment Section of the local authority at all times.

Road Sweepers / Cleaning

The cleaning of public roads in and around the subject site will be undertaken to reduce environmental impacts and care will be taken to prevent any pollution of watercourses from this activity.

Waste Arisings

Appropriate safe storage of all by-product and waste materials shall be implemented during the construction works in accordance with this Outline Construction and Environmental Management Plan and the Resource and Waste

Management Plan for the works.

Construction Stage Dewatering

Appropriate monitoring of groundwater levels during site works shall be undertaken. Standard construction phase filtering of surface water for suspended solids will be carried out. Unfiltered surface water discharges or runoff shall not be permitted from the site into the onsite watercourse during the works.

11.2 Surface water drainage works

The drainage infrastructure will be constructed and protected through the following measures:

- Hoarding or fencing to be provided to cordon-off completed infrastructure works: As is standard practice on construction sites, elements of works may be completed on a phased basis. As works are completed and handed over within each phase, this area will be enclosed with hoarding or fencing offset a safe distance from the line of the existing infrastructure and no further excavation works will be allowed within this area unless agreed with site management.
- Contractor to produce as-built construction records of drainage infrastructure. These records will be submitted to the engineer for approval in advance of handover. The as-built records will be reviewed and will need to be approved by the engineer before practical completion can be certified. The as-builts will be used by site personnel as a working record of where drainage infrastructure is located. The locations of these will be recorded on the as-built and will be marked out on the ground in advance of any works commencing in later stages. This methodology will be formally incorporated into a method statement to be completed by the groundworks sub-contractor before excavations commence.
- Marker tape to be provided on top of sewers running through live areas of site: As part of the methodology laying of drainage pipes, drainage works will have marker tape placed at a depth of 300mm above the pipe to warn the excavator and banksman of the service below. It is noted that the placing of marker tape over drainage lines is not a standard construction detail. However, the vulnerability of live drainage infrastructure serving a previous area of development within the proposed site is noted and these measures will form part of the works.
- Site personnel to be informed of works already completed and commissioned: As part of the Safe System of Work Plan (SSWP), site personnel will be made aware of the drainage lines which are in operation. A site- specific method statement will be required in all cases where it is deemed that there is a risk of damaging such services. Those involved in direct management and supervision of site-based excavations require relevant competencies to deliver safety standards on site. They will have health and safety training in order to design safe systems of work that are appropriate to specific site conditions. They will need to prepare clear and simple safety method statements that can be used and understood by site workers. Ongoing checks will be carried out to ensure that appropriate equipment has been provided and is being used correctly.
- Monitoring of excavation and prevention of undermining of infrastructure: Special care will be taken when digging above or close to the lines of services. The locations of these will be marked out on the ground in advance of any excavation being undertaken. The general principles outlined in the Health and Safety Authority document: 'Code of Practice for Avoiding Danger from Underground Services' will be followed to ensure the safety of workers and to minimise the risk of damage to any existing pipelines or buildings.
- Water quality control of discharges to watercourse or drainage network: As detailed within the previous section, adjacent watercourses/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. This includes preventing any sediment laden water from entering the surface water outfalls serving a previous phase of the development. To

prevent this from occurring surface water discharge from the site will be managed and controlled as detailed above for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. Any manholes will need to be securely covered and gullies fitted with a geotextile filter to allow protection of the surface water within the pipe. Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.

11.3 Compound facilities/parking

The compound shall be entirely within the site boundaries. Site accommodation to be provided will include suitable washing / dry room facilities for construction staff, canteen, sanitary facilities, first aid room, office accommodation etc. Access to the compound will be security controlled and all site visitors will be required to sign in on arrival and sign out on departure.

The compound shall be constructed using a clean permeable stone finish and will be enclosed with security fencing. A permeable hardstand area will be provided for staff parking and these areas will be separate from designated machinery/plant parking.

A material storage zone will also be provided in the compound area. This storage zone will include material recycling areas and facilities.

A series of 'way finding' signage will be provided to route staff / deliveries into the site and to designated compound / construction areas.

On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and sent for reuse as by-products or recovery at authorised facilities and the site compound area reinstated in full on completion of the works.

11.4 Lighting

The primary mitigation which will be implemented for this project relates to bats, as these are considered the most sensitive species in relation to night time lighting. It is noted that the mitigation proposed will also lessen in the impact in relation other nocturnal species such as Hedgehog. Potentially lighting associated with the site works could cause disturbance/displacement of Bats and other nocturnal wildlife. If of sufficient severity and duration, there could be impacts on reproductive success. Lighting mitigation measures will follow *Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers* (Bat Conservation Ireland, 2010). The following measures will be applied in relation to construction and operational lighting:

11.4.1 Lighting during construction

Site lighting will typically be provided by tower mounted temporary portable construction floodlights. The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. The following measures will be applied in relation to site lighting:

- Lighting will be provided with the minimum luminosity sufficient for safety and security purposes.

- Lights will be switched off when not in use; and
- Lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors i.e. treeline and woodland used by protected species...
- Works will primarily take place during hours of daylight to minimise disturbance to any nocturnal mammal species.

11.4.2 Lighting During Operation

The most significant positive environmental aspect of the proposed design is the exclusive use of warm white light. This choice is directly aligned with "Best Practice as published by Bat Conservation Ireland & ILP Guidance Note 8 Bats and Artificial Lighting".

Research indicates that shorter wavelength (bluer) light is more disruptive to nocturnal wildlife, particularly bats, by affecting their foraging behaviour, migration patterns, and overall health. By selecting a warmer colour temperature, the design proactively mitigates potential adverse effects on light-sensitive species, demonstrating a responsible approach to ecological conservation within the development area. The following measures have been implemented into the lighting plan:

- Colour Temperature: The consistent use of warm white light throughout the development is a critical ecological mitigation strategy. This demonstrates a commitment to minimizing biodiversity impact from the design stage.
- LED luminaires have been specified due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- Column heights have been carefully considered to minimise light spill. Specialist bollard and ground recessed lighting have been included where possible;
- Lanterns are of the fully cut off type with no light output above the horizontal plane;
- Screening by existing trees and newly planted trees will prevent light spillage onto boundary habitats;
- Exterior lighting will be controlled from a timeclock, daylight sensor and manual switching that will be located within the external mini pillars and
- The lighting layout has been designed to avoid direct lighting on the woodland and along large parts of the western boundary hedgerow. This will minimise lighting disturbance along these habitats. These measures will also ensure there is no light spillage onto the Barn owl nesting habitat to the west of the site.

11.5 Ecology

11.5.1 Protection of habitats

All personnel involved with the project will receive an on-site induction relating to operations and the environmentally sensitive nature of retained habitats onsite as well as the hydrological connection to local waterbodies including their hydrological connections to European and National sites.

All site clearance and landscaping works will comply with current legislative requirements and best practice. All retained trees that are within or close to the working wayleave of the proposed development will be protected in accordance with the requirements of British Standard BS5837:2012 'Trees in Relation to Design, Demolition and Construction' – Recommendations, with protective fencing being installed around all trees to be retained, prior to commencement of development. The planting plans and landscaping proposals will ensure that no invasive species are introduced, either deliberately or inadvertently, to the site from imported materials or other activities. Any licence necessary will be obtained if there could be a significant disturbance of any protected species.

The client will appoint an ecologist who will oversee tree protection measures for the duration of the project. The professional will make regular site visits to ensure continued

Protective fencing

Protective fencing should be erected where required as specified in the tree protection plan and in accordance with BS5837:2012. Fencing is intended as a precaution to prevent accidental damage to the rooting area of retained trees.

- The positioning of any fencing should be agreed and established prior to any construction works or site preparation works taking place.
- Signage indicating 'tree protection area, no construction access' or similar must be affixed to the protective fencing.
- Fencing is not to be removed or repositioned without approval of the project arboriculturist or ecologist.

*Protective barrier specifications (See **Figure 41**):*

1. Standard scaffold poles
2. Heavy gauge 2m tall, galvanised tube & welded mesh infill panels
3. Panels secured to uprights & cross members with wire ties.
4. Ground level
5. Uprights driven into the ground until secure (minimum depth 0.6m)
6. Standard scaffold clamps

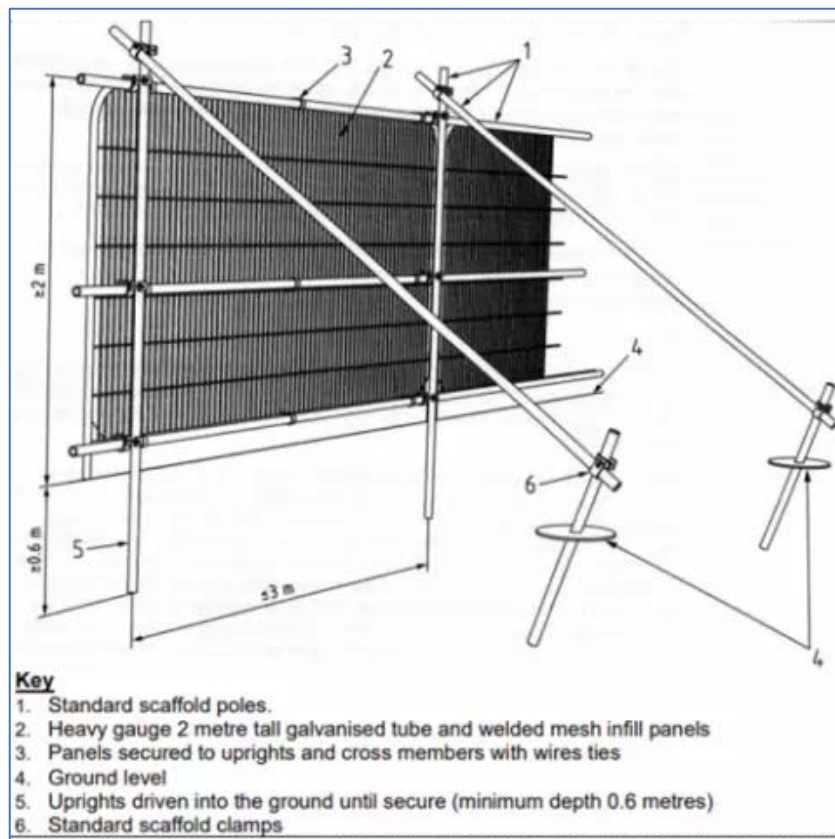


Figure 41. Tree protection fencing

Installation of hard surfacing in proximity to trees

The construction of hard surfaces can impact adjacent trees through direct damage to roots and by limiting the supply of air and water. In order to prevent root damage, excavation, impaction, removal of soil and/or changing soil levels must not be conducted within the RPA of retained trees and hedgerows. The installation of access roads and construction routes and the method of their construction will need to be agreed as part of the construction method statement.

Excavations

Excavation works can commence once the protective fence line is in place. In advance of excavation, the project manager, construction personnel and project arboriculturist or ecologist will identify and determine the extent of the impact of the proposed works and identify any additional mitigation measures to protect retained trees and hedgerows.

The project arboriculturist or ecologist will supervise the pruning of roots which are exposed and damaged during excavation works. The excavated face is to be covered with soil to prevent drying out and death of further root material.

Working within RPAs

If any works are to take place within the RPA, the project arboriculturist or ecologist must be informed so that mitigation measures are agreed upon to limit impact on root, stem and crown of tree.

Site considerations

Throughout the development stages the following must be observed:

- No materials, chemicals, machinery or vehicles are to be stored within the RPA.
- No materials are to be rested against the trunk of trees.
- Burning is not permitted within 10m of RPA or hedgerow.
- Attaching items to any part of a tree is not permitted.
- Washing of machinery run off, concrete, diesel or other contaminants are not to be discharged within 10m of RPA or hedgerows.
- Any damage caused to protective fencing, ground protection, or retained trees must be reported to the site manager without delay.
- The area around trees enclosed by protective fencing must be considered a construction exclusion zone.

The Wildlife Amendment Act 2000 (S.46.1) provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land or such growing in any hedge or ditch from the first of March to the 31st of August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. None the less it is recommended that vegetation be removed outside of the breeding season where possible. In particular, removal during the peak-breeding season (April-June inclusive) should be avoided. Such a timeframe would also minimise the potential disturbance of breeding birds outside of the proposed development site boundary.

A landscape plan has been included with the application with further detail on habitat enhancement measures (SRLA). The plan includes for native treeline and hedgerow planting and meadow areas. There is a strong emphasis on the use of the native trees and hedgerow species. The All Ireland pollinator plan 2021-2025 has greatly influenced the planting palette and soft landscape strategy. This, combined with a selection of native plant species, will define the landscape design. For full details, refer to SRLA Landscape and Green infrastructure report.

11.5.2 Bats

As noted above lighting mitigation measures have taken into account measures outlined in the *Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers* (Bat Conservation Ireland, 2010).

During the site works, general mitigation measures for bats will follow the National Road Authority's '*Guidelines for the Treatment of Bats during the Construction of National Road Schemes*' TII (2005c) and '*Bat mitigation guidelines for Ireland v2*'. Marnell *et al.* 2022). These documents outline the requirements that will be met in the pre-construction (site clearance) stage to minimise negative effects on roosting bats, or prevent avoidable effects resulting from significant alterations to the immediate landscape.

It is noted that a bat roost was recorded within T20. No derogation licence is required on the basis that T20 and its potential roost features will be retained, protected from damage and disturbance, maintained in darkness and provided with continued unobstructed flight access. Should the design or construction methodology change, the licensing requirement shall be reviewed.

No bat roosts were recorded within trees earmarked for removal. However, the presence of occasional roosting bats in mature and semi-mature trees cannot be altogether ruled out. A number of trees will be removed prior to/during construction. The following precautionary measures will be implemented.

- The EcoW will work with the contractor to ensure that trees earmarked for retention are adequately protected.
- Felling will be undertaken in the period September to late October/early November. During this period bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken.
- Felled trees will not be mulched immediately. Such trees will be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. The bat specialist will be on-hand during felling operations to inspect felled trees for bats. If bats are seen or heard in a tree that has been felled, work will cease and the local NPWS Conservation Ranger will be contacted.
- Where possible and no 'tidying up' of dead wood and spilt limbs on tree specimens will be undertaken unless necessary for health and safety.
- Treelines earmarked for retention, but adjacent to tree removal areas and thus at risk, will be clearly marked by an ecologist to avoid any inadvertent damage.

11.5.3 Birds

In order to address this limitation and to ensure compliance with the requirements of the Birds Directive (2009/147/EC), a precautionary approach has been adopted in the assessment. The potential presence of breeding birds within suitable habitats on site has been assumed.

Accordingly, the following mitigation measures are proposed:

- Vegetation clearance will be undertaken outside of the bird breeding season (1 March to 31 August), where feasible;
- Where this is not possible, pre-construction surveys will be undertaken by a suitably qualified ecologist to confirm the absence of active nests;
- Any active nests identified will be protected with appropriate exclusion zones until the nesting cycle is complete.

11.5.4 Barn Owl

A confirmed Barn Owl breeding site is located approximately 25m from the proposed development. It is noted that this area is screened from the development area by mature

treelines, which will be retained and protected throughout construction works (See Section 11.5.1).

The following measures will be implemented throughout construction works to avoid disturbance, displacement or abandonment of the breeding site.

Pre-construction measures

A suitably experienced Barn Owl specialist will inspect the breeding site within two weeks prior to the commencement of any potentially disturbing works in the vicinity of the nest.

The pre-construction survey will confirm:

- o whether the nest remains occupied;
- o whether breeding is underway;
- o the stage of the breeding attempt;
- o the principal nest entrance and flight direction; and
- o the potential for the proposed works to cause disturbance.

Surveys will be undertaken from a discreet distance and will not involve entry into or close inspection of the nest without any licence or consent required from the NPWS.

The precise nest location will be treated as confidential and will only be provided to personnel who require this information.

All relevant construction personnel will receive an ecological toolbox talk prior to the commencement of works. The toolbox talk will address:

- the legal protection afforded to Barn Owls, their eggs, young and occupied nests;
- the location and extent of the protection zones;
- prohibited activities within the protection zones;
- procedures to be followed if a Barn Owl is encountered; and
- the requirement to comply with instructions issued by the EcoW.

Protection zones

No potentially disturbing construction activity will be undertaken within 100 m of the confirmed Barn Owl breeding site while the nest is active. The restriction will remain in place until a suitably experienced Barn Owl specialist confirms that breeding has concluded and any young are no longer dependent on the nest site.

The protection zones will be clearly identified on construction drawings and, where necessary, marked on the ground using temporary fencing or signage.

Fencing and signage will not be positioned in a manner that obstructs the nest entrance or established flight routes.

Timing of works

Potentially disturbing works in the vicinity of the nest will, as far as practicable, be undertaken outside the Barn Owl breeding period.

Potentially disturbing activities include:

- vegetation clearance;
- earthworks and excavation;
- piling and rock breaking;
- road and utility construction;
- operation of cranes and other tall plant;
- use of generators, compressors or other sustained noise sources; and
- night-time working or construction lighting.

Where active breeding is confirmed, works capable of causing disturbance will not commence or continue within the construction sensitivity zone until the Barn Owl specialist has confirmed that:

- the breeding attempt has concluded;
- any young have fledged and are no longer dependent on the nest; and
- the proposed works can proceed without causing disturbance.

September should normally be regarded as the preferred period for commencing potentially disturbing works close to the breeding site, subject to confirmation that the nest is no longer active.

The absence of activity during a single inspection will not be taken as confirmation that the nest is inactive.

Construction-phase controls

An EcoW will oversee implementation of the Barn Owl mitigation measures.

The EcoW will supervise the commencement of works closest to the breeding site and will undertake periodic inspections while construction is underway nearby.

No construction compound, welfare unit, storage area, machinery parking area, refuelling area or waste storage area will be located within the ecological protection zone.

Construction personnel and machinery will not enter the ecological protection zone except where specifically authorised by the EcoW.

No night-time construction works will be undertaken within the construction sensitivity zone while the breeding site is occupied.

No floodlighting or temporary construction lighting will illuminate:

- the nesting structure;
- associated perching locations or
- nearby hedgerows or treelines used as flight routes.
- See **Section 11.4** for lighting mitigation measures.

Operational lighting has been designed to ensure there will be no light spillage onto this area (See Molloy Consulting Engineers reporting).

Monitoring and stop-work procedure

The Barn Owl specialist shall monitor the breeding site where construction is occurring within a distance that could result in disturbance.

Monitoring shall focus on adult access to the nest, feeding activity and any behavioural response to construction.

Indicators of potential disturbance may include:

- repeated alarm calling;
- adults circling or hesitating before approaching the nest;
- aborted approaches;
- prolonged absence from the nest;
- reduced feeding activity;
- displacement from established perches; or
- apparent abandonment of the breeding attempt.

Where evidence of disturbance is recorded, the affected works shall cease immediately.

Works shall not recommence until the Barn Owl specialist has reviewed the activity and confirmed that appropriate additional measures have been implemented.

Additional measures may include:

- increasing the protection zone;
- changing the timing or sequencing of works;
- reducing noise or vibration;
- installing additional visual screening;
- relocating plant or access routes; or
- suspending works until the breeding attempt has concluded.

NPWS shall be consulted where the Barn Owl specialist considers that disturbance cannot be avoided or where there is a risk of damage to the occupied nest site.

11.5.5 Biodiversity enhancement

Biodiversity net gain occurs where a development leaves biodiversity in a better state than before. The principles for biodiversity net gain as outlined in CIEEM (2016) and CIEEM (2019) have been followed throughout the ecology surveys, project design and mitigation measures to ensure that the best outcomes for biodiversity are achieved. The proposed development has avoided removing higher value habitats. Where higher value habitats cannot be avoided the impact on these habitats has been minimised and the loss of these habitats has been compensated for through focused landscape design and mitigation measures. Large areas of high value habitat will be provided within the landscape design, considering the local flora and fauna, to provide biodiversity gain that is valuable locally as well as making important contributions towards regional and national priorities for nature conservation. Overall, the project will enhance ecological connectivity within and outside the proposed development site boundary. Ongoing monitoring of mitigation and design measures will ensure that, where required, these measures can be managed and adapted to secure long-term gains for biodiversity at the site.

The proposed development has been designed to minimise the numbers of mature trees for removal. In total five mature trees will be removed and 14 retained. The woodland habitat 1219m² will also be retained. The proposed development will result in the removal of 257.3m of hedgerow. However, the majority of hedgerow onsite will be retained (808.7m). A proposed 571 new trees will be planted as part of the landscape plan resulting in an increase in tree coverage of 1142m² following development. For full details on biodiversity nett gain calculations see SRLA 20260325_MUN Biodiversity Calculations.

A range of biodiversity enhancement measures have been specified as part of the landscape plan (See SRLA drawings Landscape general plan L-100 for locations). These measures follow biodiversity nett gain principles.

Bats

Given the diversity of bats which use the site, a range of bat boxes have been specified. The boxes have been selected to provide a range of roosting opportunities for different species and colony sizes. They can be sited on existing trees. The boxes will be installed by a supervising ecologist considering relevant factors including foraging resources, commuting routes, future landscape development, and lighting and will be regularly checked for usage as part of an ongoing ecological monitoring programme. The following boxes (or similar) will be installed prior to the commencement of construction works.

Vincent Pro Bat Box

Two Vincent Pro bat boxes will be provided. This box features three vertical chambers of different sizes, providing ideal roosting space for a variety of species. Beneath the crevice entrances is a ladder which provides a rough surface for bats to land. Limited cleaning is required for these boxes as the droppings will fall out of the bottom of the chambers. The front and top of the box are black which helps the box to absorb heat. This bat box can be used by

Leisler's, Common Pipistrelle, Soprano Pipistrelle, Brown long-eared, Natterer's and Whiskered Bat.



Vincent pro bat box



Improved Roost-Maternity Bat Box



Bat Box 1FD



Bat Colony Box 1FS universal



Hedgehog dome



Example of installed Swift bricks in use.



Hedgehog highway example

Improved Roost-Maternity Bat Box

Two improved Roost-Maternity Bat Box will be provided. This box is suitable for larger roosts or maternity groups of the small crevice-dwelling bats such as pipistrelles. This has three separate crevices, each with different temperature characteristics and a wide entrance with accurately sized opening. Ideal for Pipistrelles and deters unwelcome birds etc. Internal ceramic heat sinks ensure improved temperature stability in crevices.

Bat Box 1FD

Two Bat Box 1FD will be provided. Suitable for Pipistrelle and Nathusius' Pipistrelle Bats as well as Daubenton's Bats and Long-Eared Bats. This is especially in mixed bat zones and for initial settlement attempts. The front panel can be removed for inspection and cleaning.

Bat Colony Box 1FS universal

Two Bat Colony Boxes (1FS Universal) will be provided. This type of box is readily used for forming large colonies, by Daubenton's Bats and Brown Long-Eared Bats. Nursery roosts with between 70 and 100 animals are common. Thanks to the large interior and the integrated clinging options, for large numbers of individuals, this type of box is very attractive for forming nursery roosts and for rearing young. The box is suitable as a summer and temporary roost.

Other mammals

Hedgehog boxes/highways.

Hedgehog highways will be provided between the properties to allow free movement of small mammals through the gardens/development. This requires a small hole (c. 13cm by 13cm square) to be included at the base of garden fencing to provide passage for Hedgehogs along the boundary of development site.

Four SCHWEGLER Hedgehog Dome (or similar) will be provided. These will be located under the retained woodland and hedgerow habitats. These will be located adjacent or within suitable habitat but will not be situated near internal or external roads.

This dome encourages Hedgehogs to settle in a particular area and provides year-round shelter, including during the winter months. This will be located somewhere protected from wind and rain. Ideally this will be filled with hay (supplied with the dome) but alternatively use dry leaves and straw, as well as cut up newspaper and wood shavings.

Birds

Swift

The swift is a Red List bird of conservation concern in Ireland because its population has declined by over 40% in the last 15 years. Conservation actions across the country are helping to recover populations. Swifts are faithful to their nest sites. Nest box projects, especially built-in nest boxes, can provide safe long-term homes for new breeding pairs of Swifts.

Commercial Swift nest bricks are made from hollow brick or concrete composite designed to allow access by Swifts and manufactured to modern building regulation standards. They can be integrated into the walls of buildings during the construction phase.

Twenty Swift bricks (Manthorpe Swift Brick or similar) will be installed on the apartment block J of the site under the guidance of a supervising ecologist (See DG Drawing CRECHE AND APARTMENT BLOCK J - SIDE ELEVATIONS). These will be installed following the *Swift Conservation Ireland Guidelines* (2019). These will be placed at least 5m above ground level with an open area of the building i.e., free of overhanging ledges, vegetation, and other obstacles. There will be no directional lighting in the vicinity of this area. Bricks will be positioned in rows to encourage colonial nesting. It is noted that Swift bricks will not overheat in the way that externally fitted boxes do and therefore they can be placed on any aspect of the building.

Swifts look for nest sites at locations with established colonies. Swifts are known to occur in the Mungret area (Source NBDC), although none were recorded during the site surveys. To increase the chances of attracting Swifts to a new nest location, a recording of a Swift call should be played. Swift calls can be broadcast from a small speaker placed as close as possible to the nest box or brick. New nest box sites where no lures are played are less likely to be successful in attracting nesting Swifts. This will be carried out under licence of the National Parks and Wildlife Service (NPWS).



1B Schwegler nest box



1ZA Schwegler wren roundhouses

 Treecreeper FSC Nest Box	 Log pile example
 Examples of insect hotels	 Examples of insect hotels

Swallow/House Martin

Six swallow nest cups and six house martin nest cups will be installed. Details will follow the guidance as per House Martin Conservation UK & Ireland 'Artificial nest cup installation guide'.

- All nest cups will be placed at a minimum height of 3m.
- Nest cups will be installed under the apex, soffits and/or eaves of the buildings.
- Nest cups will have a north, east or westerly aspect.
- House martins and Swallows leave droppings which can be an issue for some households, but they are easily removed with a hosepipe or brush.

Other breeding birds

In order to enhance the site for nesting birds, nesting bird boxes (a range of bird box types) will be installed at the proposed development site. 1B Schwegler nest box will be installed high on retained trees. The 1B nest boxes will be installed at a height of 1.5 metres whilst the large bird nest boxes should be positioned at least 3m in height. 1ZA Schwegler wren roundhouses

will be located in hedgerows, thickets and overgrown areas. The 1ZA will be hung in hedgerows along the northern and western boundaries.

Treecreepers like to nest in narrow gaps or clefts such as behind the bark in mature trees. Many woodlands and gardens do not possess suitable habitats such as these due to changes in woodland management, so the addition of a specialist nest box such as this Treecreeper FSC Nest Box provides an excellent alternative. Treecreeper FSC Nest Box will be provided. This box is manufactured from FSC certified wood and has a hinged lid for inspection or cleaning. The shape of the box is specially designed to be suitable for this particular bird, fitting snugly against a tree trunk with an entrance right next to the bark.

Log Piles/Loggeries

Building invertebrate habitats can provide shelter to many beneficial insects and offer a great foraging habitat for birds and other mammals.

Dead wood is one of the most valuable habitats for urban wildlife. The decline of the availability of deadwood is linked to the decline of many woodland birds due to the loss of foraging opportunities provided by this habitat.

Key points

- Install the logs vertically
- Site the loggery in a shaded part of a site
- Do not use concrete to bed the logs in. The beetles require the logs to be in contact with the soil
- Do not use well-rotted logs as they will have little wood left as food

Thirteen log piles will be installed under retained treeline and woodland habitats using the felled trees at the site. Log piles are suitable for invertebrates, small mammals and birds and can be easily installed in wooded areas of parks or open spaces. They are really just stacks of logs piled up and allowed to rot down. Left undisturbed they will support a good range of biodiversity.

Insect hotels

Nine insect hotels will be installed on meadow grassland areas. Insect hotels are excellent for attracting a wide range of invertebrate species. Perforations allow for insect access and a chamber with bamboo below for solitary bees. This can be positioned anywhere in the site where pollination is to be encouraged. The nesting tubes are ideal for solitary bees to build their nests in, the vertical slots are designed to encourage butterflies, other refuge holes are perfect for ladybirds and lacewings and the pinecones offer an excellent habitat for a range of other species.

Hibernaculae

Eleven hibernacula will be created within the proposed development site. Suitable hibernation areas for both reptiles and amphibians will be created within the proposed receptor site by importing and constructing log piles and bespoke 'reptile and amphibian hibernacula'. These

can be built using logs, piled on top of each other within a stripped area of turf approximately 50cm deep with earth. Soil material, grass cuttings, brash and leaf litter or other suitable natural material should be laid over the top to provide insulation and retain moisture (see Plate 24). Drainage will be taken into consideration when constructing the hibernacula to ensure the structures do not become inundated with water once established. These features would also provide benefits for other species including solitary bees, wasps and saproxylic insects.

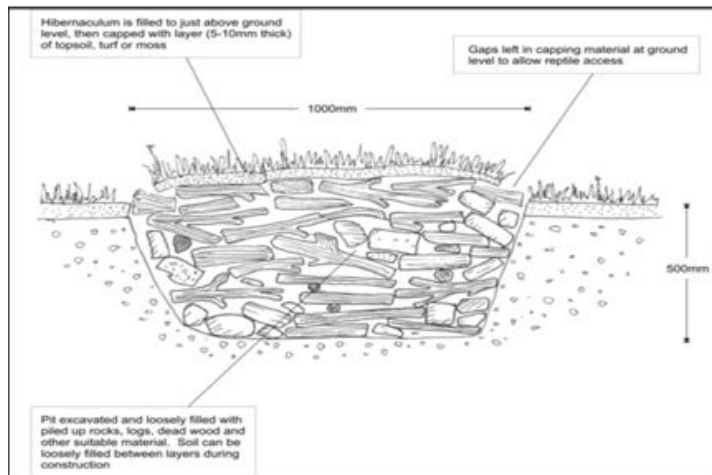


Plate 25. Illustration on how to build a reptile hibernaculum. Source Herefordshire Nature Trust

13. Conclusions

The majority of habitats which will be impacted by the proposed development are low value agricultural grasslands. However, internal treeline/hedgerow habitat, which provides habitat for breeding birds, commuting/foraging bats etc will be removed. All other treelines/hedgerows and woodland and the site will be retained and protected throughout construction and operation of the site.

The trees earmarked for removal of low to negligible potential for roosting bats. However, as a precaution mitigation measures will be implemented during tree removal to ensure there is no direct injury/mortality impacts on bats. A landscape masterplan, including a range of site specific biodiversity enhancement measures, accompanies the current application with a strong emphasis on native planting and ecological connectivity. As the newly planted areas mature they will provide alternative foraging and commuting habitat for bats, birds and other wildlife and increase connectivity with the wider landscape.

The increase in lighting within the proposed development may reduce the bat foraging value of these retained/newly planted habitats. However, operational lighting has been designed to reduce impacts on foraging bats (and other nocturnal wildlife).

Mitigation measures have been specified to ensure there will be no direct or indirect impact on breeding Barn owl.

During construction, there will be increased noise and disturbance which could potentially impact on birds and non-volant mammals. Given the availability of alternative habitat in the vicinity, the impact on birds, non-volant mammals and other wildlife is likely to be slight to moderate and short-term. This impact will reduce to slight in the long-term as native planting matures.

Mitigation measures have been proposed to protected local water quality. No difficulties in the effective implementation of the prescribed mitigation measures have been identified. No impact from the spread of invasive species will occur. Following mitigation, no significant impacts (SACs, SPAs or pNHAs) on designated sites will occur. No adverse effects on the Loughmore Common Turlough pNHA will occur as a result of the proposed development.

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Appendices

Appendix 1. TII 2009 Guidelines

Table 1: Examples of valuation at different geographical scales

Ecological valuation: Examples
International Importance: • 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. • Proposed Special Protection Area (pSPA). • Site that fulfills the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). • Features essential to maintaining the coherence of the Natura 2000 Network.⁴ • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. • Resident or regularly occurring populations (assessed to be important at the national level)⁵ of the following: - o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or - o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. • Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). • World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). • Biosphere Reserve (UNESCO Man & The Biosphere Programme). • Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). • Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). • Biogenetic Reserve under the Council of Europe. • European Diploma Site under the Council of Europe. • Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).⁶
National Importance: • Site designated or proposed as a Natural Heritage Area (NHA). • Statutory Nature Reserve. • Refuge for Fauna and Flora protected under the Wildlife Acts. • National Park. • Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. • Resident or regularly occurring populations (assessed to be important at the national level)⁷ of the following: - o Species protected under the Wildlife Acts; and/or - o Species listed on the relevant Red Data list. • Site containing 'viable areas'⁸ of the habitat types listed in Annex I of the Habitats Directive.
County Importance: • Area of Special Amenity.⁹ • Area subject to a Tree Preservation Order. • Area of High Amenity, or equivalent, designated under the County Development Plan. • Resident or regularly occurring populations (assessed to be important at the County level)¹⁰ of the following: - o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; - o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; - o Species protected under the Wildlife Acts; and/or - o Species listed on the relevant Red Data list. • Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.

- County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, 11 if this has been prepared.
- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):

- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
- Resident or regularly occurring populations (assessed to be important at the Local level)¹² of the following:
 - o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
 - o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
 - o Species protected under the Wildlife Acts; and/or
 - o Species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
- Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (lower value):

- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;
- Sites or features containing non-native species that are of some importance in maintaining habitat links.

⁴ See Articles 3 and 10 of the Habitats Directive.

⁵ It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

⁶ Note that such waters are designated based on these waters' capabilities of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*).

⁷ It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as nationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

⁸ A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

⁹ It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of County importance from an ecological perspective.

¹⁰ It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

¹¹ BAP: Biodiversity Action Plan

¹² It is suggested that, in general, 1% of the local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle

Appendix 2. Loughmore Common Turlough pNHA site synopsis (NPWS)

SITE NAME: LOUGHMORE COMMON TURLOUGH

SITE CODE: 000438

Loughmore Turlough is located about 5km south-west of Limerick City, adjacent to the main Limerick/Cork road (N20) and north of it. It lies in a shallow basin, elongated in an east-west direction, and floods shallowly (30-40cm) in winter.

A variety of plant communities occur, depending on substrate type and degree of wetness. In the western half of the site, and along the eastern shore, the substrate is peaty, and the vegetation is dominated by sedges (*Carex* spp.), with Tufted Hair-grass (*Deschampsia cespitosa*), Marsh Horsetail (*Equisetum palustre*), Tall Fescue (*Festuca arundinacea*), Early Marsh-orchid (*Dactylorhiza incarnata*), Hard Rush (*Juncus inflexus*) and Yellow Loosestrife (*Lysimachia vulgaris*). Some of these species are more commonly associated with marshes than with turloughs. Also unusual is the occurrence of Greater Bird's-foot-trefoil (*Lotus uliginosus*) and Common Fleabane (*Pulicaria dysenterica*), two species which, although relatively more common here than in other regions, have not been recorded at other Irish turloughs. A calcium-rich environment is evident in places, with the occurrence of the moss species, *Campylium stellatum*, in the ground layer.

The flooding area is largely dominated by Common Sedge (*Carex nigra*), with accompanying grasses and herbs such as Silverweed (*Potentilla anserina*), Creeping Bent (*Agrostis stolonifera*), and Creeping Buttercup (*Ranunculus repens*). Wetter areas within the site, e.g. hollows and ditches, support a slightly different vegetation, with Water Horsetail (*Equisetum fluviatile*) and Amphibious Bistort (*Persicaria amphibia*). The vegetation shows a maritime influence with the occurrence of Parsley Water-dropwort (*Oenanthe lachenalii*) and Slender Spike-rush (*Eleocharis uniglumis*). These species are more typically found in upper saltmarsh habitats, and their presence suggests that there may be a slight salt influence in the floodwater, or may be a reflection of the site's location close to the Shannon Estuary.

Standing water on the site is colonised by Water Horsetail, Branched Bur-reed (*Sparganium erectum*), Water-cress (*Nasturtium officinale*) and Broad-leaved Pondweed (*Potamogeton natans*). Small areas of limestone grassland and wet grassland are also present.

The rare plant species, Opposite-leaved Pondweed (*Groenlandia densa*), occurs on the site, as does Meadow Barley (*Hordeum secalinum*). Both of these species are protected under the Flora (Protection) Order, 1999.

Loughmore provides suitable winter habitat for Lapwing and Golden Plover, and Snipe breed here.

The main threats to the site are drainage, agricultural reclamation, pollution and afforestation. Loughmore is apparently drier today than it has been in the past, and it seems that drainage of the surrounding land rather than of the site itself may be the reason. There is evidence that bird numbers at the site may have reduced as a result of the desiccation.

Turloughs are a rare habitat in Europe, and in Ireland are under threat from agricultural intensification. Although affected by drainage, Loughmore is an unusual example of this habitat type. Due to the site's southerly location, its shallowness, its proximity to the sea and some calcium enrichment, the flora of Loughmore includes some unique elements, which enhance the conservation value of this turlough.