

7.0 BIODIVERSITY

7.1 INTRODUCTION

This chapter provides an assessment of the potential ecological effects of the proposed data centre campus development at Toureen, Ennis Co. Clare (refer to Figure 7.1 for location). The proposed development site is approximately 60 hectares. The project will consist of the development of six data hall buildings, offices, a vertical farm, an electrical substation, an energy centre, a transformer compound, undergrounding of circuit cable, associated infrastructure and a number of car parking areas (hereinafter referred to as the proposed development). A detailed description of the proposed development is included in Chapter 2 with the characteristics in relation to biodiversity described in Section 7.4.

The proposed development site is located in the 10km Grid Square R37 at R 37315 79402, east of Ennis. The land within the site comprises mainly of agricultural fields, used for pasture of cattle and sheep. A number of barns and sheds utilised for agricultural use, and four residential houses are also present within the lands. In the north west of the site, a well-established oak-ash-hazel woodland is bordered by the Spancelhill Stream. Toureen Lough lies in the south of the site, with wetland habitats present in the west and north. The field boundaries within the site largely consist of hedgerows, dry stone walls, and treelines. The R352 bounds the proposed development site to the south, with agricultural lands surrounding the north, east and south of the site, and the townland of Ennis to the west.



Figure 7.1 The proposed development in relation to wider surroundings and waterbodies (updated)

The purpose of the report is to:

- Establish and evaluate the baseline ecological environment, as relevant to the proposed development
- Identify, describe and assess all potentially significant ecological effects associated with the proposed development
- Set out the mitigation measures required to address any potentially significant ecological effects and ensure compliance with relevant nature conservation legislation
- Provide an assessment of the significance of any residual ecological effects
- Identify any appropriate compensation, enhancement or post-construction monitoring requirements

Planning, Policy and Legislation

The collation of ecological baseline data and the preparation of this assessment has had regard to the following legislation and policy documents. This is not an exhaustive list but the most relevant legislative and policy basis for the purposes of preparing this Chapter.

The following international legislation of particular relevance to the proposed development:

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora; hereafter, referred to as the 'Habitats Directive'. The Habitats Directive is the legislation under which the Natura 2000 network¹ was established and special areas of conservation (SACs) are designated for the protection of natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of that directive.
- Directive 2009/147/EEC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds; hereafter, referred to as the 'Birds Directive'. The Birds Directive is the legislation under which special protection areas are designated for the protection of endangered species of wild birds listed in Annex I of that directive.
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy hereafter, referred to as the 'Water Framework Directive'. The 'Water Framework Directive' is the legislation requiring the protection and

¹ The Natura 2000 network is a European network of important ecological sites, as defined under Article 3 of the Habitats Directive 92/43/EEC, which comprises both special areas of conservation and special protection areas. Special conservation areas are sites hosting the natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of the Habitats Directive, and are established under the Habitats Directive itself. Special protection areas are established under Article 4 of the Birds Directive 2009/147/EC for the protection of endangered species of wild birds. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats.

In Ireland these sites are designed as *European sites* - defined under the Planning Acts and/or the Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

improvement of water quality in all waters (rivers, lakes, groundwater, and transitional coastal waters) with the aim of achieving good ecological status by 2015 or, at the latest, by 2027.

The following national legislation of particular relevance to the proposed development:

- Wildlife Acts 1976 to 2021; hereafter collectively referred to as the 'Wildlife Acts'. The Wildlife Acts are the principal pieces of legislation at national level for the protection of wildlife and for the control of activities that may harm wildlife. All bird species, 22 other animal species or groups of species, and 86 species of flora are protected under this legislation.
- Planning and Development Acts 2000 to 2021; hereafter collectively referred to as the 'Planning and Development Acts'. This piece of legislation is the basis for Irish planning. Under the legislation, development plans (usually implemented at local authority level) must include mandatory objectives for the conservation of natural heritage and for the conservation of European Sites. It also sets out the requirements in relation to environmental assessment with respect to planning matters, including transposition of the Habitats and Birds Directive into Irish law.
- European Communities (EC) (Birds and Natural Habitats) Regulations 2011 to 2015; hereafter the 'Birds and Habitats Regulations'. This legislation transposes the Habitats and Birds Directives into Irish law. It also contains regulations (49 and 50) that deal with invasive species (those included within the Third Schedule of the regulations).
- *European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003). This legislation transposes the Water Framework Directive into Irish Law.*
- Flora (Protection) Order, 2022. This lists species of plant protected under Section 21 of the Wildlife Acts.
- Plans and policies that are relevant to the proposed development include:
 - National Biodiversity Action Plan 2017-2021 (Department of Culture Heritage and the Gaeltacht, 2017)
 - *Clare County Development Plan 2017 – 2023 (As Varied)* (Clare County Council, 2017) (specific objectives and policies can be found in Chapter 3 of the EIAR)
 - *Clare Biodiversity Action Plan 2017 – 2023* (Clare County Council, 2017)
 - *Clare County Development Plan 2017 – 2023 Variation No. 1*, (Clare County Council, 2019)
 - *The Limerick County Development Plan 2010-2016* (Limerick County Council, 2010)
 - *Shannon Town and Environs Local Area Plan 2012-2018* (Clare County Council, 2018)
 - *The Galway County Development Plan 2015-2021* (Galway County Council, 2015)
 - *The Kerry County Development Plan 2015-2021* (Kerry County Council, 2015)

7.2 METHODOLOGY

7.2.1 Scope of the Assessment

The study area is defined by the zone of influence of the proposed development with respect to the ecological receptors that could potentially be affected.

The Zone of Influence (Zoi), or distance over which potentially significant effects may occur, will differ across the Key Ecological Receptors (KERs), depending on the potential impact pathway(s). The results of both the desk study and the suite of ecological field surveys undertaken have established the habitats and species present within, and in the vicinity of, the proposed development site. The Zoi and study area was then informed and defined by the sensitivities of each of the KERs present, in conjunction with the nature and potential impacts associated with the proposed development.

The Zoi of habitat loss impacts will be confined to within the proposed development boundary.

The Zoi of potential impacts on surface water quality in the receiving freshwater, estuarine and coastal ecosystems associated with waterbodies that are hydrologically connected to the proposed development via the Spancelhill Stream, which is located along the north-western boundary.

The Zoi of air quality effects related to dust deposition is likely to be located within and/or adjacent to the proposed development site boundary.

The Zoi of general construction activities (*i.e.* risk of spreading/introducing non-native invasive species, and disturbance due to increased noise, vibration, human presence and lighting) is not likely to extend more than several hundred metres from the proposed development.

7.2.2 Desk study

A desk study was undertaken in **May 2022** to collate available information on the local ecological environment. The following resources were used to inform the assessment presented in this report:

- Data on European sites, Natural Heritage Areas (NHAs) or proposed Natural Heritage Areas (pNHAs) as held by the National Parks and Wildlife Service (NPWS) from <https://www.npws.ie/protected-sites> and <https://www.npws.ie/maps-and-data> – refer to Appendix 7.1 and Figure 7.5 for descriptions and locations of protected sites in the vicinity of the proposed development
- Records of rare and protected species for the 10km grid square(s), as held by the National Biodiversity Data Centre www.biodiversityireland.ie or the NPWS – refer to Appendix 7.2 for all desk study flora and fauna records
- Spatial information relevant to the planning process including land zoning and planning applications from Department of Housing Planning, Community and Local Government web map portal. Available from <https://myplan.ie/>
- Ordnance Survey Ireland mapping and aerial photography from <http://map.geohive.ie/>
- Data on waterbodies, available for download from the Environmental Protection Agency (EPA) web map service. Available from <https://gis.epa.ie/EPAMaps/>
- Information on soils, geology and hydrogeology in the area available from the Geological Survey Ireland (GSI) online Spatial Resources service. Available from <https://www.gsi.ie/en-ie/data-and-maps/Pages/Groundwater.aspx>
- Information on the conservation status of birds in Ireland from Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021)
- Information on the location, nature and design of the proposed development supplied by the applicant's design team.

- University of Bristol Speleological Society – Irish caves locations. Available from <http://www.ubss.org.uk>
- Clare County Wetlands Survey 2008 (Clare County Council, 2008). Available from <https://wetland.maps.arcgis.com>
- Information contained within the Environmental Impact Assessment Report (EIAR) prepared for the proposed development planning application, including Chapter 3 Planning and Development Context, Chapter 5 Land, Soils & Geology and Hydrogeology, Chapter 6 Hydrology, Chapter 8 Air Quality & Climate, Chapter 9 Noise and Vibration, Chapter 10 Landscape and Visual.
- Site Lighting Analysis Report and Light Spill Modelling Study, produced by Hurley Palmer Flatt (**February 2022**)
- The Construction and Environmental Management Plan, produced by AWN Consulting Ltd. (**February 2022**)
- The Landscape and Biodiversity Management Plan produced by Nicholas de Jong Associates (June 2021)
- The Landscape Design Strategy produced by Nicholas de Jong Associates (June 2021)
- Construction & Demolition Waste Management Plan For A Proposed Development, “Art Data Centre”, produced by AWN Consulting Ltd. (**February 2022**).
- Surface Water and Pollution Management Plan, Art Data Centre, produced by Clifton Scannell Emerson Associates (CSEA), (June 2021).
- *Appropriate Assessment Screening Report for: Art Data Centres, Ennis Campus* (Scott Cawley Ltd., **2022**).
- *Natura Impact Statement for: Art Data Centres, Ennis Campus* (Scott Cawley Ltd., **2022**)

7.2.3 Field survey

Ecological field surveys were carried out following the best practice professional guidelines between June – October 2018, July 2020 - April 2021, and **March 2022**. The surveys and survey dates are presented in Table 7.1.

Table 7.1 Ecological surveys and survey dates

Survey	Survey Date(s)	Surveyor(s)
Habitat surveys	27th July 2018 16th August 2018 8th – 10th July 2020 14th March 2022	Scott Cawley Ltd.
Badger surveys	7 – 9th July 2020 14th March 2022	Scott Cawley Ltd.
Otter surveys	7th – 9th July 2020 14th March 2022	Scott Cawley Ltd.
Breeding bird surveys	25th June 2020 6th July 2020 20th April 2021	Scott Cawley Ltd.
Wintering bird surveys	24th September 2020 20 – 21st October 2020 9th November 2020	Scott Cawley Ltd. and independent ornithologist, André Robinson

Survey	Survey Date(s)	Surveyor(s)
	4th December 2020 24th January 2021 17th February 2021 8th March 2021	
Bat surveys (Specific dates can be found in Table 7.6): Building surveys (internal and external) Static detector activity surveys Walked transect surveys Roost emergence/re-entry activity surveys	6th – 8th July 2020 15th March 2022 July – October 2018 July - October 2020 7th and 16th August 2018 July – August 2020 July – September 2020	Scott Cawley Ltd.

7.2.3.1 Habitats and Flora Survey

Terrestrial and aquatic habitat surveys were undertaken of the proposed development site on the 27th July and 16th August 2018 by Kate-Marie O'Connor B.A. (Hons) M.Sc. and Colm Clarke B.A. (Hons) M.Sc., on the 8th – 10th July 2020 by Siofra Quigley B.Sc. (Hons) M.Sc. and Alexis Fitzgerald B.A. (Hons) M.Sc., and on the 14th March 2022 by Siofra Quigley, following the methodology described in *Best Practice Guidance for Habitat Survey and Mapping*². All habitat types were classified using the *Guide to Habitats in Ireland*³, recording the indicator species and abundance using the DAFOR scale⁴ and recording any species of conservation interest. Vascular and bryophyte plant nomenclature generally follow that of The National Vegetation Database⁵, having regard to more recent taxonomic changes to species names after the New Flora of the British Isles⁶ and the British Bryological Society's Mosses and Liverworts of Britain and

² Smith, G.F., O'Donoghue, P., O'Hora, K. & Delaney, E. (2011) *Best Practice Guidance for Habitat Survey and Mapping*. The Heritage Council Church Lane, Kilkenny, Ireland.

³ Fossitt, J.A. (2000) *A Guide to Habitats in Ireland*. Heritage Council, Kilkenny.

⁴ The DAFOR scale is an ordinal or semi-quantitative scale for recording the relative abundance of plant species. The name DAFOR is an acronym for the abundance levels recorded: Dominant, Abundant, Frequent, Occasional and Rare.

⁵ Weekes, L.C. & FitzPatrick, Ú. (2010) *The National Vegetation Database: Guidelines and Standards for the Collection and Storage of Vegetation Data in Ireland*. Version 1.0. Irish Wildlife Manuals, No. 49. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

⁶ Stace, C. (2019) *New Flora of the British Isles*. 4th Edition. C&M Floristics.

Ireland: A Field Guide⁷. Annex I habitat types were classified after the Interpretation manual of European Union Habitats EUR28⁸ with reference to the corresponding national habitat survey reports and NPWS wildlife manuals, as applicable. The nomenclature for Annex I habitats follows that of the Interpretation manual of European Union Habitats EUR28 with abbreviated names after those used in The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview⁹. Relevés (*i.e.* sampling points of a defined size) were also taken within the following areas of habitats in order to determine whether or not they conformed to Annex I habitats:

- Species-rich dry calcareous and neutral grassland (GS1)
- Wet grassland (GS4)
- Reed and Large Sedge Swamps (FS1)
- Riparian woodland (WN5)

The relevé size was 2m² for all habitats except woodland habitats, which were sampled using a 10m² relevé, and information collected included the following:

- A list of all plant species present along with their associated percentage cover;
- A habitat condition assessment based on criteria which were drawn from the national surveys of this Annex I habitat conducted on behalf of NPWS (*i.e.* Long et al., 2018; Martin et al., 2018; O'Neill et al., 2013; Perrin et al., 2014; Wilson & Fernández, 2013); and,
- Notes on the threats and/or management of the overall surrounding area. Where applicable, the Annex I habitat was also assigned to a vegetation community.

7.2.3.2 Fauna Surveys

Terrestrial Mammals (excl. Bats)

A terrestrial fauna survey (excluding bats) was undertaken on the 7th to 9th July 2020 and on the 14th March 2022 by Siofra Quigley B.Sc. (Hons) M.Sc. The presence/absence of terrestrial fauna species were surveyed through the detection of field signs such as tracks, markings, feeding signs, and droppings, as well as by direct observation. The habitats on site were assessed for signs of usage by protected/red-listed fauna species, and their potential to support these species. Surveys to check for the presence of badger *Meles meles* setts and otter *Lutra lutra* holts within the study area, and to record any evidence of use, were undertaken. Indirect method of surveying for red squirrel *Sciurus vulgaris* and pine marten *Martes martes* were also undertaken, which included checking tree canopies for the presence of potential dreys and dens.

Infra-red motion-activated cameras were deployed in areas of suitable habitat to confirm usage of certain mammal species, specifically for badger, pine marten, and red squirrel within the woodland habitat in the north west, and to determine usage of Spancelhill Stream for foraging/commuting otters in the north west (under NPWS

⁷ Atherton, I., Bosanquet, S. & Lawley, M. (2010) Mosses and Liverworts of Britain and Ireland: A Field Guide. Latimer Trend & Co., Plymouth.

⁸ CEC. (Commission of the European Communities) (2013) Interpretation manual of European Union Habitats EUR28. European Commission, DG Environment.

⁹ NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report.

Licence No. 007/2020). These cameras were deployed for a period of 27 nights between 23rd September – 20th October 2020. The mammal ledge located in the west of the site in the culvert beneath the M18 Motorway was also checked for signs of otter or other mammal usage during surveys carried out along the Spancelhill Stream in 2020 and 2022.

Breeding Birds

Breeding bird surveys were undertaken on the 25th June and 6th July 2020 by Shea O’Driscoll B.Sc. (Hons) M.Sc., and on the 20th April 2021 by Shane Brien B.Sc. M.Sc. using a methodology adapted from the *Bird Monitoring Methods - A Manual of Techniques for Key UK Species*¹⁰ (see Table 7.2 for more details) The study area covered the lands within the proposed development site, which were slowly walked in a manner allowing the surveyor to come within 50m of all habitat features. Birds were identified by sight and song, and general location and activity were recorded using the British Trust for Ornithology (BTO) species and activity codes. Buildings and barns within the proposed development site were also checked for nesting barn swallows *Hirundo rustica*, house martins *Delichon urbicum* and barn owls *Tyto alba*.

Table 7.2 Breeding bird survey details

Date (Sunrise)	Survey Time	Weather Conditions
25/06/2020 (05:12)	05:00- 08:00	Mild, partly sunny weather with temperatures around 16°C.
06/07/2020 (05:20)	05:15- 08:30	Mild, sunny, dry weather with temperatures around 14°C and light breeze.
20/04/2021 (06:26)	06:45- 10:45	Humid day, moderate, wet conditions from rain the day before, overcast (cloud 7/8), slight breeze, temperatures around 9°C.

Wintering birds

Wintering bird surveys were undertaken once a month during the period of September 2020 and March 2021 by Shane Brien B.Sc. (Hons) M.Sc. and Niall McHugh B.Sc. (Hons) both of Scott Cawley Ltd, and André Robinson, an independent ornithologist, using a methodology based on the *Bird Monitoring Methods - A Manual of Techniques for Key UK Species*. The study area covered the lands within the proposed development site within the red line boundary and the area under land ownership to the east of the site (not within the red line boundary). Lands were initially surveyed visually using binoculars/scope from a vantage point(s) at the edge of the study area followed by a walkover of the area to identify birds which may not be visible from a distance (e.g. waders) and evidence of usage by wildfowl such as swans or geese (*i.e.* droppings). Birds were identified by sight and general location and activity. They were recorded using the British Trust for Ornithology (BTO) species and activity codes.

Hen harrier

Vantage point surveys for the presence of hen harrier were carried out in accordance with best practice guidelines *Raptors – a Field Guide to Surveys and Monitoring*

¹⁰ Gilbert, G., Gibbons, D.W. & Evans, J. (1998) *Bird Monitoring Methods - A Manual of Techniques for Key UK Species*. RSPB: Sandy

(*Second Edition 2009*) (Hardey *et al.*, 2009)¹¹. The habitats within the site were assessed for suitability for roosting and/or foraging hen harrier. Suitable wintering roosting and foraging habitat was identified within the east of the site, where the wetland/swamp habitats were located. A suitable vantage point was determined that appropriately covered the area identified as potential wintering roosting and foraging habitat. This area was surveyed for two hours at dusk, during monthly visits between September 2020 and March 2021. The site is not suitable as foraging habitat during the breeding season, as this typically occurs on moorlands and young forestry plantations^{12,13,14}.

Table 7.3 Wintering bird and hen harrier survey details

Survey type	Date (Sunrise/sunset)	Survey Time	Weather Conditions
Wintering bird	24/09/2020 (07:25)	08:00- 12:35	Dry, overcast weather with a slight breeze. Temperatures between 8°C and 14°C.
Hen harrier	24/09/2020 (19:29)	18:25 – 20:00	Dry, 50% cloud cover, strong winds blowing in a westerly direction. Temperature of 11°C.
Wintering bird	21/10/2020 (08:14)	08:00- 15:15	Overcast with light breeze and occasional showers. Temperatures of 9 - 12°C.
Hen harrier	20/10/2020 (18:29)	17:05- 18:48	Overcast with intermittent showers and north west moderate breeze. Temperatures of 10 - 13°C.
Wintering bird	09/11/2020 (07:49)	08:00- 15:30	Overcast with east-south easterly winds. Temperatures of 11°C.
Hen harrier	09/11/2020 (16:50)	15:30- 17:35	Overcast with slight winds in south easterly direction. Temperatures of 10°C
Wintering bird	04/12/2020 (08:30)	08:30- 15:00	North westerly winds, mostly overcast with temperatures between 4-5°C. Shower of rain in last hour of survey.
Hen harrier	04/12/2020 (16:22)	15:00- 17:00	Force 4 winds, with constant rain. Temperature of 4°C.
Wintering bird	24/01/2021 (08:35)	08:15- 15:30	Southerly, light winds, partially overcast with temperatures of 2-3°C.
Hen harrier	24/01/2021 (17:06)	15:45- 18:00	No rain, light winds, with temperatures of 2-3°C.

¹¹ Hardey J, Crick H, Wernham C, Riley H, Etheridge B and Thompson D (2009) *Raptors: A Field Guide to Survey and Monitoring*, 2nd Edition. TSO, Edinburgh.

¹² Ruddock, M., Mee, A., Lusby, J., Nagle, A., O'Neill, S. & O'Toole, L. (2016). *The 2015 National Survey of Breeding Hen Harrier in Ireland*. Irish Wildlife Manuals, No. 93. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Ireland.

¹³ Barton, C., Pollock, C., Norriss, D.W., Nagle, T., Oliver, G.A. & Newton, S. (2006). *The second national survey of breeding hen harriers Circus cyaneus in Ireland 2005*. Irish Birds 8: 1-20.

¹⁴ Norriss, D.W., Marsh, J., McMahon, D. & Oliver, G.A. (2002). *A national survey of breeding hen harriers Circus cyaneus in Ireland 1998-2000*. Irish Birds 7: 1-10.

Survey type	Date (Sunrise/sunset)	Survey Time	Weather Conditions
Wintering bird	17/02/2021 (07:49)	08:15-15:45	Westerly winds, mostly overcast with temperatures of 6-8°C.
Hen harrier	17/02/2021 (17:52)	16:15-18:45	West south west winds, mostly dry with intermittent light showers. Temperatures of 6°C.
Wintering bird	08/03/2021 (07:06)	08:00-16:45	North-easterly light winds, overcast with no rain. Temperatures between 6-9°C.
Hen harrier	08/03/2021 (18:23)	17:15-19:15	Intermittent drizzle with light winds. Temperature of 8°C.

Bats

Building and tree surveys

A ground-level assessment of trees, structures and buildings within the subject lands, to examine their suitability to support roosting bats and potential to act as important landscape features for commuting/foraging bats, was based on guidelines (see Table 7.4) in *Bat Surveys for Professional Ecologists: Good Practice Guidance* (Collins ed., 2016) and included inspections of trees, structures and buildings for potential roost features (PRFs), and for signs of bats (staining at roost entrances, droppings, carcasses, insect remains). This included internal access of barns and outbuildings to assess for the actual presence of bats, and for evidence as described above. Residential buildings were unable to be accessed due to Covid 19 restrictions, however all buildings were assessed externally, and barns/farm buildings were assessed internally and externally. Building and tree surveys were undertaken during surveys carried out in 2018, 2020 and 2022.

Table 7.4 Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape, applied according to professional judgement. (Collins (2016))

Suitability	Description Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for

Suitability	Description Roosting habitats	Commuting and foraging habitats
	type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	<p>Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge.</p> <p>High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, treelined watercourses and grazed parkland.</p> <p>Site is close to and connected to known roosts.</p>

Transect surveys

Two extended dusk and one all night bat activity walked transect surveys were undertaken within the subject lands. The extended dusk surveys commenced 15 minutes before sunset and lasted for approximately two hours. One full night survey was also undertaken from 15 minutes before sunset, until just before sunrise. This full night survey was carried out to determine how bats use the proposed development site throughout the night. Details of dates, timings, weather, and other details are shown in Table 7.5 below. Two routes were walked by two surveyors during each visit, the routes are illustrated on Figure 7.2. The focus of the routes was to survey linear vegetation features and field boundaries. However, this was also dependent on access between fields. Direct observations of how bats use the landscape were recorded, and handheld ultrasound detectors (Elekon Batlogger M) were used to identify the bat species by their calls. Data generated from the transect surveys was analysed using Elekon BatExplorer software, whereby calls were identified to species level (where this was possible), through professional judgement and with reference to *British Bat Calls: A Guide to Species Identification* (Russ, 2012). Transect surveys were undertaken in 2018 and 2020, however in 2018, two dusk transects were carried out, and in 2020 two dusk surveys and one full night survey were undertaken.

Table 7.5 Details of transect surveys undertaken within the proposed development site.

Date (Sunset/Sunrise)	Survey Time	Survey Type	Weather Conditions
08/07/2020 (22:00)	21:47- 23:39	Dusk transect survey	Mild, wet weather with temperatures around 16°C and light breeze. Overcast with light to moderate rain throughout the night.
28-29/07/2020 (21:35/05:20)	21:20 – 05:00	All night transect survey	Dry and partially overcast, with temperatures between 13 - 14°C.
18/08/2020 (20:55)	20:42 – 22:31	Dusk transect Survey	Dry, mild partly cloudy weather with temperatures around 16°C and light breeze.



Figure 7.2 Indicative transect routes walked within the site (updated)

Automated static detectors

The walked transect surveys were supplemented by automated static bat detectors (i.e. Song Meter SM2). This use of static bat detectors at a fixed location for an extended period of time increases the likelihood of recording lesser horseshoe bats present on site compared to walked transects only. Detectors were deployed for a minimum period of 8 nights at 15 different locations within the subject lands between the 6th July and 20th October 2020. Locations of these deployments were chosen with an emphasis on areas identified as being potentially suitable for commuting and/or foraging bats, whilst also ensuring the site was covered as best as possible. Locations of the deployed static detectors can be found in Figure 7.3. Once the detectors had been deployed for a minimum of 7 nights, they were collected, and the data was analysed using Kaleidoscope bat analysis software. This software identifies each individual bat call recorded by the detectors, which can then be used to identify the calls by species.

The average number of calls recorded per night for each species was calculated for each individual static detector. These averages were then examined against the transect survey results, and based on this analysis the features, which are important for commuting and/or foraging bats within the proposed development boundary, were identified. 14 static detectors were also deployed in 2018, in similar positions to 2020.



Figure 7.3 Locations of deployed static bat detectors (updated)

Roost emergence/re-entry activity surveys

A number of bat roost emergence/re-entry activity surveys were undertaken at six buildings and 10 structures within the lands by surveyors who are experienced in bat activity surveys. The surveys were designed with reference to methodologies in *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn.) (Collins, 2016), survey details and map showing building locations are provided in Table 7.6 and Figure 7.4. Observations of bat activity were recorded, with data generated from the surveys analysed using Elekon BatExplorer software, whereby calls were identified to species level (where this was possible), through professional judgement and with reference to *British Bat Calls: A Guide to Species Identification* (Russ, 2012). Roost emergence/re-entry surveys were only carried out in 2020.

Table 7.6 Details of emergence/re-entry bat surveys undertaken within the proposed development site

Building ID Number	Building suitability, surveyed internally/externally	Number of emergence/re-entry surveys	Date of surveys	Survey time (sunset/sunrise)	Weather Conditions
BB 1A and 1B	Low Internals carried out on BB 1A, unable to carry out internals on BB 1B due to safety concerns. Externals carried out on both	2 (1 dusk, 1 dawn)	09/07/2020	21:47 – 23:37 (21:59)	Dry, clear skies, temperatures between 12 - 14°C.
			19/08/2020	04:54 – 06:24 (06:24)	Dry, overcast, light breeze with temperatures of 17°C.

Building ID Number	Building suitability, surveyed internally/externally	Number of emergence/re-entry surveys	Date of surveys	Survey time (sunset/sunrise)	Weather Conditions
BB 2	Moderate Externals only carried out	2 (1 dusk, 1 dawn)	10/07/2020	03:22 – 05:22 (05:24)	Clear, dry night with no wind, temperatures between 12 - 14°
			21/09/2020	19:20 – 21:02 (19:37)	Dry, overcast with no wind, temperatures of 15°C
BB 3	High Externals only carried out	3 (2 dusks, 1 dawn)	07/07/2020	21:47 – 23:37 (22:00)	Overcast, light to heavy rain with no wind, temperatures of 15 - 16°C
			31/07/2020	04:20 – 05:51 (05:53)	Overcast, light rain with no wind, temperatures of 17°C
			19/08/2020	20:39 – 22:22 (20:52)	Overcast, no rain, light breeze, temperatures of 19°C
BB 4A, 4B, 4C, and 4D	Low Internals and externals carried out	1 (dusk)	06/07/2020	21:47 – 23:30 (22:01)	Light rain, overcast with no wind, temperatures of 15 - 17°C
BB 5A and 5B	Moderate (3 surveys undertaken due to poor survey conditions on first survey) Externals carried out on both, internal on BB 5B.	3 (2 dawns, 1 dusk)	27/07/2020	21:18 – 23:10 (21:36)	Overcast, with heavy rain for brief period during survey then dry for rest of survey, no wind, temperatures of 13 - 15°C
			18/08/2020	04:53 – 06:24 (06:23)	Overcast, no rain, light winds, temperatures of 16 - 17°C
			22/09/2020	05:24 – 07:25 (07:22)	Clear skies, no rain or wind, temperatures of 11 - 13°C
BB 6A, 6B, and 6C	Low Externals and internal surveys carried out	1 (dawn)	28/07/2020	03:47 – 05:48 (05:48)	Overcast, light rain, no wind, temperatures of 12 - 13°C
BB 7	Moderate (3 surveys undertaken due to	3 (2 dusks, 1 dawn)	29/07/2020	21:16 – 22:56 (21:33)	Overcast with light to moderate rain, gusty winds,

Building ID Number	Building suitability, surveyed internally/externally	Number of emergence/re-entry surveys	Date of surveys	Survey time (sunset/sunrise)	Weather Conditions
	poor conditions) survey				temperatures of 15°C
	External and internal survey carried out		21/08/2020	04:55 – 06:22 (06:28)	Overcast, no rain, moderate winds, temperatures of 15°C
			22/09/2020	19:24 – 21:00 (19:34)	Overcast, no rain or wind, temperatures of 13°C
BB 8	Moderate External only survey	2 (2 dawns)	30/07/2020	04:20 – 06:05 (05:51)	Overcast, light rain, no wind, temperatures of 16 - 19°C
			23/09/2020	05:54 – 07:20 (07:24)	Clear skies, light rain towards the end of the survey, no wind, temperatures of 11 - 12°C
BB 9	Moderate External only survey	2 (2 dusks)	30/07/2020	21:20 – 23:01 (21:31)	Overcast, dry, with no wind, temperatures of 16 - 17°C
			23/09/2020	19:20 – 21:03 (19:31)	Clear skies, dry, no wind, temperatures of 8 - 12°C



Figure 7.4 Location of buildings surveyed and associated ID number (*updated*)

Amphibians and Reptiles

A survey for suitable habitat for amphibians and reptiles was undertaken during surveys in July 2020. Suitable habitat for amphibians, such as ponds and wet ditches, and reptiles, such as habitats with stone walls, rocks or logs suitable for basking, were recorded and mapped, as well as any direct observations of individuals.

Survey limitations

Occupied residential houses (*i.e.* BB 2, BB 3, BB 5, BB 8 and BB 9) could not be surveyed internally for the presence of roosting bats due to health and safety concerns associated with COVID-19. The absence of an internal inspection does not compromise the assessment of the structure's potential to support roosting bats as buildings that were assessed as having moderate potential (according to BCT guidelines), had at least two emergence/re-entry surveys within the active bat season and during optimal survey conditions.

A number of surveys experienced poor weather during surveys, *i.e.*, bat surveys, and wintering bird surveys, which could have implications for results. Any bat activity surveys that experienced poor weather, were repeated when weather had improved. For wintering bird surveys, the visibility was considered acceptable for all surveys undertaken. Therefore, bad weather is not considered a limitation.

Bat hibernation surveys were not undertaken within this site, as the majority of buildings with suitability for hibernation, will be retained within the development. There were no suitable roosting sites for lesser horseshoe bat which roost in caves during hibernation. The barns/sheds are not suitable for hibernation for any bat species and will be removed as part of the development. However, one building (BB 7) which does

have low hibernation potential will be removed, and as pipistrelle bat species can use buildings as winter roosting sites, a precautionary approach is employed, with any removal of buildings requiring mitigation measures to check for bats pre-demolition. Whilst a hibernation survey was not carried out on BB 7, the features suitable for hibernating bats were inaccessible and could not be inspected. This is not considered a limitation as mitigation measures have been included.

Five of the 15 statics were deployed in late September which would be considered late in the season. However, weather conditions during September and October 2020 were unseasonably mild and as such, it was considered that all static deployments were undertaken in suitable conditions for recording bat activity. As 2018 surveys included static detector surveys, two seasons of bat activity (2018 and 2020) within the site have been carried out, providing a robust baseline. Whilst surveys carried out in 2018 are considered out of date in the context of guidelines (CIEEM, 2019), results from 2018 are included to provide a better understanding of bat usage of the proposed development site. Bat surveys in April and October, where they meet certain weather conditions and temperature requirements, are also considered acceptable within BCT guidelines.

Although a lot of the routes walked during transects did not pick up any calls, the difficulty in picking up brown long-eared bat calls during transect surveys due to their quiet echolocation calls and late emergence, may have impacted the results from transect surveys. However, this is not considered to be a limitation as a more accurate description of how brown long-eared bat use the lands can be predicted from the static detector deployments.

The surveys for amphibians in July 2020 included habitat suitability assessment surveys only. Common frog surveys are typically carried out in February and March and include searches for their spawn, whereas smooth newt surveys include specialist surveys involving trapping and/or night-time torching of suitable waterbodies between March and June. The aforementioned factors are not considered to pose any limitation on the ecological assessment as a precautionary approach is employed and any suitable habitat is assumed to contain these species and mitigated for appropriately.

Specific fish and invertebrate surveys were not undertaken within the proposed development. However, this is not considered to be a limitation to the assessment as a precautionary approach is applied and it is assumed any suitable habitat identified could hold populations of species based on local records.

Despite the limitations noted above, sufficient survey data was gathered to fully inform the assessment of impacts, the mitigation measures described in this report and the assessment of residual impacts predicted in relation to the proposed development.

7.2.4 Consultations

The following organisations with relevance to ecology were consulted:

- The National Parks & Wildlife Service (NPWS) section of Department of Housing, Local Government and Heritage (formerly Department of Culture, Heritage and the Gaeltacht)
- The Vincent Wildlife Trust

A summary of these consultations with relevance to Appropriate Assessment is provided in Table 7.7 below.

Table 7.7 *Ecological issues raised during consultations.*

Consultee	Date of Consultation	Issues Raised	Relevant Section of the NIS where this is addressed
NPWS - Department of Housing, Local Government and Heritage (formerly Department of Culture, Heritage and the Gaeltacht)	15/01/2021	<p>NPWS raised concerns regarding light spill from the proposed development on important ecological features for commuting and/or foraging bats, specifically in relation to lesser horseshoe bat, and that a light spill model would be a key factor in informing mitigation.</p> <p>NPWS highlighted the critical timing needed for compensatory planting of ecological corridors.</p> <p>NPWS queried whether hen harrier winter roost surveys would be undertaken.</p> <p>NPWS queried the culvert with otter ledges in place for the M18 Motorway and whether they discharge onto the site, and if they had been checked for otter usage.</p> <p>NPWS queried whether translocating calcareous grassland would be assessed fully and appropriately.</p> <p>NPWS noted hydrological issues in the northern part of the site and that further investigations were required to assess any potential hydrology constraints.</p> <p>NPWS queried if hibernation surveys were undertaken for bats.</p>	<p>Section 7.6.1.1 and 7.6.1.4 addresses mitigation required for light spill and early planting regimes.</p> <p>Section 7.2.4.2 details specific surveys undertaken for the site (including hen harrier).</p> <p>Section 7.2.4.2 details the otter surveys undertaken within the site.</p> <p>Section 7.6.1.3 addresses mitigation necessary for the translation of calcareous grassland.</p>
Vincent Wildlife Trust	13/01/2021	<p>Topics discussed included:</p> <p>Additional areas for planting were recommended within the proposed development site.</p> <p>Linear habitats for bats along Toureen Laneway was recommended to be maintained and kept completely dark.</p> <p>The Light Spill Model would be crucial in informing our assessment.</p> <p>Planting of native species on site was recommended.</p>	Section 7.2.5 of the NIS addressed mitigation required for light spill and planting regimes.
Public consultations, including landowners, neighbours and local councillors.	22/04/2021	No issues were raised during these consultations regarding ecology.	-

7.2.5 Ecological Evaluation and Impact Assessment

7.2.5.1 Ecological Evaluation

Ecological receptors (including identified sites of ecological importance) are valued with regard to the ecological valuation examples set out in *Guidelines for Assessment*

of *Ecological Impacts of National Roads Schemes: Revision 2*¹⁵ and the guidance provided in *Guidelines for Ecological Impact Assessment in the UK and Ireland*¹⁶ – refer to Appendix 7.7 for examples of how ecological importance is assigned. In accordance with these guidelines, important ecological features within what is referred to as the Zone of Influence (Zoi) of the proposed development which are “both of sufficient value to be material in decision making and likely to be affected significantly” are deemed to be ‘Key Ecological Receptors’ (KERs). These are the ecological receptors which may be subject to significant effects from the proposed development, either directly or indirectly. KERs are those biodiversity receptors with an ecological value of local importance (higher value) or greater.

7.2.5.2 Impact Assessment

Ecological impact assessment is conducted following a standard source-pathway-receptor model, where, in order for an impact to be established all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism is sufficient to conclude that a potentially significant effect would not occur.

- Source(s) – e.g. pollutant run-off from proposed works
- Pathway(s) – e.g. groundwater connecting to nearby qualifying wetland habitats
- Receptor(s) – e.g. wetland habitats and the fauna and flora species they support

Characterising and Describing the Impacts

The parameters considered in characterising and describing the potential impacts of the proposed development are per the EPA’s *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*¹⁷ and CIEEM’s *Guidelines for Ecological Impact Assessment in the UK and Ireland*: whether the effect is positive, neutral or negative; the significance of the effects; the extent and context of the effect; the probability, duration and frequency of effects; and, cumulative effects.

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. The following development types are included in considering cumulative effects:

- Existing projects (under construction or operational)
- Projects which have been granted consent but not yet started
- Projects for which consent has been applied for which are awaiting a decision, including those under appeal
- Projects proposed at a plan level, if relevant (e.g. future strategic infrastructure such as roads or greenways)

¹⁵ NRA (2009) *Guidelines for Assessment of Ecological Impacts of National Roads Schemes: Revision 2*. National Roads Authority.

¹⁶ CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland*. Chartered Institute of Ecology and Environmental Management, Winchester, UK.

¹⁷ Environmental Protection Agency. (2022) *Guidelines on the information to be contained in Environmental Impact Assessment Reports*. Draft, May 2022. (refer to Table 3.3)

The likelihood of an impact occurring, and the predicted effects, can also be an important consideration in characterising impacts. In some cases, it may not be possible to definitively conclude that an impact will not occur. In these cases, the evaluation of significant effects is based on the best available scientific evidence but where reasonable doubt still remains then the precautionary principle is applied and it may need to be assumed that in the absence of mitigation significant effects may occur. Professional judgement is used in considering the contribution of all relevant criteria in determining the overall magnitude of an impact.

Significant Effects

In determining whether potential impacts will result in significant effects, the CIEEM guidelines were followed. The approach considers that significant effects will occur when there are impacts on either:

- the structure and function (or integrity) of defined sites, habitats or ecosystems; or
- the conservation status of habitats and species (including extent, abundance and distribution).

Integrity

The term “integrity” may be regarded as the coherence of ecological structure and function, across the entirety of a site that enable it to sustain all of the biodiversity or ecological resources for which it has been valued (NRA, 2009).

The term ‘integrity’ is most often used when determining impact significance in relation to designated areas for nature conservation (e.g. SACs, SPAs or pNHA/NHAs) but can also be the most appropriate method to use for non-designated areas of biodiversity value where the component habitats and/or species exist with a defined ecosystem at a given geographic scale.

An impact on the integrity of an ecological site or ecosystem is considered to be significant if it moves the condition of the ecosystem away from a favourable condition: removing or changing the processes that support the sites’ habitats and/or species; affects the nature, extent, structure and functioning of component habitats; and/or, affects the population size and viability of component species.

Conservation Status

Similar definitions for conservation status given in the EU Habitats Directive 92/43/EEC, in relation to habitats and species, are also used in the CIEEM (2018) and NRA (2009) guidance which are summarised as follows:

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

An impact on the conservation status of a habitat or species is considered to be significant if it will result in a change in conservation status, having regard to the definitions of favourable conservation status provided in the EU Habitats Directive

92/43/EEC – *i.e.* into the future, the range, area and quality of habitats are likely to be maintained/increased and species populations are likely to be maintained/increased.

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

7.3 RECEIVING ENVIRONMENT

7.3.1 Designated sites

7.3.1.1 European sites

Special Areas of Conservation (SAC) are designated under the EC Habitats Directive (92/43/EEC) for the protection of habitats listed on Annex I and/or species listed on Annex II of the Directive. Special Protection Areas (SPAs) are designated under the Birds Directive (2009/147/EC) for the protection of bird species listed on Annex I of the Directive, regularly occurring populations of migratory species (such as ducks, geese or waders), and areas of international importance for migratory birds.

SACs and SPAs are offered additional protection under county development plans, as is the case for the *Clare County Development Plan 2017-2023 Variation no 1*, through Objective CDP14.9 on Natura 2000 sites which requires that planning authorities give due regard to their protection in planning policies and decisions (Clare County Council, 2017).

The proposed development does not overlap with any European sites. There are 23 European sites within the vicinity of the proposed development. The nearest European site is the Lower Shannon SAC, located c. 1.4km south-west of the proposed development site. The next closest European site is Ballyallia Lake SAC, located c. 2.2km north west of the proposed development, designated for Natural eutrophic lakes habitat type (NPWS, 2017). A section of this European site also overlaps with Ballyallia Lough SPA, located c. 2.5km north west of the proposed development site.

The Spancelhill River flows along the north-western boundary of the proposed development site, flanked by the woodland on the southern bank and improved agricultural grassland and scrub on the northern bank. It flows between two attenuation ponds located within and adjacent to the western section of the proposed development site, before exiting the site through a culvert under the M18 Motorway to Ennis. Spancelhill River then flows c. 2.1km downstream into the River Fergus, which in turn discharges into the Fergus Estuary c. 4.9km downstream. The River Fergus overlaps with the Lower River Shannon SAC where the Spancelhill Stream joins the River Fergus, and the Fergus Estuary overlaps with the River Shannon and River Fergus Estuaries SPA c. 4.9km downstream. Therefore, the closest European site to the proposed development, is the Lower River Shannon SAC, located 2.1km downstream, or 1.4km south west (as the crow flies) to the proposed development.

The Dromore Woods and Loughs SAC is located c. 4.5km north west of the proposed development site. A portion of the River Fergus flows through this European site. The River Fergus then flows c. 9.3km downstream, via Ballyallia Lough SAC, and combines with the outfall of the River Fergus that connects with the Spancelhill stream, upstream of this. There is therefore a hydrological link between the proposed development site and European sites.

There are 12 SACs designated for populations of lesser horseshoe bat within 15km of the proposed development. The nearest SAC designated for populations of lesser horseshoe bat is the Old Domestic Building (Keevagh) SAC, located c. 4.3km south west of the proposed development. A detailed analysis of how lesser horseshoe bat use the proposed development site can be found in Section 7.3.3.5.

There are four SPAs within 15km of the site. The nearest SPA is Ballyallia Lough SPA, located c. 2.5km north west of the site, designated for its wetlands and wildfowl, including: wigeon *Anas penelope*, gadwall *Mareca strepera*, teal *Anas crecca*, mallard *Anas platyrhynchos*, shoveler *Spatula clypeata*, coot *Fulica atra*, and black-tailed godwit *Limosa limosa*. The River Shannon and River Fergus Estuaries SPA also designated for its wetlands and waterbirds, is located c. 7km downstream of the site, via Spancelhill River which flows along the western boundary of the site, and the River Fergus.

The SAC and SPA sites in the vicinity of the proposed development, their distance from the proposed development and their qualifying interests/special conservation interests are presented in Appendix 7.2.

The locations of those SAC and SPA sites relative to the proposed development are illustrated on Figure 7.5 below.

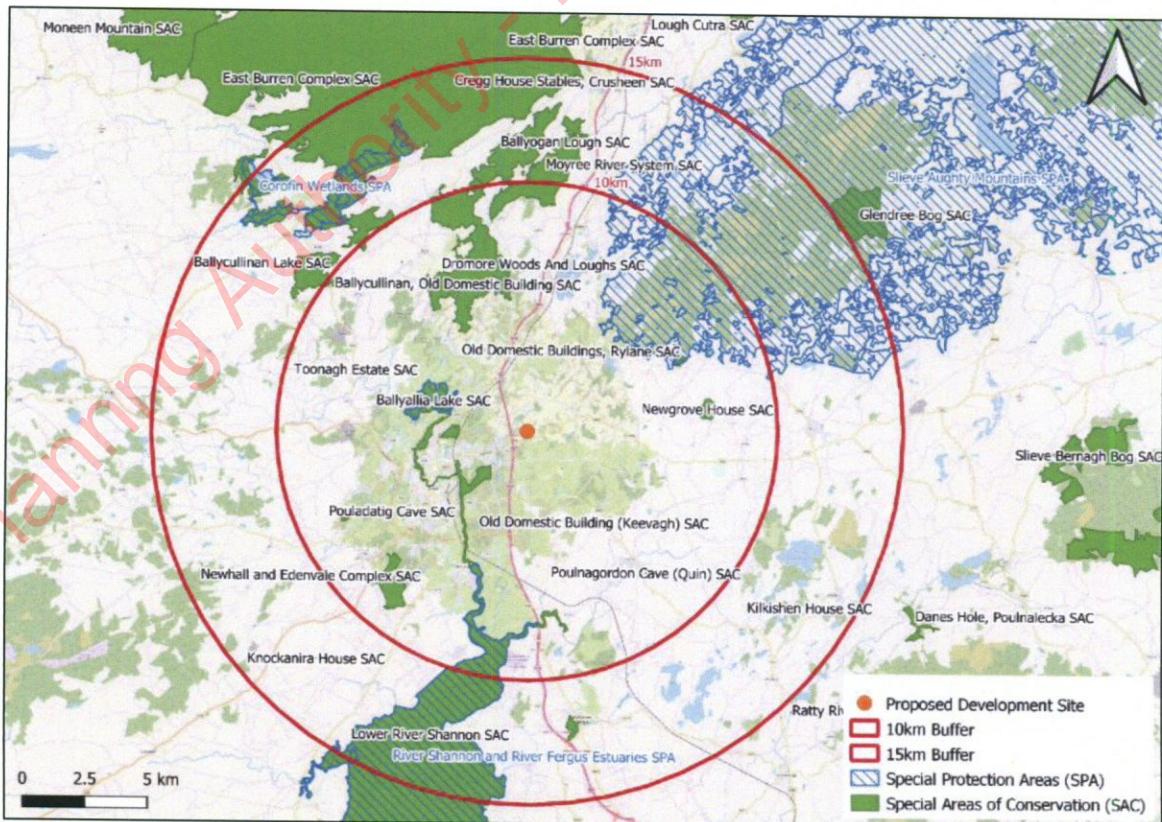


Figure 7.5 European sites in the vicinity of the proposed development

7.3.1.2 Nationally designated sites

Natural Heritage Areas (NHAs) are designated under the Wildlife Acts to protect habitats, species or geology of national importance. In addition to NHAs there are proposed NHAs (referred to as pNHAs), which are also sites of significance for wildlife and habitats and were published on a non-statutory basis in 1995, but have not since been statutorily proposed or designated. Proposed NHAs are offered protection in the interim period under county or city development plans, as is the case for the *Clare County Development Plan 2017 – 2023* through Objective B3 which requires that planning authorities give due regard to their protection in planning policies and decisions (Clare County Council, 2017).

The proposed development does not overlap with any National sites. There are 24 National sites within the vicinity of the development, two of them being NHAs, and 22 pNHAs. The closest NHA is Oysterman's Marsh NHA, located c. 5.6km north-east of the proposed development. The closest pNHA is Newpark House (Ennis) pNHA, located c. 1.5km west of the proposed development.

The Spancelhill River which flows along the north western boundary of the site, flows under the M18 through a culvert, before flowing c. 2.1km downstream into the River Fergus, which then discharges into the Fergus Estuary, c. 4.9km downstream. The Fergus Estuary and Inner Shannon, North Shore pNHA overlaps with the Fergus Estuary at this outfall of the River Fergus. There is therefore a hydrological link between the proposed development site and National sites downstream.

The NHA and pNHA sites in the vicinity of the proposed development, their distance from the proposed development and their qualifying interests/special conservation interests are presented in Appendix 7.1. The locations of those NHA and pNHA sites relative to the proposed development are illustrated Figure 7.6 below.

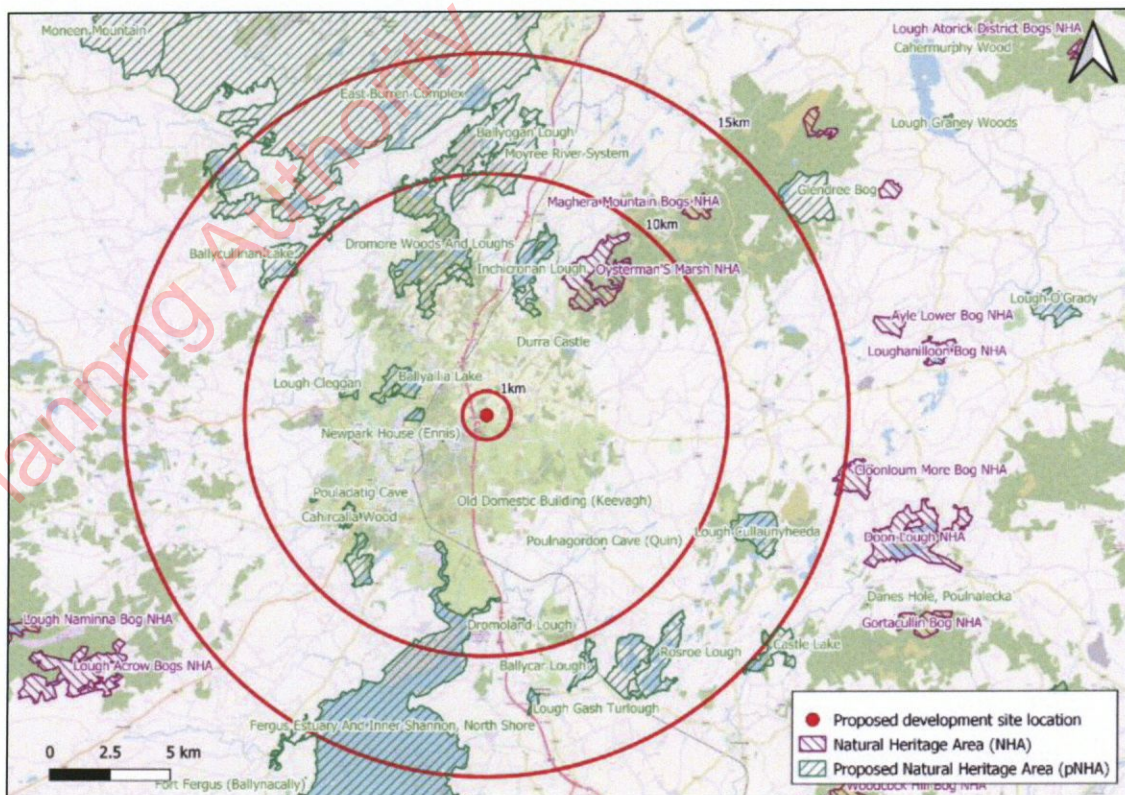


Figure 7.6 National sites in the vicinity of the proposed development

7.3.2 Habitats and Flora

7.3.2.1 Habitats

No protected plant species contained within the Flora (Protection) Order, 2022 were recorded within the proposed development site during surveys undertaken in 2018, 2020, or 2022. *Galium uliginosum*, a rare plant species (of least concern) contained within *Ireland Red List No. 10: Vascular Plants* (Wyse Jackson *et al.*, 2016), was identified within the proposed development site, in the rich fen and flush habitat in the north of the site. There were no species listed on *Ireland Red List No. 8: Bryophytes* (Lockhart *et al.*, 2012) recorded within the proposed development site in either year. No non-native, invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 were recorded within the proposed development site in 2018, 2020 or 2022.

Each habitat identified within the proposed development site was classified according to Fossitt (2000)³ and their corresponding level of ecological importance was determined in accordance with CIEEM (2018) and NRA (2009) guidelines. A detailed description of each habitat valued as being local importance (higher value) or higher is provided below along with an overall summary of all other habitats. Habitats valued as being of local importance (higher value) or higher include the following:

- Mesotrophic lake (FL4)
- Other Artificial Lakes and Ponds (FL8)
- Reed and large sedge swamps (FS1) including the Annex I habitat *Cladium* Fens [*7210]
- Depositing/Lowland Rivers (FW2)
- Marsh (GM1)
- Dry calcareous and neutral grassland (GS1) including the Annex I habitat Calcareous grassland [6210]
- Wet grassland (GS4) including the Annex I habitat *Molinia* meadows [6410]
- Rich Fen and Flush (PF1) including the Annex I habitat Alkaline fens [7230]
- Hedgerows (WL1)
- Treelines (WL2)
- Oak-ash-hazel woodland (WN2)
- Riparian woodland (WN5) including the Annex I habitat Alluvial Woodland [*91E0]
- Wet Willow-alder-ash woodland (WN6) including the Annex I habitat Alluvial Woodland [*91E0]
- Immature woodland (WS2)

Several areas of some of these habitats (*i.e.* dry calcareous and neutral grassland, wet grassland, oak-ash-hazel woodland and hedgerows) were valued as being of local

importance (lower value) due to being less species diverse, improved in nature, and in poor quality due to cattle poaching.

Figure 7.7 presents all habitats identified and mapped within the proposed development site, while Figure 7.8 presents the level of ecological importance of these habitats. Habitats beyond the red line boundary that are considered to be of international importance are included in Figure 7.8 as they are within the ground water Zol from the proposed development site. Species lists for each of the habitats valued as being of local importance (higher value) or higher are provided in Appendix 7.3.

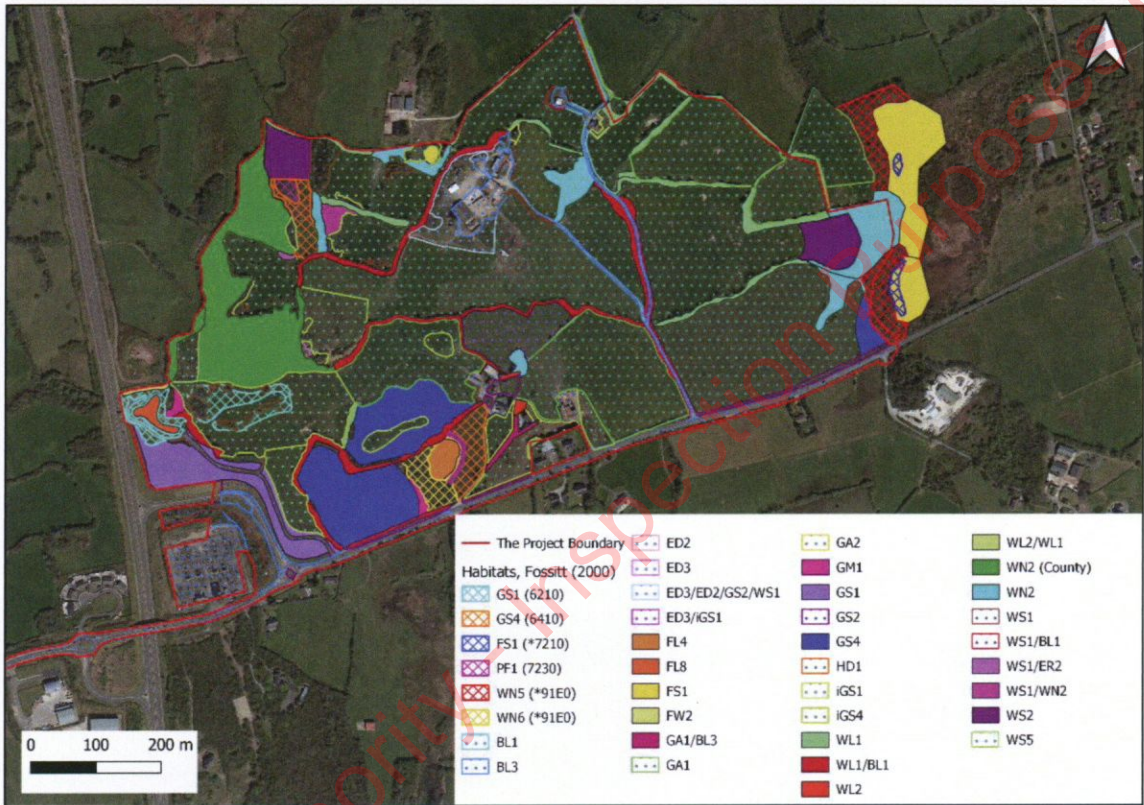


Figure 7.7 Habitats identified within the proposed development site, as classified according to Fossitt, J.A (2000) and the Interpretation manual of European Union Habitats EUR28 (CEC, 2013) (updated)

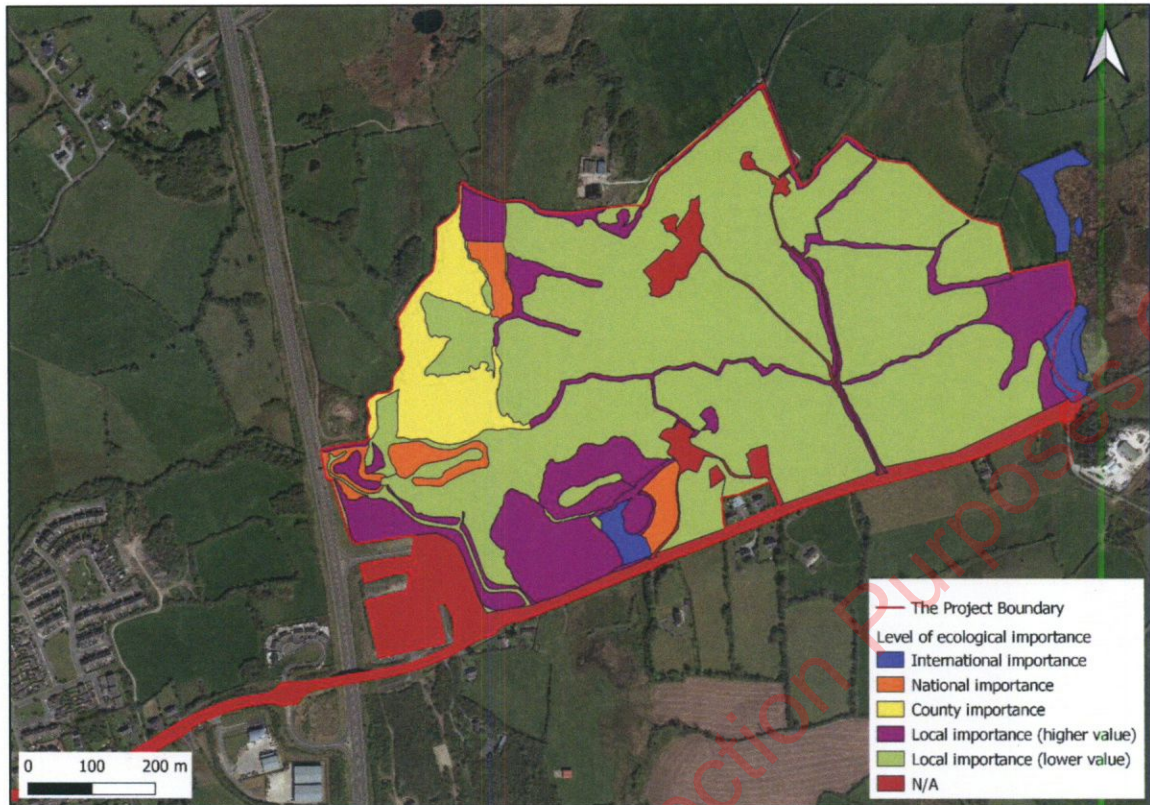


Figure 7.8 Level of ecological importance of each habitat identified within the proposed development site, as determined in accordance with CIEEM (2018) and NRA (2009) guidelines (updated)

Habitats valued as being of national, county, or local importance (higher value)

Mesotrophic Lakes (FL4), c. 0.21ha in total area (see Plate 1)

A small mesotrophic lake, referred to as Toureen Lough (ITM grid reference 537343 679385), was identified in close proximity to the southern boundary of the proposed development site, directly north of an existing farm laneway. Lake water was clear with no signs of algal growth. *Nuphar alba* was noted in the centre of the lake, while reed vegetation forms the dominant feature fringing the lake edge. At a few smaller locations along the lake's eastern boundary, *Nasturtium officinale* and *Apium nodiflorum* occurred where cattle were accessing the lake to drink. Other species found here included; *Potamogeton natans*, *Lemna minor*, and *Ranunculus flammula*. This habitat is valued as being of local importance (higher value) due to the diversity of plant species present in the context of the surrounding local environment.



Plate 1. Toureen Lough, with evidence of cattle poaching along its periphery

Other Artificial Lakes and Ponds (FL8), c. 0.13ha in total area (see Plate 2)

This habitat consisted of an existing attenuation pond of the M18 Motorway (ITM grid reference 536891 679457) located adjacent to the western boundary of the proposed development site, directly south of the Spancelhill Stream. It contained a variety of macrophytes, which included floating plant species, such as *Lemna minor* and *Potamogon* species, as well as emergent plant species, such as *Typha latifolia*, *Alisma plantago-aquatica* and *Sparganium erectum*. It was bordered by a fringe of reed and large sedge swamps habitat, which was dominated by *Phragmites australis*.

The level of importance of this habitat was valued as being of local importance (higher value) due to the diversity of plant species present in the context of the surrounding local environment, and relatively good quality of the habitat due to it being fenced off from the surrounding agricultural lands.



Plate 2 Existing attenuation pond of the M18 Motorway dominated by various macrophytes species

Reed and Large Sedge Swamps (FS1) c. 2ha in total area (See Plate 3)

Reed and large sedge swamp (FS1) also occurs across an extensive area to the east of the red line boundary, adjacent to the riparian woodland habitat described below. Here the conditions are too wet and inundated to support true riparian woodland, and instead a swamp habitat occurs, interspersed with scattered inundation-tolerant shrubs and scrub vegetation (WS1). This habitat hosts a number of typical species of swamp

habitat, including the dominant common reed and the occasional large sedge species, *Cladium mariscus*, along with *Carex rostrata* and *Carex paniculata*. *Menyanthes trifoliata* provides a dense mat of floating vegetation, whilst on the open water itself, *Lemna minor* is abundant, alongside *Nuphar lutea*. The scattered scrubby areas are dominated by *Salix cinerea*, hybrid willow and some *Myrica gale*, and mostly occur on the somewhat higher, drier parts of the swamp.

Some swamp vegetation with great fen-sedge in Ireland may be classified as the EU Habitats Directive Annex I habitat *Cladium fen* [*7210], which is described in detail by NPWS (2019). Eight positive indicator species (namely *Cladium mariscus*, *Juncus articulatus*, *Carex paniculata*, *Carex rostrata*, *Equisetum fluviatile*, *Galium palustre*, *Lythrum salicaria* and *Mentha aquatica* – “typical species” as per NPWS, 2019) in total for this Annex I habitat were recorded in the wider swamp habitat here, but no high-quality indicator species were recorded. *Cladium mariscus* was also recorded within the relevés themselves. It is occasionally present in this habitat and is not generally forming dense stands, as it is largely out-competed by common reed. This vegetation represents a relatively species-poor calcareous swamp/fen habitat. Nonetheless, NPWS (2019) state that areas/stands of great fen-sedge “including areas that support species-poor vegetation” are referable to the Annex I 7210 habitat. Therefore, following a precautionary principle, this swamp habitat located in east beyond the red line boundary, must classify as Annex I *Cladium fen* 7210 habitat. This habitat is currently considered to be stable in Ireland (NPWS, 2019). The habitat in the east is considered to be of international importance as it is a priority Annex I habitat.

The margins of the aforementioned mesotrophic lake (Toureen Lough) were dominated by *Typha latifolia* and *Phragmites australis* vegetation, with occasional colonising *Salix* spp. This habitat formed a tall and dense buffer between the lake and surrounding vegetation and occurs within the lake shallows. Likewise, the margins of the attenuation pond were comprised of this habitat. It is a naturally relatively species-poor habitat; however, it is considered to be of local importance (higher value), due to its rarity in the wider local environment. The habitat at Toureen Lough merged with alkaline fen at its outward edge. This transition area was marked by the emergence of *Carex paniculata* as the dominant species.



Plate 3. Reed and large sedge swamp habitat to the east of the red line boundary, with common reed and great fen-sedge present

Depositing/lowland Rivers (FW2) (See plate 4)

The Spancelhill Stream, a tributary of the River Fergus, is located only partially within the proposed development site as it flows along the north-western and western boundaries in proximity of the oak-ash-hazel woodland. From there, it flows under the M18 Motorway via an existing culvert. Plant species growing in association with the stream included a variety of emergent macrophytes such as *Filipendula ulmaria*, *Typha latifolia*, *Mentha aquatica*, *Apium nodiflorum* and *Phragmites australis*. The ground substrate of the Stream was mixed, with some areas dominated by gravel, with other areas extremely soft and silty. Depth ranged from c. 50cm – 1m, and was c. 2-3m wide. Whilst this habitat is badly poached by cattle, resulting in a partially degraded habitat, the level of importance of this habitat was valued as being of local important (higher value) due to the connectivity it provides to areas downstream.



Plate 4 Spancelhill Stream with evidence of cattle poaching along banks

Marsh (GM1), c. 0.13ha in total area

This habitat was located within the southern section of the proposed development site adjacent to a wet grassland field, and directly east of the Spancelhill Stream in close proximity to the attenuation pond. In both areas, ground conditions were damp under foot with water of a depth of c. 5cm noted in parts. The level of importance of this habitat was valued as being of local important (higher value) due to the diversity of plant species present in the context of the surrounding local environment.

It was dominated by species typical of wet, marshy ground conditions such as *F. ulmaria*, *L. salicaria*, *M. aquatica*, *A. nodiflorum*, *Epilobium hirsutum*, *P. australis* and *Salix* species. This habitat, located adjacent to the wet grassland field, gradually graded into wet woodland as tree species, such as *Salix* species, became more dominant. There was no evidence of extensive grazing or poaching within these areas located.

Dry Calcareous and Neutral Grassland (GS1), c. 2.2ha in total area (see Plate 5)

This habitat was present:

- on the hillslopes of undulating, neutral grassland fields located within the south-western section of the proposed development site;
- either side of the existing laneway leading to the attenuation pond; and,

- on top of the banks of the attenuation pond.

The level of importance of this habitat within these different areas varied (*i.e.* national importance and local importance (higher value)) according to their species composition and structure.

A variety of calcicole plant species were recorded across this habitat. These included *Briza media* and *Linum catharticum*, which are high quality positive indicator species of the Annex I habitat Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) [6210], hereafter referred to as calcareous grassland [6210] (as per O'Neill *et al.*, 2013), and *Daucus carota*, *Leontodon saxatilis* and *Galium verum*, which are positive indicator species of this same-said Annex I habitat. Common grass species were also recorded, including *Festuca rubra*, *Holcus lanatus*, *Agrostis stolonifera*, *Cynosurus cristatus* and *Dactylis glomerata*, as were forb species typical of more improved agricultural grassland, such as *Senecio jacobaea*, *Ranunculus repens* and *Trifolium repens*. These species were notably more dominant in areas valued as being of local importance (higher value) in comparison to the areas valued as being of national importance. There was evidence of heavy grazing and poaching on the hillslopes. Both areas located at the attenuation pond and within the adjacent field within the south-western corner of the proposed development site were stockproof.

Two areas of this habitat were valued as being of national importance as they corresponded to the Annex I habitat calcareous grassland [6210] due to their species composition and structure as recorded in the respective relevés. The overall conservation status of this Annex I habitat is "Bad" (NPWS, 2019) and as such this habitat is considered to be of high conservation concern at a national level. These areas were located on the hillslopes located within an improved neutral grassland field and on top of the banks of the attenuation pond. Two high quality positive indicator species and four positive indicator species of this Annex I habitat (as per O'Neill *et al.*, 2013) were recorded in both relevés taken in these areas. These areas did not correspond to the priority Annex I habitat¹⁸, *i.e.* the orchid-rich variant of 6210, as no orchid species were identified within these areas. Both these areas are considered to be of poor quality (or "unfavourable" conservation status, O'Neill *et al.*, 2013) as they failed the condition assessment on the criterion of number of indicator positive indicator species being less than seven and in the case of the former area, the criterion of evidence of serious grazing or disturbance in the local vicinity. This area is under threat from scrub encroachment.

¹⁸ A priority status is accorded to Annex I habitats that are in danger of disappearance and whose natural range falls within the territory of the European Union (O'Neill *et al.*, 2013).



Plate 5 Area of Annex I habitat dry calcareous grassland [6210], valued as being of national importance, located on top of the banks of the attenuation pond

Wet Grassland, c. 4ha in total area (see Plate 6)

The majority of this habitat was located:

- within the south-western section of the proposed development site in close proximity to Toureen Lough, a shallow drainage ditch and an area of wet woodland;
- within the north-western section of the proposed development site located east of the woodland; and,
- along the south-eastern boundary of the site, directly west of Ardnamurry Lough which is located outside the proposed development site.

The level of importance of this habitat within these different areas varied (*i.e.* national importance and local importance (higher value)) according to their species composition and structure.

Typical wet grassland species recorded included *Molinia caerulea*, *F. ulmaria*, *Galium palustre* and *Lotus pedunculatus*, which are positive indicator species of the Annex I habitat *Molinia* meadows on calcareous, peaty or clayey-silt laden soils (*Molinia caeruleae*) [6410], hereafter referred to as *Molinia* meadows [6410] (as per O'Neill *et al.*, 2013). Other species typical of wet habitats recorded included *L. salicaria*, *Iris pseudacorus*, *Cardamine flexuosa* and *Hypericum tetrapterum*. Common grass species recorded included *H. lanatus*, *Anthoxanthum odoratum*, *C. cristatus* and *Alopecurus geniculatus*, while rush species recorded included *Juncus articulatus*, a positive indicator species of the Annex I habitat *Molinia* meadows [6410], and *J. effusus* and *J. inflexus*. Species typical of more improved grassland habitats, such as *Lolium perenne*, *T. repens*, *R. repens* and *Plantago lanceolata* were also recorded. Overall these species did not dominate the species composition; however, they were notably more dominant in areas valued as being of local importance (higher value) in comparison to those valued as being of national importance. There was evidence of extensive heavy grazing and poaching within the fields located within the southern section of the proposed development site.

There were two areas of this habitat that were valued as being of national importance as they corresponded to the Annex I habitat *Molinia* meadows [6410] due to their species composition and structure as recorded in a relevé. The overall conservation

status of this Annex I habitat is “Bad” (NPWS, 2019) and as such this habitat is considered to be of high conservation concern at a national level. These areas were located within the north-western section of the proposed development site, east of the oak-ash-hazel woodland and south of the planted immature woodland and rich fen and flush, and in a field by Toureen Lough. One high quality positive indicator species and four positive indicator species of this Annex I habitat (as per O’Neill *et al.*, 2013) were recorded within the relevé taken in the north-western area. The high quality positive indicator species *Dactylorhiza fuchsia* and positive indicator species *Juncus articulatus* were both recorded outside, but within close proximity to the relevé. No relevé was taken within the field by Toureen Lough; however, it was noted that a total of eight positive indicator species of this Annex I habitat (as per O’Neill *et al.*, 2013) were recorded within this area, but no high-quality positive indicator species were recorded. It was also noted that the sward was diverse throughout and had a high proportion of forbs to grasses. The field by Toureen Lough was heavily grazed and poached at the time of survey. The most abundant species was articulated rush *Juncus articulatus*, although its total cover was limited by the high grazing levels.

This area is considered to be of poor quality (or “unfavourable” conservation status, O’Neill *et al.*, 2013) as it failed the condition assessment on the criteria of number of indicator positive indicator species being less than seven and the ration of forb to graminoid species.



Plate 6 Area of Annex I habitat *Molinia meadows* [6410], valued as being of national importance, located within the north-western section of the proposed development site

Rich Fen and Flush (PF1), c. 0.13ha in total area (see Plate 7)

This habitat was located in two different areas, one of which was located within the northern section of the proposed development site, while the second was located within the southern section. The level of importance of this habitat within these different areas were both of national importance according to their species composition and structure.

The small area of rich fen and flush, located in the far north west of the proposed development site, described as a wetland/pond feature, corresponded to a depression between wooded areas, and are naturally relatively species-rich vegetation communities. It is likely to have formed as a consequence of a lake infilling and can be described as a topogenous fen (*i.e.* forming in a valley or depression). It was notable for the presence of *Typha latifolia*, *Sparganium erectum* in combination with a sward dominated by *Schoenus nigricans*, and sedge species such as *Carex flacca*, *C. paniculata* and *C. nigra*, over a brown moss understorey, which included the abundant

Calliergonella cuspidata. The characteristic *Galium uliginosum* was relatively abundant, as was *M. aquatica*. This habitat merged with the adjacent Annex I habitat *Molinia* meadows [6410] characterised by rushes and purple moor-grass at its edge.

A more-species-poor fen community occurs bordering on the landward side of reed and tall sedge swamp vegetation at Toureen Lough. Here the overstorey is a near monoculture of *Carex paniculata*, with occasional *Lychnis flox-cuculi* and a few forb species of the adjacent wet grassland habitat, with which it merges at its edge.

Fen habitats located within these two particular areas corresponded to the description of the Annex I habitat Alkaline fen [7230], which are described as “Wetlands mostly or largely occupied by peat- or tufa-producing small sedge and brown moss communities developed on soils permanently waterlogged, with a soligenous or topogenous base-rich, often calcareous water supply, and with the water table at, or slightly above or below, the substratum...” within the *Interpretation Manual of European Union Habitats* (European Commission, 2013). The conservation status of alkaline fens [7230] in Ireland is “bad” due to ongoing losses in national area, and due to the poor condition of a large proportion of the habitat within the country (NPWS, 2019).

The examples of rich fen and flush habitats within these two areas are considered to be of national importance. The total area of this habitat within the lands is relatively small, however they are a naturally species-rich habitat type and correspond to an Annex I habitat type, which is of “bad” conservation condition in Ireland. It is considered likely that similar examples of this habitat occur within the surrounding area based on the author’s knowledge of the geography of the surrounding landscape and a review of orthophotography of the locality, and for this reason the habitat is not considered to be rare or unusual locally.



Plate 7 Fen habitat in north western section of the site

Hedgerow (WL1), c. 5.38km in total length (see Plate 8)

The majority of the field boundaries located across the proposed development site consisted of this habitat. Several of which were growing adjacent to stone walls, while others were adjacent to drainage ditches. The level of importance of some hedgerows was valued as being of local importance (higher value) due to their structure and plant species composition. These hedgerows were notably more diverse in comparison to those valued as being of local importance (lower value).

Overall, these hedgerows were dominated by *Corylus avellana*. Other woody species present included *Crataegus monogyna*, *Fraxinus excelsior*, *Ilex aquifolium* and *Rubus*

fruticosus. *Acer pseudoplatanus*, *Sambucus nigra* and *Rosa* sp. were also present in some of these hedgerows; however generally in lower abundances. *Hedera helix* was often recorded growing in association with several of these woody species. The understorey of these hedgerows were not especially species rich. It generally included species common to more shaded environments, such as *Arum maculatum*, *Geranium robertianum* and *Asplenium scolopendrium*, and others common to hedgerows, such as *Galium aparine* and *Anthriscus sylvestris*. A number of these hedgerows were growing adjacent to stone walls, which formed field boundaries.



Plate 8 Hedgerow, valued as being of local importance (higher value), located in the southern section of the proposed development site

Oak-ash-hazel Woodland (WN2), c. 5.5ha in total area (see Plate 9)

The majority of this habitat, which was generally dominated by a low canopy of *C. avellana*, was identified within the north-western section of the proposed development site, adjacent to semi-natural and improved grassland fields and planted immature woodland. There were also four other relatively small, isolated blocks of this habitat, ranging from c. 0.34-0.08ha in total area, that were located: in close proximity to the northern boundary; in the centre of the proposed development site north-east of existing farm buildings; and, adjacent to the eastern boundary of the proposed development site.

The level of importance of this habitat within these different areas varied (*i.e.* county importance and local importance (higher value)) according to their structure (including geological structure) and plant species composition. The most important area is the largest woodland block (c. 3.6ha in total area) located within the north-western section of the proposed development site, east of the Spancelhill stream. This block of woodland is valued as being of county importance, while all other areas of this habitat are valued as being of local importance (higher value).

Overall, the woodland canopy was relatively low and dominated by *C. avellana*, *C. monogyna* and *Fagus sylvatica*. *F. excelsior*, *I. aquifolium* and *S. nigra* were also recorded; however, in lower abundances in comparison to the former three species. Below this, the shrub layer was dominated by *Rubus fruticosus* and *Prunus spinosa*, while the field layer contained a variety of herbaceous species typical of shaded woodlands such as *Oxalis acetosella*, *Geum urbanum*, *Circaea lutetiana*, *G. robertianum* and *A. maculatum*. *H. helix* was also noted densely covering the field layer, as well as growing on the woody tree species. Other herbaceous species recorded included those typical of more improved habitats including *Urtica dioica* and *R. repens*. A limited number of fern species were recorded. These comprised of

Dryopteris filix-mas and *A. scolopendrium*. Exposed rocky limestone outcrops of varying sizes were present, often densely covered in moss species *Fissidens spp.* and *H. helix*. There was evidence of grazing and poaching by livestock throughout this habitat with numerous paths passing through the woodland, resulting in relatively large areas of exposed soil.

A relevé was taken within this area to confirm whether or it corresponded to the wooded variant of Annex I priority habitat Limestone pavement [*8240]. Whilst this area did contain 12 positive indicator species of this Annex I habitat (as per Wilson & Fernández, 2013), it was determined that it did not correspond to this Annex I habitat for the following reasons:

- It lacked the distinctive clint and gryke and/or shattered limestone pavement geological structure that is characteristic of this Annex I habitat (as per Wilson & Fernández, 2007);
- It lacked a sufficient percentage cover of exposed rock (*i.e.* at least 50%, the percentage cover of exposed bare soil was 60%¹⁹); and,
- The average depth of soil present was *c.* 14cm, which in the context of this Annex I habitat is not considered to be not shallow enough (> 2cm).

The other areas of this habitat that are valued as being of local importance (higher value) were less species-rich compared to this large block of woodland and generally lacked the more typical woodland structure (*i.e.* a relatively well-developed understorey layer) and the exposed rocky outcrops. Significant encroachment from scrub species (*i.e.* *R. fruticosus*, *Ulex euroaepus* and *P. spinosa*) was noted within two of the four isolated woodland blocks valued as being of local importance (higher value). This may have resulted in the stunted growth of *C. avellana*, *C. monogyna* and *F. sylvatica* within these particular areas. Consequently, these areas may be described as a mosaic of woodland and scrub habitats. All these areas are valued as being of local importance (higher value) primarily due to their importance in maintaining ecological corridors.



¹⁹ According to the *Interpretation Manual of European Union Habitats EUR28* (Commission of the European Communities, 2013), "The rock surface [of this Annex I habitat] is almost devoid of overlying soils (considerably less than 50% cover) except for some patches of shallow skeletal or loessic soils, although more extensive areas of deeper soil occasionally occur; sometimes there is encroachment of peat."

Plate 9 Oak-ash-woodland habitat dominated by *C. avellana* with exposed rocky outcrops and valued as being of county importance, located within the north-western section of the proposed development site.

Riparian woodland (WN5), c. 1.03ha in total area

Riparian woodland (WN5) occurs along the margins of the wider swamp area to the east of the red line boundary of the proposed development site. This habitat hosts a number of classic riparian woodland plant species, including the dominant canopy species *Salix cinerea* subsp. *oleifolia* and *Salix* × *multinervis*, as well as shrub and low woody shrub species like *Myrica gale*, *Hedera helix* and *Rubus fruticosus* agg., and a herb layer of such species as *Filipendula ulmaria*, *Juncus effusus*, *Angelica sylvestris*, *Galium palustre* and *Carex paniculata*. The inundated condition of the herb layer is indicated by the presence of *Comarum palustre* and *Menyanthes trifoliata*.

Some areas of riparian woodland habitat in Ireland may be classified as the EU Habitats Directive priority Annex I habitat *[91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*). The description of the Irish variant of this habitat is outlined within O'Neill & Barron (2013) and is based on the outcomes of the *National Survey of Native Woodland 2003-2008* (Perrin et al., 2008). A minimum of seven indicator species of Perrin et al. (2008), at least one of which must be *Alnus glutinosa*, *Fraxinus excelsior* or *Salix* sp., must be present in the monitoring plot for vegetation to correspond to *[91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*), based on the assessment methodology of Perrin et al., (2008). The status of Alluvial woodland *91E0 primarily depends on; the canopy being dominated by *Salix* sp., the woodland is flooded routinely, and that the woodland is more than 4m in width, all of which this habitat possesses. As only three positive indicator species (namely *Filipendula ulmaria*, *Angelica sylvestris* and *Stellaria palustris*) were recorded in this riparian woodland habitat, this habitat is of poor quality, however this habitat is under threat in Ireland from habitat loss (NPWS, 2019). Therefore, the habitat here is considered to be of international importance. It has been valued as such due to the overall naturalness of the vegetation type, as it has the three factors that the status of Alluvial woodland habitat relies on (as previously described), as well as considering the conservation status of the habitat in Ireland and its status as a priority habitat.

Wet Willow-Alder-Ash Woodland (WN6), c. 1.5ha in total area, (see Plate 10)

A small area of wet woodland is located on the southern and western shores of Toureen Lough, where the dominant overstorey tree is grey willow *Salix cinerea*. It occurs in an area between Toureen Lough and the southern boundary of the lands with the R352 road.

As mentioned, grey willow was the most abundant canopy species, with some goat willow *S. capraea* and very occasional eared willow *S. aurita*. The canopy is low, c. 5-10m high, with many of the willow species with partially collapsed branches. Alder *Alnus glutinosa* appears occasionally, while hazel *Corylus avellana* begins to appear where the ground is drier. Understorey species noted included canary reed-grass *Phalaris arundinacea*, with abundant meadowsweet and enchanter's-nightshade *Circaea lutetiana*, and occasional wild *Angelica sylvestris*, flag iris *Iris pseudacorus* and greater tussock-sedge. Part of the canopy has recently been cleared by coppicing, which is probably linked to the presence of overhead power lines.

While a relevé was not undertaken within the woodland, a comparison of species composition against communities described within the Irish Vegetation Classification

(IVC) indicates that it most closely aligns with the IVC category “WL3F *Salix cinerea* – *Phalaris arundinacea* woodland”. This is a community of heavy, base-rich soils. It is rare in the west of the country, with the exception of Clare (Perrin *et al.*, 2008).

This woodland type within the proposed development site corresponds to the Annex I priority habitat “[91E0] alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)”, herein referred to as “alluvial woodland [91E0]”, based on its location within 20m of Toureen Lough, and due to the presence of typical alluvial woodland [91E0] species, as per Perrin *et al.* (2008). Seven positive indicator species were recorded within the woodland, while a single negative indicator species, sycamore *Acer pseudoplatanus*, was recorded, albeit with very low abundance. Alluvial woodland [91E0] is a priority habitat, meaning it is a habitat in danger of disappearance at a European level, and whose natural range falls mainly within the territory of the European Union (European Commission, 2013). The conservation status of alluvial woodland [91E0] in Ireland is “bad” (NPWS, 2019), because it is a highly fragmented habitat occurring as small pockets of woodland, with a very limited total area within the country. The example within the subject lands is considered to be of international importance. It has been valued as such due to the overall naturalness of the vegetation type, and the diversity of species present, as well as considering the conservation status of the habitat in Ireland and its status as a priority habitat.



Plate 10 Wet willow-alder-ash woodland habitat dominated by grey willow, with typical [91E0] alluvial woodland understorey.

Immature woodland (WS2), c. 1.1ha in total area

This habitat was located along the northern boundary of the proposed development site adjacent to fen habitat and along the eastern boundary of the proposed development site adjacent to an improved grassland field. Both areas had been recently planted with tree saplings. The former area was fenced-off and inaccessible; therefore, it was surveyed from the existing fenceline. It was dominated by planted *Alnus glutinosa* and *Salix cinerea*, while *Viburnum opulus* was occasionally present. The latter area was partially accessible. It contained tree species *Quercus* sp., *Betula* sp., *F. sylvatica*, *Sorbus aucuparia* and *C. avellana*. This area gradually became more dominated by scrub species, such as *R. fruticosus*, *U. europaeus* and *Pteridium aquilinum*, to the east. The level of importance of this habitat was valued as being of local important (higher value) primarily due to its importance in maintaining ecological corridors.

Overall summary of the habitats valued as being of local importance (lower value) and/or of artificial nature

The majority of the proposed development site (*i.e.* c. 41ha in area) consisted of habitats that were valued as being of local importance (lower value) or of artificial nature. These predominantly comprised relatively large fields of improved agricultural grassland (Plate 11). Some of these fields located within the western section of the proposed development site were identified as neutral calcareous grasslands as they exhibited significant signs of land improvement. Whilst some calcicole species were recorded within these fields *Daucus carota* and *Lotus corniculatus*, they were in very low abundances and overall, these fields were dominated by species typical of more improved agricultural grassland habitats.

One improved wet grassland field was noted along the southern boundary of the proposed development site, directly north of the R352. Likewise, whilst it contained some species that were typical of wet grassland, it was dominated by those more typical of improved grassland habitats. Dry meadows and grassy verges were recorded along the bank of the M18 Motorway, which was dominated by large tussocks of *Arrhenatherum elatius*, along the roadside verge of the R352 and within the existing farmyard located off the R352. There were also some relatively small areas of amenity grassland, *i.e.* lawns located within private gardens.

Some hedgerows located within the proposed development site were valued as being of local importance (lower value) as they were species-poor, often containing only one species, recently planted and heavily pruned. There was a species-poor treeline/hedgerow of planted young saplings of *Crataegus monogyna* and *Fraxinus excelsior* considered to be of local importance (lower value) located along the boundaries of a field located in close proximity to the southern boundary.

There were two relatively small blocks of oak-ash-hazel woodland that were valued as being of local importance (lower value), due to species-poor upper storey, dominated by *Corylus avellana*, and very species poor understorey, which was in parts dominated by scrub encroachment. There were a number of relatively small patches of scrub habitat scattered across the site, often in association with hedgerows, woodland and stone wall habitats. There was also a relatively small area dominated by *P. aquilinum* located directly west of the wet woodland within the south-western section of the proposed development site.

Recolonising bare ground comprised the private laneway from the R352 to the attenuation pond located within the western section of the proposed development site and two other patches located with improved dry calcareous and neutral grasslands which consisted of exposed ground which had been recolonised.

There were drainage ditches located across the site in association with hedgerows. These generally contained shallow stagnant water and in parts were heavily poached by livestock. A locally fed spring was identified in the west of the site, between the improved grassland habitat and the oak-ash-hazel woodland. This flowed eastwards along a drainage ditch and into Spancelhill Stream in the west of the site. There was limited macrophyte species present within this habitat. They were valued as being of local importance (lower value).

An area of recently felled woodland (WS5) was identified within the Oak-Ash-Hazel Woodland (WN2) on the western side of the proposed development site, along the banks of the Spancelhill Stream.

Habitats valued as being of artificial nature included spoil and bare ground, buildings and artificial surfaces, such as the existing residential and farm buildings, private roads and other areas of concrete/hard standing such as farm yards, and stone walls and other stonework that were not associated with any other habitat.



Plate 11. An example of improved agricultural grassland that dominates the habitats within the site.

7.3.3 Fauna

7.3.3.1 Terrestrial Fauna (Excluding bats)

Badger

Badger *Meles meles*, and their breeding and resting places, are protected under the Wildlife Acts. The NBDC data search returned 40 records of badger within c. 2km of the proposed development with the latest from 2018 (Appendix 7.2).

Evidence of badger activity was found within the woodland area in the north-western section of the proposed development site. Two confirmed badger setts, badger hair, snuffle holes, and mammal paths were identified within this woodland habitat. One sett (located c. 180m west from the footprint of the proposed development) consisted of a single entrance and is likely to be a subsidiary or outlier sett (Figure 7.9). This sett is being actively used by badger as confirmed with the identification of badger hair at its entrance, and fresh, heaped soil in front of the sett. Mammal paths were evident throughout the woodland, however these paths cannot be confirmed as solely badger as cattle traverse the area frequently. A second sett was also identified in this woodland, c. 30m north-east of the other sett and c. 200m from the footprint of the proposed development. This sett consisted of three entrances with varying levels of activity. Badger scratching was evident on an adjacent tree. This sett is also likely used as a subsidiary or annex. A badger was confirmed using this sett from the deployed camera trap. Snuffle holes were also identified in the area around the sett.

A potential sett was identified amongst mounds of rocks within the woodland area, located c. 170m from the footprint of the proposed development. Large crevices were evident here, that may extend underground. At least one badger was identified on the deployed cameras traversing over the rocks, possibly emerging and/or entering a crevice. Pine martens were also identified using this area possibly for refuge.

During surveys in 2022, an additional sett was identified in the east of the proposed development site, in the area of oak-ash-hazel woodland adjacent to the wetland habitat. This area is located on a steep slope and comprised of three holes along this ridge. These holes were deemed active due to fresh bedding identified in front of two of the holes, badger hair and snuffle holes. Mammal trails leading to and from the sett were also noted.

The habitats within the proposed development site (*i.e.* grassland, scrub, hedgerow and woodland), provide suitable foraging and commuting habitat for badger.

Due to their stable Irish populations, badger are considered to be of “Least concern” in terms of conservation (Nelson *et al.*, 2019). The local badger populations are valued to be of local importance (higher value), as there is an abundance of suitable habitat within the proposed development site and its vicinity, which has been confirmed by the presence of a number of active badger setts, and from the NBDC desk study search with 40 records within 2km.

Otter

Otter *Lutra lutra*, and their breeding and resting places, are protected under the Wildlife Acts. Otter are also listed on Annex II and Annex IV of the EU Habitats Directive and are afforded strict protection under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations, 2011. The NBDC data search returned 16 records for otter within c. 2km of the proposed development, with the latest from 2018 (Appendix 7.2). Locations of these records included along a section of the River Fergus through Ennis town, and the eastern banks of Ballyallia Lough, both of which have hydrological connections with the proposed development site.

No holts or couches were identified along Spancelhill Stream, Toureen Lough, or the attenuation ponds located within the western section of the proposed development site. Two otter spraints were identified on rocks within Spancelhill Stream, adjacent to the woodland located within the north-eastern section of the site c. 180m west of the footprint of the proposed development at its closest point (Figure 7.9). The mammal ledge located underneath the M18 Motorway culvert in the west of the site was also checked for otter usage, and whilst no evidence was identified during surveys carried out here in 2020, **an otter spraint was identified on the M18 mammal ledge in 2022**. No other evidence of otter activity was recorded within the proposed development site.

The banks of Toureen Lough were deemed to be unsuitable for otter holt creation as they consisted of waterlogged soils frequently poached by cattle. Fish are present in Toureen Lough and therefore, it is suitable foraging habitat for otter. Whilst there is no surface hydrological connection between Spancelhill Stream and Toureen Lough, otter may still cross the site from the Spancelhill Stream to Toureen Lough (c. 385 in distance). No evidence of this was recorded during any of the surveys.

Spancelhill Stream is suitable for otter holt/couch creation, and for commuting or foraging otter. Evidence of otter activity was identified within the Stream. The Stream is subject to frequent pollution from cattle manure and feeding areas, which may limit its suitability for otters. Otters were not identified on the camera trap that was deployed along the Stream.

Otters are Qualifying Interest (QI) species of nearby European Sites: Lower River Shannon SAC located c. 2.1km downstream of the proposed development site, via the Spancelhill Stream and the River Fergus; and, Dromore Woods and Loughs SAC, located c. 4.5km from the proposed development site as the crow flies and c. 12.9km

upstream of the proposed development, via the River Fergus and the Spancelhill Stream. The local otter population is valued as being of international importance as it may be connected with the Qualifying Interest otter populations of these European sites, which are hydrologically connected to the proposed development site, and is discussed in more detail in the Natura Impact Statement (NIS) in Section 5.1.3.1.

Pine Marten

Pine marten *Martes martes* are protected under the Wildlife Acts. Pine marten are also listed on Annex V of the EU Habitats Directive and are afforded strict protection under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations, 2011. The NBDC database search returned two records of pine marten within c. 2km of the proposed development site (Appendix 7.2).

A potential pine marten den was identified within the woodland in the north-eastern section of the proposed development site (c. 170m from the footprint of the proposed development), amongst a large collection of limestone rocks and boulders, where holes and crevices were identified (Figure 7.9). A camera that was deployed opposite this pile of rocks identified a pine marten amongst the rocks on three separate occasions. On one occasion, an individual also appeared to leave its scent on a rock near to a potential entrance. This is likely to be a potential pine marten den or refuge site; however, as pine marten are known to use multiple den sites, it is likely to be used sporadically (Vincent Wildlife Trust, 2020). The woodland and surrounding scrub habitat is suitable for foraging pine marten and would provide ample foraging opportunities for their varied diet of berries, insects, birds, small mammals, and frogs.

Pine martens are listed as a species of "least concern" conservation wise (Nelson *et al.*, 2019) due to the recent increases in populations numbers across the country. In consideration of this the presence of records of the species in the surrounding area, and the abundance of suitable habitat in the area, the local pine marten population is valued to be of local importance (higher value).

Other Mammals

Red squirrel *Sciurus vulgaris*, hedgehog *Erinaceus europaeus*, Irish hare *Lepus timidus hibernicus*, pygmy shrew *Sorex minutus* and Irish stoat *Mustela erminea hibernica* are protected under the Wildlife Acts. The NBDC database search identified one record of pygmy shrew and Irish stoat, two records of red squirrel, Irish hare and pine marten, and three records of hedgehog within c. 2km of the proposed development site (Appendix 7.2).

During the field surveys, an *ad-hoc* observation of an Irish hare was recorded in the grassland habitat adjacent to the woodland. No evidence or sightings of red squirrel, hedgehog, pygmy shrew, or Irish stoat was recorded within the proposed development site. However, the woodland located within the proposed development site (c. 40m from footprint of the proposed development) would provide suitable breeding and/or foraging habitat for all of the aforementioned species. Red squirrels are more commonly found within mixed woodlands and/or coniferous woodlands due to a steadier food source year round (Lawton *et al.*, 2020); however they can also be found within deciduous woodlands, specifically where oak *Quercus* sp. and/or hazel *Corylus avellana* tree species are present as red squirrel are known to forage acorns and hazelnuts. Pygmy shrews, hedgehogs and Irish stoat are found in a range of habitats; however, they are predominantly present in habitats with a rich ground cover, and as such the woodland and scrub habitats within the site are considered suitable for these species. In addition, the dense hedgerows and stone walls present would also provide

cover and commuting corridors for these species. Irish hare is also found in a range of habitats, from coastal dunes to mountain tops, and densities vary from year to year and habitat to habitat²⁰.

All small mammal species returned in the NBDC search are of “Least” conservation concern (Nelson *et al.*, 2019). They are widely distributed throughout Ireland. The habitats on site and in the surrounding environs are suitable for all of the aforementioned mammal species, and as such the mammal species are therefore valued as being of local importance (higher value).

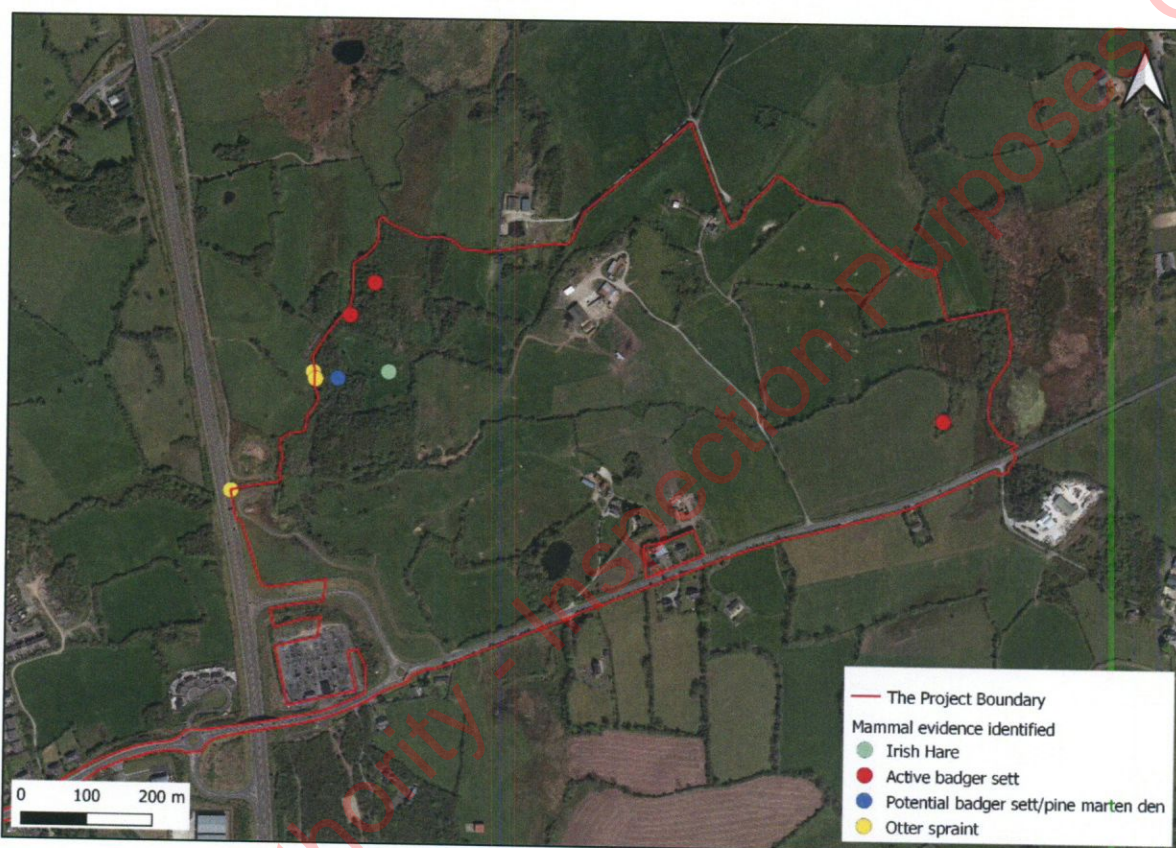


Figure 7.9. Location of mammal signs recorded within the proposed development site (updated)

Non-native Invasive Mammals

The NBDC database search returned no records for any fauna species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 within 2km of the proposed development site. There were no sightings or evidence of any of these species on site during surveys in 2018, 2020 or 2022 either.

A greater white-toothed shrew *Crocidura russula* was identified on the eastern bank of Toureen Lough within the proposed development boundary on the 19th March 2019. This species is listed as a ‘medium impact’ species, from the Invasive Species in Ireland prioritisation risk assessment. Two records of Bank Vole *Myodes glareolus*,

²⁰ Species Profile: Irish Hare, Vincent Wildlife Trust Ireland. Accessed here: <https://www.vincentwildlife.ie/species/irish-hare>

and European rabbit *Oryctolagus cuniculus*, also listed as 'medium impact' species, were returned from the NBDC database study for records within c. 2km of the proposed development site. Records of 'high impact' species, fallow deer *Dama dama*, house mouse *Mus musculus*, and sika deer *Cervus nippon*, were also returned from the NBDC search. Rabbit and greater white-toothed shrew were the only species identified using the site during field surveys of the site.

7.3.3.2 Birds

Breeding Birds

All wild birds, and their nests and eggs, are protected under the Wildlife Acts. Some bird species are also listed on Annex I of the EU Birds Directive. The following birds were observed within or in the vicinity of the proposed development site:

- Green listed species (*i.e.* of low conservation concern): Blackbird *Turdus merula*, blackcap *Sylvia atricapilla*, blue tit *Cyanistes caeruleus*, buzzard *Buteo buteo*, coal tit *Periparus ater*, chaffinch *Fringilla coelebs*, chiffchaff *Phylloscopus collybita*, dunnoek *Prunella modularis*, hooded crow *Corvus cornix*, , jackdaw *Corvus monedula*, , magpie *Pica pica*, pheasant *Phasianus colchicus*, robin *Erithacus rubecula*, rook *Corvus frugilegus*, song thrush *Turdus philomelos*, wood pigeon *Columba palumbus*, and wren *Troglodytes troglodytes*. Other species noted onsite but less frequently encountered included, bullfinch *Pyrrhula pyrrhula*, goldfinch *Carduelis carduelis*, , and lesser redpoll *Acanthis cabaret*.
- Amber list species (*i.e.* of medium conservation concern): house sparrow *Passer domesticus*, swallow *Hirundo rustica*, goldcrest *Regulus regulus*, linnet *Carduelis cannabina*, willow warbler *Phylloscopus trochilus*, short-eared owl *Asio flammeus* and starling *Sturnus vulgaris*
- Red list species (*i.e.* of high conservation concern): grey wagtail *Motacilla cinerea*

Grey wagtail are red-listed (*i.e.* of high conservation concern) due to declines in breeding populations. This species was recorded during multiple site visits near Toureen Lough and adjacent to the wetland area in the north western section of the proposed development site. Both male and female individuals were identified during the March wintering bird visit. Thirteen records of this species were identified within c. 2km of the site, with the most recent from 2011.

There are a number of habitats within the proposed development site that are suitable for breeding birds to nest in, including trees, barns, hedgerows and scrub. The proposed development site is likely to encompass and/or form part of the breeding territories of a number of bird species recorded during the surveys. Breeding behaviour of the majority of species was observed within the proposed development site, predominately along or close to hedgerows and the woodland areas within the site. Barn swallows were observed nesting in a barn in the north-eastern section of the proposed development site (*i.e.* building code: BB 5B), with three nests identified along the wooden rafters. A pair of buzzards were observed on numerous surveys throughout 2020 soaring and calling above the proposed development site. Whilst a nest was not identified, it is likely they are nesting nearby in the local area.

Whilst there were a number of farm buildings and barns within the site, there were no buildings suitable for barn owls, due to lack of potential nest places within the barns

present *i.e.* a concave or level surface or cavity, that is elevated and well hidden²¹. No evidence of barn owls was identified within the proposed development site. A short-eared owl was identified during a bat survey carried out in 2019, flying over the east of the site.

Due to the presence of a potential breeding population of grey wagtail, a red-listed species, and lack of recent local records, grey wagtails are considered to be of county importance. The other breeding bird populations within the proposed development site are considered to be of local importance (higher value).

Wintering Birds

The desk study records from the NBDC include 42 wintering waterfowl, gull and wader species. Including 10 species listed under Annex I of the Birds Directive within c. 2km of the proposed development site. These records are present in Appendix 7.2.

Table 7.8 below provides a summary of the findings of the winter bird surveys with respect to those species which are of highest conservation concern, and were recorded within winter bird survey sites:

- Special Conservation Interests (SCIs), for a wintering population, of nearby SPAs
- Species listed under Annex I of the Birds Directive (2008/144/EC)
- Red, Amber and Green BoCCI species listed for their wintering populations

Table 7.8 Details of wintering bird species found within the proposed development site

Common name/Latin name/BoCCI Code	Distribution in the study area	Peak count/Site/Date	Conservation Importance		
			BoCCI (Breeding)	Annex I	SCI
Black-headed gull <i>Chroicocephalus ridibundus</i> (BH)	Observed flying over site, did not land within site during three visits.	22 birds, flying high above the central area of the site and headed west, seventh visit	Amber (B/W)	-	✓
Coot <i>Fulica atra</i> (CO)	Observed on the wetland feature in the north of the site during one visit.	2 birds, on wetland/pond feature in the north, on first visit	Amber (B/W)	-	-
Common gull <i>Larus canus</i> (CM)	Observed circling c. 40m high above site during one visit. Did not land within site.	43 birds, in central area of site, on seventh visit.	Amber (B/W)	-	-
Gadwall <i>Mareca strepera</i> (GA)	Observed wading in wetland meadow adjacent to Toureen Lough during one visit, and on the wetland feature in the north during one visit.	2 birds, on Toureen Lough in October	Amber (B/W)	-	✓

²¹ Barn Owl Roosting and Nesting Places, The Barn Owl Trust (2015). Accessed here: <https://www.barnowltrust.org.uk/how-to-manage-land-for-barn-owls/roosting-nesting-places/>

Common name/Latin name/BoCCI Code	Distribution in the study area	Peak count/Site/Date	Conservation Importance		
			BoCCI (Breeding)	Annex I	SCI
Grey heron <i>Ardea cinerea</i> (H.)	Observed in the bank of Toureen Lough, during one visit.	1 bird, Toureen Lough, on fourth visit	Green (B/W)	-	-
Kestrel <i>Falco tinnunculus</i> (K.)	A female observed hunting high above the west of the site during sixth visit; one individual observed flying over north of the site during 3 rd visit.	1 bird observed in the west adjacent to M18 Motorway, and 1 bird observed in the north.	Red (B)	-	-
Lesser black-backed gull <i>Larus fuscus</i> (LB)	Observed flying above the site in the west during second visit, did not land.	1 bird observed in the west in October	Amber (B)	-	-
Little egret <i>Gallinula chloropus</i> (ET)	Observed on banks of Toureen Lough during second visit.	1 bird observed in Toureen Lough in October.	Green (B/W)	✓	-
Snipe <i>Gallinago gallinago</i> (SN)	2 birds observed during fourth visit wading in attenuation pond in the west; 1 bird observed in attenuation pond during fifth visit; one bird observed in meadow adjacent to Toureen Lough and wading in attenuation pond during sixth visit.	2 birds in attenuation pond in December visit.	Red (B/W)	-	-
Teal <i>Anas crecca</i> (T.)	Observed on the wetland/pond feature in the north of the site during three visits.	10 birds, on the wetland feature in the north, on third visit in November	Amber (B/W)	-	✓
Tufted duck <i>Aythya fuligula</i> (TU)	Observed on wetland/pond feature in the north during second visit.	1 bird, on wetland/pond feature in the north, in Octobers visit.	Amber (B/W)	-	-
Mallard <i>Anas platyrhynchos</i> (MA)	Observed on Toureen Lough during three visits, on the wetland feature in the east during one visit and on the wetland feature in the north during one visit	2 birds, on Toureen Lough, and on feature in the north.	Amber (B/W)	-	✓

During wintering bird surveys carried out between September 2020 and March 2021, five SCI species from nearby European sites were identified within the lands; coot,

mallard, gadwall, and teal being SCI species of Ballyallia Lough SPA c. 2.7km north west of the site, and black-headed gull and teal, SCI species for the River Shannon and River Fergus Estuaries SPA, located c. 5.1km south west of the site, and teal also being an SCI species for the River Shannon and River Fergus Estuaries SPA and Corofin Wetlands SPA, c. 10.7km north west of the site. Suitable habitat for these species was identified within the proposed development, and included; Toureen Lough, the M18 Motorway Attenuation Pond, the wetland habitats in the east of the lands (small section of this habitat within the red line boundary), and the wetland features in the north west. The lands provide some areas of suitable foraging habitat (e.g. open amenity, arable and improved agricultural grassland), for specific wintering birds such as geese and swans. However, these suitable habitats, while they are present on site, are grazed, mostly located in hilly areas giving limited sight lines, and therefore would have limited suitability for these species. There is ample habitat however for waterfowl and some wader species within the wetland habitats found in the proposed development site. The habitats offer suitable foraging habitat and shelter for smaller overwintering species such as passerine species fieldfare *Turdus pilaris* and redwing *Turdus iliacus*, green-listed species which were both recorded during the wintering bird surveys carried out in October and November 2020. Peak numbers of 40 for redwing and 30 for fieldfare were observed, with both species identified in the north west of the site moving along the hedgerows. Grey wagtail was also identified during three visits, in the attenuation pond in the west, and feeding on cattle adjacent to the farm buildings in the south (BB 4A), farm buildings in the north (BB 6A), with a peak count of two individuals. Grey wagtail is a red-listed species (i.e. of high conservation concern)

The proposed development is within the normal foraging range of SCI species of the River Shannon and River Fergus Estuaries SPA, Ballyallia Lough SPA, the Slieve Aughty SPA, and the Corofin Wetlands SPA. The lands provide limited areas of suitable foraging habitat (e.g. open amenity grassland) due to the largely agricultural habitats on site, for specific wintering birds such as geese and swans. There is ample habitat however for waterfowl and some wader species within the wetland habitats found in the proposed development site.

The habitats offer suitable foraging habitat and shelter for smaller overwintering species such as passerine species fieldfare and redwing, which were both recorded during the wintering bird surveys carried out between September 2020 and March 2021.

Considering the above, the local populations of wintering birds (excluding SCI species), are considered to be of local importance (higher value). The SCI bird species populations are considered to be of international importance.

Hen harrier

The desktop search returned records for hen harrier and merlin *Falco columbarius*, both Annex I species on the Bird Directive, within c. 2km of the proposed development. Whilst there is no suitable summer breeding and foraging habitat within the proposed development (i.e. heather moorland, open non-afforested habitats, and young forestry plantations¹³¹⁴), suitable habitat for wintering hen harrier was identified within the marsh/reed habitat in the east of the site (Ardnamurry Lough), beyond the red line boundary of the proposed development site. The site was deemed unsuitable for

merlin, as they are typically associated with forestry plantations and moor and heathlands (Lusby et al., 2017)²².

Dedicated surveys for hen harrier were carried out monthly between September 2020 and March 2021 (optimum time for winter roost survey²³), in this area of suitable roosting habitat. No hen harriers were recorded within or near the proposed development site during these surveys. The nearest European site for which both these species are designated is the Slieve Aughty Mountains SPA, located c. 4.5km north west of the proposed development site.

7.3.3.3 Reptiles

The Wildlife Acts provide protection to Ireland's only reptile species, common lizard, *Zootoca vivipara*

The NBDC data search did not return any records for common lizard within c. 2km of the proposed development site. No evidence or sightings of common lizards were noted during surveys on site, however suitable habitat for reptiles does exist within the site. The majority of the field boundaries are composed of dry stone walls, which provide ample basking opportunities for reptiles, adjacent to hedgerows and scrub habitat for cover from predators. Within the woodland areas of the site, mounds of limestone rock can be found in various places, this may provide areas of refuge below ground during colder periods.

Local reptile populations are considered to be of local importance (higher value).

7.3.3.4 Amphibians

The Wildlife Acts provide protection to Ireland's two amphibian species, common frog *Rana temporaria* and smooth newt *Lissotriton vulgaris*.

The NBDC data search returned three records of amphibians within c. 2km of the site, all of which were common frog (Appendix 7.2). No evidence of amphibians was found within the lands; however suitable breeding and foraging/resting habitat was identified within the wetland features of the site, including: Toureen Lough, the wetland/fen area in the east of the site, and the marsh/fen area in the northern section of the proposed development site. Drainage ditches that may contain stagnant water during and after periods of heavy rain may also provide suitable breeding habitat for amphibians.

Local amphibian populations are considered to be of local importance (higher value).

7.3.3.5 Bats

Bats, and their breeding and resting places, are protected under the Wildlife Acts. All bat species are also listed on Annex IV of the EU Habitats Directive (with the Lesser horseshoe bat also listed on Annex II) and are afforded strict protection under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations, 2011. The NBDC database search returned records for the following bat species: lesser horseshoe bat *Rhinolophus hipposideros*, brown long-eared *Plecotus*

²² Lusby, J., Corkery, I., McGuinness, S., Fernández-Bellon, D., Toal, L., & Norriss, D. et al. (2017). *Breeding ecology and habitat selection of Merlin Falco columbarius in forested landscapes*. *Bird Study*, 64(4), 445-454.

²³ *Irish Hen Harrier Winter Survey, Survey Guide*. Found here <http://www.ihws.ie/>

auritus, Leisler's *Nyctalus leisleri*, common pipistrelle *Pipistrellus pipistrellus*, and soprano pipistrelle *Pipistrellus pygmaeus*.

The review of records held by Bat Conservation Ireland returned 125 records of bat roosts from within c. 10km of the proposed development site (Appendix 7.2). The closest bat roosts to the proposed development site were all lesser horseshoe bat, located c. 405m, c. 800m and c. 830m south of the proposed development site, respectively. The closest roost to the site for lesser horseshoe bat in Kilfelim, is a common pipistrelle and Leisler's bat roost. Six additional lesser horseshoe bat roosts lie within c. 2km of the proposed development site as well as one known Daubenton's bat roost located c. 2km south west of the proposed development site.

Bat survey details and results undertaken in 2020 and 2022 is discussed below, bat surveys and results from 2018 can be found in Appendix 7.8. A summary of each of the survey types undertaken within the proposed development site is described below, followed by a detailed description and evaluation of each of the species found within the proposed development site, with associated figures.

Building Inspection Surveys

All buildings within the lands were assessed externally for evidence of bats, with barns and shed also accessed internally and externally. Residential houses could not be accessed internally due to health and safety concerns associated with COVID-19. Summary results of each building surveyed, the suitability for roosting bats, and any evidence of bats identified can be found below in table 7.9 and in Appendix 7.4. A more detailed analysis for each species is described below in relation to building surveys.

Table 7.9 Description of buildings within the proposed development site

Building ID no.	Roost	Rating	Details of building and surrounding habitat
BB 1A	Yes	Low	Cattle shed with concrete block and corrugated metal walls and corrugated metal roof. Open on side of shed. Surrounding landscape - pasture fields to the north, east and west, and treelines to the south.
BB 1B	No	Low	Adjacent to 1A. Concrete external walls with corrugated roof. Not accessible inside due to safety concerns. Creamery machinery within. Same surroundings as 1A
BB 2	Yes	Moderate	Large residential house, brick walls with rendering, slate roof, two stories. Surrounded by treelines and hedgerows, and Torreen Lough closeby. Most likely more features present near roof but due to height of house difficult to assess fully.
BB 3	Yes	High	Residential house, bungalow, slate roof with concrete walls.
BB 4A	No	Low	Corrugated cow shed with part concrete walls, and wooden beams within. Pasture fields bordered by hedgerows/treelines. Adjacent to meadow with Tooreen Lough
BB 4B	No	Low	Stone/Stipling walls with corrugated roof, cow shed. Adjacent to 4A
BB 4C	No	Negligible	Tall barn building, very open with wooden beams, no walls on two sides, very exposed. Corrugated roof and sides
BB 4D	No	Low	Small building with stone walls, partly collapsed roof on one side and very open, small room at end with some potential
BB 5A	Yes	Moderate	Brick house with flat slated roof. Wooden sheds in garden, treelines and hedgerows adjacent to house, surrounding habitat pasture field

Building ID no.	Roost	Rating	Details of building and surrounding habitat
BB 5B	Yes	Low	Wood shed close to BB 5A, exposed on two sides, concrete block walls and corrugated metal roof. Wooden beams inside. Thick ivy on western end of shed. Surrounded by pasture fields, very exposed. Swallows nesting in here
BB 6A, 6B, 6C	No	Low	Three cattle barn sheds, all with corrugated steel roofs and concrete block walls. Very exposed buildings, mostly open with very little features. Suitable for foraging but little roosting features, any present would only house small numbers of bats. Hedgerows and treelines nearby, with pasture fields surrounding.
BB 7	No	Moderate	Residential unoccupied house. Very run down, concrete walls with slate roof. Dense ivy at northern gable end where stone shed used to be. Well connected to hedgerows and treelines nearby.
BB 8	Yes	Moderate	Modern residential building, stone walls with flat slated roof. Garage building behind house. Hedgerow surrounding building (<i>Leylandii</i> spp.), and main road along southern boundary.
BB 9	Yes	Moderate	Modern residential building, with stone walls and flat roof slates. Large slated shed/building (Edward casey kitchens workshop) beside house. Hedgerows and treelines along boundary, road along southern boundary.

Summary of Roost Emergence/Re-entry Activity Surveys

The details of emergence and re-entry surveys can be found in Appendix 7.5.

In summary, during these surveys 19 roosts were identified across 16 buildings located within the proposed development site. Full details of these roosts are provided in Table 7.10 and their locations are presented in Figure 7.10. **An additional roost was identified during building inspection surveys carried out in March 2022, totalling the number of roosts within the proposed development to 20.**

Table 7.10 Summary of roosts recorded within the proposed development site (see Figure 7.10 for location of buildings)

Building Code	Description of building	Species roosting	Number roosting and total roosts	Description of roost (s)
BB 1A	Cattle shed with corrugated iron roofing.	Soprano pipistrelle	One individual bat emerging from one roost.	Bat seen emerging from underneath corrugated metal sheeting.
BB 2	Residential house	Soprano pipistrelle	Four roosts with max 2 individuals in each.	Four roosts mainly located on the roof of building.
BB 3	Residential house	Soprano pipistrelle	Five roosts, with 30 individuals from one, nine from another and one to two from remaining.	Mainly located near chimney and under lead flashing. Also above porch.
BB 5A	Residential house	Soprano pipistrelle and common pipistrelle	Four roosts with max two bats in each	Located across the house, two under roof flashing, and under slates.
BB 5B	Wood shed	Brown long-eared	One roost with two individual bats	Observed emerging from dense ivy growing within shed.
BB 6C	Barn shed	Leisler's bat	One roost with one bat	Observed roosting during the daytime building inspections

				between a crack within the outside wall of the shed.
BB 8	Residential house	Soprano pipistrelle	Three roosts, one with 13 bats, other two with one to two individual bats	One roost on the garage, and two within house by conservatory.
BB 9	Residential house	Soprano pipistrelle	One roost with max eight individuals.	Emerged above porch.

The majority of roosts recorded within the proposed development site were small, single pipistrelle roosts, likely to be either male and/or night roosts. Two potential soprano pipistrelle maternity colonies were identified at BB 3 and BB 8, with 30 and 13 individual bats observed emerging and/or re-entering the roosts during the surveys. All of the barns were considered to be of low potential, and this was evident from the results of the activity surveys (*i.e.* the lack of roosts identified in all except one). One barn (BB 1A) had one soprano pipistrelle re-entry, and another barn (BB 5B) was found to be a brown long-eared roost, with two individuals observed on the walls and rafters within the barn, and warming up before leaving the barn for foraging. All of the occupied residential houses within proposed development site had at least one roost, and BB 3 contained the highest number of roosts and bats recorded across the proposed development site.

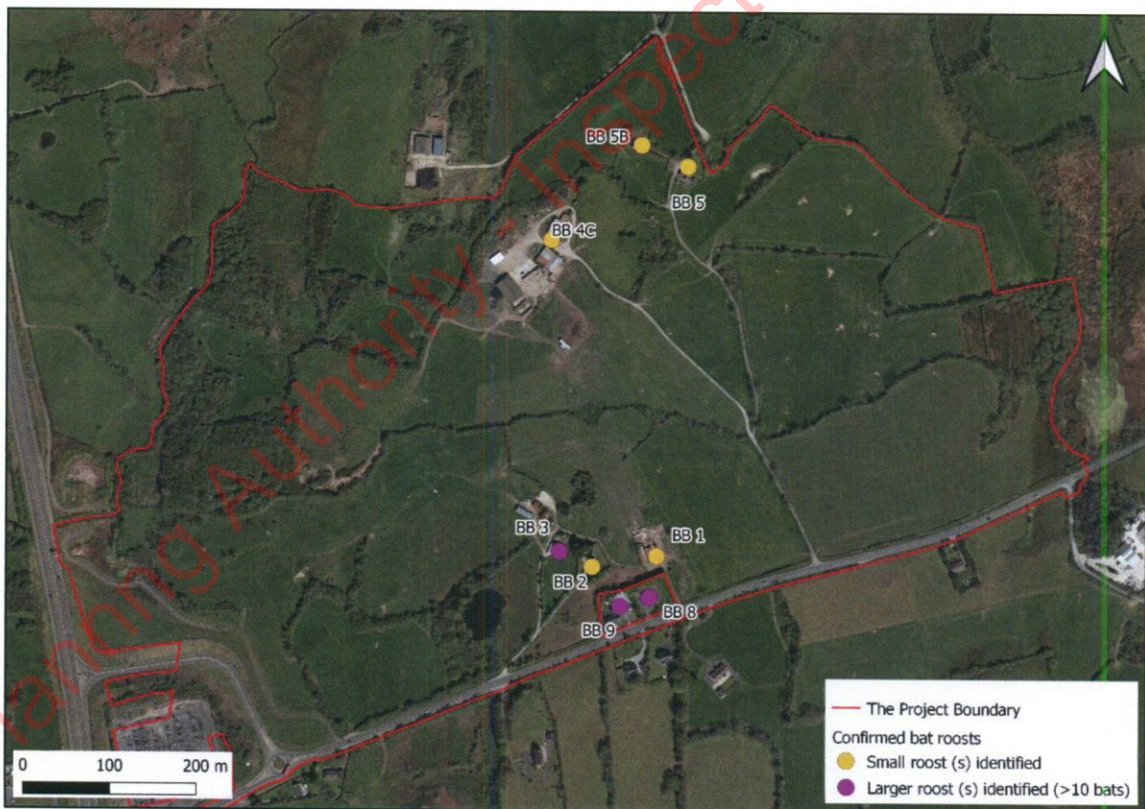


Figure 7.10 Location of roost buildings within the proposed development site (*updated*)

Summary of Transect Surveys

A range of bat survey types were carried out in 2018 and 2020, in order to determine what bat species were using the proposed development site and to establish the level of importance of the proposed development site for local bat species.

Bats recorded during these surveys were associated with the hedgerows and treelines, along field boundaries, foraging and/or commuting within the proposed development site. Specific areas had higher rates of activity as based on the total number of calls across all three transects for each species and diversity of bat species recorded. These areas included:

- Toureen Laneway, a double hedgerow track lined with mature trees, within the south-eastern section of the site (176 total number of calls recorded, 5 species);
- Toureen Lough in the south-western section of the site adjacent to R352, and the lands immediately around it (70 total number of calls recorded, four species);
- The woodland in the north-western section of the site, specifically the edges along treelines/hedgerows (186 total number of calls recorded, 5 species); and
- The hedgerows coming off Toureen Laneway, towards the eastern section of the site (60 total number of calls recorded, 4 species).

Areas that were walked but exhibited lower levels of activity included:

- Along the southern most boundary of the site, parallel to R352;
- The south western corner, south of the attenuation pond;
- North of BB 6A, 6B and 6C (Figure 7.4) along the northern boundary; and
- In the north eastern corner along the boundary with riparian woodland.

The most commonly recorded species across all three transect survey visits was soprano pipistrelle bat, followed by common pipistrelle, Leisler's bat, brown long-eared bat, *Myotis* spp., and lesser horseshoe bat.

Full details of these 2020 surveys are provided in Appendix 7.8 and the locations of the transect routes are presented in Figure 7.2. A summary for each species is provided below.

Surveys undertaken in 2018, had largely similar results to those in 2020, with the addition of a single lesser horseshoe bat call identified during the second visit in 2020 (Appendix 7.6, Figure 7.11). Brown long-eared bat was also identified during the 2020 transect surveys, whilst no calls were recorded for this species during the 2018 surveys. Three surveys were undertaken in 2020 however, including an all night survey, with just two dusk transects completed in 2018. Bat activity levels were similarly high in both years in the areas listed above.

Automated Static Detectors

In total, six bat species were recorded on automated static bat detectors deployed within the survey area, including: Leisler's bat, common pipistrelle bat, soprano pipistrelle bat, brown long-eared bat, lesser horseshoe bat and unidentified *Myotis* bats. Unidentified Pipistrelle bats were also identified²⁴.

Full details of the static detector results are provided in Table 7.11 and the locations of the transect routes are presented in Figure 7.2.

²⁴ In some instances, it can be difficult to differentiate between calls of both pipistrelle species, where their peak frequency approaches 50kHz, and in this instance we have assigned the generic category *Pipistrellus* species. Calls of this type have been incorporated into soprano and common pipistrelle results.

Table 7.11 Results of bat activity surveys per location using automated static bat detectors

Location	Habitat description	Deployment dates	Number of nights recorded	Species recorded ²⁵ (overall total number of calls and average number of calls per night)
1	Automated detector placed within a hawthorn hedgerow located directly east of woodland area.	6th July 2020 – 28th July 2020	7	Lesser horseshoe bat (138) (19.71) Common pipistrelle (12) (1.71) <i>Myotis</i> sp. (52) (7.43) Soprano pipistrelle (11) (1.58) Leisler's bat (1) (0.14)
2	Automated detector placed within a hawthorn hedgerow south of woodland area, within the west of the subject lands.	6th July 2020 – 28th July 2020	16	Soprano pipistrelle (753) (47.06) Pipistrelle sp. (336) (21) Common pipistrelle (39) (2.44) <i>Myotis</i> sp. (20) (1.25) Lesser horseshoe bat (2) (0.13) Leisler's bat (2) (0.13)
3	Automated detector was deployed west of Toureen Laneway attached to a hawthorn tree on lower field boundary	6th July 2020 – 28th July 2020	2	Common pipistrelle (5) Soprano pipistrelle (2) Brown long-eared (1)
		21st September 2020 – 20th October 2020	12	Common pipistrelle (426) (35.5) Soprano pipistrelle (210) (17.5) <i>Myotis</i> sp. (2) (0.17) Lesser horseshoe bat (1) (0.08)
4	Automated detector was deployed on an ash tree along Toureen Laneway	6th July 2020 – 28th July 2020	14	Soprano pipistrelle (1,146) (81.86) Common pipistrelle (858) (61.29) <i>Pipistrellus</i> sp. (335) (23.93) Leisler's bat (221) (15.79) Brown long-eared (96) (6.86) <i>Myotis</i> sp. (65) (4.64)

²⁵ The number of bat calls is provided beside each species in brackets. To note, this does not necessarily correspond to the exact number of bats using the lands; however, it does provide an indication of usage by a particular bat species at that location

Location	Habitat description	Deployment dates	Number of nights recorded	Species recorded ²⁵ (overall total number of calls and average number of calls per night)
5	Automated detector deployed on oak tree on the edge of scrub habitat in the east of the site.	6th July 2020 – 28th July 2020	18	Soprano pipistrelle (1,399) (77.11) Lesser horseshoe bat (409) (22.72) Common pipistrelle (178) (9.89) <i>Pipistrellus</i> sp. (93) (5.17) <i>Myotis</i> sp. (77) (4.28) Leisler's bat (8) (0.44) Brown long-eared (6) (0.33)
6	Detector was deployed within a hawthorn hedgerow north of barn buildings in the south of the site.	7th July 2020 – 28th July 2020	20	Soprano pipistrelle (610) (30.5) Common pipistrelle (337) (16.85) Leisler's bat (65) (3.25) Brown long-eared (29) (1.45) <i>Myotis</i> sp. (20) (1) <i>Pipistrellus</i> sp. (17) (0.85) Lesser horseshoe bat (15) (0.75)
7	Automated detector was deployed within a hedgerow along a field boundary adjacent to Toureen Laneway, in the north of the site.	7th July 2020 – 27th July 2020	4	Soprano pipistrelle (12) Common pipistrelle (3) Ble (1)
		21st September 2020 – 20th October 2020	8	Lesser horseshoe bat (101) (12.63) <i>Pipistrellus</i> sp. (51) (6.38) <i>Myotis</i> sp. (22) (2.75) Leisler's bat (18) (2.25) Soprano pipistrelle (15) (1.88) Common pipistrelle (14) (1.75) Ble (3) (0.38)
8	Automated detector was placed within hedgerow/Treeline adjacent to Toureen Lough	28th July 2020 – 17th August 2020	4	Soprano pipistrelle (1726) (431.5) <i>Pipistrellus</i> sp. (264) (66) Common pipistrelle (25) (6.25) Leisler's bat (21) (5.25) <i>Myotis</i> sp. (8) (2) Ble (3) (0.75) Lesser horseshoe bat (2) (0.5)

Location	Habitat description	Deployment dates	Number of nights recorded	Species recorded ²⁵ (overall total number of calls and average number of calls per night)
9	Automated detector was placed within hedgerow adjacent to attenuation pond in the west of the site.	28th July 2020 – 27th July 2020	20	Lesser horseshoe bat (36) (1.8) <i>Myotis</i> sp. (7) (0.35) Leisler's bat (2) (0.1) Ble (2) (0.1)
10	Automated detector was placed on a hawthorn tree behind the barn buildings in the north of the site.	30th July 2020 – 18th August 2020	16	Soprano pipistrelle (3,431) (214.44) Common pipistrelle (1,279) (79.94) <i>Pipistrellus</i> sp. (812) (50.75) Leisler's bat (244) (15.25) Lesser horseshoe bat (42) (2.63) Brown long-eared (36) (2.25) <i>Myotis</i> sp. (30) (1.88)
11	Automated detector was deployed on a blackthorn tree in the very north east boundary corner of the site.	21st September 2020 – 20th October 2020	8	Common pipistrelle (1,440) (180) Soprano pipistrelle (1,215) (151.88) <i>Pipistrellus</i> sp. (246) (30.75) Leisler's bat (107) (13.38) Brown long-eared (23) (2.88) Lesser horseshoe bat (8) (1) <i>Myotis</i> sp. (7) (0.88)
12	Automated detector was deployed on a hazel tree within a hedgerow in the north eastern boundary of the site.	21st September 2020 – 20th October 2020	18	Soprano pipistrelle (1,135) (63.05) Common pipistrelle (321) (17.83) Ble (87) (4.83) Leisler's bat (66) (3.67) <i>Pipistrellus</i> sp. (31) (1.72) Lesser horseshoe bat (28) (1.56) <i>Myotis</i> sp. (13) (0.72)
13	Automated detector was deployed on the eastern boundary within a hedgerow adjacent to riparian woodland.	21st September 2020 – 20th October 2020	9	Soprano pipistrelle (181) (20.11) <i>Myotis</i> sp. (77) (8.56) Common pipistrelle (59) (6.56) Lesser horseshoe bat (34) (3.78) Ble (16) (1.78)

Location	Habitat description	Deployment dates	Number of nights recorded	Species recorded ²⁵ (overall total number of calls and average number of calls per night)
				Leisler's bat (3) (0.33) <i>Pipistrellus</i> sp. (1) (0.11)
14	Automated detector was deployed on a hazel tree in the north west adjacent to the woodland and fen areas.	28th July – 18th August 2020	22	Common pipistrelle (562) (25.55) Soprano pipistrelle (422) (19.18) Leisler's bat (155) (7.05) Lesser horseshoe bat (29) (1.32) Brown long-eared (25) (1.14) <i>Pipistrellus</i> sp. (5) (0.23) <i>Myotis</i> sp. (2) (0.09)
15	Automated detector was deployed in the south eastern corner adjacent to marsh and wet grassland habitats	18th August – 21st September 2020	7	Soprano pipistrelle (755) (107.86) Common pipistrelle (422) (60.29) <i>Myotis</i> sp. (68) (9.71) Brown long-eared (12) (1.71) Leisler's bat (2) (0.29) <i>Pipistrellus</i> sp. (2) (0.29) Lesser horseshoe bat (2) (0.29)

Evaluation per bat species

Lesser horseshoe bat

Transect surveys

One lesser horseshoe bat call was recorded during the second transect survey in July 2020, in the south of the proposed development site. No other calls of this species were identified during these surveys. This species was not identified during transect surveys in 2018.

Static detector surveys

Lesser horseshoe bat calls were identified on 14 out of 15 of the deployed static detectors, with varying degrees of activity. Highest numbers of calls per night were recorded in the east at the boundary of scrub/woodland habitat, in the west along a hedgerow bordering the woodland area, and along a hedgerow adjacent to Toureen Laneway, all of which are bordered by pasture fields. This is the ideal habitat for lesser horseshoe bat, and is considered to be important for commuting and foraging for this species within the proposed development site, as is the case for all other bat species identified within the proposed development site. Full details of the number of calls per

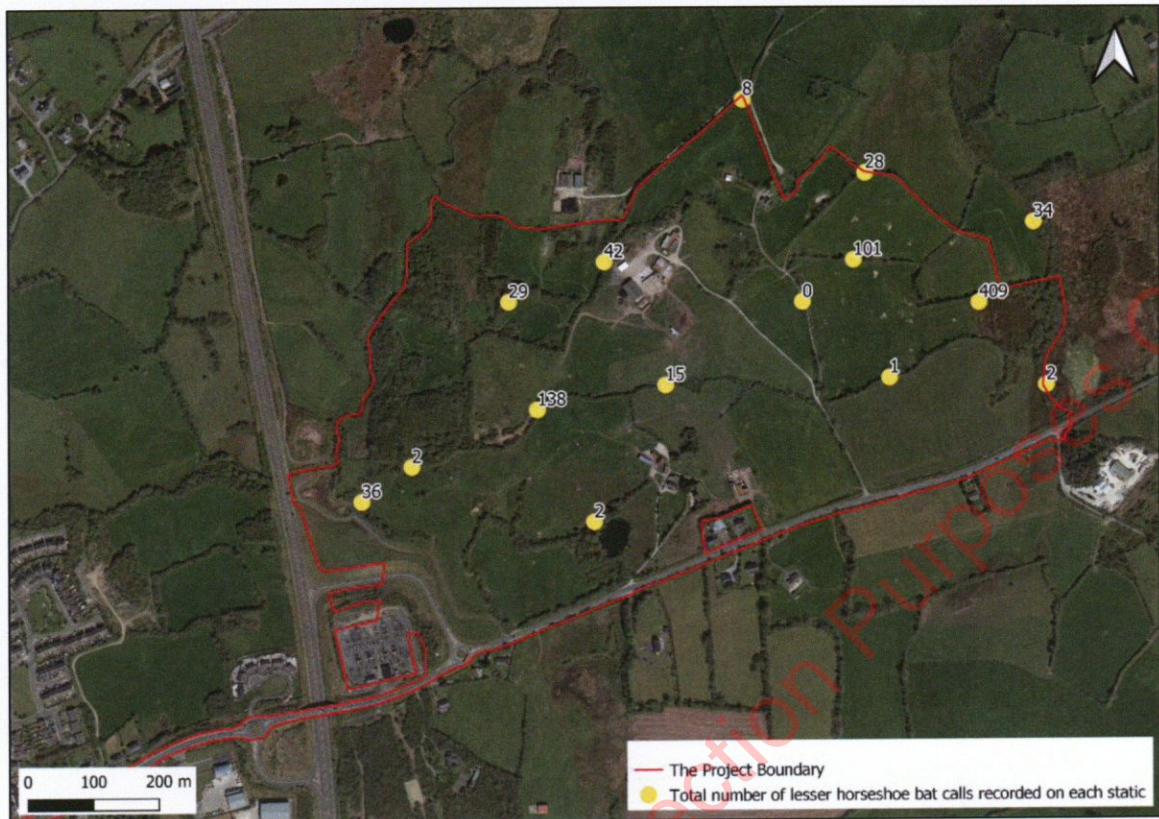


Figure 7.12 Total number of lesser horseshoe bat calls recorded at each static (updated)

Roost emergence/re-entry activity surveys

Lesser horseshoe bat was not recording during any of the post-emergence/re-entry surveys undertaken at the buildings within the proposed development site, and as such no roosts were recorded of this species within the proposed development boundary. Lesser horseshoe bat are restricted in terms of their choice of roosting site, as they cannot land on walls and crawl in and instead they must fly through an opening large enough to accommodate its wingspan (Kelleher, 2006)²⁶. As a result, lesser horseshoe bats are typically cave-dwelling species, however in Ireland, this species will also use buildings for their summer roosts, and caves for hibernation roosts²⁷. Old stone buildings with slate roofs are ideal roosting sites as they usually offer a warm area near the apex of the roof in which to rear young. There are no caves or suitable roost buildings located within or near the proposed development site, with the closest cave in Ballyallia, located c. 2.8km north west of the site, and the nearest known roost located c. 405m south of the proposed development site²⁸.

Evaluation

Overall, activity levels of lesser horseshoe bat were considered to be moderate in relation to other bat species activity across the proposed development site. The

²⁶ Kelleher, C. (2006). *Summer Roost Preferences of Lesser Horseshoe bat Rhinolophus hipposideros in Ireland*. The Irish Naturalists' Journal, Vol. 18, No.6, pp. 229-231.

²⁷ McAney, K. (2014) *An overview of Rhinolophus hipposideros in Ireland (1994–2014)* Vespertilio 17: 115–125, 2014

²⁸ University of Bristol Speleological Society – Irish caves locations. Available from <http://www.ubss.org.uk>

hedgerows and treelines bordered by pasture grassland located within the eastern section of the site, were the most frequented by this species with the highest levels of activity experienced here. Areas located close to the woodland also had a high number of calls per night. The results from surveys carried out in 2018 by Scott Cawley Ltd., were similar to the results of the 2020 surveys²⁹. The results from the other areas within the site are very similar to the 2020 survey results, with hedgerows near the woodland having the highest number of calls per night of lesser horseshoe bat during both seasons of surveys.

Unlike other species, lesser horseshoe bats do not have a wide distribution throughout the country with their core area restricted to six western counties (*i.e.* Clare, Cork, Galway, Kerry, Limerick and Mayo) and it has the smallest predicted core area of any other species (Roche *et al.*, 2014).

Lesser horseshoe bat are known to forage a few kilometres from the roost, relying on linear landscape features to commute to and from these roosts, and avoiding flying out in the open (Roche *et al.*, 2014). As evident from the results of the desk study, numerous small lesser horseshoe roosts exist in the vicinity of the subject lands, and it is likely that they use the subject lands for foraging or the linear vegetation features for commuting to and from their roosts. Nearby European site designated for lesser horseshoe bats include Old Domestic Buildings (Keevagh) SAC, located c. 4.3km away, Dromore Woods and Loughs SAC, located c. 4.2km north east, and Old Domestic Buildings, Rylane SAC, located c. 5.9km east, it is possible individual bats foraging within the proposed development site are connected with these SAC populations.

Given the small range of the species, the quantity and proximity of confirmed lesser horseshoe bat roosts around the site as well as the species' sensitivity to habitat change and removal of linear vegetation features, and the potential connection of populations of lesser horseshoe bats to a number of European sites designated for this species, the local population of lesser horseshoe bat have been classified as being of international importance.

Soprano Pipistrelle Bat

Transect Surveys

Full details from each transect survey are provided above in Appendix 7.6 and locations of each of the recorded soprano pipistrelle calls are shown on Figure 7.13-7.14. Soprano pipistrelle was the most commonly occurring species recorded during all three transect visits during surveys undertaken in July and August 2020. This was also the case in surveys carried out in 2018. This species was identified across the site with a high number of associated calls. Area of high activity were: along Toureen Laneway, which traverses the site from the R352 in the south to the north; along the hedgerows associated with this laneway; at Toureen Lough and the farm buildings adjacent to this; and, the woodland in the north west. Lower levels of activity associated with this species were identified: along the southern boundary; parallel to the R352; and also along the north eastern boundary of the site. The levels of activity recorded and the corresponding areas, were both very similar to the results of the 2018 surveys, with the highest number of soprano pipistrelle calls within the proposed development boundary recorded at Toureen Lough, Toureen Laneway, and the woodland. Activity

²⁹ The proposed development boundary has been extended slightly eastwards in 2020, and therefore the eastern most area of the site had not been surveyed previously in 2018.

levels were recorded along well-established hedgerows and treelines, and linear features, which provide suitable commuting and/or foraging routes for bats to the wider environment beyond the proposed development site.

Static Detector Surveys

Soprano pipistrelle calls were identified on 14 of the 15 static detectors deployed in 2020. In 2018 static detector deployments, this species was recorded on all 14 detectors deployed. The level of activity recorded on these statics was generally high, as was the case during transect surveys. The highest number of calls recorded per night and the highest total number of calls recorded, were both at Toureen Lough. Very high levels of activity were also recorded at: the woodland in the north west; Toureen Laneway; the marsh area adjacent to barn buildings (BB 6) in north; and the scrub habitat and hedgerows adjacent in the east. These results were similar to the results of the 2018 surveys, with very similar levels of activity recorded at all static deployment locations (or closest location or detector). Full details of the number of calls per night and number of nights static bat detectors were deployed are presented in Table 7.11, and in Figure 7.13 and 7.14 below.

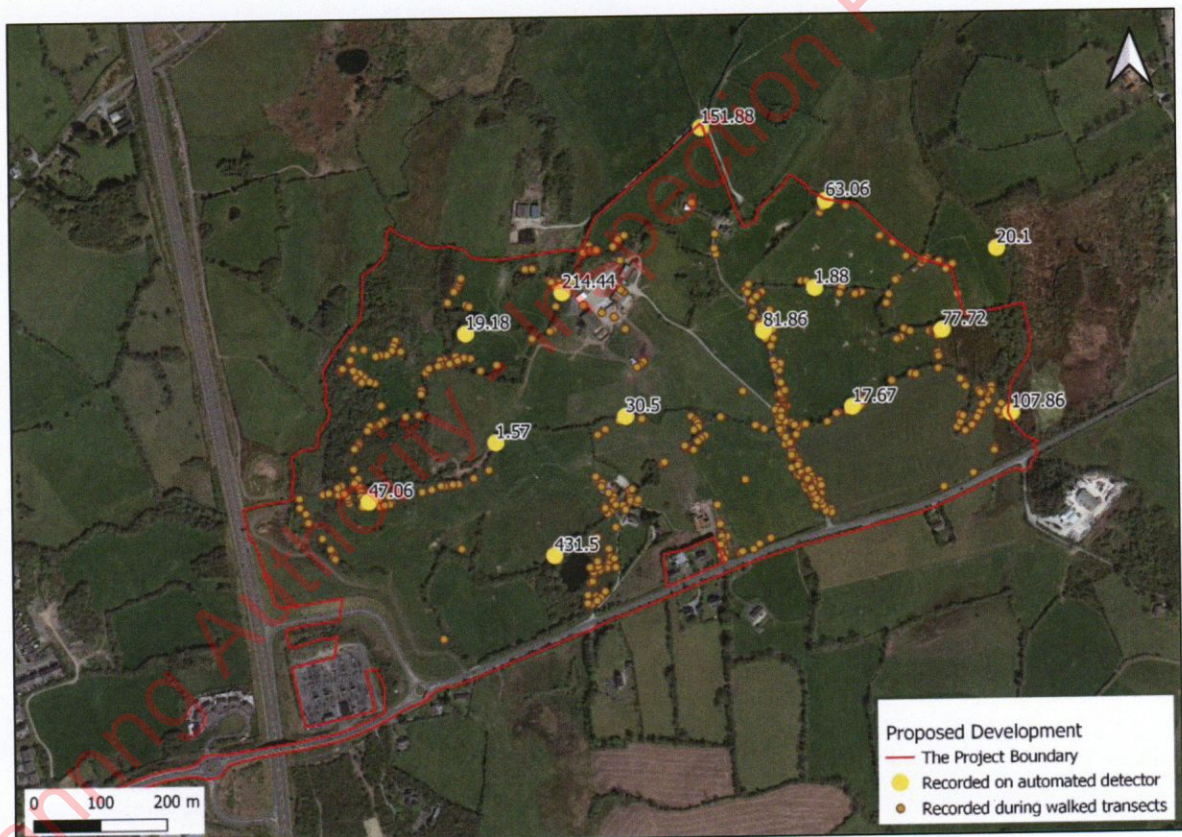


Figure 7.13 Location of soprano pipistrelle calls recorded during both walked transects and automated static bat detector deployment, along with the average number of soprano pipistrelle calls recorded per night during the static deployment only (updated)

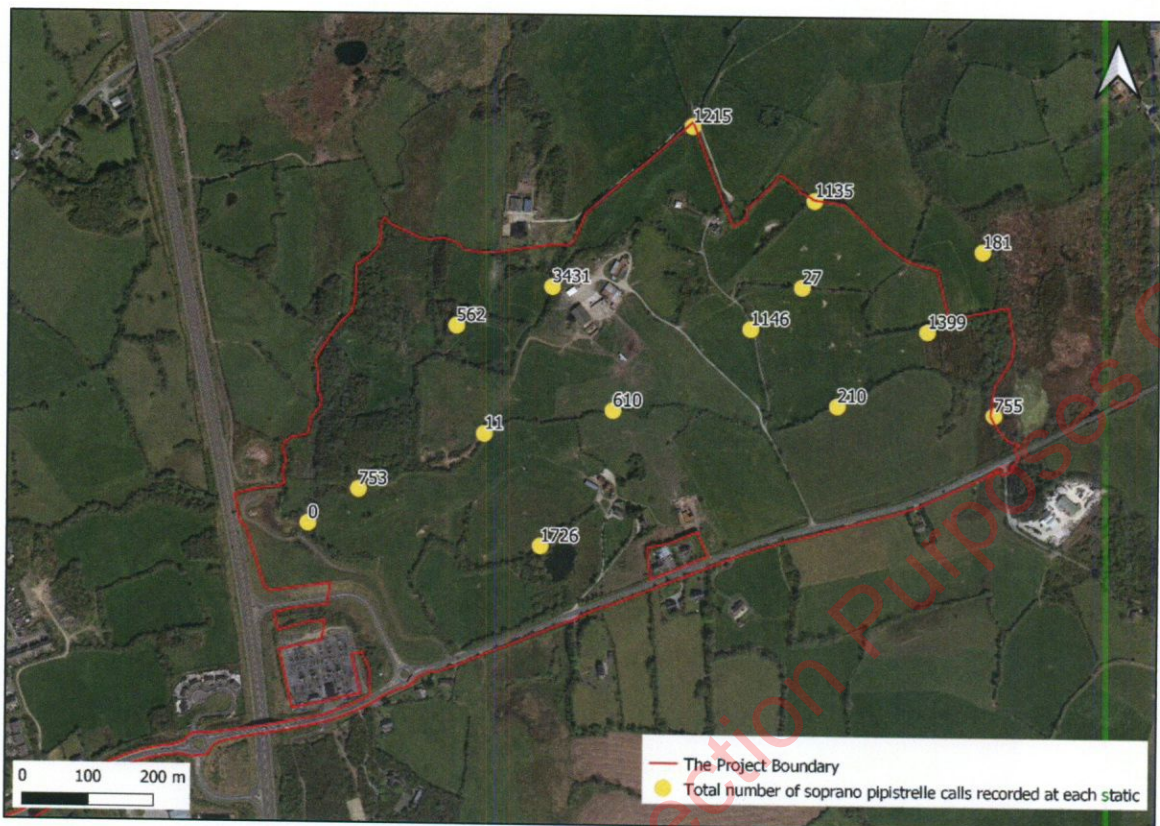


Figure 7.14 Total number of Soprano pipistrelle calls recorded at each static (updated)

Roost emergence/re-entry activity surveys

Of the 16 buildings on site that were surveyed, 18 soprano pipistrelle roosts were identified. Full details of the surveys and species identified can be found in Appendix 7.5, and buildings can be found in Figure 7.4. The following buildings contained soprano pipistrelle roosts:

- BB 1A – One individual soprano pipistrelle bat was recorded at this roost during the first survey in July at this building.
- BB 2 – Four soprano pipistrelle roosts identified at this building across two surveys. Small roosts of one to two individual bats.
- BB 3 – Five soprano pipistrelle roosts identified at this building across three surveys. 30 individual bats were recorded emerging/re-entering from one location in this building. 11 other individual bats were recorded at another roost location within this same building, the other roosts were smaller with one to three individual bats.
- BB 5A – Four soprano pipistrelle roosts identified at this building across three surveys; all of which comprised small roosts with one to two individual bats.
- BB 8 – Three soprano pipistrelle roosts identified at this building across two surveys. 13 individual bats were recorded emerging from one roost, while two individual bats were recorded emerging/re-entering from two other roosts.
- BB 9 – One soprano pipistrelle roost was identified at this building during one survey, with 8 individual bats recorded emerging from one roost.

Soprano pipistrelle calls were also identified foraging and commuting during the activity surveys at the buildings on site. Moderate to high numbers of calls were noted around all of the farm buildings, with soprano pipistrelle observed foraging within and around BB 1A, 1B, BB 4A -D, 5B, and 6A-C and using the treelines and hedgerows as commuting corridors to these buildings. Activity was also recorded around the treelines and hedgerows of the residential houses and gardens associated with the houses.

Evaluation

Soprano pipistrelle was the most commonly recorded bat species identified within the proposed development site, during all the survey types carried out. This is consistent with the results of the 2018 surveys. Levels of activity were particularly high along well-established linear hedgerows and treelines, and adjacent to waterbodies and farm buildings, where prey availability is likely to be high. Soprano pipistrelle bats are a specialist species, and tend to favour riparian habitats more than other pipistrelle species (Rachwald *et al.*, 2016). The large roosts in BB 3 and BB 8, are potentially maternity colonies. This is deduced from the numbers of bats identified emerging/re-entering from these buildings, and from the obvious increase in numbers around the peak breeding season, and the drop in numbers of individuals, post breeding season (*i.e.* September). Pipistrelle species typically forage near their roost (BCT, 2021), and the results from the transect surveys and emergence re-entry surveys would suggest that bats roosting in these buildings use the nearby Toureen Lough and hedgerows/treelines connected to this for foraging, and commute along the linear features adjacent to other areas of foraging within the site. Toureen Laneway was also an area that exhibited high activity levels of this species. This laneway is lined with mature trees, and as such would provide suitable commuting and/or foraging habitat for pipistrelle species in the area.

Soprano pipistrelle bats are known to have a widespread distribution across the region, and in Ireland (Roche *et al.*, 2014). Soprano pipistrelles populations vary in abundance across the country (Aughney *et al.*, 2018), with populations trends steadily increasing. Taking this into account, as well as the availability of suitable roosting, commuting and foraging habitat in the immediate surrounding environment, the presence of potential maternity colonies on site, as well as multiple other small roosts, the local soprano pipistrelle population is valued as being of County Importance.

Common Pipistrelle Bat

Transect surveys

Full details from each transect survey are provided above in Appendix 7.6 and locations of each of the recorded common pipistrelle calls are shown on Figure 7.15 – 7.16. Common pipistrelle was recorded during all three transect visits during the surveys in 2020, and on both transect visits carried out in 2018. It was the second most frequent species encountered during all transect surveys undertaken. The areas with the highest numbers of calls from this species were very similar to soprano pipistrelle, and included; Toureen Laneway, woodland in north west, hedgerows in the east, and around the farm buildings in the north of the site (BB 6A, B, C and BB 5B). Toureen Lough had noticeably less number of common pipistrelle calls compared to soprano pipistrelle calls. This was also the case for the surveys carried out in 2018. Areas with lower activity levels for this species included the south western area of the site, the southern boundary along the R352, and the northern boundary. As with soprano pipistrelle, activity was associated with well established hedgerows and mature treelines, and around farm buildings where foraging opportunities of insects are higher.

Static detector surveys

Common pipistrelle was identified on 14 of the 15 static detectors deployed on site in 2020, and on all 14 detectors deployed in 2018. Similar to soprano pipistrelle, and the results from the transects, common pipistrelle was identified throughout the site, with high levels of activity recorded along Toureen Laneway, along the hedgerows and treelines of the woodland in the north west, and around the farm buildings in the north of the site (BB 6A, B, C, D). This species was not identified on Static 9, located in the west of the site, adjacent to the M18 Attenuation pond. Static 1 and 2 located along the hedgerow directly east of Static 9, also had low numbers of calls³⁰. Full details of the number of calls per night and number of nights static bat detectors were deployed are presented in Table 7.11, and in Figure 7.15 and 7.16 below.

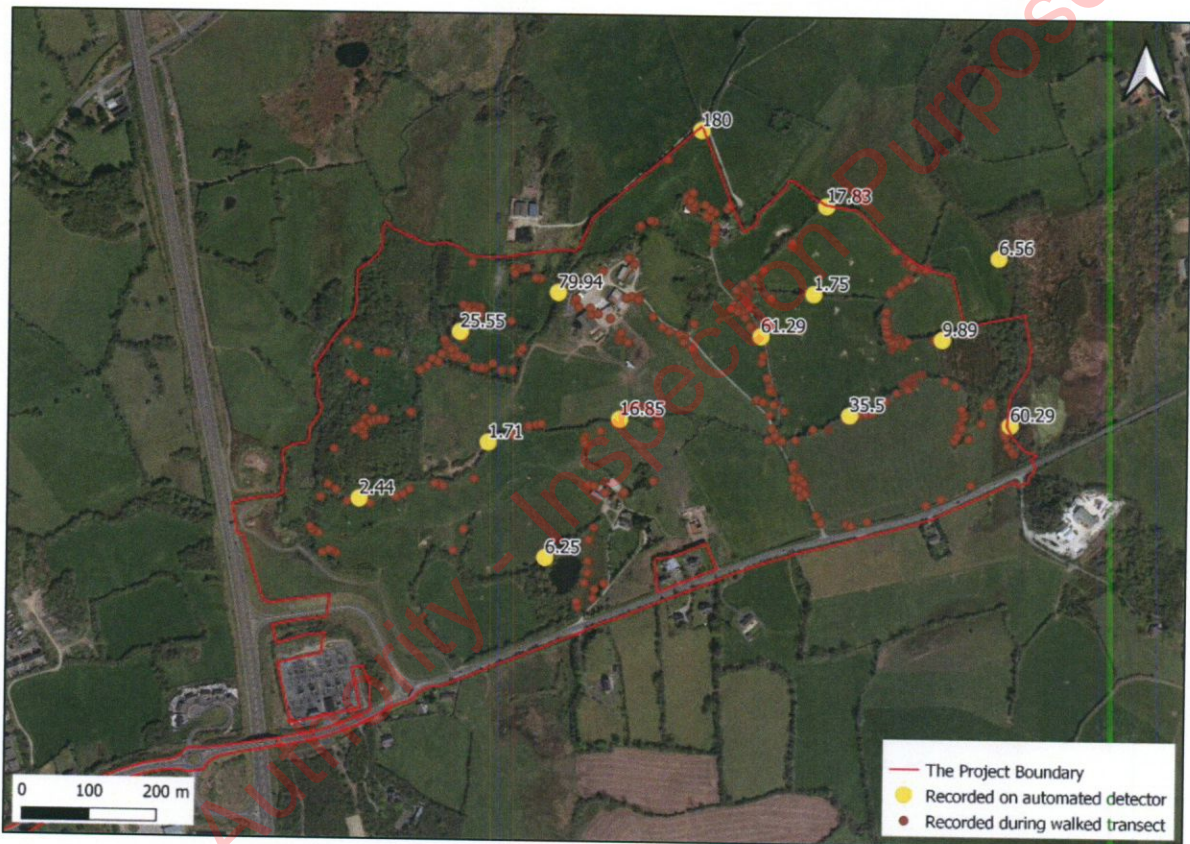


Figure 7.15 Location of common pipistrelle calls recorded during both walked transects and automated static bat detector deployment, along with the average number of common pipistrelle calls recorded per night during the static deployment only (updated)

³⁰ However Static 1 only recorded calls for 7 nights, which may have impacted the results, as it was deployed for a shorter amount of time, and would have a lower number of calls than if it had been deployed for longer.

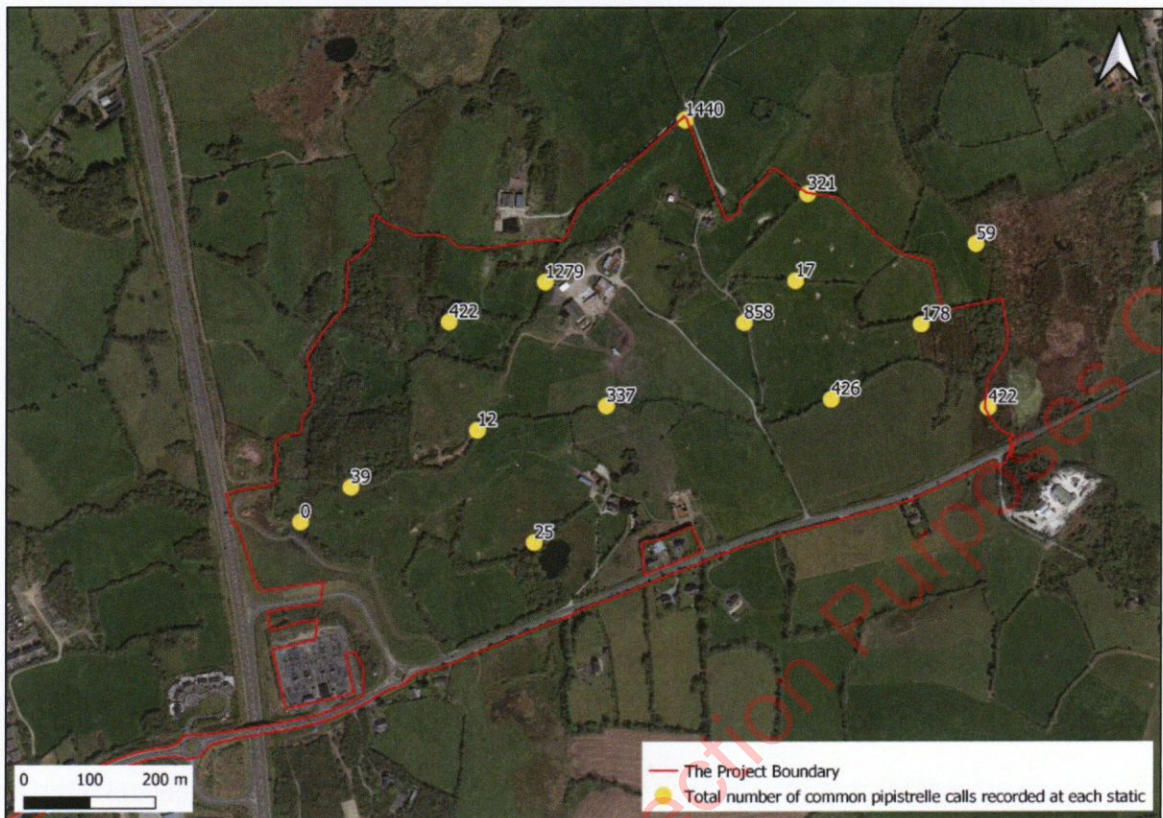


Figure 7.16 Total number of common pipistrelle calls recorded at each static (updated)

Roost emergence/re-entry activity surveys

One common pipistrelle roost was identified within one of the 16 buildings on site. This roost was identified at BB 5A, with one individual bat emerging during one survey. No other roosts of this species were identified. Similar to soprano pipistrelle, common pipistrelle bats were observed foraging around the barn buildings previously mentioned, and using hedgerows and treelines connected to these buildings.

Evaluation

Common pipistrelle was the second most commonly recorded bat species identified within the proposed development site. This is consistent with the results of the 2018 surveys. The areas that exhibited the highest levels of activity were very similar to the locations where soprano pipistrelle was recorded; however only one roost was identified across the proposed development site. This suggests that the site is an important foraging area for common pipistrelle, who may be roosting in structures and/or trees close to the site. The site may also be used by bats commuting to and from local roost sites. The mature hedgerows and treelines along field boundaries within the site provide linear corridors for commuting bats through the site between foraging areas within the farm buildings in the north (BB 6A, B, C) and in the south (BB 4A, B, C, D) (likely feeding off insects attracted to cow dung), and to the wetland habitats.

Common pipistrelle bats are widespread in Ireland; however, they tend to show a southern bias in their distribution, with greater numbers occurring in the south west and east of the country than in the north (Roche *et al.*, 2014). This species has also shown increasing population trends in recent years. Taking this into account, as well as the availability of suitable roosting, commuting and foraging habitat in the immediate

surrounding environment, the local common pipistrelle population within the study area are considered to be of local importance (higher value).

Brown long-eared bat

Transect surveys

Full details from each transect survey are provided above in Appendix 7.6 and locations of each of the recorded brown long-eared bat calls are shown on Figure 7.17 – 7.18. Brown long-eared were recorded during two of the three transect visits carried out within the site. Brown long-eared calls were not identified during any of the transect visits carried out in 2018. The number of brown long-eared calls recorded during transects was relatively low in comparison to other bat species. Brown long-eared bats have very quiet, short echolocation calls, forage in cluttered habitats and therefore are less likely to be recorded by handheld bat detectors (Aughney *et al.*, 2011). This species also emerges from roosts later than other species, as their typical prey (Lepidopterans) tend to be available later in the night. However, all-night transect survey, with the addition of static detectors, addresses this limitation.

A number of areas within the site were identified as important commuting corridors for this species. The area with the highest number of calls recorded was Toureen Laneway, with a total of 20 calls recorded during two of the three visits. Five brown long-eared bat calls clustered together were recorded in the area adjacent to the woodshed located in the north of the site (BB 5B). These were likely to be the individual brown long-eared bats roosting within BB 5B. Single brown long-eared calls were also recorded within and along the woodland edge in the north west of the site, and in the south adjacent to the R352 and a small pocket of woodland in an agricultural field.

Static detector surveys

Brown long-eared bats were identified on 13 of the 15 static detectors deployed on site in 2020, and on six of the 14 detectors deployed in 2018. Activity levels were low across the site, with the highest number of calls and highest average number of calls per night recorded along Toureen Laneway. This is consistent with the transect data and static data recorded in 2018. Activity was highest in the northern section of the site, along the northern boundary and adjacent to the farm buildings (BB 6A-C), compared to the southern section of the site. These deployment locations (*i.e.* Static locations 10, 11, 12) are connected to the brown long-eared bat roost in BB 5B by hedgerows and treelines. The two statics located along the hedgerow through the site in the west (*i.e.* location 1 and 2), did not record any brown long-eared bat calls, with the other statics in the south, recording a low number of brown long-eared calls and a low average number of calls per night across the duration of deployment. Full details of the number of calls per night and number of nights static bat detectors were deployed are presented in Table 7.11, and in Figure 7.17 and 7.18 below.

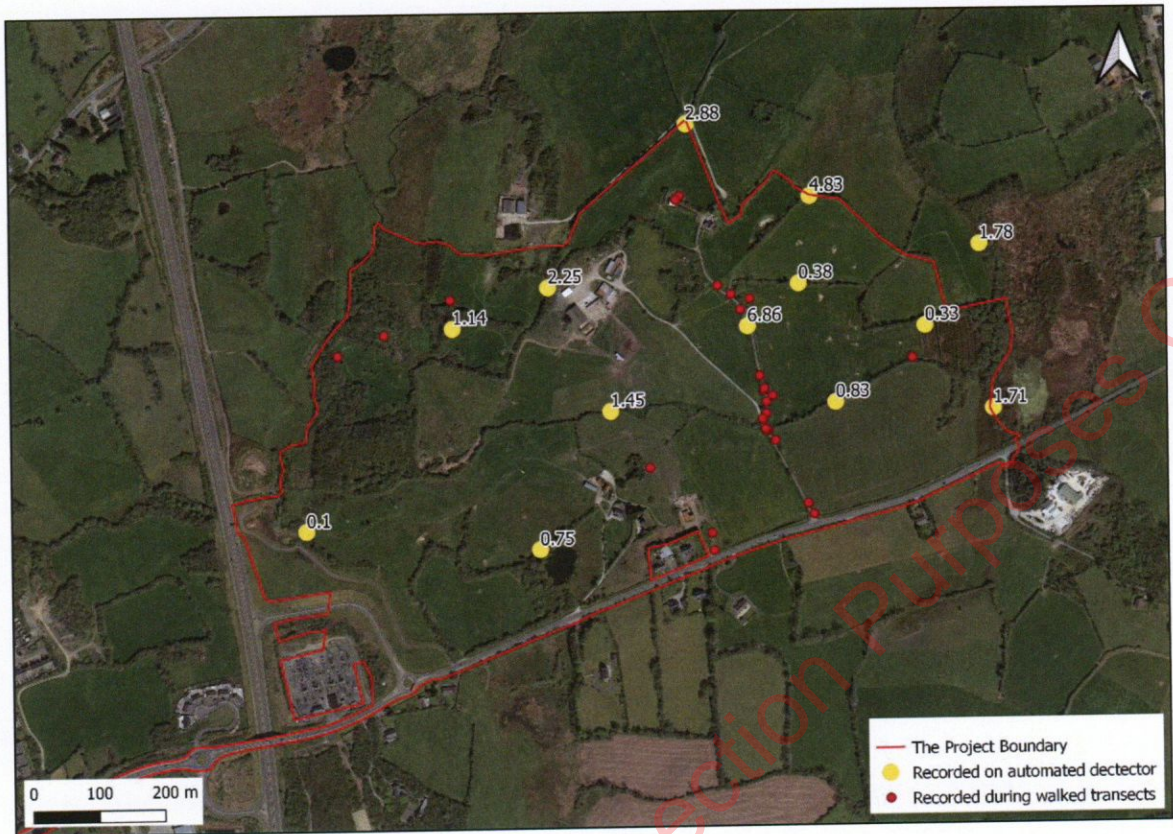


Figure 7.17 Location of brown long-eared bat calls recorded during both walked transects and automated static bat detector deployment, along with the average number of brown long-eared bat calls recorded per night during the static deployment only (updated)

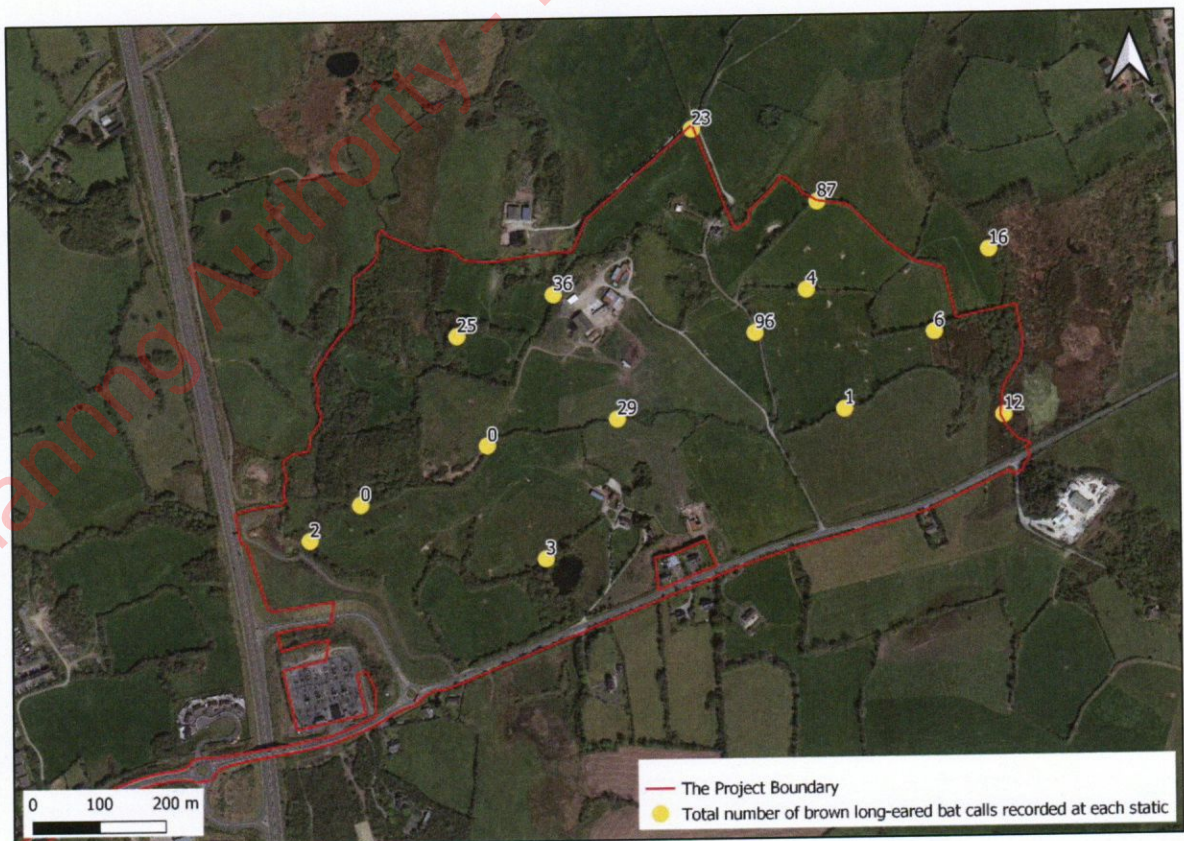


Figure 7.18 Total number of brown long-eared bat calls recorded at each static (updated)

Roost emergence/re-entry surveys

One brown long-eared bat roost was identified within one of the 16 buildings on site (*i.e.* BB 5B). Two individuals were observed emerging from features in the interior wall inside this farm building, where it was densely covered in ivy. Following emergence, these bats proceeded to fly around barn, possibly warming up before emerging from the building to feed. One of the individuals also landed on a wooden supporting beam, where surveyors could identify the species as brown long-eared and record the brown long-eared calls on the handheld bat detector. Both individuals emerged after *c.* 20 minutes within the building.

Brown long-eared bat calls were also recorded during numerous other emergence/re-entry surveys on site, however no other brown long-eared bat roosts were identified. Activity was recorded near the farm buildings and residential houses, in the south of the site (*i.e.* BB 1A, 1B, 2, 3, 8), with activity noted primarily along hedgerows and treelines adjacent to the buildings. Brown long-eared bat was also identified in the north near BB 5A. These are likely to be the individual bats commuting to/from foraging sites and their roost in BB 5B.

Evaluation

Whilst brown long-eared bats were not the most frequently identified bat species within the site with other species showing higher levels of activity, they were recorded widely across the site, as demonstrated by the results from the static bat detector surveys. It is possible that brown long-eared bats were under-recorded within the proposed development site, due to their short, quiet echolocation calls which can go undetected by bat detectors³¹. Static bat detectors would be more likely to record the calls as they are deployed all night and brown long-eared typically emerge an hour after sunset, however, the bats would have to be flying relatively close to the detectors to be picked up as the detection of these calls by bat detectors is limited to a distance of approximately 0.7m (Aughney and Roche, 2008³²). On this basis, a precautionary principle has been applied, and it has been assumed that most hedgerows and treelines within the site are important for foraging and commuting brown long-eared bats, particularly heavily wooded areas such as the woodland area in the north west, the mature treelined Toureen Laneway and the mature hedgerow along the northern boundary. Toureen Laneway is particularly important for this species as it connects the roost building (BB 5B) to the wider landscape via hedgerows and treelines.

As brown long-eared bats are widely distributed across the country and have also shown a stable increasing population trend³¹, due to the presence of a roost within the site, and the widespread distribution of this species across the site, this local population of brown long-eared bat is considered to be of local importance (higher value).

³¹ Aughney, T., Langton, S. & Roche, N. (2011) Brown long-eared bat roost monitoring scheme for the Republic of Ireland: synthesis report 2007-2010. Irish Wildlife Manuals, No. 56. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

³² Aughney, T & Roche, N. (2008) *Brown long eared bat Plecotus auritus Roost Monitoring 2007, Irish Bat Monitoring Programme*. Bat Conservation Ireland www.batconservationireland.org.

Leisler's bat

Transect surveys

Full details from each transect survey are provided above in Appendix 7.6, and locations of each of the recorded Leisler's bat calls are shown on Figure 7.19–7.20. Leisler's bats were the third most commonly identified species during transect surveys of the proposed development, and calls were detected on all three transects carried out in 2020, and both transects in 2018. Areas with the highest levels of activity were along Toureen Laneway, and in the wet grassland habitat adjacent to Toureen Lough. Whilst this species was identified with higher numbers of calls in similar areas in 2018 i.e. Toureen Laneway and Toureen Lough, activities levels in 2018 were a lot lower than activity levels in 2020. Very little activity was recorded in the woodland in the north west, which differs from the all other bat species identified within the lands. This is likely due to the feeding preferences of Leisler's bat, as it is an exclusively aerial-hawking species³³, foraging up to heights of 30m. Although this species was identified from calls along hedgerows and treelines, this likely just reflects the walking route that was undertaken by surveyors, potentially resulting in missed commuting and/or foraging Leisler's bats that were feeding at a height over the fields and pastures. In this essence, whilst treelines and hedgerows are important for this species, they are less likely to be impacted directly from the removal of these features. High buildings or structures could pose collision risk issues for this species as a result.

Static detector surveys

Leisler's bat were detected on 14 out of 15 static detectors deployed in 2020, and 11 out of 14 in 2018. Activity levels were highest in the north of the site, along Toureen Laneway, and along the southern mot hedgerow associated with the laneway. Little to no activity was recorded in the west, particularly the south west, south of the woodland habitat. Static detectors deployed in 2018, had significantly lower numbers of calls picked up on detectors, however activity was highest along Toureen Laneway, and in the north of the site.

³³ Vincent Wildlife Trust, Ireland. Species profile – Leisler's bat. Accessed here: <https://www.vincentwildlife.ie/species/leislars-bat>

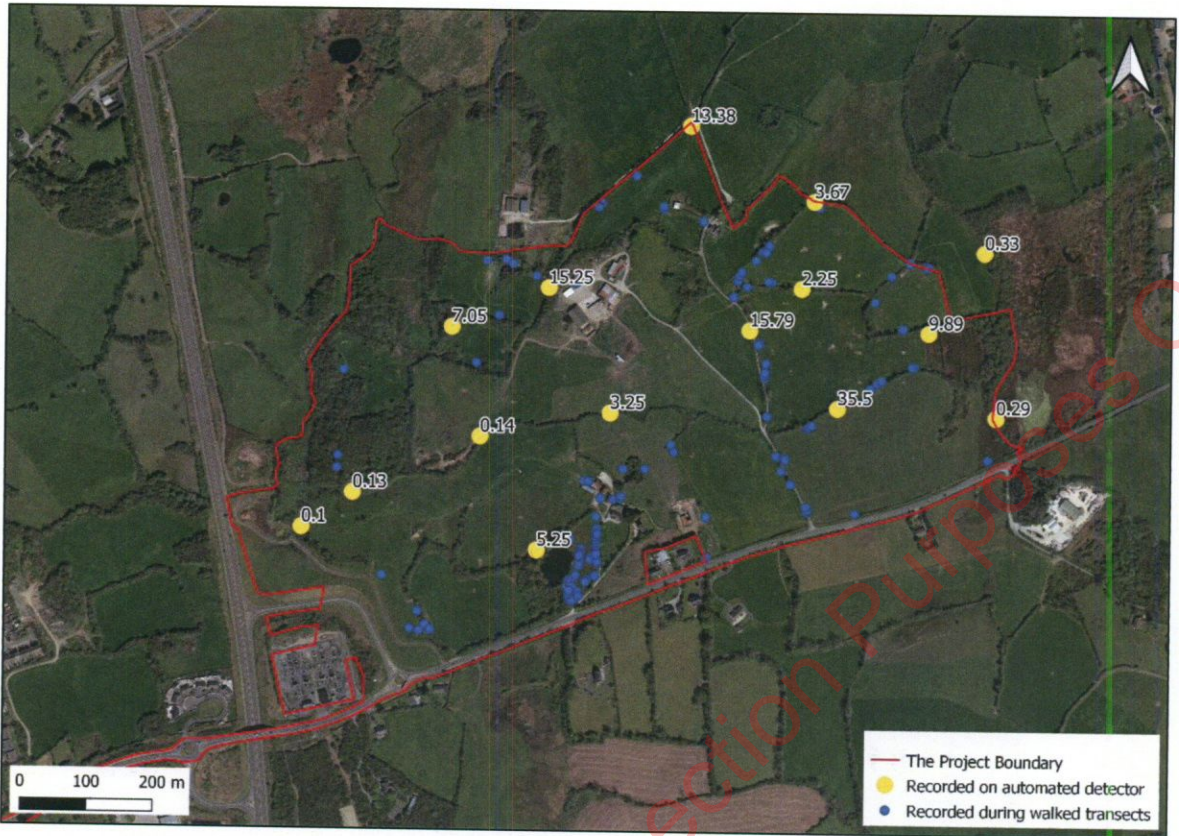


Figure 7.19 Location of Leisler's bat calls recorded during both walked transects and automated static bat detector deployment, along with the average number of Leisler's bat calls recorded per night during the static deployment only (updated)

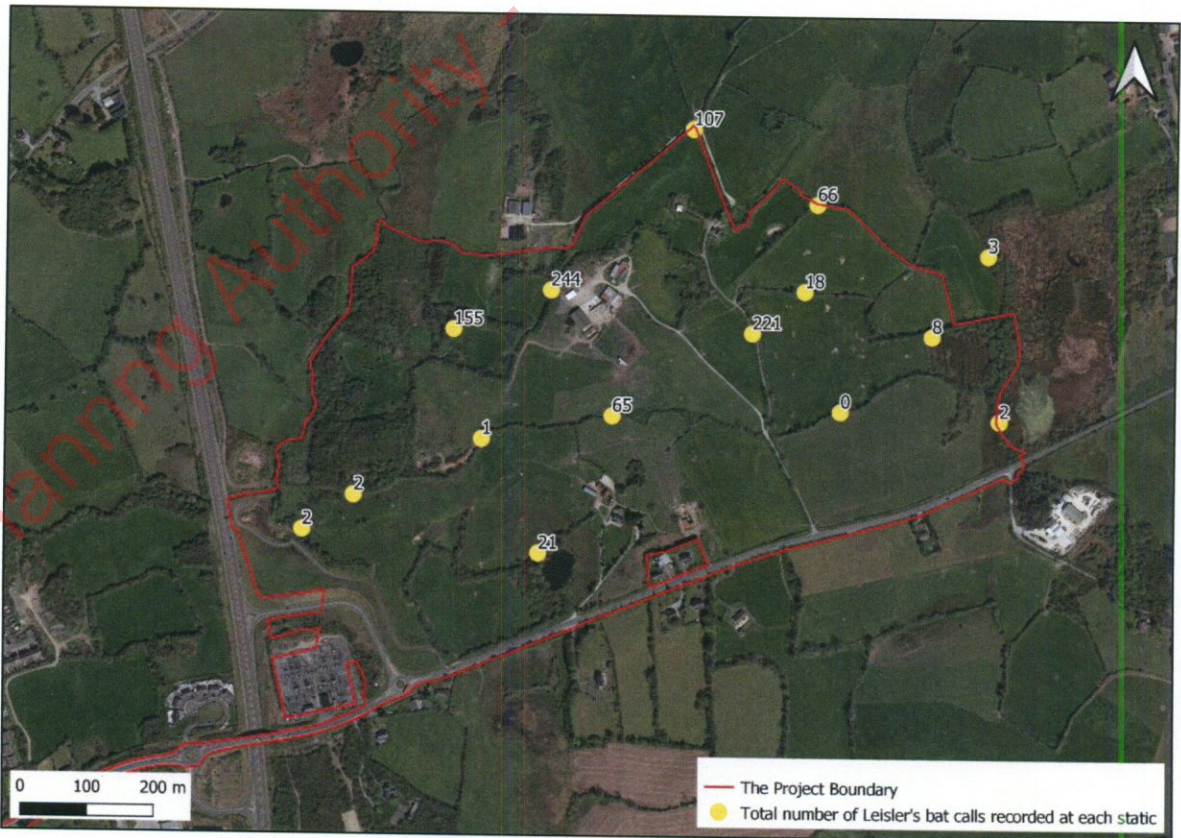


Figure 7.20 Total number of Leisler's bat calls recorded at each static (updated)

Roost emergence/re-entry surveys

There were no Leisler's bat roosts identified within the proposed development site during activity surveys. **However; a Leisler's bat roost with one bat was identified during daytime building inspections during surveys in March 2022.** Leisler's are predominantly tree roosting bats but can occasionally roost in buildings as nursery roosts³³. Roost emergence/re-entry surveys on trees were not carried out.

Evaluation

Leisler's bats were recorded in high numbers across the site, particularly in surveys carried out in 2020. They are known to have a widespread distribution across the region, and in Ireland (Roche *et al.*, 2014), however Leisler's bats tend to show a southern bias in their distributions, with greater numbers occurring in the south west and east of the country than in the north. Populations of this species have shown to be increasing in recent years. Leisler's are high flying bats, and as such, they may have been using areas not covered by detectors (middle of fields etc.), and therefore potentially not identified. However, Leisler's bat calls are typically loud and can be heard from a significant distance away, and would likely have been picked up by static and/or handheld detectors despite this. Given the high suitability of the site for this species, **the Leisler's bat roost identified**, and the increasing population trends, particularly in the south west of the country, the local population of Leisler's bat is valued as being of local importance (higher value).

Myotis sp.

Transect surveys

Full details from each transect survey are provided above in Appendix 7.6, and locations of each of the recorded *Myotis sp.* calls identified are shown on Figure 7.21–7.22. *Myotis sp.* was identified on all three transect surveys undertaken in 2020, and during one transect survey undertaken in 2018. Higher activity levels were mainly associated with Toureen Laneway, and in areas close to the barns/farm buildings in the north (*i.e.* BB 6C and BB 5B). There was very little activity recorded in the south western and eastern areas of the site. Similarly, very few *Myotis sp.* calls were recorded during transect surveys undertaken in 2018.

Static detector surveys

Myotis sp. were identified on all 15 static detectors in 2020, and all 14 detectors in 2018. Although *Myotis sp.* calls were widespread across the site, activity levels were varied. Detectors on the eastern boundary of the site adjacent to wetland features, and Toureen Laneway, had the highest number of calls and highest average number of calls per night. Daubenton's bat, a *Myotis sp.* bat that typically feeds above water by gleaning insects from the surface³⁴, was are likely to use the areas of open water located within the eastern section of the site site as feeding habitat. Toureen laneway is lined with mature ash and oak trees, and with high numbers of calls from *Myotis sp.* identified along this corridor, Natterer's bat could potentially be the *Myotis sp.* foraging along here. The woodland in the north west had moderate levels of activity, particularly on the southern edge. The highest levels of *Myotis sp.* recorded in the 2018 surveys were located in the north west of the site, in the woodland habitat.

³⁴ *Daubenton's bat*, Woodland Trust. Accessed here: <https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/animals/mammals/daubentons-bat/>

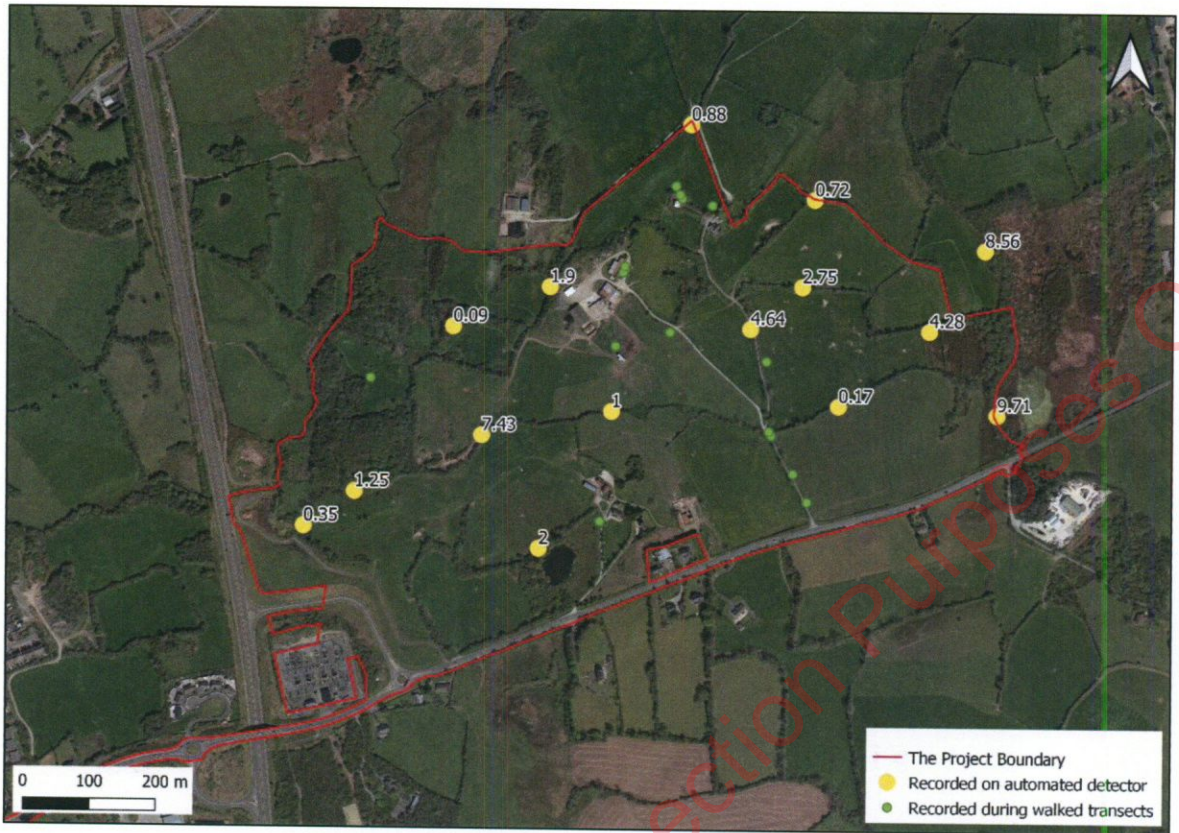


Figure 7.21 Location of *Myotis* sp. bat calls recorded during both walked transects and automated static bat detector deployment, along with the average number of *Myotis* sp. calls recorded per night during the static deployment only (updated)

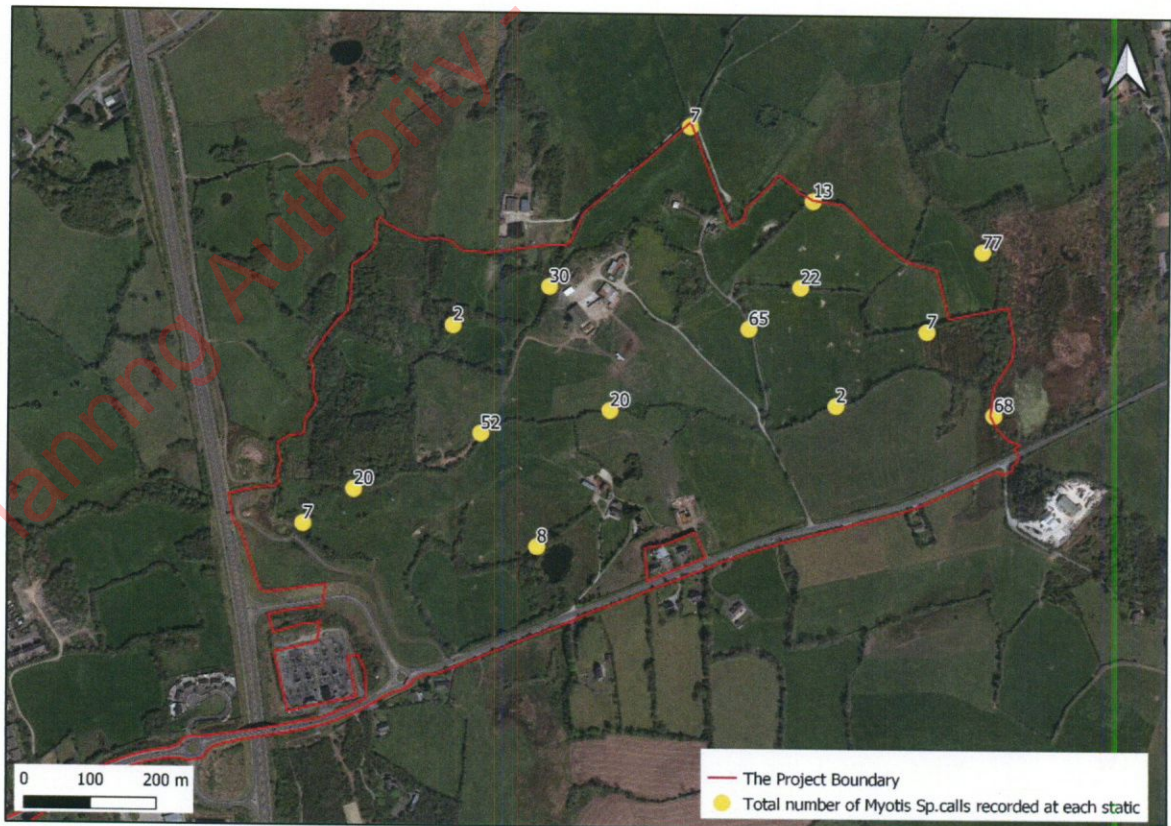


Figure 7.22. Total number of *Myotis* species calls recorded at each static (updated)

Roost emergence/re-entry surveys

There were no *Myotis* sp. bat roosts identified within the proposed development. *Myotis* sp. bats can roost in a range of roost types, including buildings and trees.

Evaluation

Whilst widely recorded within the proposed development site, moderate levels of activity were observed from the various survey types carried out. Commuting routes along hedgerows and treelines are important corridors for these species who prefer to feed close to vegetation to avoid predation³⁵. *Myotis* bat species, including Daubenton's bat, whiskered bat and Natterer's bat have a relatively wide but dispersed distribution throughout Ireland. Bat species of the genus *Myotis* were associated most commonly with habitats within the west and east of the site, i.e. the woodland area, and the wetlands in the east. Outside of the subject lands the next closest area of significant woodland is c. 110m south. Similarly, certain species in the genus *Myotis* (i.e. Daubenton's bat) perform the majority of its foraging over water. Numerous smaller waterbodies are present outside of the subject lands, such as the larger lakes of Holoan Lough, located c. 500m south-east of the subject lands, Girroga Lough located c. 2.3km west, and Ballyallia Lake located c. 2.6km north-west, and a smaller lough, Ballymacahill Lough, located c. 250m north of the subject lands. Given the widespread distribution of bats of the genus *Myotis* and the availability of similar habitat (woodland and waterbodies) within the immediate surrounding environment, the local population of *Myotis* sp. is considered to be of local importance (higher value).

Tree surveys

The habitat within the lands provides excellent commuting and foraging routes for bats within the area. The treelines and hedgerows within and along the boundaries of the site follow linear routes which are connected to treelines and hedgerows in the surrounding area. The subject lands are unlit by adjacent roads or buildings, and therefore are suitable for foraging bats. A total of 17 trees (i.e. 14 Ash *Fraxinus excelsior* and three sycamore *Acer pseudoplatanus*) were identified to have the potential to support roosting bats within the proposed development site (Figure 7.23). 14 of these trees were deemed as having low potential, with two trees deemed as having moderate potential, and one deemed as having high potential, assessed in accordance with Collins *et. al* (2016) bat survey guidelines (Figure 7.23).

Figure 7.23 Location of trees with potential bat roost features (updates)

7.3.3.6 Fish

Fish species are protected under the Fisheries Acts and by fishing bye-laws. Atlantic salmon, river lamprey, sea lamprey and brook lamprey are listed on Annex II of the EU Habitats Directive.

³⁵ Jones, G., Rydell, J. (1994) Foraging strategy and predation risk as factors influencing emergence time in echolocating bats. Philosophical Transactions Of The Royal Society Of London. Series B: Biological Sciences, 346(1318), 445-455.

The proposed development site lies within the Fergus_SC_040 catchment. The EPA segment of the Spancelhill Stream which is contained within the study area is Spancelhill_010. Spancelhill_010 segment is c. 7.5km and consists of the channel of the Spancelhill Stream from its starting point in O'Briens Big Lough, to where it joins the River Fergus downstream of the proposed development site. The Spancelhill Stream and the River Fergus have not been surveyed by Inland Fisheries Ireland (IFI) for their Ecological Fish Status. There are five Annex II fish species found within the Lower River Shannon SAC, i.e. sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, Atlantic salmon *Salmo salar* and twaite shad *Alosa fallax*, the four former species of which are Qualifying Interests of the SAC. The three lamprey species and Atlantic salmon have all been observed to be spawning in the Lower Shannon and its tributaries (NPWS, 2013d). There was one fish species record, sea lamprey, identified within c. 2km returned from the desk study. While fish surveys were not carried out in the waterbodies within the proposed development site, Toureen Lough, and the M18 Attenuation Pond have potential to hold populations of small fish species. Spancelhill Stream is not suitable for salmonid species due to the heavy poaching from cattle using the stream from nearby lands. This poaching has resulted in very silty, soft substrate, and little instream vegetation. Instream vegetation is important for rivers/streams used by salmonid species, as it provides protection from predators³⁶. Lamprey species tend to live in soft substrate, where they can hide from predators³⁷. As this habitat is present along the Spancelhill Stream that borders the proposed development site, there is potential for lamprey species to be directly impacted from the installation of the drainage pipes, headwall and mattress.

Annex II fish species are classified as being of international importance, while non-Annex II fish species are classified as being of local importance (higher value).

7.3.3.7 Invertebrates

White-Clawed Crayfish *Austropotamobius pallipes*

White-clawed crayfish are legally protected under the Wildlife Acts and are also listed on Annex II of the Habitats Directive. Ireland remains the only part of the EU with no introduced species of crayfish, as such is of key conservation concern.

The desk study did not return any records for white-clawed crayfish within 2km of the proposed development. The closest record for this species is located in Lough Cullaunyeeda, c. 10.1km south-east of the proposed development and is not hydrologically linked to the site. Although this species is not known to be within the River Fergus Catchment, this species is present in the Shannon Catchment³⁸, and therefore populations could expand into the River Fergus Catchment, which has a direct hydrological link to the proposed development site via the Spancehill Stream. The local population of white-clawed crayfish is therefore considered to be of local importance (higher value).

³⁶ Marsh, JE, Lauridsen, RB, Gregory, SD, et al. Above parr: Lowland river habitat characteristics associated with higher juvenile Atlantic salmon (*Salmo salar*) and brown trout (*S. trutta*) densities. *Ecol Freshw Fish*. 2019; 00: 1– 15.

³⁷ Lamprey habitats, Lamprey Surveys and consultancy advice UK & Ireland. Found here: <https://lampreysurveys.com/lamprey-habitats/>

³⁸ Reynolds, J.D., O'Connor, W., O'Keeffe, C. & Lynn, D. (2010) A technical manual for monitoring white-clawed crayfish *Austropotamobius pallipes* in Irish lakes. Irish Wildlife Manuals, No 45, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.

Freshwater Molluscs (including freshwater pearl mussel *Margaritifera margaritifera*)

The freshwater pearl mussel population of the Lower River Shannon SAC is present in the Cloon River, which is located in a different river catchment to that of the proposed development, c. 20.5km south west of the proposed development (NPWS, 2012a). The desk study returned no records for freshwater mollusc species and will not be considered further.

Marsh Fritillary *Euphydryas aurina*

Marsh fritillary are legally protected under Annex II of the Habitats Directive. Surveys for marsh fritillary were not carried out as part of this assessment. In an Irish context, the conservation status of these species in Ireland is designated as 'Vulnerable' (Regan *et al.* 2010).

The desk study did not return records for marsh fritillary within the footprint of the proposed development. Desk study records in the wider area were largely historical (pre-1980s). The most recent record was from 2011 and located c. 800m north west of the proposed development site in Cappagh More. Although specific butterfly surveys were not carried out within the proposed development, the site was surveyed for various other species multiple times (See Table 7.1), and any evidence of this species would have been identified if present. This species was not identified within the proposed development site during surveys carried out in 2018 and 2020.

Marsh fritillary are restricted to habitats containing a low, open sward with abundant devil's-bit scabious *Succisa pratensis* including sand dunes, calcareous grassland, fens, raised and blanket bogs, upland heaths and grasslands. Calcareous grass is present within the footprint of the proposed development site and outside the footprint of the development. Suitable habitat for marsh fritillary, namely devil's-bit scabious, was not identified within the proposed development, and as such the site is not suitable for this species and is not considered further.

Other invertebrates

The desk study returned records for 26 species listed on Ireland Red List No. 4 (Regan *et al.* 2010), and Ireland Red List No. 6 (Nelson *et al.* 2011), within c. 2km of the proposed development site. There were no Red Listed or rare bee species records identified within c. 2km of the proposed development site. None of these species were identified within the proposed development site during surveys carried out in 2018 or 2020.

14 of the 18 red-listed butterfly species records identified were of Least Concern. The remaining four species included; small heath *Coenonympha pamphilus* (Near Threatened) with the most recent record from 1978, wall butterfly *Lasiommata megera* (Endangered) with the most recent record from 1998, wood white *Leptidea sinapis* (Near threatened) with the most recent record from 2006, and marsh fritillary (as described above). Butterfly are known to favour nectar-rich flowers which provide larval foodplants, preferred species include cock's-foot grass *Dactylis glomerata*, bird's-foot trefoil *Lotus corniculatus*, common nettle *Urtica dioica*, cuckoo flower *Cardamine pratensis*, garden nasturtium *Tropaeolum majus*, common holly *Ilex aquifolium* and common ivy *Hedera helix* (Butterfly Conservation Ireland 2020).

The remaining eight red-listed species identified within c. 2km of the proposed development included six species of damselfly, and two species of dragonfly, all listed as species of Least Concern (Appendix 7.2).

Corresponding habitats within the proposed development are located in dry meadows and grassy verges (GS2), amenity grassland (GA2), dry calcareous and neutral grassland (GS1) habitats, wet grassland (GS4) and the various wetland habitats within the site (Toureen Lough, Lough Ardnamurry, M18 Attenuation pond). Species diversity was low in terms of foodplants in these habitats. Butterfly communities that are known to survive in highly fragmented landscapes are mobile species that can feed off a range of plants (Öckinger *et al.* 2010).

The local invertebrate population is considered to be of local importance (higher value).

7.3.4 Summary of Ecological Evaluation

Table 7.12 below summarises the ecological evaluation of all receptors taking into consideration legal protection, conservation status and local abundance, and identifies the Key Ecological Receptors (KERs). Species, habitats and features not qualifying as KERs are not subjected to impact assessment in line with current best practice of assessing the impacts on what are determined to be important ecological or biodiversity features: CIEEM and TII guidelines (CIEEM, 2018 and National Roads Authority, 2009).

Table 7.12 Summary of the ecological evaluation

Ecological Receptor	Ecological Valuation	KER?
Designated Sites		
Lower River Shannon SAC	International	Yes
Ballyallia Lake SAC	International	Yes
Dromore Woods and Loughs SAC	International	Yes
Old Domestic Building (Keevagh) SAC	International	Yes
Old Domestic Buildings, Rylane SAC	International	Yes
Ballyallia Lough SPA	International	Yes
Slieve Aughty Mountains SPA	International	Yes
River Shannon and River Fergus Estuaries SPA	International	Yes
Corofin Wetlands SPA	International	Yes
All other SAC or SPA sites	International	No
Newpark House (Ennis) pNHA	National	Yes
Old Domestic Building (Keevagh) pNHA	National	Yes
Ballyallia Lake pNHA	National	Yes
Lough Cleggan Lake pNHA	National	Yes
Durra Castle pNHA	National	Yes
Dromore Woods and Loughs pNHA	National	Yes
Fergus Estuary and Inner Shannon, North Shore pNHA	National	Yes
All other NHA or pNHA sites	National	No
Habitats		
Wet Willow-Alder-Ash woodland (WN6)	International	Yes

Ecological Receptor	Ecological Valuation	KER?
Designated Sites		
Alluvial woodland [*91E0]		
Reed and large sedge swamp (FS1) <i>Cladium</i> Fen [*7210]	International	Yes
Dry calcareous and neutral grassland (GS1) Calcareous grassland [6210]	National	Yes
Wet grassland (GS4) Molinia meadows [6410]	National	Yes
Rich fen and flush (PF1) Alkaline fen [7230]	National	Yes
Oak-Ash-Hazel woodland (WN2)	County	Yes
Mesotrophic lake (FL4)	Local importance (higher value)	Yes
Depositing/lowland rivers (FW2)	Local importance (higher value)	Yes
Other artificial lakes and ponds (FL8)	Local importance (higher value)	Yes
Rich fen and flush (PF1)	Local importance (higher value)	Yes
Reed and large sedge swamps (FS1)	Local importance (higher value)	Yes
Marsh (GM1)	Local importance (higher value)	Yes
Dry calcareous and neutral grassland (GS1)	Local importance (higher value)	Yes
Wet grassland (GS4)	Local importance (higher value)	Yes
Hedgerows (WL1)	Local importance (higher value)	Yes
Treelines (WL2)	Local importance (higher value)	Yes
Oak-Ash-Hazel Woodland (WN2)	Local importance (higher value)	Yes
Immature Woodland (WS2)	Local importance (higher value)	Yes
All other habitats	Local importance (lower value)	No
Fauna Species		
Lesser horseshoe bat	International importance	Yes
Soprano pipistrelle	County importance	Yes
All other bat species	Local importance (higher value)	Yes
SCI Wintering birds	International importance	Yes
All other wintering birds	Local importance (higher value)	Yes
Otter	International importance	Yes
Grey wagtail	County importance	Yes
Other breeding birds	Local importance (higher value)	Yes
Pine marten	Local importance (higher value)	Yes
Other mammal species	Local importance (higher value)	Yes
Badger	Local importance (higher value)	Yes
Reptiles	Local importance (higher value)	Yes
Amphibians	Local importance (higher value)	Yes

Ecological Receptor	Ecological Valuation	KER?
Designated Sites		
Annex I Fish species	International importance	Yes
Other fish species	Local importance (higher value)	Yes
Freshwater molluscs	Local importance (lower value)	No
White-clawed crayfish	Local importance (higher value)	Yes
Marsh fritillary	N/A	No
Other invertebrates	Local importance (higher value)	Yes

7.4 CHARACTERISTICS OF THE DEVELOPMENT

The proposed development is to demolish a number of existing dwelling houses and farm outbuildings and to develop six data storage facilities, an energy centre, an Above Ground Installation (AGI) building, a vertical farm, a substation compound and associated ancillary development on a c. 60ha greenfield site (currently used for agriculture and hosting power transmission infrastructure) in the townlands of Tooreen and Cahernalough, Ennis, Co. Clare. The development is fully described in Chapter 2 Description of the Proposed Development. This section outlines the characteristics of the development in relation to biodiversity.

Figure 7.24 presents the site layout for the proposed masterplan. The footprint of the proposed development occupies c. 17.3ha of the c. 60ha development site; the site layout reserves c. 10 ha of lands as ecological buffer zones. The indicated buffer zones on Figure 7.24 were delineated following assessment undertaken as part of the area assessment within the Clare County Development Plan 2017 – 2023 (Variation No. 1).

To facilitate the footprint of the development, there will be a total loss of 2.7km of hedgerows, and 30 trees. There will also be approximately 1,525m² of scrub being removed. In order to ensure the site continues to remain suitable for local wildlife species, there will be replacement planting of 4.86km of new native hedgerows, 57 new native trees and 58,567m² of native woodland planting. The proposed planting plan will be carried out in phases, with the first phase carried out pre-construction before any removal of vegetation takes place. In order to reduce the amount of soil being removed from the lands, berms will be utilised in a number of places within the proposed development. These areas will be planted with woodland species, and will further screen the development. The proposals for the site have been prepared taking account of the of the All-Ireland Pollinator Plan with the majority of the species proposed in the various habitats recommended in the Plan. Further details on the landscaping proposals and phasing of the development can be found in Chapter 10 *Landscape And Visual Impact Assessment* of the EIAR³⁹, The Landscape and Biodiversity Management Plan⁴⁰, and the Landscape Design Strategy⁴¹ that will be submitted as part of this application.

³⁹ Chapter 10 *Landscape and Visual Impact Assessment*. Nicolas de Jong Associates (July 2021)

⁴⁰ *Landscape and Biodiversity Management Plan, Art Data Centres – Ennis Campus*. Nicolas de Jong Associates (July 2021)

⁴¹ *Landscape Design Strategy, Art Data Centres – Ennis Campus*. Nicolas de Jong Associates (July 2021)



Figure 7.24. Proposed development boundary. Red hatched areas show the buffer zones included in the proposed development (updated)

Foul water

There is an existing 225mm diameter foul drain that forms part of an existing foul drainage network that services the existing Knockanean area southwest of the proposed development along the existing Tulla Road/R352. This existing foul drain discharged to the existing Pumping Station of Gort Na mBlath located approximately 550m further west from the proposed development. It is proposed to convey and discharge all domestic foul flows generated from the proposed development into the existing Gort Na mBlath Pumping Station. A temporary trench excavation along the Tulla road will be undertaken to facilitate pipe laying for connection with existing public wastewater sewer and mains water supply.

There is no trade effluent proposed for this development. Foul sewage will be collected from site (data storage facility, offices and energy centre washroom facilities and canteen) and discharged through a new pumping station which will be constructed as part of this proposed development, to the foul drainage network which runs along the Tulla Road and ultimately discharges to Ennis North (Clonroadmore) Wastewater Treatment Plant (WWTP) Reg D0048. Ennis North WWTP has no capacity issues and consultation with Clare County Council has confirmed that sufficient wastewater capacity is available and a pre-connection enquiry PCE application form has been submitted to Irish Water (IW).

Surface water

The proposed surface water drainage design for the development comprises various drainage components including positive stormwater networks, attenuation systems

and several Sustainable Drainage System (SuDS) elements. Stormwater will be attenuated on site for the 1:1000 yr flood event. An over flow subsurface pipeline will discharge at current discharge rates (greenfield) to the Spancelhill Stream (also known as Ballymacahill River).

The roofs, yards and internal access roads proposed throughout and within the footprint of the proposed development will be drained through a sealed drainage system that will ultimately be collected by gullies and conveyed through a series of proposed storm water pipes prior to discharging into a proposed open attenuation basin. There will be no direct discharge from hardstand area to swallow holes or existing pond features within the site boundary. Further details are provided in Chapter 7 of the EIAR and within the CSEA engineering reports and drawings⁴² prepared for planning.

7.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

As per the relevant guidelines, significant effects have only been assessed for KERs, as listed in Table 7.12. An impact is considered to be ecologically significant if it is predicted to affect the integrity or conservation status of a KER at a specified geographical scale. All impacts are described in the absence of mitigation.

7.5.1 Construction Phase

7.5.1.1 Designated Sites

This section describes and assesses the potential for the proposed development to result in likely significant effects on European sites that lie within the Zol of the proposed development. In the context of European sites this is focussed on the habitats and species for which the sites are selected (*i.e.* Qualifying Interest (QIs) for SACs and Special Conservation Interest species (SCIs) for SPAs) and the conservation objectives supporting their conservation status in each site. In the case of NHAs and pNHAs the assessment considers whether the integrity of any such site would be affected by the proposed development with reference to the ecological features for which the site is designated, or is proposed.

European sites

In the context of assessing whether the proposed development would be likely to result in an impact on the integrity of any European sites, the tests and assessment presented in the Natura Impact Statement (NIS) fulfil this role. The NIS considers whether the proposed development will affect the conservation objectives supporting the favourable conservation condition of any European sites' QIs/SCIs and as a result presents an assessment of whether the integrity of any European sites would be affected – *i.e.* if the proposed development would adversely affect the integrity of a European site, this would constitute a likely significant effect in the context of the EIA Directive.

The nature and scale of the proposed development, the identified potential impacts and their relationship to European sites were considered in order to determine which European sites were located within the Zol of the proposed development, in view of

⁴² Engineering Planning Report, Art Data Centre – Ennis Campus. Clifton Scannell Emerson Associates (CSEA), July 2021

best scientific knowledge and in view of conservation objectives, and therefore potentially at risk of the proposed development affecting their conservation objectives. The potential impacts associated with the proposed development are discussed below in relation to those European sites within its Zol (see also Section 5 and Section 6 of the NIS⁴³).

The Zone of Influence (Zol) is a distance within which the proposed development could potentially affect the conservation condition of QI habitats or QI/SCI species of a European site.

The mechanism to define the Zol is summarised as follows:

- Consider the nature, size and location of the proposed development;
- Consider the sensitivities of the ecological receptors;
- Identify impact sources and pathways; and
- Determine the Zol based on the extent of the impact.

Considering the Zol, in the absence of mitigation measures, the proposed development was assessed as having the potential to adversely affect the integrity of the following eight European sites (refer to Section 5 and Section 6 of the NIS³³):

- Lower River Shannon SAC
- Dromore Woods and Loughs SAC
- Old Domestic Building (Keevagh) SAC
- Old Domestic Buildings, Rylane SAC
- River Shannon and River Fergus Estuaries SPA
- Ballyallia Lough SPA
- Slieve Aughty Mountains SPA
- Corofin Wetlands SPA

The locations of these European sites relative to the proposed development, and the predicted Zol, are shown on Figure 7.5.

The following potential impacts on European sites have been identified based on the existing ecological environment and the extent and characteristics of the proposed development (see information provided below for detailed description of these potential impacts and relevant European site):

- Habitat loss and fragmentation;
- Habitat degradation/effects on QI/Sci species as a result of hydrological impacts;
- Habitat degradation as a result of hydrogeological impacts;
- Habitat degradation as a result of air quality impacts;
- Habitat degradation as a result of introducing/spreading non-native invasive species;
- Disturbance and displacement impacts; and
- Direct injury/mortality

As the proposed development does not traverse any European sites, there is no potential for habitat fragmentation of any European site to occur.

⁴³ *Natura Impact Statement, Art Data Centre – Ennis Campus*. Scott Cawley, June 2022

A potential source-pathway-receptor link exists between the proposed development site and the following European sites : Lower River Shannon SAC and River Fergus and River Shannon Estuaries SPA. This link is via the Spancelhill Stream, which flows along the north western boundary of the proposed development site, flowing downstream before joining the River Fergus and finally discharging into the Fergus Estuary. QI and SCI species/habitats of these European sites located downstream of the proposed development site are therefore at risk of habitat degradation, which may occur in the event of a pollution event affecting surface water quality. The Dromore Woods and Loughs SAC is located c. 4.5km north west of the proposed development site, and is upstream of the proposed development site. A portion of the River Fergus flows through this European site. The River Fergus then flows c. 9.3km downstream, via Ballyallia Lough SAC, and combines with the outfall of the River Fergus that connects with the Spancelhill Stream, upstream of this. There is therefore a hydrological link between the proposed development site and these aforementioned European sites.

Otters are QI species of the Lower River Shannon SAC and Dromore Woods and Loughs SAC, and therefore at risk from the proposed development should an accidental pollution event affect surface water quality. QI habitats within this European site are not at risk due to this European site being located upstream of the proposed development site.

There are a number of European sites in the vicinity of the proposed development that are designated for lesser horseshoe bat (Appendix 7.1). This species has been identified commuting and foraging within the proposed development site. The normal core foraging range for lesser horseshoe bat is within 2-3km of roosts, which sometimes extends up to 4km (Bontadina, 2002 and Biggane, 2003). This distance can reduce down to a few hundred metres in the birthing season whilst larger scale movements of up to c. 15km are not unreasonable when bats move between winter and summer roosts. The Core Sustenance Zone (CSZ) for this species is described as the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost. A review carried out by BCT of radio-tracked individuals, has defined the CSZ as within 2.5km of their roosts⁴⁴. From research carried out in Galway on radio-tracked lesser horseshoe bats, this species has been shown to travel as far as c. 5.15km from roosts for foraging (Rush and Billington, 2014). In consideration of this, it is possible that individual lesser horseshoe bats recorded within the proposed development site may be connected to the populations of the following European sites located within 6km of the proposed development site: Old Domestic Building (Keavagh) SAC, Dromore Woods and Loughs SAC, and Old Domestic Buildings, Rylane SA. European sites outside of 6km from the proposed development will not be impacted by the proposed development as a result.

Ballyallia Lough SPA and Corofin Wetlands SPA are not hydrologically or otherwise connected to the proposed development site. However, a number of SCI species of these European sites were recorded within the proposed development site during the wintering bird surveys, and therefore the conservation objectives of these European sites could be indirectly impacted on a result of the proposed development site.

⁴⁴ NPWS (2018) *Conservation objectives supporting document – lesser horseshoe bat (Rhinolophus hipposideros) Version 1*. Conservation Objectives Supporting Document Series. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland.

As the NIS concluded, the potential impacts associated with the proposed development have the potential to affect the receiving environment and, as a result, the conservation objectives supporting the QIs/SCIs of eight European sites: Dromore Woods and Loughs SAC, Lower River Shannon SAC, Old Domestic Building (Keevagh) SAC, Old Domestic Buildings, Rylane SAC, Ballyallia Lough SPA, River Shannon and River Fergus Estuaries SPA, Slieve Aughty Mountains SPA and Corofin Wetlands SPA.

Lower River Shannon SAC

As described in Section 7.1 of the NIS, the proposed development has the potential to affect the qualifying interests and conservation objectives, and therefore the integrity, of the Lower River Shannon SAC because of the following:

Habitat degradation/effects on QI species as a result of hydrological impacts

The release of contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water features during construction, has the potential to affect water quality in the receiving aquatic environment. Such a pollution event may include: the release of sediment into receiving waters and the subsequent increase in mobilised suspended solids; and the accidental spillage and/or leaks of containments (e.g. fuel, oils, lubricants, paints, bituminous coatings, preservatives, weed killer, lime and concrete) into receiving waters. The associated effects of a reduction of surface water quality could potentially extend for a considerable distance downstream of the location of the accidental pollution event or the discharge. The proposed development is hydrologically connected to the Spancelhill Stream and the River Fergus both of which discharge into the Fergus Estuary. Therefore, (albeit unlikely due to the distance between the main construction activities and watercourses) there is potential for the proposed development to result in effects which could have implications for the conservation objectives of Lower River Shannon SAC as a result of hydrological impacts.

Habitat loss and fragmentation

Otter are a QI species for Lower River Shannon SAC, which is downstream of the proposed development. Research carried out by Ó Néill et al. (2008) on ranging behaviours of otter on river systems in Ireland found that female otter ranges averaged c. 7.5km while male otter home ranges varied between c. 7-19km. Evidence of otter was identified within the proposed development site along Spancelhill Stream. As there is a hydrological connection between the proposed development and the European site (located c. 2.1km downstream), it is considered that the proposed development site is within the potential home range of otter associated with the Lower River Shannon SAC and, therefore, otter present within Spancelhill Stream at this location may be connected with this SAC population. Construction works within the Spancelhill Stream will include the installation of a grated culvert with associated headwall and mattress, with a total loss of 2m³ of bankside habitat. This habitat loss is considered to be temporary (2-3 weeks), and will be reinstated following completion of this. The total area of this installation will be 2m³. Therefore, the predicted habitat loss impact will not have any long-term effects on the QI otter population in terms of distribution/range, extent of available habitat, couch/holt sites, and barriers to connectivity. Therefore the impact on otter populations connected to the Lower River Shannon SAC as a result of direct habitat loss/fragmentation, is not considered to be significant.

The installation of this culvert, headwall and mattress, may require instream works. As the section of the Spancelhill Stream where works will be required has suitable habitat

for lamprey species, there is potential for the proposed development to directly impact these QI species, i.e. brook lamprey, river lamprey, and sea lamprey.

Indirect habitat loss as a consequence of severe habitat degradation arising from a reduction in water quality and/or change to the hydrological regime, could also affect the conservation status of the Lower River Shannon QI species, including: otter, sea lamprey, river lamprey, brook lamprey, and Atlantic salmon from the Lower River Shannon SAC.

Disturbance and/or displacement

A temporary and/or permanent increase in noise, vibration and/or human activity levels during the construction and/or operation of the proposed development could result in the disturbance to and/or displacement of QI otter populations present in the vicinity of the proposed development. Such disturbance effects would not be expected to extend beyond a distance of c. 150m⁴⁵ for the majority of the proposed development, as noise levels associated with general construction activities would attenuate to close to background levels at that distance and beyond. Noisy works associated with the proposed development could include piling works between c. 150-200m away from watercourses known to support otter. These potential impacts could occur to such a degree that the conservation objectives of the Lower River Shannon SAC are undermined. As the works are planned during the day, levels of noise would not be expected to be dissimilar to background traffic noise, to which the mostly nocturnal otter would be habituated to from the M18 Motorway directly west of the site. If works were required at night time, however, an increase in noise levels in close proximity to watercourses used by otter could result in disturbance impacting otter movements. Furthermore, temporary works that will be occurring adjacent to Spancelhill Stream for the construction of services pipes for drainage and fibre optics, and the installation of a headwall and mattress with culvert, could also result in disturbance. It is predicted that the disturbance could affect the local population over the short term, but that the local otter population could utilise other unaffected suitable habitat along the watercourse during this temporary period. This is not uncommon among otter who can maintain a number of resting sites within their territory⁴⁶.

The temporary works required in the bank of Spancelhill Stream, may also result in a disturbance and/or displacement of lamprey species in the watercourse, that are from the Lower River Shannon SAC. Lamprey species may utilise the soft, silty substrate within this section of the Stream for burrowing into, and therefore any instream works required may temporarily impact the conservation objectives of this QI species.

Therefore, there is potential for the proposed development to result in significant effects (albeit temporary) which could have implications for the conservation objectives of Lower River Shannon SAC as a result of disturbance/displacement impacts,

Habitat degradation as a result of introducing/spreading non-native invasive species

⁴⁵ This is consistent with Transport Infrastructure Ireland (TII) guidance (Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes and Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes) documents. This is a precautionary distance, and likely to be moderated by the screening effect provided by surrounding vegetation and buildings, with the actual Zol of construction related disturbance likely to be much less in reality.

⁴⁶ Species Profiles: Otter. Vincent Wildlife Trust (VWT). Accessed here: <https://www.vincentwildlife.ie/species/otter>

No non-native invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 were present within, or in close proximity to, the proposed development. During construction and/or routine maintenance/management work, non-native species could potentially be introduced to terrestrial habitats located within downstream European sites via surface water features. The introduction and/or spread of these invasive species to downstream European sites could potentially result in the degradation of existing habitats present, in particular coastal habitats not permanently or regularly inundated by seawater. These species may outcompete other native species present, negatively impacting the species composition, diversity and abundance and the physical structural integrity of the habitat. This in turn could undermine the conservation objectives of these European sites. The proposed development is hydrologically connected to the Spancelhill Stream, River Fergus, both of which flow into the Fergus Estuary. Therefore, there is potential for the proposed development to result in significant effects which could have implications for the conservation objectives of the Lower River Shannon SAC as a result of invasive species spread.

Affecting the integrity of the Lower River Shannon SAC would result in a significant effect at the international geographic scale.

Dromore Woods and Loughs SAC

As described in Section 7.2 of the NIS, the proposed development has the potential to affect the qualifying interests and conservation objectives, and therefore the integrity, of Dromore Woods and Loughs SAC because of the following:

Habitat loss and fragmentation

Otter are a QI species for Dromore Woods and Loughs SAC, which is upstream of the proposed development. Research carried out by Ó Néill et al. (2008) on ranging behaviours of otter on river systems in Ireland found that female otter ranges averaged c. 7.5km while male otter home ranges varied between c. 7-19km. Evidence of otter was identified within the proposed development site along Spancelhill Stream. As there is a hydrological connection between the proposed development and the European site (located c.12km downstream), it is considered that the proposed development site is within the potential home range of male otters associated with the Dromore Woods and Loughs SAC and, therefore, otter present within Spancelhill Stream at this location may be connected with this SAC population. Construction works within the Spancelhill Stream will include the installation of a grated culvert with associated headwall and mattress, with a total loss of 2m³ of bankside habitat. This habitat loss is considered to be temporary (2-3 weeks), and will be reinstated following completion of this. The total area of this installation will be 2m³. Therefore, the predicted habitat loss impact will not have any long-term effects on the QI otter population in terms of distribution/range, extent of available habitat, couch/holt sites, and barriers to connectivity. Therefore the impact on otter populations connected to the Dromore Woods and Loughs SAC as a result of direct habitat loss/fragmentation, is not considered to be significant.

However, indirect habitat loss as a consequence of severe habitat degradation arising from a reduction in water quality and/or change to the hydrological regime, could affect the conservation status of this QI species from Dromore Woods and Loughs SAC.

Lesser horseshoe bat is a QI species for Dromore Woods and Loughs SAC which is located c. 4.5km north west of the proposed development site. This species has been recorded using the proposed development site for foraging and/or commuting during surveys carried out in 2018 and 2020. No roosts were identified within the site.

However, records from BCI (as discussed in Section 7.3.3.5), identified nine lesser horseshoe roosts within 2km of the proposed development site, with the closest being c. 430m south. Research carried out on this species has suggested that the majority of feeding activity takes place within c. 2-3km of roosts during the year with occasional movements in excess of c. 4km (Bontadina, 2002 and Biggane, 2003). This distance can reduce down to a few hundred metres in the birthing season whilst larger scale movements of up to 15km are not unreasonable when bats move between winter and summer roosts. The Core Sustainance Zone (CSZ) for this species is described as the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost. A review carried out by BCT of radio-tracked individuals, has defined the CSZ as within 2.5km of their roosts. From research carried out in Galway on radio-tracked lesser horseshoe bats, this species has been shown to travel as far as c. 5.15km from roosts for foraging (Rush and Billington, 2014). In consideration of this, a precautionary approach has been adopted and it has been assumed for the purposes of this assessment that the lesser horseshoe bats recorded within the proposed development site may be connected with the lesser horseshoe bat populations of Dromore Woods and Loughs SAC. Although there will be a loss of suitable habitats within the site for this species including 2.7km of hedgerows and 30 trees, the design layout of the proposed development has been designed to minimise the amount of suitable foraging and/or commuting habitat removal through an iterative process. However, as there will be a loss of lesser horseshoe bat foraging and/or commuting habitat to facilitate the development, therefore there is potential for the conservation status of this species to be compromised by the development in the absence of mitigation.

As Dromore Woods and Loughs SAC is located upstream of the proposed development site, there is no impact pathway for effects on designated QI habitats at risk of habitat loss and fragmentation.

Habitat degradation/effects on QI/SCI species as a result of hydrological impacts

As the Dromore Woods and Loughs SAC is located upstream of the proposed development, there is no potential for a pollution event of any magnitude to affect any QI habitats or associated plant species for which this European site is designated. However, as the proposed development is hydrologically connected to the River Fergus and there is potential for impacts to occur on otter populations (a mobile species) associated with Dromore Woods and Loughs SAC. The release of contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water features during construction, or operation, has the potential to affect water quality in the receiving aquatic environment. Such a pollution event may include: the release of sediment into receiving waters and the subsequent increase in mobilised suspended solids; and, the accidental spillage and/or leaks of containments (e.g. fuel, oils, lubricants, paints, bituminous coatings, preservatives, weed killer, lime and concrete) into receiving waters. The associated effects of a reduction of surface water quality which could in turn negatively affect the otter population through direct contact with pollutants or a decline in fish prey. These potential impacts could occur to such a degree that the conservation objectives of Dromore Woods and Loughs SAC QI species are undermined.

Therefore, (albeit very unlikely due to the distance between the main construction activities and watercourses) there is potential for the Proposed development to result in effects which could have implications for the conservation objectives of Dromore Woods and Loughs SAC as a result of hydrological impacts.

Disturbance and displacement impacts

A temporary and/or permanent increase in noise, vibration and/or human activity levels during the construction and/or operation of the proposed development could result in the disturbance to and/or displacement of the otter population present in the vicinity of the proposed development. Disturbance and/or displacement effects on otter populations connected to Dromore Woods and Loughs SAC are as described above in Section 7.5.1.1 under the Lower River Shannon SAC heading., and are considered to be a temporary potential impact on this QI species.

Lesser horseshoe bat, a QI species for Dromore Woods and Loughs SAC, have been identified using the site as foraging and/or commuting grounds predominately located along hedgerows and treelines within the site, and along the woodland area in the north west of the proposed development. There are no lesser horseshoe bat roosts within the proposed development site. The closest roost identified to the site is approximately c. 430m south, in Kilfelim. It is considered likely that Dromore Woods and Loughs SAC is within the normal core foraging range and the normal commuting range of this species. Research carried out on this species has suggested that the majority of feeding activity takes place within c. 2-3km of roosts during the year with occasional movements in excess of c. 4km (Bontadina, 2002 and Biggane, 2003). This distance can reduce down to a few hundred metres in the birthing season, with research carried out in Galway on radio-tracked lesser horseshoe bats, this species has been shown to travel as far as c. 5.15km from roosts for foraging (Rush and Billington, 2014). Larger scale movements of up to c. 15km are not unreasonable when bats move between winter and summer roosts. The Core Sustenance Zone (CSZ) for this species is described as the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost. A review carried out by BCT of radio-tracked individuals, has defined the CSZ as within 2.5km of their roosts. There will be removal of treelines and hedgerows within the footprint of the development, and additional lighting proposed. In the absence of mitigation, removal of suitable foraging and commuting habitat within the proposed development site, and an increase in light levels may potentially indirectly impact on lesser horseshoe bat species that utilise the site for roosting, foraging and/or commuting by making it unsuitable.

Therefore, there is potential for the proposed development to result in effects which could have implications for the conservation objectives of Dromore Woods and Loughs SAC as a result of disturbance/displacement impacts.

Affecting the integrity of the Dromore Woods and Loughs SAC would result in a likely significant effect at the international geographic scale.

Old Domestic Building (Keevagh) SAC & Old Domestic Buildings, Rylane SAC

As described in Section 7.3 of the NIS, the proposed development has the potential to affect the qualifying interests and conservation objectives, and therefore the integrity, of the Old Domestic Building (Keevagh) SAC, and Old Domestic Buildings, Rylane SAC because of the following:

Habitat loss and fragmentation

Lesser horseshoe bat is a QI species for Old Domestic Building (Keevagh) SAC which is located c. 4.3km south east of the proposed development site, and Old Domestic

Buildings, Rylane SAC, located c. 5.9km north east. This species has been recorded using the proposed development site for foraging and/or commuting during surveys carried out in 2018 and 2020. Habitat loss and fragmentation impacts on lesser horseshoe bat populations from Old Domestic Building (Keevagh) SAC and Old Domestic Buildings, Rylane SAC, are as described above in Section 7.5.1.1. under the Dromore Woods and Lough SAC heading. As there will be a loss of lesser horseshoe bat foraging and/or commuting habitat to facilitate the development, therefore there is potential for the conservation status of this species to be compromised by the development in the absence of mitigation.

Disturbance and displacement

A temporary and/or permanent increase in noise, vibration and/or human activity levels during the construction and/or operation of the proposed development could result in the disturbance to and/or displacement of QI populations present in the vicinity of the proposed development. Lesser horseshoe bat, a QI species for Old Domestic Building (Keevagh) SAC, and Old Domestic Buildings, Rylane SAC, have been identified using the site as foraging and/or commuting grounds, predominately located along hedgerows and treelines within the site, and along the woodland area in the north west of the proposed development. Results from the surveys carried out within the proposed development site can be found above in Section 7.3.3.5. There will be removal of treelines and hedgerows within the footprint of the development, and additional lighting proposed. In the absence of mitigation, removal of suitable foraging and commuting habitat within the proposed development site, and an increase in exiting light levels may potentially indirectly impact on lesser horseshoe bat species that utilise the site for roosting, foraging and/or commuting by making it unsuitable.

Therefore, there is potential for the proposed development to result in significant effects in the absence of mitigation which could have implications for the conservation objectives of Old Domestic Building (Keevagh) SAC, and Old Domestic Buildings, Rylane SAC as a result of disturbance/displacement impacts.

Affecting the integrity of the Old Domestic Building (Keevagh) SAC and Old Domestic Buildings, Rylane SAC would result in a likely significant effect at the international geographic scale.

Ballyallia Lough SPA, River Shannon and River Fergus Estuaries SPA, Slieve Aughty Mountains SPA and Corofin Wetlands SPA

As described in Section 7.3 of the NIS, the proposed development has the potential to affect the qualifying interests and conservation objectives, and therefore the integrity, of Ballyallia Lough SPA, River Shannon and River Fergus Estuaries SPA, Slieve Aughty Mountains SPA and Corofin Wetlands SPA because of the following:

Habitat degradation/effects on QI/SCI species as a result of hydrological impacts

The release of contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water features during construction, or operation, has the potential to affect water quality in the receiving aquatic environment. Such a pollution event may include: the release of sediment into receiving waters and the subsequent increase in mobilised suspended solids; and, the accidental spillage and/or leaks of containments (e.g. fuel, oils, lubricants, paints, bituminous coatings, preservatives, weed killer, lime and concrete) into receiving waters. The associated effects of a reduction of surface water quality could potentially extend for a considerable distance downstream of the location of the accidental pollution event or

the discharge. The proposed development is hydrologically connected to the River Fergus, which discharges into the Fergus Estuary and thereafter the River Shannon and River Fergus Estuaries SPA. Whilst Ballyallia Lough SPA and Corofin Wetlands SPA are upstream of proposed development, some of the SCI species overlap with the River Shannon and River Fergus Estuaries SPA *i.e.* teal, wigeon, whooper swan, black-tailed godwit and wetland and waterbirds. Therefore it cannot be excluded that SCI species from Ballyallia Lough and Corofin Wetlands SPA also feed in the River Shannon and River Fergus Estuaries SPA.

Therefore, (albeit unlikely due to the distance between the main construction activities and watercourses) this reduction in water quality (either alone or in combination with other pressures on water quality) could result in the degradation of sensitive habitats present within River Shannon and River Fergus Estuaries SPA, which in turn would negatively affect the SCI bird species that rely upon these habitats as foraging and/or roosting habitat. It could also negatively affect the quantity and quality of prey available to SCI bird species. These potential impacts could occur to such a degree that they result in significant effects which could have implications for the conservation objectives of Ballyallia Lough SPA, River Shannon and River Fergus Estuaries SPA, and Corofin Wetlands SPA.

Disturbance and displacement

A temporary and/or permanent increase in noise, vibration and/or human activity levels during the construction and/or operation of the proposed development could result in the disturbance to and/or displacement of SCI bird species present within the footprint and/or the vicinity of the proposed development. Such disturbance effects would not be expected to extend beyond a distance of c. 300m, as noise levels associated with general construction activities would attenuate to close to background levels at that distance and beyond. Construction activities such as piling could extend beyond a distance of c. 300m however, this will be occurring within the west of the footprint of the design, at Data Centre 6 and Data Centre 5.

There were five SCI species identified within the proposed development site during wintering bird surveys carried out on the site, these included: coot, mallard, gadwall, teal and lesser black-backed gull (see Section 5.1.3.3). Suitable habitat for these species was identified in the wetland habitats within the proposed development site, including; Toureen Lough, the M18 Attenuation Pond, the wetland in the east of the site (outwith the redline boundary), and the temporary pond features in the north west of the site. Toureen Lough, and the wetland feature in the north west, are within 300m of the footprint of the proposed development, and therefore are likely to be impacted by construction activities and SCI bird species may potentially be disturbed from these suitable habitats. The majority of the wetland habitat will be screened visually from the development by the existing planting and additional planting proposed (*i.e.* Toureen Lough and wetlands in the east, and attenuation pond in the west). During construction there will be an increase in noise and vibration within the site (Chapter 9 Noise and Vibration, AWN 2021), however this is predicted to be a Moderate and Short-Term Impact at worst during initial ground works, reducing to Not Significant following this. The small temporary pond features in the north (floods in winter months only) will be directly adjacent to the proposed development construction. Whilst this alteration of suitable habitat will result in a temporary disturbance (*i.e.* over one winter period), due to the small numbers identified on this feature (<10 individuals), the size of the feature, and the suitable habitat in the surrounding lands (*i.e.* Ballymacahill Lough c. 250m north, Cahernalough Lough c. 550m north east, Holoan Lough c. 880m south east, O'Briens Big Lough c.3km north east) the disturbance and displacement impacts are not likely to result in effects which could have implications for the conservation

objectives of Ballyallia Lough SPA, River Shannon and River Fergus Estuaries SPA, and Corofin Wetlands SPA. There are no predicted impacts on SCI bird species during the operational phase of the proposed development, as noise levels are predicted to be Not Significant at the areas of suitable habitat within the site, and due to the establishment of additional and retained planting that will further screen wetland areas from any disturbance associated with the development.

The Slieve Aughty Mountains SPA is designated for breeding populations of hen harrier and merlin. There is no suitable breeding or foraging habitat within or near the proposed development for merlin, however suitable wintering roosting habitat for hen harrier was identified in the east of the site slightly outside the red line boundary, where a wetland/swamp habitat was located. Winter surveys carried out here did not identify any hen harrier using the site within or surrounding the lands. However, as suitable winter foraging/roosting habitat was identified, it cannot be ruled out that hen harrier may be impacted by the proposed development as a result of disturbance/displacement impacts. The suitable habitat extends outside the proposed development site in the east, and other areas of suitable wintering roosting/foraging habitat exist in close proximity to the proposed development in lowland wetland habitats, and within the Fergus Estuary downstream of the site.

Habitat loss and fragmentation

Records of hen harrier, an Annex I bird species were returned from the vicinity of the proposed development. Hen harriers have been found to travel up to 9km from nests (Arroyo et al., 2014), and the nearest European site designated for this species is Slieve Aughty Mountains SPA, c. 4.5km from the proposed development. This species is known to breed and forage in the summer on heather moorland and young forestry plantations where they nest on the ground. They will then spend winter in more coastal and lowland areas throughout Ireland. Therefore, there is potential that hen harriers associated with the Slieve Aughty Mountains SPA may hunt and roost during winter in the vicinity of the proposed development. However, dedicated hen harrier vantage point surveys were carried out within the proposed development and no individuals were identified within or in the adjoining lands. Given that the proposed development will sit into the landscape and the nearest building to suitable habitat to be constructed will be over 250m away, there is no potential for the proposed development and predicted habitat loss impact to have any long-term effects on the QI populations in terms of population trends, distribution/range, extent of available habitat or loss of territory on SCI populations of hen harrier associated with the Slieve Aughty Mountains SPA.

Direct injury/Mortality

The development has been designed so that the buildings will be set into the existing landscape and will be 40m maximum in height, will be screened by various landscaping features including tree and hedgerow planting carried out during the first phases of the development which will have matured by the time the buildings will be established. The development is also not on a known flight path for SCI and wintering bird species, with gull species typical flying height range up to 250m above sea level while foraging and travelling⁴⁷. Given the small numbers of SCI species identified using the proposed development, most of which were located in the west or north west of the site, it is

⁴⁷ Thaxter, C., Ross-Smith, V., & Cook, A. (2015). How high do birds fly? A review of current datasets and an appraisal of current methodologies for collecting flight height data: Literature review. British Trust for Ornithology Research Report No. 666.

predicted that there is no potential for the proposed development to increase the collision risk to mobile SCI species which are present in the area, during the construction and operational phases.

The proposed development does not require any tall structures to be constructed (maximum height at 40m), and whilst hen harrier do tend to fly at lower altitudes⁴⁸, they were not identified within the site, and the only suitable foraging and roosting habitat is located outwith the redline boundary and the footprint of the site. As such there is no potential, for the proposed development to present a collision risk to hunting and/or breeding hen harrier, during the construction and operational phases. Therefore, there is no potential for the proposed development to result in mortality of SCI bird species associated with European sites

Affecting the integrity of the Ballyallia Lough SPA, River Shannon and River Fergus Estuaries SPA, Slieve Aughty Mountains SPA and Corofin Wetlands SPA would result in a likely significant effect at the international geographic scale.

Nationally designated sites

In the case of NHAs and pNHAs the assessment considers whether the integrity⁴⁹ of any such site would be affected by the proposed development with reference to the ecological features for which the site is designated or is proposed.

As the proposed development does not traverse any national site, there is no potential for habitat fragmentation of any national site to occur.

The boundaries of the Fergus Estuary and Inner Shannon, North Shore pNHA overlaps with the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. In the absence of site synopses for this pNHAs, it has been assumed that these sites are designated for the same reasons as the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. Similarly, the boundaries of Old Domestic Building (Keevagh) pNHA, Ballyallia Lake pNHA, and Dromore Woods and Loughs pNHA overlap with Old Domestic Building (Keevagh) SAC, Ballyallia Lake SAC, and Dromore Woods and Lough SAC. Therefore, the potential impacts during construction on these national sites would be as previously described above in Section 7.5.1.1, under their respective headings. These potential impacts could affect habitat and species within the pNHAs, and therefore, the integrity of the pNHAs which could potentially result in a significant negative effect at the national geographic scale.

Newpark House (Ennis) pNHA

There is no site synopsis available for this national site, however detail from Newpark House Hotel website⁵⁰, describes the site as containing "Irish Oak, beech and some magnificent specimens of lime and poplar." This national site is not hydrologically connected or otherwise to the proposed development site, and as such the integrity of the pNHA is unlikely to be impacted from the proposed development site at any geographic scale.

⁴⁸ Madders, M. and Whitfield, D. P. (2006). Upland raptors and the assessment of wind farm impacts. *Ibis*, 148, 43-56.

⁴⁹ Refer to Section 7.2.5 for definition and impact assessment methodology

⁵⁰ Newpark House Hotel. Available at: <https://www.newparkhouse.com>

Lough Cleggan Lake pNHA

This national site is located c. 4.9km west of the proposed development site and is designated for its diverse range of habitats and plant species. It is also of local importance for wintering waterfowl, including breeding populations of tufted duck and coot. These populations of tufted duck and coot may be connected to the individual coot birds that were recorded using the lands within the proposed development site.

The potential impacts of the proposed development on this pNHA are as outlined above for the SPAs: an accidental pollution event during construction that may affect surface water in the local environment and in turn result in the degradation of habitats that may support these bird species; and, the potential for disturbance and displacement of these bird species from an increase in noise and vibration associated with the construction phase of the development.

These potential impacts could affect species within the pNHA, and therefore, the integrity of the pNHA which could potentially result in a significant negative effect at the national geographic scale.

Durra Castle pNHA

This national site is located c. 3.4km north east of the proposed development and is designated for nursery/breeding population of lesser horseshoe bat. This pNHA is within the normal foraging range of lesser horseshoe bats as previously described, and therefore, there is potential for individuals using the proposed development as foraging and/or commuting grounds, to be connected to this pNHA population, and therefore there is potential for this national site to be impacted as a result of the proposed development.

The potential impacts of the proposed development on this pNHA are outlined above in Section 7.5.1.1 for the SACs designated for lesser horseshoe bats, *i.e.* disturbance and displacement impacts from an increase in light levels and from the removal of suitable foraging and/or commuting grounds, and the loss of suitable habitat within the normal foraging range of this species.

These potential impacts could affect species within the pNHA, and therefore, the integrity of the pNHA which could potentially result in a significant negative effect at a national geographic scale.

7.5.1.2 Habitats

Habitat Loss

Construction of the proposed development will result in the loss of habitat area; totalling c. 17.7ha. With the exception of the Annex I habitat calcareous grassland [6210] located in the west of site, none of the habitats directly lost by the proposed development are considered to be any greater than of a local biodiversity importance (higher value). The majority of the habitats within the proposed development footprint (c.16.4ha) are of local biodiversity importance (lower value) and predominantly comprised:

- Buildings, artificial surfaces and bare ground (c. 1ha to be lost)
- Improved agricultural grassland (c. 11.4ha to be lost),
- Poor quality dry calcareous and neutral grassland (c. 1.0ha to be lost)

- A mosaic of recolonising bare ground, dry meadows and grassy verges, spoil and bare ground, and scrub (c. 2.5ha to be lost)

As these habitats are of a local biodiversity importance (lower value), their loss or modification will not result in a likely significant effect on biodiversity. These habitats will be permanently lost from the subject lands and will largely be replaced by buildings and artificial surfaces including the data centre hall buildings, vertical farm building, substation, energy centre, and associated roads and pathways.

The habitat types that are considered to be of a high local biodiversity value, are the following:

- Hedgerows (WL1), with the total linear length of this habitat being lost is c. 2.7km. The loss of this habitat is considered to be significant at a local scale only, due to the common nature of this habitat in the local environs.
- Marsh (GM1) habitat, with a total loss of c. 5m² due to the surface water drainage pipe layout in the north west of the site. This loss is considered not to be significant at any geographic scale due to the small amount of this habitat being lost, and availability of this habitat in other areas of the site, and outside the proposed development site in the wider environs;
- Wet grassland (GS4) habitat, with a total loss of c. 1.4ha in the south west of the site. This loss is considered to be significant at a local scale only due to the availability of this habitat in other parts of the site, and outside the proposed development site in the wider environs; and
- Lowland/Depositing Rivers (FW2), with a total loss of 2m² in the eastern most bank for implementation of the attenuation drainage outfall pipe and fibre optic cable.

The areas of oak-ash-hazel woodland and immature woodland in the north west, Toureen Lough, the alluvial woodland (*91E0), *Molinea* meadows (6410) and alkaline fen (7230) surrounding Toureen Lough and in the north west, and calcareous grassland (6210) adjacent to the attenuation pond by the M18 Motorway, will be protected under the 'Ecological Buffer Space' as designated by *Clare County Development Plan Variation No. 1*. These areas will be retained, protected from development and will not be directly impacted from the development. Other areas of local importance (higher value) or more that will not be impacted directly from development as they are beyond the footprint are the Alluvial woodland (*91E0), *Cladium* fen (*7210), oak-ash-hazel woodland, immature woodland and reed and large sedge swamp habitat in the east of the site.

The areas of calcareous grassland that will be directly affected by construction works due to the location of the attenuation pond, correspond to the Annex I habitat calcareous grassland [6210] listed under the Habitats Directive. This area of c. 0.79ha of the Annex I habitat will be directly impacted by construction works, with the overall habitat within the proposed development totalling c. 0.89ha. In the absence of mitigation, the loss of Annex I habitat calcareous grassland [6210] within the proposed development site will lead to a temporary impact at a national level, due to its location within the favourable reference range, current range, and current distribution of calcareous grassland [6210]⁵¹.

⁵¹ NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill

Introducing or spreading non-native invasive plant species

No non-native invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 were present within, or in close proximity to, the proposed development. However, during construction and/or routine maintenance/management work, non-native species could potentially be introduced to terrestrial habitats located within downstream habitats via surface water features. Giant hogweed is typically found in damp places such as riverbanks and spreads via seed dispersal (NBDC, 2013a), while Himalayan balsam and Japanese knotweed are both found in a wider variety of habitats including river banks, roadsides, and urban areas such as waste ground and railways; the former species spreading by seed dispersal, the latter vegetatively (NBDC, 2013b; NBDC, 2013c). Giant hogweed, Himalayan Balsam and Japanese knotweed are all classified as high impact invasive species.

The introduction and/or spread of these invasive species to downstream European sites and sensitive habitats could potentially result in the degradation of existing habitats present, in particular coastal habitats not permanently or regularly inundated by seawater. These species may outcompete other native species present, negatively impacting the species composition, diversity and abundance and the physical structural integrity of the habitat. This in turn could result in a significant effect, at geographic scales ranging from local to international.

Habitat degradation from dust generated during construction

The proposed development has the potential to generate dust during construction works which could affect vegetation in habitat areas within and adjacent to the proposed development boundary. This has the potential to affect highly sensitive and ecologically-important habitat areas (e.g. designated area for nature conservation or areas of Annex I habitat) both within and in the surrounding environment and result in a likely significant negative effect, at geographic scales ranging from local to international.

An Accidental Pollution Event during Construction Affecting Surface Water Quality in the Receiving Environment

During construction contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water feature has the potential to have a significant negative impact on water quality and consequently affect aquatic and wetland habitats in the receiving environment. The effects of frequent and/or prolonged pollution events in a river system have the potential to be extensive and far-reaching and could potentially have significant long-term effects. In a worst-case scenario, estuarine and coastal habitats downstream of the proposed development site could also be affected.

However, it is considered unlikely that a pollution event of such a magnitude would occur during construction or be any more than temporary in nature. Particularly considering the environmental protection controls incorporated into the design of the proposed development, the fact that the development footprint is located away from any wetland areas (i.e. minimum c. 50m away), and that any works that are near water features will be undertaken in accordance with IFI/NRA guidelines. Nevertheless, a precautionary approach is being taken in assuming a level of risk (albeit low due to the distance between surface water features and the main construction activities) of water quality impacts. Consequently, detailed mitigation measures are required to further minimise the risk of the proposed development having any perceptible effect on water quality during construction.

During construction suspended solids, silt and other harmful materials generated as a result of proposed works could be released into the local drainage infrastructure and travel downstream, including, potentially, into watercourses such as the Spancelhill Stream, River Fergus and wider Fergus Estuary. Cement based products used in the construction phase of the proposed development (e.g. concrete and/or bentonite which are highly corrosive and alkaline materials), if released into any watercourse may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, the potential to be negatively impacted from other a wide range of pollutants contained within surface water runoff remains. Habitat degradation as a consequence of construction effects on surface water quality has the potential to affect the conservation status of downstream estuarine and coastal habitats in the Fergus Estuary European sites, such as the Lower River Shannon SAC, and therefore, has the potential to result in a significant negative impact at an international scale. The Spancelhill Stream is hydrologically connected to downstream habitats including those which are QI Annex I habitats or SCI supporting wetland habitat which may also be at risk of habitat degradation as a consequence of construction effects on surface water quality.

Habitat Degradation – Groundwater

Any effects on the existing hydrogeological baseline supporting wetland habitats, has the potential to negatively affect habitat extent and distribution, and vegetation structure and composition. The potential effects upon the existing hydrogeological regime are not necessarily limited to habitats within the proposed development boundary but can be far-reaching, with significant negative long-term effects. This is discussed in more detail in Chapter 5 *Land, Soils, Geology & Hydrogeology* of the EIAR.

7.5.1.3 Bats

Roost loss in buildings

Lesser horseshoe bat

There are no lesser horseshoe bat roosts located within the proposed development, with the closest known roost of this species located c. 430m south of the proposed development site. There were no suitable roosting sites (i.e. old stone buildings or caves) within the proposed development site. Therefore, there is no potential for likely significant effects on the conservation status of lesser horseshoe bats to occur at any geographic scale as a result of this potential direct impact of roost loss (See Section 5.1.3.2 of the NIS, Scott Cawley, 2021).

Soprano pipistrelle bat

There are 17 confirmed soprano pipistrelle roosts within buildings located within the proposed development site. All but one of these are located in residential buildings, with one roost in a cattle shed (BB 1A). 13 of these roosts were small roosts of one to two individuals. BB 3 had one roost of 30 bats, and another roost of 9 bats, BB 8 had a roost of 13 bats, and BB 9 had a roost of seven to eight bats. Overall, this site is considered to be an important site for roosting soprano pipistrelles.

Accidentally destroying a bat roost, in particular if the affected roost was a significant maternity or hibernation roost, would have the potential to have long-term effects on the local bat population of the species concerned. The layout of the proposed

development site has been designed so as to avoid any impacts on bat roosts (**with the exception of one bat roost, as described below**) within the proposed development site. The buildings (BB 1A, BB 2, BB 3, BB 5A, BB 8 and BB 9) will be retained as they are currently, with a 30m dark buffer zone also in place to ensure roosting bats are not disturbed by construction activities, and continue to use the roost buildings. Therefore, there is no potential for likely significant effects on the conservation status of soprano pipistrelle bats to occur at any geographic scale as a result of this potential direct impact of building loss.

Common pipistrelle and brown long-eared bat

One common pipistrelle and one brown long-eared building roost were identified within the proposed development site, both small roosts of two individuals (*i.e.* BB 5A and BB 5B, respectively). These roosts are small, and significant at a local scale only; therefore the loss of these roosts would result in a likely significant effect at a local scale only.

However, as mentioned above, all confirmed bat roosts (**with the exception of BB 6C as discussed below**) within buildings in the proposed development site will be retained and protected from development, and consequently will not be impacted by the development. Therefore, there is no potential for likely significant effects on the conservation status of common pipistrelle and brown long-eared bat to occur at any geographic scale as a result of this potential direct impact of building loss.

Myotis sp.

There were no *Myotis* sp. building roosts identified within the proposed development site. The buildings within the site are suitable for roosting *Myotis* sp. As there are no buildings with confirmed *Myotis* sp. bat roosts species within the proposed development site there is no potential for likely significant effects on the conservation status of these bat species to occur at any geographic scale as a result of this potential direct impact of building loss.

Buildings that did not have confirmed roosts (*i.e.* BB 1B, BB 4A – D, BB 6A-B, and BB 7) were all negligible - low potential farm buildings, with the exception of BB 7, which was considered to be of moderate potential for roosting bats. These buildings will be removed as part of the development. Although roosts were not identified in any of these buildings, due to the high activity levels and numbers of roosting bats across the site, a precautionary principle will be applied, and subsequent mitigation measures implemented to ensure there are no risks of injury/mortality to local bat species as a result of the proposed development.

Leisler's bat

One Leisler's bat roost with a single Leisler's bat was identified within BB 6C. This roost was only identified during surveys in 2022, highlighting the transient and mobile bat species are. This roost is small, and significant at a local scale only; therefore, the loss of this roost would result in a likely significant effect at a local scale only.

This roost comes under the footprint of the proposed development, and as mentioned previously, bats are protected by law in Ireland, and it is considered to be appropriate to undertake all reasonable measures to avoid mortality of bats during proposed works. In the absence of any mitigation, the potential effects of roost loss on Leisler's bat would be significant, although in light of the small number of bats roosting in the building, the scale of impact would be at the local level only. Potential impacts of loss of this roost would not have an impact on the conservation status for this species as

they are widespread in the area, and across Ireland, and are a species listed as 'Least Concern'.

Tree roost loss

There were no confirmed bat tree roosts within the proposed development site. However, there were 17 trees identified as having bat roost potential features. These included; one high potential tree, two moderate potential trees, and 14 low potential trees. Therefore there is potential for local bat species to be impacted by the removal of potential tree roosts within the site. Lesser horseshoe bats do not typically use trees for roosting in due to their specific roosting preferences and are therefore excluded from impacts related to tree roost removal⁵². Soprano and common pipistrelle bat, Leisler's bat, brown long-eared bat, and all species of *Myotis* bat use trees for roosting⁵³.

The proposed development will not directly, or indirectly, affect any known bat roosts. Trees on site with the potential to support roosting bat, could be occupied at the time of site clearance; and there is therefore the potential that bats on site could be injured or killed. All the bats recorded using the site that roost in trees are common species in Ireland that are classified as being of "least concern" in the *Ireland Red List No. 3: Terrestrial Mammals* (Marnell *et al.*, 2019). The low and moderate potential trees within the proposed development site that have some potential for roosting bats, are not considered to be of significant in size and are unlikely to hold enough space for them to be maternity or hibernation roosts. One high potential tree located within the site could support larger roost sizes due to the size of PRFs identified. The potential effects on bat populations arising from loss of a number of potential small roost sites, and one potentially larger roost site, is considered to be significant, at a local (high) geographic scale only.

Bats, and their breeding and resting places, are strictly protected under the Birds and Habitats Regulations, and under the Wildlife Acts, and it is an offence under that legislation to intentionally kill or injure bats or to interfere with or destroy their breeding or resting places. Therefore, mitigation measures are included to ensure that any tree removal works do not result in the permanent loss of tree roosting sites or result in bats being accidentally killed or injured during construction.

Habitat Loss as a result of fragmentation of foraging/commuting habitat and commuting routes

Bats rely on suitable semi-natural habitats which support the insect prey upon which they feed. The proposed development will result in the loss of such habitats used for feeding by all bat species recorded in the study area.

Suitable habitat for foraging and commuting bats within the footprint of the proposed development includes hedgerows, treelines, scrub, open grassland and farm buildings (foraging on prey within cattle sheds). The area of the habitats which will be lost as a result of the proposed development is significant at a local scale only, considering the quantity of suitable habitat, which will not be impacted, in the local vicinity. The total loss of bat commuting and/or foraging habitat is c. 1.38km. Habitat loss for other bat

⁵² Lesser horseshoe bat *Rhinolophus hipposideros*, Bat Conservation Trust (2010).

⁵³ Bat Roosts, Bat Conservation Ireland. Access here: <https://www.batconservationireland.org/irish-bats/bat-roosts>

species using the subject lands for foraging and/commuting, *i.e.* soprano and common pipistrelle, Leisler's bat, Daubenton's bat, *Myotis* sp., and brown long-eared bat, is likely to result in a significant effect, at a local (high) geographic scale, due to highly suitable habitat in the surrounding environs, stable populations of these species, and as they are species of 'least concern'. Impacts on lesser horseshoe bats are discussed in Section 6 of the NIS (Scott Cawley, 2021), and above in Section 7.5.1.1 under the heading for Old Domestic Building (Keevagh) SAC and Old Domestic Buildings, Rylane SAC.

Installation of temporary working and site compound lighting which may cause indirect disturbance of flight patterns

One construction compound is proposed at the location of the proposed Data Centre 1 adjacent to Toureen Laneway in the south of the site. Potential impacts of lighting during construction will be slight and short-term as construction works will generally be confined to daylight hours (07:30-17:30). Where works are required during hours of darkness, portable lighting will be used, which will be pointed downwards at a 45-degree angle and away from any sensitive receptors (hedgerows, treelines, confirmed bat roosts, Toureen Lough, and Spancelhill Stream). Artificial lighting within suitable habitat may result in avoidance behaviour by bats, and could prevent bats from accessing foraging areas or roosts and/or result in bats taking more circuitous routes to get to foraging areas and hence potentially depleting energy reserves and abandonment of nearby roosts. Security lighting will not involve high intensity lighting (*e.g.* floodlighting), therefore the impact of increased artificial lighting at the proposed construction compound on bat species excluding lesser horseshoe bat is considered to be significant at the local level only. The impact of increased lighting during construction on lesser horseshoe bat, is considered to be significant at an international level, which is discussed in Section 6 of the NIS (Scott Cawley, 2021), and above in Section 7.5.1.1 under the heading for Old Domestic Building (Keevagh) SAC and Old Domestic Buildings, Rylane SAC.

Construction works will typically be undertaken during normal daylight working hours, and therefore the requirement for lighting to accommodate construction works during night-time, in areas where existing light levels are low, will be limited and restricted to winter time when sunrise/sunset is later/earlier. Temporary lighting effects associated with the construction of the proposed development on local bat species, is considered to be significant at the local geographic scale only.

7.5.1.4 Otter

Although it cannot be predicted if otter will establish new holt or couch sites within the Zol of the proposed development before construction works commence, it is a possibility, and this scenario has been taken into account in the mitigation strategy. As the otter populations that utilise the proposed development are considered to be part of European site populations downstream and hydrologically connected to the site (*i.e.* Lower River Shannon SAC and Dromore Woods and Loughs SAC), any potential impacts predicted on this species are discussed in Section 7.5.1.1 above, and in Section 6 of the NIS produced as part of this planning application (Scott Cawley, 2021).

7.5.1.5 Badger

A total of **three** confirmed badger setts were recorded across the proposed development site. None of which are located within the footprint of the proposed development and none located within the Zol of the general construction activities (*i.e.* within 50m) based upon the impact distance bands described in the TII guidance

(National Roads Authority, 2006a). All setts are located beyond the 150m of the proposed Project and therefore beyond the Zol of any potential pile driving or blasting works and any other construction activities.

Although it cannot be predicted if badger will establish new setts within the Zol of the proposed Project before construction works commence, it is a possibility and this scenario has been taken into account in the mitigation strategy (refer to Section 7.6.1.6).

Loss of foraging habitat and breeding/rest sites.

The proposed development will not result in the permanent loss of any badger sett identified during the surveys and therefore there is no potential for impacts arising from the loss of breeding sites to occur at any geographic scale.

Construction will result in the permanent loss of c. 16.7ha of suitable foraging/commuting habitat for badgers (*i.e.* hedgerows, grassland, scrub, and spoil). However, given the lack of evidence of badger using these areas within the site, the availability of suitable badger habitat in the immediate surrounding environment, the proposed development is unlikely to affect the conservation status of the local badger population and will not result in a likely significant negative effect, at any geographic scale.

Disturbance/displacement

Along with any potential displacement effects associated with habitat loss, increased human presence and/or noise and vibration associated with construction works, the proposed development has the potential to displace badgers from foraging habitat located beyond the footprint of the proposed development.

As construction works will typically be undertaken during normal daylight working hours and badgers are nocturnal in habit, the displacement of badgers from the retained areas of suitable foraging habitat (*i.e.* areas located beyond the footprint of the proposed development) is extremely unlikely to affect the local badger population and therefore will not result in a likely significant negative effect, at any geographic scale. In addition, the construction phase of the development is predicted to produce noise levels that are slight-moderate, and short-term in nature, with the construction noise levels predicted to be the same or below the baseline noise levels, at max. 63dB (A) or below, prior to mitigation. Following initial ground works, construction noise impacts will reduce to not significant at any geographic level. Badgers residing within the wider study area are likely to be habituated to certain level of disturbance within the suburban environment and therefore are likely to be less sensitive to very localised, temporary increases in disturbance.

Disturbance and displacement effects on badger may also arise as a result of increased artificial lighting during construction. Nocturnal mammals, such as badger, are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich & Longcore, 2005). The majority of the proposed development is currently free from artificial lighting. The proposal may result in the introduction of portable lighting to previously unlit areas, and for the proposed construction compound security lighting for the duration of construction. However, works will normally only be undertaken during daylight hours (07:30-17:30), and any security lighting will be pointed down at a 45-degree angle and away from sensitive receptors. Although the particular location of the proposed compound is not considered

to be of any significance for local badger, i.e. in the south of the site where Data Hall 1 will be located, light spill into adjacent suitable areas could render these areas unsuitable for foraging badger. This is unlikely to result in a negative effect on badgers, as it will be temporary in nature and very localised, and there is ample suitable habitat for foraging and breeding badger in the surrounding areas.

7.5.1.6 Other mammals (including pine marten and Irish hare)

Pine marten and Irish hare were the only other mammals identified within the proposed development site during mammal surveys carried out in 2020. The desk study results also included records of red squirrel, pygmy shrew, hedgehog and Irish stoat within 2km of the proposed development site.

Habitat Loss

The construction of the proposed development will result in the temporary loss of suitable habitat for small mammals located within in the proposed development site. Pine marten were identified within the woodland in the north east of the site, and Irish hare were identified in close proximity to the woodland in the north east. This woodland area is suitable as foraging and/or breeding habitat for all of the aforementioned species, with the exception of Irish hare, which is most typically found in lowland pasture habitat⁵⁴. The habitat that will be temporarily lost as a result of the proposed development is only suitable for commuting and foraging of these species, as the woodland habitat in the north west will be retained. Given the relatively low numbers of individuals of each species that are likely to be affected (i.e. pine marten, red squirrel, hedgehog, pygmy shrew and Irish hare), the protection of the woodland in the north east from any development for pine marten, red squirrel, pygmy shrew and hedgehog, and the abundance of alternative suitable habitat available locally, the effects of habitat loss associated with construction works are unlikely to affect the long-term viability of the respective local populations of these species. Therefore, habitat loss is unlikely to affect the species' conservation status or result in a significant negative effect, at any geographic scale.

Mortality Risk

Site clearance works have the potential to result in the mortality of small mammal species. The potential for this impact to occur would be expected to be greater during the breeding season when juveniles would be present in nests, or in the case of hedgehog impacts may be greater during their hibernation period. Furthermore, the potential for direct mortality to small mammals would be greater in the more vegetated areas, as opposed to areas dominated by artificial ground/ grassland habitat, as the former areas would offer more in terms of breeding/ resting habitat for small mammal species. Given the relatively low numbers of individuals of each species that are likely to be affected, and that these species are highly mobile, site clearance is unlikely to result in a level of mortality that would affect the species' conservation status, and result in a significant negative effect, even at a local geographic scale. Nevertheless, there is a risk of small mammals (e.g. pygmy shrew and hedgehog) falling into excavations or pits during construction. To ensure no mammals are harmed during the construction of the proposed development site, mitigation is provided for this risk.

⁵⁴ Reid, N., Dingerkus, K., Montgomery, W.I., Marnell, F., Jeffrey, R., Lynn, D., Kingston, N. & McDonald, R.A. (2007) Status of hares in Ireland. *Irish Wildlife Manuals*, 30. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.

Disturbance/displacement

Along with any displacement effects associated with habitat loss, increased human presence and/or noise and vibration associated with construction works, the proposed development has the potential to displace mammals from both breeding/resting places and from foraging habitat. The construction phase of the development is predicted to produce noise levels that are slight-moderate, and short-term in nature. Following initial ground works, construction noise impacts will reduce to not significant. The construction phase of the development is predicted to produce noise levels that are slight-moderate, and short-term in nature, the with construction noise levels predicted to be the same or below the baseline noise levels, at max. 63dB or below prior to mitigation. Following initial ground works, construction noise impacts will reduce to not significant. Mammals (as described in Section 7.3.3.1) residing within the wider area are likely to be habituated to disturbance within the suburban environment from Ennis town, and the M18 Motorway both to the west.

As construction works will typically be undertaken during normal daylight working hours and these small mammal species are nocturnal in habit, the displacement of these small mammal species from retained foraging areas (*i.e.* areas located beyond the footprint of the proposed development) is extremely unlikely to affect the local small mammal populations and therefore will not result in a likely significant negative effect, at any geographic scale.

7.5.1.7 Breeding Birds

Habitat Loss and Loss of Breeding/Resting Sites

The proposed development will result in the loss of breeding bird nesting and foraging habitat within the footprint of the proposed development. The areas of habitat loss within the proposed development boundary are provided in Section 7.5.1.2 and tabulated in Table 7.12 for all KER habitat types. These areas comprise a total linear length of c. 1.38km of hedgerows and treelines. In addition, there are areas of scrub, wet grassland, agricultural grassland (c. 12.3ha in total area) within the footprint of the proposed development, which are not KERs in their own right due to their limited botanical value, however, may provide nesting and/or foraging habitat for birds. These areas will be removed during construction of the proposed development resulting in an additional loss of breeding bird nesting and/or foraging habitat. There will also be removal of the farm sheds within the proposed development site, and whilst no breeding birds were identified in the buildings for removal (aside from BB 5B was identified as having barn swallow nests, however it will be retained), they have the potential to support breeding bird populations such as barn swallows and house martins.

The primary consequence of habitat loss will be increased competition for resources (*e.g.* nesting habitat and/or prey/food source) both between and amongst breeding bird species. The magnitude of this effect will be largely defined by many unquantifiable factors such future land use changes and whether the local habitat resource has currently reached its carrying capacity or not in terms of breeding bird species. For species with larger home ranges during the breeding season (*i.e.* buzzard) habitat loss at the scale of the proposed development is not likely to have any perceptible effects on breeding success or population dynamics.

The habitat areas that will be lost as a result of the proposed development form a relatively small part of larger expanses of similar habitat types and mosaics in the wider locality. The proposed development is connected to agricultural lands of the same land

uses within the proposed site. The hedgerows and treelines that demarcate these boundaries would be important breeding sites for local bird species, including red-listed grey wagtail. The woodland in the north west, and scrub/woodland in the east will be retained and protected as part of the development. None of the habitat areas to be lost are unique to the locality and, either individually or collectively, are not likely to support a significant proportion, or the only population, of any given breeding bird species locally. Although a temporary decline in overall breeding bird abundance could potentially occur at a local level (*i.e.* the footprint of the proposed development), this is unlikely to affect the local range of the breeding bird species present nor is it likely to affect the ability of these breeding bird populations to maintain their local populations in the long-term.

Mortality Risk

If site clearance works were to be undertaken during the bird breeding season (*i.e.* March to August, inclusive) it is likely that nest sites holding eggs or chicks would be destroyed and birds killed.

Mortality of birds at the scale of the proposed development, over what is likely to be a single breeding bird season in terms of completing site clearance works, will probably have a short-term effect on local breeding bird population abundance.

However, in the longer-term this would be unlikely to affect the ranges of the breeding bird species recorded in the study area nor would it be likely to affect the long-term viability of the local populations. Mortality of birds during site clearance works could result in a short-term significant effect on local breeding bird populations at a local scale only, due to the amount of hedgerows being lost within the footprint of the development (*i.e.* c. 2.7km).

Disturbance/displacement

The noise, vibration, increased human presence and the visual deterrent of construction traffic, associated with site clearance and construction will temporarily disturb breeding bird species and is likely to displace breeding birds from habitat areas adjacent to the footprint of the proposed development. Construction activities will largely involve excavations of the land, construction of buildings, construction of pathways and new road layouts, with piling also proposed at two locations in the west of the site also proposed. The magnitude of the impact will be dependent on the type of construction works and their duration; general construction activities will have a less pronounced affect than blasting, in terms of its ZoI, but will be on-going from a period of between 9-12 months (as well as a 6-month advanced work period) and multiple breeding seasons. The construction phase of the proposed development will be completed on a phased basis, over a period of 6 years.

Although it is not possible to definitively quantify the magnitude of this potential impact (or the potential effect zone) in a worst case scenario it could potentially extend for several hundred metres from the proposed development. As such, the construction works have the potential to affect the conservation status of affected breeding bird species and will result in a likely short-term significant negative effect, at a local geographic scale.

7.5.1.8 Wintering birds

This section of the impact assessment deals with wintering bird species, *i.e.* those bird species which are listed on either the BoCCI Red or Amber lists for their wintering

populations or are Annex I species. The assessment carried out in the NIS for the proposed development considered the potential for the proposed development to affect the bird species listed as SCIs of European sites for their wintering populations. That assessment concluded that proposed development would not affect their wintering bird colonies or have any long-term effects on the local wintering populations following implementation of mitigation measures. Therefore, for these species, the proposed development will not affect the conservation status of the SCI wintering bird populations and will not result in a significant adverse effect on the integrity of the European sites (See Section 7.5.1.1 above and Section 6 of the NIS (Scott Cawley, 2021).

Habitat Loss and/or disturbance/displacement

The development will not involve the removal or alteration of any of the permanent waterbodies within the proposed development site as they are within the ecological protection areas as set out by Clare County Council in the Variation No. 1. The footprint of the development will encroach on a temporary 'pond' wetland feature in the north west of the site, where tufted duck and coot were identified during one of the wintering bird surveys. Other areas within the site that come under the footprint of the proposed development, were not deemed suitable and were confirmed to be not used by any wintering bird species during surveys undertaken on the site.

Moreover, a temporary and/or permanent increase in noise, vibration and/or human activity levels during the construction and/or operation of the proposed development could result in the disturbance to and/or displacement of wintering bird species present within the footprint and/or the vicinity of the proposed development.

Current understanding of construction related noise disturbance to wintering waterbirds is based on the research presented in Cutts *et al.* (2009) and Wright *et al.* (2010). In terms of construction noise, levels below 50dB would not be expected to result in any response from foraging or roosting birds. Noise levels between 50dB and 70dB would provoke a moderate effect/level of response from birds, *i.e.* birds becoming alert and some behavioural changes (e.g. reduced feeding activity), but birds would be expected to habituate to noise levels within this range. Noise levels above 70dB would likely result in birds moving out of the affected zone, or leaving the site altogether. At c. 300m, typical noise levels associated with construction activity (BS 5228) are generally below 60dB or, in most cases, are approaching the 50dB threshold. As such, disturbance effects for general construction activities across the majority of the proposed development would not be expected to extend beyond a distance of c. 300m, as noise levels associated with general construction activities would attenuate to close to background levels at that distance and beyond.

The construction phase of the development is predicted to produce noise levels that are slight, and short-term in nature. Following initial ground works, construction noise impacts will reduce to not significant. The construction noise levels predicted to be the same or below the baseline noise levels, at max. 63dB or below.

As the majority of works will be carried out during normal working daylight hours (07:30-17:30), the potential for construction to disturb wintering birds at night, will not arise under normal circumstances. Impacts associated with increased levels of disturbance will likely result in the temporary displacement of these wintering bird species to other suitable available lands in the locality. These impacts will be associated with general construction activities (e.g. visual impact of construction workers and machinery and the associated vibration and more constant/continuous noise levels) and impulse noise disturbance from infrequent noise sources with a high noise level, such as piling.

Following the completion of construction, disturbance levels will likely return to baseline conditions and as a result these lands will become available again as foraging and/or roosting habitat for these wintering bird species.

While a good proportion of wintering birds identified in the desk review are typically found in coastal, estuarine and intertidal habitats including the Fergus and Shannon Estuary, and therefore will not be impacted directly during construction, there are large areas of suitable foraging and/or roosting habitat available for these wintering bird species both adjacent to, and in the wider locality of the proposed development (*i.e.* beyond the 300m study area, from c. 300m from these existing sites located within the footprint of the proposed development). Therefore the effect of habitat loss on wintering bird species is considered to result in a potential short-term significant effect, at a local geographic scale only.

Habitat Degradation – Surface Water Quality

During construction, contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water feature has the potential to have a significant negative impact on water quality and consequently an impact on wintering birds; either directly (*e.g.* bird species coming into direct contact with pollutants) or indirectly (*e.g.* acute or sub-lethal toxicity from pollutants affecting their food supply or supporting habitats). The effects of frequent and/or prolonged pollution events in a waterbody have the potential to be extensive and far-reaching and could potentially have significant long-term effects.

However, it is considered unlikely that a pollution event of such a magnitude would occur during construction or be any more than temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk (albeit low due to the distance between surface water features and the main construction activities) of water quality impacts and detailed mitigation measures are required to further minimise the risk of the proposed development having any perceptible effect on water quality during construction.

During construction suspended solids, silt and other harmful materials generated as a result of proposed works could be released into the local drainage infrastructure and travel downstream via Toureen Lough, Spancelhill Stream, including, potentially, into watercourses such as the River Fergus, Fergus Estuary and wider Shannon Estuary. Cement-based products used in the construction phase of the proposed development (*e.g.* concrete and/or bentonite which are highly corrosive and alkaline materials), if released into any watercourse may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality and could consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, estuarine/ coastal foraging habitats downstream could also be affected.

Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the species' conservation status and result in a likely significant negative effect, at a local geographic scale. Mitigation measures have been designed to protect water quality during construction (See Chapter 6 Hydrology and Section 7.6 of the CEMP).

Direct injury/mortality

The potential for injury/mortality to SCI bird species from the proposed development is discussed in Section 6.7 of the NIS (Scott Cawley Ltd., 2021), and in Section 7.5.1.1

above under the Ballyallia Lough SPA, River Shannon and River Fergus Estuaries SPA, Corofin Wetlands SPA, and the Slieve Aughty Mountains SPA heading. The impacts described within these sections are also relevant and apply to other wintering bird species (*i.e.* not SCI species).

7.5.1.9 Amphibians

There are records of common frog and smooth newt within c. 2km of the proposed development site, and suitable habitat is present for these species within the permanent wetland features and, therefore, it cannot be ruled out that these species occur in the vicinity of the proposed development.

Disturbance & Mortality Risk

Site clearance works have the potential to result in disturbance to, and the direct mortality of amphibians. Given the protection zones of the wetland features within the site, and the distance between the footprint of the site and the availability of other wetland areas outwith the proposed development in the wider area (*i.e.* Ballymacahill Lough, c. 250 north of the subject lands), the number of individuals that would potentially be at risk is considered to be very low and impacts on such individuals would be unlikely to affect the local populations in the long-term. However, common frog is protected under the Wildlife Acts and it is an offence to hunt, take or kill them, or wilfully to interfere with or destroy their breeding places. Mitigation measures have been provided to ensure adherence to the Wildlife Acts.

Habitat Severance/Barrier Effect

The temporary to short-term physical disruption of the existing landscape during site clearance and construction will not fragment habitat used by amphibians, and the footprint of the development does not overlap with suitable amphibian habitats. Therefore, habitat severance during construction and any associated barrier effect are not likely to affect the species' conservation status and are not predicted to result in a likely significant negative effect to amphibians, at any geographic scale.

Habitat Degradation – Surface Water Quality

During construction, contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water feature have the potential to have a significant negative impact on water quality and, consequently, an impact on amphibian species' either directly (*e.g.* species coming into direct contact with pollutants) or indirectly (*e.g.* acute or sub-lethal toxicity from pollutants affecting their food supply or supporting habitats). The effects of frequent and/or prolonged pollution events in a waterbody have the potential to be extensive and far-reaching and could potentially have significant long-term effects.

However, it is considered unlikely that a pollution event of such magnitude would occur during construction or be any more than temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk (albeit low due to the distance between surface water features and the main construction activities) of water quality impacts and detailed mitigation measures are required to further minimise the risk of the proposed development having any perceptible effect on water quality during construction.

Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the species' conservation status and result in a likely

significant negative effect, at a local geographic scale. Mitigation measures have been designed to protect water quality during construction (see Chapter 6 *Hydrology*, and Section 7.6 of the CEMP).

7.5.1.10 Reptiles

No reptiles were identified within the proposed development during surveys carried out in 2018 and 2020. The NBDC did not return any records of common lizard within the proposed development site, however suitable habitat was identified along the stone walls, and exposed rock habitats within the site. Therefore, it cannot be ruled out that these species do not occur in the wider area.

Disturbance & Mortality Risk

Site clearance works have the potential to result in disturbance to, and the direct mortality of, common lizard. Given the availability of potentially suitable habitat for common lizard in the wider study area and the relatively low number of individuals that would potentially be at risk, it is considered that such impacts are unlikely to affect the local common lizard populations in the long-term. However, given the potential for lizard to be present in a variety of habitats, disturbance and mortality impact could result in a short-term significant negative effect on common lizard, at a local scale.

Habitat Severance/Barrier Effect

The temporary physical disruption of the existing landscape during site clearance and construction will fragment habitat used by common lizard. As a temporary, short-term impact, this is unlikely to present a significant barrier to the movement of the species such that it would affect the local common lizard population in the long-term. Therefore, habitat severance during construction and any associated barrier effect are not likely to affect the species' conservation status and are not predicted to result in a likely short-term significant negative effect to the common lizard, at any geographic scale.

7.5.1.11 Fish

This section only describes fish species in the local waterbodies within the site and that surface water drains to from the site (i.e. Toureen Lough, Spancelhill Stream, M18 Attenuation pond, River Fergus). Impacts on QI species within downstream European sites are described above in Section 7.5.1.1 and in Section 6 of the NIS (Scott Cawley, 2021).

Habitat Degradation – Surface Water Quality

During construction, contaminated or heavily silted surface water runoff, pump discharges and/or an accidental spillage or pollution event into any surface water feature has the potential to have a significant negative impact on water quality and consequently on aquatic habitats and fish species, and potentially also in the marine environment downstream. This could be either directly (e.g. acute or sub-lethal toxicity from pollutants or siltation events damaging spawning habitat downstream) or indirectly (e.g. affecting their food supply or supporting habitats).

The effects of frequent and/or prolonged pollution events in a river system have the potential to be extensive and far-reaching and could potentially have significant long-term effects. It is considered unlikely that a pollution event of such magnitude would occur during construction or if such an event did occur, it would be temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk

(albeit low due to the distance between surface water features and the main construction activities) of water quality impacts and detailed mitigation measures are required to further minimise the risk of the proposed development having any perceptible effect on water quality during construction.

Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the conservation status of affected fish species and result in a likely significant negative effect, at a local geographic scale given the fact that the other fish species in question are common in Irish waters and not of conservation concern.

Habitat Loss

There will be a loss of 2m² of habitat along the banks of the Spancelhill Stream in the south west of the proposed development site, in order to install the grated culvert with headwall and mattress for the surface water drainage pipe. During construction of this, this could result in a loss of habitat if instream works are required to facilitate this. This will be a temporary loss (i.e. 2-3 weeks of construction), which will result in a potential short-term impact on local fish populations, significant at a local geographic scale.

7.5.1.12 Invertebrates

White-clawed crayfish

During construction, contaminated or heavily silted surface water runoff, pump discharges and/or an accidental spillage or pollution event into any surface water feature has the potential to have a significant negative impact on water quality and consequently on aquatic habitats and white-clawed crayfish, and potentially also on the marine environment downstream. This could be either directly (e.g. acute or sub-lethal toxicity from pollutants or siltation events damaging habitat downstream) or indirectly (e.g. affecting their food supply or supporting habitats).

The effects of frequent and/or prolonged pollution events in a river system have the potential to be extensive and far-reaching and could potentially have significant long-term effects. It is considered unlikely that a pollution event of such magnitude would occur during construction or if such an event did occur, it would be temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk (albeit low due to the distance between surface water features and the main construction activities) of water quality impacts and detailed mitigation measures are required to further minimise the risk of the proposed development having any perceptible effect on water quality during construction.

Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the conservation status of affected white-clawed crayfish species and result in a likely significant negative effect, at a local geographic scale given the fact that this species is not known to occur in the receiving local environment, and there are no records of this species within 2km of the proposed development.

7.5.1.13 Other invertebrates

The majority of suitable habitat for other invertebrate species (as described in Section 7.3.3.7), including butterfly, damselfly and dragonfly species, will not be directly impacted by the development as they are outwith the footprint of the proposed development. These areas include the waterbodies and wetland areas of the site (Toureen Lough, M18 Attenuation pond, and Lough Ardnamurry). There will also be

the removal and translocation of 0.79 ha of calcareous grassland to a field to the south east of its current location, at the south western end of DC6. It will therefore continue to be suitable for this species once translocated. Until this habitat is successfully translocated, the translocation of suitable habitat will result in a temporary significant effect, at a local geographic scale. The removal of other suitable habitat, including wet grassland, and dry meadows and grassy verges habitat, will not result in a likely significant effect, due to the size of the areas that will be removed, availability of these habitats in other areas of the proposed development and outside the site in the wider environs.

7.5.2 Operational Phase

7.5.2.1 European sites

Lower River Shannon SAC

As described in Section 7.1 of the NIS, the proposed development has the potential to affect the qualifying interests and conservation objectives, and therefore the integrity, of the Lower River Shannon SAC because of:

- An accidental pollution event during operation affecting water quality in the Spancelhill Stream and the River Fergus, which drains to the Lower River Shannon SAC, subsequently affecting QI/SCI species as a result of habitat degradation.

During operation, water runoff from the proposed development will discharge following attenuation and passing through an oil interceptor to the Spancelhill Stream. SUDs, including filter drains and bioswales, and oversized pipes fitted with petrol interceptors, are proposed in suitable locations within the proposed development. These systems will allow surface water runoff from the roads, footpaths and cycle lanes to be discharged to ground via treatment systems to reduce the rate of infiltration (e.g. filter drains). The inclusion of these SUDs systems will reduce the volume of surface water runoff discharging to the existing drainage network. The functioning and effectiveness of both elements of the road drainage network are discussed in more detail in Chapter 6, Hydrology. The existing subterranean flow within the karst will not be altered by the development. Measures will be incorporated in the design to ensure this flow regime continues as current and these are outlined in Chapter 5 Hydrogeology.

Affecting the integrity of the Lower River Shannon SAC would result in a likely significant effect at the international geographic scale. However, due to the design measures that will be in place during operation, an accidental pollution event affecting water quality and the QI species within, will not result in a significant effect at any geographic scale.

Dromore Woods and Loughs SAC

As described in Section 7.2 of the NIS, the proposed development has the potential to affect the qualifying interests and conservation objectives, and therefore the integrity, of Dromore Woods and Loughs SAC because of:

Habitat degradation/effects on QI species as a result of hydrological impacts

During operation, water runoff from the proposed development will discharge following attenuation and passing through an oil interceptor to the Spancelhill Stream. SUDs, including filter drains and bioswales, and oversized pipes fitted with petrol interceptors, are proposed in suitable locations within the proposed development. These systems

will allow surface water runoff from the roads, footpaths and cycle lanes to be discharged to ground via treatment systems to reduce the rate of infiltration (e.g. filter drains). The inclusion of these SUDs systems will reduce the volume of surface water runoff discharging to the existing drainage network. The functioning and effectiveness of both elements of the road drainage network are discussed in more detail in Chapter 6, Hydrology. The existing subterranean flow within the karst will not be altered by the development. Measures will be incorporated in the design to ensure this flow regime continues as current and these are outlined in Chapter 5 Hydrogeology.

Disturbance and/or displacement

During operation, the strategies in place are to limit the duration of the lighting at night and also limit lux levels wherever possible. However there is potential for light spill from the proposed development on suitable areas of foraging and/or commuting habitats used by lesser horseshoe bats. There will also be the addition of lighting along new pathways on the Tulla Road, which will be turned on during the hours of darkness for safety reasons. A light spill modelling drawing has been used to indicate where any areas of light spill may be within and beyond the proposed development, prior to mitigation⁵⁶. Impacts on lesser horseshoe bats during the operational phase of the development could result in a significant impact at the international scale.

Affecting the integrity of the Dromore Woods and Loughs SAC from disturbance and/or displacement of QI species would result in a likely significant effect at the international geographic scale.

Old Domestic Building (Keevagh) SAC & Old Domestic Buildings, Rylane SAC

As described in Section 7.3 of the NIS, the proposed development has the potential to affect the qualifying interests and conservation objectives, and therefore the integrity, of the Old Domestic Building (Keevagh) SAC, and Old Domestic Buildings, Rylane SAC because of:

- Artificial lighting during construction may disturb and/or displace the QI species, lesser horseshoe bats, from the proposed development site. The potential impacts for this European site are as described above under the heading for Dromore Woods and Loughs SAC.

Affecting the integrity of the Old Domestic Building (Keevagh) SAC and Old Domestic Buildings, Rylane SAC would result in a likely significant effect at the international geographic scale.

Ballyallia Lough SPA, River Shannon and River Fergus Estuaries SPA, and Corofin Wetlands SPA

As described in Section 7.3 of the NIS, the proposed development has the potential to affect the qualifying interests and conservation objectives, and therefore the integrity, of Ballyallia Lough SPA, River Shannon and River Fergus Estuaries SPA, and Corofin Wetlands SPA because of:

- An accidental pollution event during operation affecting water quality in the Spancelhill Stream and the River Fergus, which are hydrologically connected to the proposed development site, and subsequently affecting SCI species as a result of habitat degradation.

During operation, water runoff from the proposed development will discharge following attenuation and passing through an oil interceptor to the Spancelhill Stream. SUDs, including filter drains and bioswales, and oversized pipes fitted with petrol interceptors, are proposed in suitable locations within the proposed development. These systems will allow surface water runoff from the roads, footpaths and cycle lanes to be discharged to ground via treatment systems to reduce the rate of infiltration (e.g. filter drains). The inclusion of these SUDs systems will reduce the volume of surface water runoff discharging to the existing drainage network. The functioning and effectiveness of both elements of the road drainage network are discussed in more detail in Chapter 6, Hydrology. The existing subterranean flow within the karst will not be altered by the development. Measures will be incorporated in the design to ensure this flow regime continues as current and these are outlined in Chapter 5 Hydrogeology.

Affecting the integrity of the Ballyallia Lough SPA, River Shannon and River Fergus Estuaries SPA, and Corofin Wetlands SPA would result in a likely significant effect at the international geographic scale. However, due to the design measures that will be in place during operation, an accidental pollution event affecting water quality and the QI species within, will not result in a significant effect at any geographic scale.

7.5.2.2 National sites

As previously described in Section 7.5.1.1 above for European sites, the boundaries of a number of National sites overlap with a number of European sites. Therefore, the potential impacts on these National sites during operation would be as previously described above in Section 7.5.1.1 and in the NIS (Scott Cawley, 2021), under their respective headings. These potential impacts could affect habitat and species within the pNHAs, and therefore, the integrity of the pNHAs which could potentially result in a significant negative effect at the national geographic scale.

Newpark House (Ennis) pNHA

The proposed development is not connected to this pNHA, hydrologically or otherwise, and, consequently, the proposed development is unlikely to result in a significant effect at any geographic scale that would affect the integrity of this pNHA .

Lough Cleggan Lake pNHA

The proposed development is upstream of this National site, and therefore, the protected species here are not at risk of habitat degradation as a result of a change in the hydrological regime. Therefore, the risk of downstream effects on this site as a result of hydrological effects does not arise.

A number of bird species also use this pNHA for foraging and breeding. The proposed development site could be an ex-situ site for these bird species and potentially disturb or displace any birds that may be using the proposed development. The impact of this during operation is minimal however, due to the distance between suitable foraging habitat and the proposed development, (i.e. c. minimum 50m away) and as the noise produced from the development will be similar to background noise levels.

These potential impacts could however affect species within the pNHA, and therefore, the integrity of the pNHA which could potentially result in a significant negative effect at the national geographic scale.

Durra Castle pNHA

Operational impacts on protected species within Durra Castle pNHA, i.e. lesser horseshoe bat is considered to be the installation of artificial lighting around the development. These potential impacts could affect habitat and species within the pNHA, and therefore, the integrity of the pNHA, which could potentially result in a significant negative effect at a national geographic scale.

7.5.2.3 Habitats

Habitat Degradation- Surface Water Quality

During operation, there will be a total net increase of 17.3 hectares in the impermeable area discharging to the Fergus Estuary. There will be drainage outfalls to the Spancelhill Stream via an attenuation pond. Surface water runoff from the proposed development could contain harmful compounds such as hydrocarbons, heavy metals and particulate matter, which would be derived from the internal combustion engines of vehicles coming in and out of the site. These harmful compounds could affect the water quality of the waterbodies within the Zol of the proposed development, as well as affecting aquatic flora and fauna located therein.

Where there is an increase in impermeable surface area, the drainage design principles ensure that there will be no net increase in the surface water flow discharged to these receptors (see Section 6 for more detail on drainage design).

Sections of the proposed development that do not have an increase in impermeable surface area will continue to discharge, directly to the receiving surface water network. Watercourses located within the Zol of the proposed development include Toureen Lough, wetland/pond feature in the north, Spancelhill Stream, and River Fergus, along with waterbodies and wetlands associated with the Fergus Estuary.

During operation, water runoff from the proposed development will discharge following attenuation and passing through an oil interceptor to the Spancelhill Stream. SUDs, including filter drains and bioswales, and oversized pipes fitted with petrol interceptors, are proposed in suitable locations within the proposed development. These systems will allow surface water runoff from the roads, footpaths and cycle lanes to be discharged to ground via treatment systems to reduce the rate of infiltration (e.g. filter drains). The inclusion of these SUDs systems will reduce the volume of surface water runoff discharging to the existing drainage network. The functioning and effectiveness of both elements of the road drainage network are discussed in more detail in Chapter 6, Hydrology. The existing subterranean flow within the karst will not be altered by the development. Measures will be incorporated in the design to ensure this flow regime continues as current and these are outlined in Chapter 5 Hydrogeology.

Habitat degradation, as a consequence of operational effects on surface water quality will therefore not result in a significant effect at any geographic scale.

Habitat Degradation – Air Quality

Air quality modelling of NO_x concentration and deposition rates were calculated at receptor points within the proposed development site, including ecological receptors (refer to Chapter 8 *Air Quality & Climate* for details). The Air Quality Standards Regulations (AQS) 2011 (S.I. No. 180 of 2011) have a limit value of 30µg/m³ for the protection of vegetation. The potential impact of habitat degradation as a result of air quality impacts during the operational phase of the proposed development by means

of a breach of the ambient air quality standards as a result of air emissions from the data centre back-up diesel generators and the energy centre engines. The back-up diesel generators modelled for the purpose of the air quality assessment will only be used in the event of a power failure at the site and for testing purposes. During normal operations at the facility, the electricity will be supplied by the energy centre on site, which is powered by natural gas.

There are habitats within the proposed development site that are sensitive to changes in air quality including; alkaline fen [7230], *Cladium* fen [*7230], *Molinia* meadows [6410], and calcareous grassland [6210], as described in Section 7.3.2.1 above. Although these habitats are within 5km of both a motorway and the urban townland of Ennis, and as such the NO_x does not exist, the modelling has nonetheless been carried out to demonstrate the change these habitats are predicted to experience due to the proposed development. Emissions from the facility lead to an ambient NO_x concentration (excluding background) which ranges from 43.6 - 56.4 mg/m³ at the worst-case location within the site over the five years of meteorological data modelled. In addition, modelling results based on conservative assumptions indicate that the proposed development combined with background concentrations lead to an ambient NO_x concentration which ranges from 62.6 - 75.4 mg/m³ at the worst-case location within the site over the five years of meteorological data modelled.

In terms of deposition, the maximum Nitrogen (N) deposition flux for the worst-case year is 10.86 kg/ha/yr. This can be compared to the range of critical loads for the various onsite habitats outlined in the UNECE 2010 Report "Empirical Critical Loads And Dose-Response Relationships". Rich fen critical loads range from 15-30 kg/ha/yr, poor fen critical loads range from 10-15 kg/ha/yr, *Molinia* meadows ranged from 15-25 kg/ha/yr whilst calcareous grassland ranged from 15-25 kg/ha/yr (UNECE, 2010). Therefore, the maximum critical load of N is below the upper ranges of all habitats onsite and also below most of the lower ranges of the onsite habitats also.

However, as the critical load is above the lower limit for poor fens such as the *Cladium* fen in the east of the site and the alkaline fen beside Toureen Lough, a more detailed analysis has been undertaken at the actual location of these sensitive habitat sites. In terms of deposition, the maximum Nitrogen (N) deposition flux for the worst-case year is 6.33 kg/ha/yr within the onsite poor fens habitat. This can be compared to the range of critical loads for the poor fen habitat outlined in the UNECE 2010 Report "Empirical Critical Loads And Dose-Response Relationship" of 10-15 kg/ha/yr. Thus the maximum critical load of N is below the lower range of the critical load for poor fen habitats.

For the aforementioned reasons, the operational phase impact of the proposed development on designated sites is considered to be not significant at any geographic level.

7.5.2.4 Bats

Indirect Disturbance of Flight Patterns Due to Operational Lighting

High levels of bat activity were recorded across the site. Additional permanent lighting features within areas of suitable habitat may result in avoidance behaviour by bats. Such displacement (which could be a matter of metres) could prevent bats from accessing foraging areas or roosts and / or result in bats taking more circuitous routes to get to foraging areas and hence potentially depleting energy reserves and abandonment of nearby roosts. Given the rural setting of the proposed development site, and the lack of artificial light within the site and in surrounding lands, the effects

of displacement as a result of increased lighting along the access roads, and adjacent to buildings, is considered to be significant at a local geographic scale only, for soprano and common pipistrelle bat, brown long-eared bat, *Myotis* sp. (all species) bat, and Leisler's bat. Lesser horseshoe bat, the most light sensitive species using the lands for foraging and/or commuting, is a QI species for nearby European sites, and impacts are described above in Section 7.5.2.1, and in Section 6 of the NIS (Scott Cawley, 2021). A light spill model study has been prepared to identify the requirements to mitigate any potential light spill, and demonstrate the results of these measures, to ensure there are no effects on local bat species. Mitigation measures for the impacts on bat species can be found in Section 7.6.1.1, Section 7.6.1.4 and Section Section 7.6.2.1 below.

7.5.2.5 Otter

As the otter populations that utilise the proposed development are considered to be part of European site populations downstream and hydrologically connected to the site (i.e. Lower River Shannon SAC and Dromore Woods and Loughs SAC), any potential impacts predicted on this species are discussed in Section 7.5.2.1 above, and in Section 6 of the NIS produced as part of this planning application (Scott Cawley, 2021).

7.5.2.6 Badger

Habitat Severance/ Barrier Effect

Barriers such as road infrastructure within the proposed development site may affect the foraging behaviour of badgers and the commuting corridors they utilise, e.g. it may impact on the movement of this species between breeding, foraging and hibernation sites and as a result local populations can become isolated, resulting in long-term effects on genetic diversity and gene flow, at a local geographic scale.

As the proposed development will involve the development of roads and services, buildings, parking areas and pathways, there is potential for the proposed development to act as a barrier to badger movement across the landscape. However, badgers are likely to adjust quickly as their movement to other areas within or beyond the proposed development site will not be restricted; therefore, this potential impact is not considered to be significant at any geographic scale.

Disturbance and displacement impacts from light spill

Nocturnal mammals, such as badger, are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich & Longcore, 2005). The proposed development is mostly unlit and rural in nature.

The development is largely a 'dark development' and light spill on areas outside of the footprint and on important features for wildlife will be less than 0.1Lux. The badger setts and main badger foraging habitat (i.e. the woodland in the north west) will be a sufficient distance away from the development and therefore will not be impacted by any level of light spill arising from the proposed development.

Therefore, lighting associated within the proposed development is not predicted to disturb or displace badgers from habitat areas located beyond the footprint of the proposed development, will not affect the species conservation status in that regard and will not result in a likely significant negative effect, at any geographic scale.

7.5.2.7 Other Mammals (including pine marten and Irish hare)

Habitat Severance/ Barrier Effect

Barriers such as road infrastructure within the proposed development site may affect the foraging behaviour of small mammals such as pine marten and Irish hare and the commuting corridors they utilise, e.g. it may impact on the movement of these species between breeding, foraging and hibernation sites and as a result local populations can become isolated, resulting in long-term effects on genetic diversity and gene flow, at a local geographic scale.

As the proposed development will involve the development of roads and services, buildings, parking areas and pathways, there is potential for the proposed development to act as a barrier to mammal movement across the landscape. However, mammals are likely to adjust quickly as their movement to other areas within or beyond the proposed development site will not be restricted; therefore, this impact is not considered to be significant at any geographic scale.

Mortality Risk

The proposed development will increase the level of traffic moving in and out of the site, which has the potential to result in the mortality of small mammal species. The potential for this impact to occur would be expected to be greater during the breeding season when juveniles would be present in nests, or in the case of hedgehog impacts may be greater during their hibernation period. Furthermore, the potential for direct mortality to small mammals would be greater in more vegetated areas, as opposed to artificial ground/ grassland habitat, as these areas would offer more in terms of breeding/ resting habitat for small mammal species. The planting that will be in place during operation, will screen the development, and encourage movement of mammals around the site. Traffic movements will largely be during the day for workers going to and from the site, and as most of the aforementioned species (i.e. pine marten, hedgehog and pygmy shrew) are nocturnal species, the risk is reduced. Given the relatively low numbers of individuals of each species that are likely to be affected, and that these species are highly mobile, an increase in traffic movements around the proposed development is unlikely to result in a level of mortality that would affect the species' conservation status, and result in a significant negative effect, even at a local geographic scale.

Disturbance and displacement impacts from light spill

Nocturnal mammals, such as pine marten, hedgehog and pygmy shrew, are likely to be disturbed by the introduction of artificial light into established breeding and foraging areas (Rich & Longcore, 2005). The proposed development is mostly unlit and rural in nature.

The development is largely a 'dark development' and light spill on areas outside of the footprint and on important features for wildlife will be less than 0.1Lux. The main foraging and breeding habitat (i.e. the woodland in the north west), will be a sufficient distance away from the development and therefore will not be impacted by light spill.

Therefore, lighting associated within the proposed development is not predicted to disturb or displace mammal species from habitat areas located beyond the footprint of the proposed development, will not affect the species conservation status in that regard and will not result in a likely significant negative effect, at any geographic scale.

7.5.2.8 Breeding birds

Disturbance/ Displacement

Increases in noise levels, associated with the increased frequency of traffic, as well as increased human presence, owing to the provision of the proposed cycle tracks and pathways, and may also have a negative effect on bird abundance and occurrence in the locality. Operation noise impacts are predicted to be negative, not significant-moderate, and long-term. With day to day noise levels predicted at max. 35 dB, and emergency noise at max. 50 dB. Increased noise levels, as well as causing disturbance to birds in the locality, may also affect the breeding success of local bird populations as bird calls could become drowned out by traffic noise.

The displacement of breeding birds from the proposed development boundary is likely to result in an increase in competition for resources (e.g. nesting habitat or prey/food sources) both between and amongst breeding bird species, which in turn would have negative impacts on local breeding bird populations in the long-term.

Although the proposed development is predicted to have a long-term effect on local breeding bird populations, even at a local level this is not predicted to affect the ability of local breeding bird species to persist within their current ranges or to maintain their populations long-term. Therefore, the proposed development is not likely to affect the conservation status of breeding bird species and will not result in a likely significant negative effect, at any geographic scale.

7.5.2.9 Wintering birds

This section of the impact assessment deals with wintering bird species, *i.e.* those bird species which are listed on either the BoCCI Red or Amber lists for their wintering populations or are Annex I species. The assessment carried out in the NIS for the proposed development considered the potential for the proposed development to affect the bird species listed as SCIs of European sites for their wintering populations. That assessment concluded that proposed development would not affect their wintering bird colonies or have any long-term effects on the local wintering populations following implementation of mitigation measures. Therefore, for these species, the proposed development will not affect the conservation status of the SCI wintering bird populations and will not result in a significant adverse effect on the integrity of the European sites (See Section 6 of the NIS (Scott Cawley, 2021).

Disturbance/ Displacement

During operation, the proposed development has the potential to disturb and displace wintering bird species from habitats near the proposed development footprint due to an increase in noise, human activity and visual disturbance associated with increased human presence and increased traffic flow. Although the operational disturbance/displacement effect cannot be quantified it would be expected to be much less than the 300m ZoI associated with construction works. Noise generated during operation is anticipated to be long-term, imperceptible, and negative (Chapter 9 Noise and Vibration, AWN 2021). Most species of wintering birds are likely to habituate to the increased traffic flows and human presence. There will be no human presence outside of the footprint of the development, due to the buildings being fenced off from the surrounding areas. Any operational noise increases are not likely to alter the existing baseline effect on wintering birds using the habitats locally.

Although there is still likely to be some level of displacement effect, a perceptible effect would be expected to be limited to habitats immediately adjacent to the proposed development, owing to the duration for screening landscape planting to become fully re-established. As any operational noise increases are not likely to alter the existing baseline noise effect on wintering birds in the locality, effects of noise disturbance can also be excluded.

Any displacement of birds from habitat areas during the operation of the proposed development could be expected to be temporary, as a significant amount of planting will be carried out prior to the development, and will have established for during operation. However, it is not predicted to affect the conservation status of wintering bird species by virtue of the widespread availability of a number of other suitable forage sites nearby and across the wider Fergus Estuary. Thus, the operational impact should not result in a likely significant negative effect, at any geographic scale.

Habitat Degradation – Surface Water

During operation, surface water runoff from the proposed development will discharge to the receiving surface water drainage network. Surface water runoff from the proposed development could contain harmful compounds such as hydrocarbons, and particulate matter, if mitigation is not in place. These harmful compounds could be transferred to waterbodies that support populations of riparian/ estuarine bird species such as the Toureen Lough, wetland/pond feature in the north, Spancelhill Stream, River Fergus, and the Fergus Estuary. This could affect water quality in these areas and therefore have a negative effect on winter bird species as a result of direct contact with pollutants or a reduction in food supply.

The proposed drainage design incorporates pollution control measures to allow surface water runoff from the carriageways, footpaths and cycle lanes to be discharged through a petrol interceptor and through permeable paving in areas of low traffic. The inclusion of SUDs systems and attenuation will reduce the volume of surface water runoff discharging to the existing drainage network. The functioning and effectiveness of both elements of the site drainage network are discussed in more detail in Chapter 6, *Hydrology*.

Habitat degradation because of effects on surface water during operation therefore, does not have the potential to affect the species' conservation status and will not result in a likely significant negative effect, at any geographic scale.

7.5.2.10 Amphibians

Suitable amphibian habitat such as Toureen Lough, the M18 attenuation pond, and the wetland features in the north and east of the site, was identified within the proposed development. The desk study returned records of common frog within c. 2km of the proposed development and therefore impacts on these species cannot be excluded due to suitable habitat on site.

Habitat Severance/ Barrier Effect

Barriers such as road infrastructure within the proposed development site may affect the foraging behaviour of amphibians and the commuting corridors they utilise, e.g. it may impact on the movement of amphibian species between breeding and/or hibernation sites, and as a result local populations can become isolated, resulting in long-term effects on genetic diversity and gene flow, at a local geographic scale.

As the proposed development roads will be screened by the use of BERMs and hedgerows, and the permanent wetland features utilised by amphibians within the site will not be impacted directly by the proposed development, the effect of habitat severance/ barrier effect on amphibian species is not considered to be significant at any geographic scale.

Mortality Risk

The proposed development will not result in any increase in terms of mortality risk to amphibians during operation, as no proposed works will be occurring within or adjacent to any of the permanent wetland features within the site. Therefore, the impact of mortality risk to amphibians, as a result of the proposed development is not considered to be significant at any geographic scale.

Habitat Degradation – Surface Water

During operation, surface water runoff from the proposed development will discharge, largely unrestricted, to the receiving surface water drainage network. Surface water runoff from the proposed development could contain harmful compounds such as hydrocarbons, heavy metals and/or particulate matter.

The release of contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water features during operation, has the potential to affect water quality in the receiving aquatic environment. Such a pollution event may include: the release of sediment into receiving waters and the subsequent increase in mobilised suspended solids; and the accidental spillage and/or leaks of containments (e.g. fuel, oils, lubricants, paints, bituminous coatings, preservatives, weed killer, lime and concrete) into receiving waters. The associated effects of a reduction of surface water quality could potentially extend for a considerable distance downstream of the location of the accidental pollution event or the discharge. The proposed development is hydrologically connected to the Spancelhill Stream and the River Fergus both of which discharge into the Fergus Estuary.

The proposed drainage design incorporates pollution control measures to allow surface water runoff from the carriageways, footpaths and cycle lanes to be discharged through a petrol interceptor and through permeable paving in areas of low traffic. The inclusion of SUDs systems and attenuation will reduce the volume of surface water runoff discharging to the existing drainage network. The functioning and effectiveness of both elements of the site drainage network are discussed in more detail in Chapter 6, *Hydrology*.

Habitat degradation because of effects on surface water during operation therefore, does not have the potential to affect the species' conservation status and will not result in a likely significant negative effect, at any geographic scale.

7.5.2.11 Reptiles

Habitat Severance/Barrier Effect

The presence of the proposed development will not create any permanent barrier in the landscape to the movement of common lizard. Therefore, habitat severance and barrier effect is not likely to affect the species conservation status and result in a significant effect at any geographic scale.

Mortality Risk

Common lizard are vulnerable to mortality, however the presence of the proposed development will not pose a permanent mortality risk to the species due to lack of large infrastructure that could result in heavy traffic, limited traffic movements confined to the proposed internal road network, and due to the lack of evidence of this species within and surrounding lands.

Therefore, mortality risk is not predicted to affect the species' conservation status or result in a likely significant negative effect to reptiles, at any geographic scale.

7.5.2.12 Fish

Habitat Degradation – Surface Water

There will be a drainage outfall to the Spancelhill Stream following attenuation. Therefore, there is a risk that discharges from the proposed development drainage network could affect water quality, potentially over the long-term, and consequently impact upon aquatic habitats and fish species. In a worst-case-scenario, this could result in a permanent decline in fish species abundance and distribution.

The proposed drainage design incorporates pollution control measures (i.e. petrol interceptors) followed by attenuation ponds (where drainage will be discharged to the existing surface water/storm sewer), as described in detail in Chapter 6.

Those sections of the proposed development drainage that are to be discharged to ground, pose no risk to surface water quality as they are greenfield as current. It is extremely unlikely that the normal operating water quality of the drainage outfalls discharging to the existing surface water/drainage network, even in the unlikely event of a pollution incident, would have any perceptible long-term effect on water quality in receiving watercourses. The functioning and effectiveness of the site drainage network are discussed in more detail in the hydrology chapter (Chapter 6 Hydrology).

Habitat degradation because of effects on surface water during operation, is not predicted to result in a likely significant negative effect, at any geographic scale.

Habitat Severance/Barrier Effect

There will be no permanent structure in place within the Spancelhill Stream as a result of the proposed development, and therefore habitat severance/barrier effect is not considered to be result in a negative effect on fish species, at any geographic scale.

7.5.2.13 Invertebrates

White-clawed crayfish

There will be drainage outfalls to the Spancelhill Stream by the proposed development. Therefore, there is a risk that discharges from the proposed development drainage network could affect water quality, potentially over the long-term, and consequently impact upon aquatic habitats and white-clawed crayfish populations. In a worst-case-scenario, this could result in a permanent decline in white-clawed crayfish abundance and distribution. This is unlikely however due to the lack of local records in the receiving downstream environment.

The proposed drainage design incorporates pollution control measures (i.e. petrol interceptors) followed by attenuation ponds (where drainage will be discharged to the existing surface water/storm sewer), as described in detail in Chapter 6.

Those sections of the proposed development drainage that are to be discharged to ground, pose no risk to surface water quality as they are greenfield as current. It is extremely unlikely that the normal operating water quality of the drainage outfalls discharging to the existing surface water/drainage network, even in the unlikely event of a pollution incident, would have any perceptible long-term effect on water quality in receiving watercourses. The functioning and effectiveness of the site drainage network are discussed in more detail in the hydrology chapter (Chapter 6 Hydrology).

Habitat degradation because of effects on surface water during operation, is not predicted to result in a likely significant negative effect, at any geographic scale.

7.5.2.14 Other invertebrates

No operational impacts are predicted on this species as areas of suitable habitat are located outside the footprint of the development, and the translocation of suitable calcareous grassland will have been allowed to establish and continue to provide habitat for this species during operation.

7.6 REMEDIAL AND MITIGATION MEASURES

7.6.1 Construction Phase

7.6.1.1 European sites

The mitigation measures that are specifically required to ensure that the proposed development will not adversely affect the integrity of the European sites within the Zol (i.e. Lower River Shannon SAC, Dromore Woods and Loughs SAC, Old Domestic Building (Keevagh) SAC, Old Domestic Buildings, Rylane SAC, River Shannon and River Fergus Estuaries SPA, Ballyallia Lough SPA, and Corofin Wetlands SPA) are presented in the NIS (See Section 7). Following a consideration and assessment of the proposed development on the identified relevant European sites, the following mitigation measures were developed to address potential impacts that were identified:

Measures to Protect Surface Water Quality during Construction

A site-specific Construction Environmental Management Plan (CEMP) is also included with the applicant's planning documentation submitted to Clare County Council. The Principal Contractor and all construction contractors will implement the mitigation measures specified in the CEMP.

These measures have been developed in consideration of the following standard best international practice including but not limited to:

- Construction Industry Research and Information Association (CIRIA) (2005) Environmental Good Practice on Site (C692)
- CIRIA, (2001) Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532)
- CIRIA, (2000) Environmental Handbook for Building and Civil Engineering Projects (C512)

- CIRIA, (2007) The SUDS Manual (C697)
- CIRIA C648: Control of water pollution from linear construction projects: Technical guidance
- CIRIA (2006) Control of water pollution from linear construction projects: Site guide (C648)
- IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004
- BPGCS005, Oil Storage Guidelines

The construction contractor will be required to implement the following specific mitigation measures as a condition if granted by Clare County Council all of which will be incorporated into the CEMP, for release of hydrocarbons, polluting chemicals, sediment/silt and contaminated waters control:

- Specific measures to prevent the release of sediment over baseline conditions in the downstream receiving water environment, during the construction work. These measures include, but are not limited to, the use of silt fences, silt curtains, settlement lagoons and filter materials.
- Provision of exclusion zones and barriers (e.g. silt fences) between earthworks, stockpiles and temporary surfaces to prevent sediment washing into the existing drainage systems and hence the downstream receiving water environment.
- Provision of temporary construction surface drainage and sediment control measures to be in place before earthworks commence.
- Weather conditions will be taken into account when planning construction activities to minimise risk of run-off from the site.
- Prevailing weather and environmental conditions will be taken into account prior to the pouring of cementitious materials for the works adjacent to any surface water drainage features, or drainage features connected to same. Pumped concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to existing surface water drainage systems. Concrete washout areas will be located remote any surface water drainage features, where feasible, to avoid accidental discharge to watercourses. Washing out of any concrete trucks on site will be avoided.
- Any fuels or chemicals (including hydrocarbons or any polluting chemicals) will be stored in a designated, secure bunded area(s) to prevent any seepage of potential pollutants into the local surface water network. These designated areas will be clearly sign-posted and all personnel on site will be made aware of their locations and associated risks.
- All mobile fuel bowsers shall carry a spill kit and operatives must have spill response training. All fuel containing equipment such as portable generators shall be placed on drip trays. All fuels and chemicals required to be stored on-site will be clearly marked. Care and attention will be taken during refuelling and

maintenance operations. Particular attention will be paid to gradient and ground conditions, which could increase risk of discharge to waters.

- A register of all hazardous substances, which will either be used on site or expected to be present (in the form of soil and/or groundwater contamination) will be established and maintained. This register will be available at all times and shall include as a minimum:
 - Valid Safety Data Sheets;
 - Health & Safety, Environmental controls to be implemented when storing, handling, using and in the event of spillage of materials;
 - Emergency response procedures/precautions for each material; and,
 - The Personal Protective Equipment (PPE) required when using the material.
- Implementation of response measures to potential pollution incidents.
- Robust and appropriate Spill Response Plan and Environmental Emergency Plan will be prepared prior to works commencing and they will be communicated, resourced and implemented for the duration of the works. Emergency procedures/precautions and spillage kits will be available and construction staff will be trained and experienced in emergency procedures in the event of accidental fuel spillages.
- All trucks will have a built-on tarpaulin that will cover excavated material as it is being hauled off-site and wheel wash facilities will be provided at all site egress points.
- If groundwater is encountered during the proposed works and temporary pumping at a very localised location is required:
 - An appropriate dewatering system and groundwater management system specific to the site conditions will be designed and maintained. These will include measures to minimise any surface water inflow into the excavation, where possible, and the prolonged exposure of groundwater to the atmosphere will be avoided.
 - Qualitative and quantitative monitoring will be adopted to ensure that the water is of sufficient quality to discharge. The use of silt traps will be adopted if the monitoring indicates the requirement for same with no silt or contaminated water permitted to discharge to the receiving water environment.
- Water supplies shall be recycled for use in the wheel wash. All waters shall be drained through appropriate filter material prior to discharge from the construction sites.
- The removal of any made ground material, which may be contaminated, from the construction site and transportation to an appropriate licensed facility shall be carried out in accordance with the Waste Management Act, best practice and guidelines for same.
- The site investigation did not encounter any contaminated soil. However, If any potentially contaminated material is encountered, it will need to be segregated

from clean/inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled 'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous' using the HazWasteOnline application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the EC Council Decision 2003/33/EC, which establishes the criteria for the acceptance of waste at landfills.

- In the event that Asbestos containing materials (ACMs) are found during demolition works, the removal will only be carried out by a suitably permitted waste contractor, in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010. All asbestos will be taken to a suitably licensed or permitted facility.
- Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste (most notably wet concrete, pile arisings and asphalt).
- All the above measures implemented on site will be monitored throughout the duration of construction to ensure that they are working effectively, to implement maintenance measures if required/applicable and to address any potential issues that may arise.

Measure to prevent the spread of invasive species during construction

Pre-Construction Survey

Invasive plant species were not identified within the proposed development site. A pre-construction invasive species survey must be carried out prior to any construction activities (including enabling works) by a suitably qualified specialist to confirm the presence or absence and extent of any invasive species within the proposed development site prior to the development. Data collected as part of this survey will also include the approximate area of any respective colonies (m²) and a detailed description of the infestations (e.g. approximate total number of stems, pattern of growth and information on other vegetation present), if invasive species are identified. This information will inform calculations of volumes of infested soils to be excavated, as part of the measures outlined below.

General Measures to Avoid Spreading Invasive Species during Construction or Soil Movement

The species noted in Section 6.4 are invasive and are particularly effective at colonising disturbed ground (e.g. construction sites). Some species spread by the re-growth of cut fragments or root material, they can readily re-grow in new areas if the existing stands are disturbed e.g. by machinery, people, livestock etc.

The most common ways that these species can be spread is:

- Site and vegetation clearance, mowing, hedge-cutting or other landscaping activities;
- Spread of plant fragments during the movement or transport of soil;
- Spread of plant fragments through the local surface water and drainage network;

- Contamination of vehicles or equipment with plant fragments which are then transported to other areas; and;
- Importation of soil from off-site sources contaminated with invasive species plant material.

It is preferable to eradicate invasive species prior to the onset of construction of any proposed development in close proximity. If control programmes have not been achieved before construction begins then the affected areas must be fenced off prior to and during construction in order to avoid spreading seeds or plant fragments around or off the construction site. Earthworks or machinery movement must be avoided in these areas until the relevant species have been eradicated.

If soil is imported to the site for landscaping, infilling or embankments, the contractor must gain documentation from suppliers that the material is free from invasive species.

Disposal of Material if species identified

If any invasive species plant material is collected (e.g. by hand-pulling or mowing), it is important that its disposal does not lead to a risk of further spread. The movement of plant material of any plants listed on the Third Schedule requires a licence from the National Parks and Wildlife Service (NPWS) under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended). Invasive species (particularly roots, flower heads or seeds) must be disposed of at licensed waste facilities or composting sites, appropriately buried, or incinerated having regard to relevant legislation, for example; Section 32 of the Waste Management Act, 1996 to 2008; Section 4 of the Air Pollution Act, 1987; relevant local authority byelaws and any other relevant legislation. All disposals must be carried out in accordance with the relevant Waste Management legislation (as per guidance from NRA, 2008).

It should be noted that some invasive species plant material or soil containing residual herbicides may be classified as either 'hazardous waste' or 'non-hazardous waste' under the terms of the Waste Management Acts, and both categories may require special disposal procedures or permissions. Advice should be sought from a suitably qualified waste expert regarding the classification of waste and the suitability of different disposal measures.

As noted above, additional specific measures for the management of Japanese knotweed cuttings or contaminated soil can be found in the UK Environment Agency document *The Knotweed Code of Practice: Managing Japanese Knotweed on development sites* (UK Environment Agency, 2013 (withdrawn 2016)).

Measures to be Followed During the Application of Herbicides

The control options for some species will require the use of herbicides, which can pose a risk to human health, to non-target plants or to wildlife. In order to ensure the safety of herbicide applicators and of other public users of the site, a qualified and experienced contractor, and qualified Herbicide Advisor, must be employed to carry out all work.

It is advised that the appointed contractor refer to the following documents, which provide detailed recommendations for the control of invasive species and noxious weeds:

- TII Publication: The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020)
- Managing invasive non-native plants in or near fresh water (Environment Agency, 2010)

These documents include measures to aid the identification of relevant species, with details for the timing, chemicals, methodology for chemical control, and for measures to avoid environmental damage during the use of herbicides.

Measures to Protect Otter from habitat loss/fragmentation and Disturbance/Displacement impacts

This section presents the mitigation measures that will be implemented during construction to avoid the potential impacts of the proposed development on QI otter populations associated with the Lower River Shannon SAC. All of the mitigation measures will be implemented in full. They are in accordance with best practice, and tried and tested, effective control measures to protect otter.

Pre-Construction Survey

- Prior to construction works commencing, the appointed contractor will engage the services of a suitably qualified ecologist to conduct a pre-construction otter survey of the proposed development. The survey will be undertaken within 10 months in advance of construction and supplemented by a further inspection of the proposed development immediately prior to site clearance to ensure that no new holts have been established in the intervening period. These surveys will be carried out in accordance with Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2006).
- Where any new active holts/couches are recorded within 150m of the proposed development the appointed ecologist will ensure that adequate mitigation is provided in accordance with Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2006), and a derogation licence is sought from the NPWS where necessary.

Mitigation measures for new active holts/couches recorded within 150m of the development

Until such time as otters have been successfully evacuated from active holts, the following provisions should apply to all construction works:

- No works should be undertaken within 150m of any holts at which breeding females or cubs are present. Following consultation with NPWS, works closer to such breeding holts may take place - provided appropriate mitigation measures detailed below are in place.
- No wheeled or tracked vehicles (of any kind) should be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance should also not take place within 15m of such holts, except under licence.
- The prohibited working area associated with otter holts should, where appropriate, be fenced with temporary fencing prior to any possibly invasive works. Fencing should be in accordance with Clause 303 of the NRA's

Specification for Roadworks (National Roads Authority). Appropriate awareness of the purpose of the enclosure should be conveyed through notification to site staff and sufficient signage should be placed on each exclusion fence. All contractors or operators on site should be made fully aware of the procedures pertaining to each affected holt.

Ecological Clerk of Works/Retained Ecologist

- Were a new holt to be encountered within 150 metres (up and downstream) of watercourse crossing, NPWS consultation will be sought, and the services of an Ecological Clerk of works or retained Ecologist (both with experience with otter survey/mitigation) would be required.
- The appointed contractor shall employ the services of an Ecological Clerk of Works (EcOW) with experience in otter, to oversee and advise works at watercourse crossings for the proposed development (they may also undertake the preconstruction survey). The EcOW will have the authority to:
 - Review method statements;
 - Oversee works;
 - Provide instruction to the appointed contractor(s); and,
 - Require the temporary cessation of works, where necessary.
- Access to and from the M18 Motorway culvert mammal ledge will be maintained at all times, with no works to be carried out at this location.
- The EcOW will deliver a toolbox talk on biodiversity including otter to the appointed contractor(s). This talk will include instructions on identifying otter and details on the protections afforded to otter under Irish and EU legislation. The EcOW will outline the actions which will be taken by the contractor(s) if otter are noted on or near the Proposed development during construction works.

Measures to Prevent/Reduce Disturbance and Displacement of otters

- Night working within/directly adjacent to watercourses where otter are known to commute will be avoided and will only be permitted with the prior approval of the planning authority.
- Where night-working adjacent to watercourses known to support otter, is required, the advice of a suitably qualified ecologist must be sought and a derogation licence, if necessary, will be sought from NPWS permitting such works.

Measures to prevent disturbance and/or displacement of lamprey species

An Ecological Clerk of Works will supervise the following mitigation strategy at the location of the drainage outfall in the banks of the Spancelhill Stream:

- A silt curtain and spill boom will be put in place across the width of the river immediately downstream of the works location, to capture any sediment which is mobilised during the works and any hydrocarbon escape or spill during construction works;

- The works will be undertaken either by placement of sandbags or cofferdam to ensure working in the dry, or as close to dry conditions as possible. Once in place, water will be pumped out of the sandbagged/cofferdam area.
- Prior to pumping commencing the area will be inspected and hand and net searched by the EcOW to check for any lamprey present. Repeat inspections will be undertaken as water levels are lowered during the course of pumping. A sieve will be placed over the in-take pipe of the pump to prevent any accidental uptake of lamprey that may be present.
- Once the area has been substantially de-watered, if net and manual searches cannot comprehensively exclude the possibility of lamprey remaining, then an excavator located out of the water and on the bankside, will carefully excavate the area small sections at a time and will deposit spoil in excess of 10m from the edge of the river bankside for inspection. The ECoW will manually search these spoil heaps for any lamprey present.
- Any lamprey recovered will be handled with care, temporarily stored in buckets of water and released back to the river at a downstream location within 20 minutes of capture.
- Once the outfill pipe has been fully constructed the ECoW will supervise the removal of the sandbags/cofferdam. The silt curtain and spill boom must remain in place until these have been removed and for a period until silt has settled/been captured.
- There will be no concrete pouring and all materials (i.e. pipe, headwall and mattress) will be pre-cast prior to installation.
- The mitigation measures relating to the protection of surface water quality in receiving watercourses during construction are detailed above in Section 7.1.5 and apply for the works at this location, and will be adhered to at all times.
- The culvert, headwall and mattress have been designed in consultation with IFI and in accordance with the design criteria set out in Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016).
- IFI's guidelines on bio-security measures (IFI, 2010) must be adhered to during works at Spancelhill Stream.

Measures to Protect Lesser Horseshoe bat from habitat loss/fragmentation impacts

Any vegetation (including trees, hedgerows or scrub adjacent to, or within, the proposed development boundary) which is to be retained shall be afforded adequate protection during the construction phase in accordance with the Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes (National Roads Authority, 2006b), as follows:

- All trees along the proposed development boundary that are to be retained, both within and adjacent to the proposed development boundary (where the root protection area of the tree extends into the proposed development boundary), will be fenced off at the outset of works and for the duration of construction to avoid structural damage to the trunk, branches or root systems of the trees. Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the

Root Protection Area (RPA) of the tree. The RPA will be defined based upon the recommendation of a qualified arborist

- Where fencing is not feasible due to insufficient space, protection for the tree/hedgerow will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk of the tree and strapping stout buffer timbers around it
- The area within the RPA will not be used for vehicle parking or the storage of materials (including soils, oils and chemicals). The storage of hazardous materials (e.g. hydrocarbons) or concrete washout areas will not be undertaken within 10 m of any retained trees, hedgerows and treelines
- A qualified arborist shall assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the proposed development boundary but whose RPA is impacted by the works. Any remedial works required will be carried out by a qualified arborist
- A buffer zone of at least 5m will be maintained between construction works and retained hedgerows to ensure that the root protection areas are not damaged.

Surveys carried out confirmed that lesser horseshoe bat use the treelines and hedgerows located within the proposed development site as foraging and commuting habitat. The proposed development will result in a total loss of c. 2.7km hedgerows, and 30 trees; therefore replacement planting is required to ensure that there will be no net loss of lesser horseshoe bat foraging and commuting habitat as a result of the proposed development. This will comprise of c. 4.86km of hedgerow and 57 new trees within the proposed development site (see the Landscape Design Strategy⁴¹, and Chapter 10 *Landscape and Visual Impact Assessment*³⁹ being submitted as part of this application for location map, planting schedule and specific details of proposed species). Native hedgerow planting will include the following species; Alder *Alnus glutinosa*, hazel *Corylus avellana*, hawthorn *Crataegus monogyna*, holly *Ilex aquifolium*, honeysuckle *Lonicera periclymenum*, crab apple *Malus sylvestris*, wild cherry *Prunus avium*, blackthorn *Prunus spinosa*, dog rose *Rosa canina*, elder *Samucus nigra*, and guelder rose *Viburnum opulus*. Tree planting will include semi-mature species such as: Sessile oak *Quercus petraea*, beech *Fagus sylvatica*, strawberry tree *Arbutus unedo*, Scot's pine *Pinus sylvestris*, multistem birch *Betula pendula*, rowan *Sorbus acuparia*, double flowering wild cherry *Prunus avium plena*, and crab apple. This will ensure the proposed development complies with Objective 14.11 of the *Clare County Development Plan 2017-2023 (as varied)*, and the requirement that there is no net loss of lesser horseshoe bat habitat within the proposed development. This proposed planting has been designed to ensure that connectivity for foraging and commuting bats is maintained - *i.e.* along the peripheries of the site, and within the site from the woodland in the north west to suitable foraging habitats such as Toureen Lough, and along hedgerows in the north to woodland and wetland habitats in the east. Existing hedgerows along the southern boundary that are less species rich, will be enhanced through additional planting of native species. The proposed planting will occur in phases, with the earliest planting occurring along important foraging and/or commuting routes in the north, south and east of the site, at pre-construction stage and prior to removal of any habitats. This will ensure that suitable foraging and commuting habitat for lesser horseshoe bat is established prior to the removal of such habitat during the construction of the proposed development; therefore maintaining the site's suitability for lesser horseshoe bat. Cattle grazed fields are known to have higher rates of bat activity than ungrazed grassland (Downs et al.

2010)⁵⁵, therefore in addition to the hedgerows and treeline planting, areas of cattle grazed grassland will be maintained as they are currently in the east, north and west of the site with additional hedgerows separating fields, to provide further suitable habitat for lesser horseshoe bat.

Measures to protect lesser horseshoe bats from disturbance/displacement impacts

A light spill model study was undertaken by Hurley Palmer Flatt (June 2021)⁵⁶ to determine the effects of artificial light and Artificial Light At Night (ALAN) on bats as a result of the proposed development and identify how to reduce or eliminate ALAN onsite, based on information from both Eurobats Guideline No.8, the Institution of Lighting Professionals (ILP) Guidance Note No.8. and Bat Conservation Ireland *Guidance Notes for: Planners engineers, architects and developers*⁵⁷. Potential impacts of lighting during construction will be slight and short-term as construction works will generally be confined to daylight hours (07:30-17:30). Where works are required during hours of darkness, portable lighting will be used, which will be pointed downwards at a 45-degree angle and away from any sensitive receptors (hedgerows, treelines, confirmed bat roosts, Toureen Lough, and Spancelhill Stream).

7.6.1.2 National sites

The mitigation measures that are specifically required to ensure that the proposed development will not adversely affect the integrity of the national sites within the Zol, and that overlap with previously described European sites (*i.e.* Fergus Estuary and Inner Shannon, North Shore pNHA, Old Domestic Building (Keevagh) pNHA, Ballyallia Lake pNHA, and Dromore Woods and Loughs pNHA), are presented in the NIS in Section 7 (Scott Cawley, 2021). Therefore, the mitigation measures outlined above in Section 7.6.1.1, and as detailed in the NIS, will prevent the proposed development resulting in a significant negative effect on these pNHA sites at the national geographic scale.

The additional national sites within the Zol of the proposed development, *i.e.* Newpark House (Ennis pNHA), Lough Cleggan Lake pNHA, and Durra Castle pNHA, and the subsequent mitigation required, are described below.

Lough Cleggan Lake pNHA

The mitigation strategy in relation to potential impacts arising from the proposed development on Lough Cleggan Lake pNHA includes surface water protection measures to prevent surface water quality effects (See Section 7.6.1.1)

Durra Castle pNHA

The mitigation strategy in relation to potential impacts arising from the proposed development on Durra Castle pNHA includes measures to prevent disturbance and displacement impacts of lesser horseshoe bat from suitable foraging and/or commuting

⁵⁵ Downs, N., & Sanderson, L. (2010). Do Bats Forage Over Cattle Dung or Over Cattle?. *Acta Chiropterologica*, 12(2), 349-358.

⁵⁶ Site Lighting Analysis Report and Light Spill Modelling Study, Project Art, produced by Hurley Palmer Flatt (June 2021)

⁵⁷ *Guidance Note for: Planners, engineers, architects and developers*. Bat Conservation Ireland (2010)

grounds, and from the impacts of habitat loss of suitable habitat within the normal foraging range of this species (See Section 7.6.1.1)

7.6.1.3 Habitats

Habitat Loss and Fragmentation

Where possible, habitats of Local Importance (Higher Value), such as tree line and hedgerow habitat types which lie within the footprint, or close to the footprint of the proposed development, that are not directly impacted by the proposed development will be retained. Habitats of higher value are being retained outside the footprint of the development, but within the red line boundary. All proposed works will adhere to the requirements of The BSI Standards Publication: BS 5837:2012 Trees in Relation to Design, Demolition and Construction. These areas will be protected for the duration of construction works and fenced off at an appropriate distance.

Any vegetation (including trees, hedgerows or scrub adjacent to, or within, the proposed development boundary) which is to be retained shall be afforded adequate protection during the construction phase in accordance with the *Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes* (National Roads Authority, 2006b), as follows:

- All trees and hedgerows within the proposed development boundary that are to be retained, both within and adjacent to the proposed development boundary (where the root protection area of the tree extends into the proposed development boundary), will be fenced off at the outset of works and for the duration of construction to avoid structural damage to the trunk, branches or root systems of the trees and hedgerows. Temporary fencing will be erected at a sufficient distance from the tree or hedgerow so as to enclose the Root Protection Area (RPA). The RPA will be defined based upon the recommendation of a qualified arborist.
- Where fencing is not feasible due to insufficient space, protection for the tree/hedgerow will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk of the tree and strapping stout buffer timbers around it.
- The area within the RPA will not be used for vehicle parking or the storage of materials (including soils, oils and chemicals). The storage of hazardous materials (e.g. hydrocarbons) or concrete washout areas will not be undertaken within 10 m of any retained trees, hedgerows and treelines.
- A qualified arborist shall assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the proposed development boundary but whose RPA is impacted by the works. Any remedial works required will be carried out by a qualified arborist.
- A buffer zone of at least 5m will be maintained between construction works and retained trees and hedgerows to ensure that the root protection areas are not damaged.

The proposed development will result in a total loss of c. 2.7km hedgerows, and 30 trees. Replacement planting will comprise of c. 4.86km of hedgerow and 57 trees within the proposed development site (see the Landscape Design Strategy Report⁴¹ and Associated drawings for location map, planting schedule and specific details of

proposed species). Native hedgerow planting will include the following species; *Alnus glutinosa*, *Corylus avellana*, *Crataegus monogyna*, *Ilex aquifolium*, *Lonicera periclymenum*, *Malus sylvestris*, *Prunus avium*, *Prunus spinosa*, *Rosa canina*, *Samucus nigris*, and *Viburnum opulus*. Tree planting will include semi-mature species such as: *Quercus petraea*, *Fagus sylvatica*, *Arbustus unedo*, *Pinus sylvestris*, *Betula pendula*, *Sorbus acuparia*, *Prunus avium plena*. There will also be woodland structure planting on the peripheries of the site and of the buildings, which will total c. 58,567m² of planting, and 3300 trees per/ha (i.e. an equivalent of approx.. 19 trees). This will ensure the proposed development complies with Objective 14.17 of the Clare County Development Plan 2017-2023 (as varied), and the requirement that any tree that will be felled will be replaced on the basis of a minimum ratio of 10 new native trees per 1 tree felled.

Existing hedgerows along the southern boundary that are less species rich, will be enhanced through additional planting of native species. The proposed planting will occur in phases (See Chapter 10 *Landscape And Visual Impact Assessment* of the EIA, and the Landscape Design Strategy), with the earliest planting occurring along important foraging and/or commuting routes in the north, south and east of the site, at pre-construction stage and prior to removal of any habitats. This will ensure that suitable foraging and commuting habitat for lesser horseshoe bat is established prior to the removal of such habitat during the construction of the proposed development.

An area of c. 0.79ha of Annex I habitat dry calcareous grassland [6210], which occurs within the footprint of the proposed development in the location of the proposed SuDS basin, is to be translocated to the field to the south east, at the south western end of DC6, as shown on Dwg. ADC-L-001, in order to maximise its prospect of successful re-establishment in a new location. The conditions at the new location are suitable for the habitats re-establishment, as the habitat present is currently species poor amenity grassland. A Landscape and Biodiversity Management Plan⁴⁰ accompanies this application to advise the developer on the relocation and management of this habitat type within the proposed development.

The proposed methodology for translocation of this area of Annex I grassland habitat will include the following steps:

- Preparation – The area where the habitat is to be relocated will be prepared by stripping the topsoil to a depth of between c. 10-30cm.
- The donor site (i.e. location of existing Annex I dry calcareous grassland [6210]) and receptor site (i.e. location where habitat will be relocated to)s will be fenced off for the duration of construction works, to minimise any disturbance/ accidental damage to these habitats.
- Translocation - The soils of the grassland which are to be relocated are carefully removed using a suitable excavator, during suitable weather conditions, and laid out on the prepared receptor site.
- Again, the donor (including pre-existing Annex I grassland) and receptor sites will be fenced off for the duration of construction works, to minimise disturbance/ accidental damage to these habitats.
- Its establishment can be aided by following the correct management methods and by sowing the land with Irish wildflower seed mixes, which include positive indicator species for 'this Annex I grassland. It will be ensured that this seed mix is of Irish origin to avoid planting invasive non-native species that will deteriorate the quality of the existing Annex I grassland.
- Management - Commitment to the Landscape and Biodiversity Management⁴⁰ plan will be required to ensure the successful establishment of the Annex I dry calcareous grassland on site. The proposed management will include mowing

the grass once a year, and the removal of the cuttings after the plants have seeded. The area under management will be fenced off, to avoid trampling, until the grassland has established.

- Monitoring - The areas of translocated habitat will be monitored annually for three consecutive years, and in addition five years and 10 years following completion. It may take some time for the newly relocated grassland to establish and success cannot be guaranteed.

The above proposed methodology will be included within the Landscape and Biodiversity Management Plan⁴⁰ and will need to be agreed with the local authority prior to construction.

Protection of Vegetation from Dust during Construction

To control dust emissions during construction works mitigation measures shall include: spraying of exposed earthwork activities and site haul roads during dry and/or windy conditions; provision of wheel washes at exit points; control of vehicle speeds and speed restrictions (20 km/h on any un-surfaced site road); covering of haulage vehicles; and, sweeping of hard surface roads. These procedures will be strictly monitored and assessed on a daily basis.

Specific mitigation measures to protect sensitive habitats, i.e. habitats of local importance or higher as outlined in Table 7.12, is included in Section 7.2.2 of the CEMP and in more detail in Chapter 8 *Air Quality & Climate*. A summary of these measures include:

- Good site management through good design, planning and effective control strategies by avoiding dust becoming airborne at source.
- Monitoring of dust levels will be carried out frequently, with quick response plans to adverse weather conditions.
- Site routes will be monitored with speed restrictions in place, and frequent use of bowsers during drier periods.
- During periods of dry and windy weather, watering of materials will be carried out to increase stability of soil. Works will be postponed during conditions with very high winds (gales).
- Materials will be stored in sheltered areas of the site, with regular watering to ensure stability of the soil.
- Materials being transported off site will be enclosed or covered.
- A power washing facility or wheel cleaning facility will be installed near to the site compound for use by vehicles exiting the site when appropriate.

Habitat Degradation – Surface Water Quality

The mitigation measures relating to the protection of water quality in receiving watercourses during construction are outlined above in Section 7.6.1.1, Section 7.6 of the CEMP and the construction Surface Water and Pollution Management plan⁵⁸.

Habitat Degradation – Groundwater

There will be no dewatering or alteration to the natural groundwater regime. The mitigation measures relating to the protection of water flow and water quality in karst

⁵⁸ Surface Water and Pollution Management Plan, Art Data Centre. Clifton Scannell Emerson Associates, June 2021.

conduits during construction are outlined in Section 7.6 of the CEMP and the construction Surface Water and Pollution Management Plan. A summary of these measures include:

- No works will be carried out within or within 10m of Toureen Lough, with no oil or subsoil storage in the vicinity of this feature.
- The swallow hole located south of DC56 will be clearly delineated and marked prior to construction and surrounded by a concrete ring with chamber and manhole cover. The swallow hole will be monitored daily to ensure it is free flowing and that there are no changes to the existing flow regime.
- The spring located north of DC6 will be clearly delineated and marked. No proposed works will occur within this feature, and a buffer zone of at least 10m will apply.
- Provision of exclusion zones and barriers (e.g. silt fences) will be used between earthworks, stockpiles and temporary surfaces to prevent sediment washing into the existing drainage systems and hence protecting the integrity of the features within the site.
- The ponds north of DC4 are in close proximity to the proposed development, however no construction activities will occur within these features. The DC4 structure will be 'built up' using engineered infill material.
- In areas where potential karst conduits are interpreted i.e. at proposed structures DC3 and DC6, additional geophysical surveying and a sufficient number of exploratory boreholes will be undertaken to further delineate areas of inferred conduit/ below ground flows. These building foundations will be piled, and the design of the piling methodology including pile depths/ spacing (m) designed to allow bridging of the existing [identified as potential] karst conduits i.e. ensuring no change to the existing groundwater flow regime across the site.

Measures to prevent the spread of invasive species during construction

The mitigation measures described in Section 7.6.1.1 are relevant for this section and apply here.

7.6.1.4 Bats

Measures to Protect Bats during the Removal of Suitable Roosting Sites

All bat species and their roost sites are strictly protected under both European and Irish legislation including:

- Wildlife Act 1976 and Wildlife (Amendment) Act, 2000 (S.I. No. 38 of 2000)
- Council Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna 1992 (Council Directive 92/43/EEC)
- European Communities (Birds and Natural Habitats) Regulations, 2011

It is an offence under Section 23 of the Wildlife Acts 1976-2017 and under Section 51 of the European Communities (Birds and Natural Habitats) Regulations, 2011 to kill a bat or to damage or destroy the breeding or resting place of any bat species. Under the European Communities (Birds and Natural Habitats) Regulations it is not necessary that the action should be deliberate for an offence to occur. This places an onus of due diligence on anyone proposing to carry out works that might result in such damage or destruction. Under Section 54 of S.I. 477 of 2011, a derogation may be granted by the Minister where there is no satisfactory alternative and the derogation is

not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range. Given that the proposed development **will** result in the loss of a confirmed bat roost, a derogation licence under Section 54 of S.I. 477 of 2011 **will** be required⁵⁹.

The following mitigation measures are proposed in relation to structures **with confirmed bat roosts, or** are considered to have the potential to support roosting bats:

- **Demolition of structures with confirmed bat roosts (i.e. BB 6C), and of buildings considered to have potential to support roosting bats (i.e. BB 1B, BB 4A-D, BB6A-B and BB 7) will be undertaken in March and April or in September, October and/or early November in daylight hours, during dry mild weather when daytime temperatures are above 10°C. Spring and autumn coincide with periods when bats are active, but are at least risk from disturbance as they are not undergoing hibernation or raising young.**
- All structures that were confirmed as having potential for bat roosts will be re-examined immediately prior to demolition to assess whether bats are present at the time of demolition. This will be an all-night survey of these structures undertaken during suitable weather conditions to determine if bats enter the building during the night or early morning. If bats are present, then they will require exclusion from the property over several nights or, if possible, bats present will be physically removed by hand by a licensed bat specialist and placed in a bat box and then released in the evening after capture. The number, type and location of bat boxes to be included can be found in the Landscape and Biodiversity Management Plan⁴⁰. 15 bat boxes are proposed for installation in the proposed development site.
- For structures which have not been confirmed as bat roosts that are due to be demolished but are regarded to have potential for bats, a bat detector survey of the property to be demolished will be carried out. If demolitions are proposed during the period of May to August and a bat roost is confirmed to be present, the proposed demolition will not be permitted. This will be an all-night survey undertaken during suitable weather conditions to determine if bats enter the building during the night or early morning. If bats are present, then they will require exclusion from the property over several nights or if possible, bats present will be physically removed by hand by a licensed bat specialist and placed in a bat box and then released in the evening after capture.
- Once structures containing roosts are deemed to be clear of bats, the bat specialist will be on site to supervise the demolition procedure until the structure is no longer deemed able to support a bat roost. This is because bats may re-enter a partially demolished structure overnight.

Measures to Protect Bats during Vegetation Clearance

The following mitigation measures are proposed in relation to those trees identified as having potential to support roosting bats (Figure 7.23). Bats could occupy suitable roosting features at any time prior to the commencement of works. Therefore, there is an inherent risk that bats could be affected by the proposed felling works. Where possible, trees with PRFs should be retained. Where this is not possible, the following mitigation procedures will be followed:

⁵⁹ If a bat roost is identified during pre-construction stage in a structure or tree, a derogation licence will be sought from NPWS.

- Felling of confirmed and potential tree roosts will be undertaken during the periods of April to May or September to October as during this period bats are capable of flight and may avoid the risks from tree felling if proper measures are undertaken, but also are neither breeding nor in hibernation
- Use of detectors alone may not be sufficient to record bat emergence and re-entry in darkness. Therefore, prior to felling of confirmed and potential tree roosts, an emergence survey using infra-red illumination and video camera(s) and bat detectors will be carried out on the night immediately preceding the felling operation to determine if bats are present
- Where it is safe and appropriate to do so for both bats and humans, such trees may be felled using heavy plant to push over the tree. In order to ensure the optimum warning for any roosting bats that may still be present, the tree will be pushed lightly two to three times, with a pause of approximately 30 seconds between each nudge to allow bats to become active. The tree should then be pushed to the ground slowly and should remain in place until it is inspected by a bat specialist
- Trees should only be felled "in section" where the sections can be rigged to avoid sudden movements or jarring of the sections
- Where remedial works (e.g. pruning of limbs) is to be undertaken to trees deemed to be suitable for bats, the affected sections of the tree will be checked by a bat specialist (using endoscope under a separate derogation licence held by that individual) for potential roost features before removal. For limbs containing potential roost features high in the tree canopy, this will necessitate the rigging and lowering of the limb to the ground (with the potential roost feature intact) for inspection by the bat specialist before it is cut up or mulched. If bats are found to be present, they will be removed by a bat specialist licenced to handle bats and released in the area in the evening following capture
- If any bat tree roosts are confirmed, and will be removed by the proposed felling works, then a derogation licence will be required from the NPWS and appropriate alternative roosting sites will be provided in the form of bat boxes.

Measure to control and reduce light spill during construction

During construction, the use of security lighting such as that around the construction compound could impact on commuting/foraging territory, however night works will not be undertaken during construction. During winter months when days are shorter, there may be a temporary level of light spill from the construction compound either side of sunrise/sunset. This will be during hibernation period for bats however, and impacts will be minimal. Therefore, mitigation is recommended for the temporary impact of light spill of bat species.

Security lighting at construction compounds or in active works areas in close proximity to bat commuting and/or foraging areas will be designed in conjunction with the EcOW/bat ecologist to minimise light spill. Measures to reduce light spill may include the following:

- the use of sensor/timer triggered lighting;
- LED luminaires will be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- column heights will be considered to minimise light spill; and,

- accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only where needed.

Measures to reduce impacts from habitat loss

The proposed development will result in a total loss of c. 2.7km hedgerows, and 30 trees; therefore replacement planting is required to ensure that there will be no net loss of lesser horseshoe bat foraging and commuting habitat as a result of the proposed development, and to ensure there will be no impact on local bat species, See Section 7 of the NIS (Scott Cawley, 2021), and Section 7.6.1.1 above. This will comprise of c. 4.86km of hedgerow and 57 trees within the proposed development site (see the Chapter 10 *Landscape and Visual Impact Assessment*³⁹, and the Landscape Design Strategy⁴¹ for location map, planting schedule and specific details of proposed species). Native hedgerow planting will include the following species; *Alnus glutinosa*, *Corylus avellana*, *Crataegus monogyna*, *Ilex aquifolium*, honeysuckle *Lonicera periclymenum*, *Malus sylvestris*, *Prunus avium*, *Prunus spinosa*, *Rosa canina*, *Samucus nigris*, and *Viburnum opulus*. Tree planting will include semi-mature species such as: *Quercus petraea*, *Fagus sylvatica*, *Arbustus unedo*, *Pinus sylvestris*, *Betula pendula*, *Sorbus acuparia*, *Prunus avium plena*. There will also be woodland structure planting on the peripheries of the site and of the buildings, which will total c. 58,567m² of planting, and 3300 trees per/ha. This will ensure the proposed development complies with Objective 14.11 of the *Clare County Development Plan 2017-2023 (As varied)*, and the requirement that there is no net loss of lesser horseshoe bat habitat within the proposed development.

This proposed planting has been designed to ensure that connectivity for foraging and commuting bats is maintained - *i.e.* along the peripheries of the site, and within the site from the woodland in the north west to suitable foraging habitats such as Toureen Lough, and along hedgerows in the north to woodland and wetland habitats in the east, also ensuring connectivity is maintained to/from roost buildings.

Existing hedgerows along the southern boundary that are less species rich, will be enhanced through additional planting of native species. The proposed planting will occur in phases. with the earliest planting occurring along important foraging and/or commuting routes in the north, south and east of the site, at pre-construction stage and prior to removal of any habitats. This will ensure that suitable foraging and commuting habitat for bat species is established prior to the removal of such habitat during the construction of the proposed development; therefore maintaining the site's suitability for local bat species. Cattle grazed fields are known to have higher rates of bat activity than ungrazed grassland (Downs et al. 2010)⁶⁰; therefore, in addition to the hedgerows and treeline planting, areas of cattle grazed grassland will be maintained as they are currently in the east, north and west of the site with additional hedgerows separating fields, to provide further suitable habitat for lesser horseshoe bat.

7.6.1.5 Otter

As the otter populations that utilise the proposed development are considered to be part of European site populations downstream and hydrologically connected to the site (*i.e.* Lower River Shannon SAC and Dromore Woods and Loughs SAC), any mitigation measures required to prevent impacts on this species are discussed in Section 7.6.1.1

⁶⁰ Downs, N., & Sanderson, L. (2010). Do Bats Forage Over Cattle Dung or Over Cattle?. *Acta Chiropterologica*, 12(2), 349-358.

above, and in Section 7 of the NIS produced as part of this planning application (Scott Cawley, 2021).

7.6.1.6 Badger

Disturbance/displacement

The mitigation measures described below follow the recommendations set out in the *Guidelines for the Treatment of Badgers during the Construction of National Road Schemes* (National Roads Authority, 2006). These guidelines set out the best practice approach in considering and mitigating impacts on badgers during construction works.

As the usage of setts by badgers can change over time, a pre-construction check of the activity status of all setts will be carried out within 12 months of any construction work commencing within the Zol of the setts discussed below.

As badgers could potentially establish new setts in the future within the Zol of the proposed development, a pre-construction check of all suitable habitat within the proposed development boundary will be required within 12 months of any constructions works commencing. Any new badger setts present will be afforded protection in line with the requirements set out in the TII/NRA guidance document as follows:

- Badger setts will be clearly marked and the extent of bounds prohibited for vehicles clearly marked by fencing and signage
- No heavy machinery shall be used within 30m of badger setts; lighter machinery (generally wheeled vehicles) shall not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance shall not take place within 10m of sett entrances
- During the breeding season (*i.e.* December to June inclusive), none of the above works shall be undertaken within 50m of active setts, nor blasting or pile driving within 150m of active setts
- Works can be undertaken within these zones following consultation with, the approval of and, if required, under the supervision of a badger ecologist

As the proposed development will not result in the loss of any badger setts, there is no requirement to construct any artificial setts as part of the mitigation strategy.

7.6.1.7 Other Mammals (including pine marten and Irish hare)

The construction phase of the proposed development is not deemed to affect the local mammal population and will not result in a likely significant negative effect, at any geographic scale. However, mitigation is provided should small mammals (*e.g.* pygmy shrew and hedgehog) become trapped in excavations or pits required for construction activities. During construction, the use of egress ramps in any pits or holes that have been dug on site is required. This will allow for any mammal species that have fallen in, to allow to escape and be unharmed by construction activities.

7.6.1.8 Breeding birds

Measures to Protect Breeding Birds During Construction from mortality/injury

Vegetation (*e.g.* hedgerows, trees, scrub and grassland) will not be removed, between the 1st March and the 31st August, to avoid direct impacts on nesting birds.

Disturbance/displacement

Similar to the requirements provided above in terms of reducing mortality risk, vegetation clearance undertaken in the appropriate time should ensure that direct impact on nesting birds will not occur.

7.6.1.9 Wintering birds

Measures to Reduce impacts to wintering birds due to vegetation loss

In the absence of any other ecological requirement/constraint, the removal of screening vegetation from adjacent or within/adjacent to inland forage/resting sites used by wintering bird species (i.e. pond features in the north west) shall be undertaken outside the statutory breeding bird season (March 1st to August 31st) and before the arrival of wintering birds. Thus, vegetation clearance in areas adjacent to or within/adjoining or near feeding sites should be scheduled for September.

Only that vegetation, which is absolutely necessary shall be removed, with very little suitable habitat being removed/alterd, the remainder shall be fenced off from works activity (as necessary) in accordance with accepted landscaping protocols.

Measures to prevent Disturbance and Displacement Impacts

The proposed location of the temporary (suggested 2 years) construction compound is in open grassland in the south of the site. Given the proximity of the compound to known feeding sites i.e. Toureen Lough, M18 Motorway attenuation pond, within the proposed development site, the following measures should be put in place to minimise disturbance to wintering bird species at this location.

The compound shall be established outside of the wintering bird season (i.e. October to March);

- The compound shall be fully screened on all sides for the duration of the works. The screening shall be put in place before the arrival of wintering birds;
- In respect of the physical screening, particular attention should be paid to the west side and additional noise reducing material installed to minimise potential impact on habitat for wintering bird species;
- The normal hours of operation within the compound shall correspond to daylight working hours (8am – 6pm), when background traffic noise on adjacent road may “mask” construction noise within the compound; and
- Outside of work hours during winter months (i.e. 07:30-17:30) shall only be carried out in areas which do not support or impinge on wintering bird species feeding or movement.

Habitat Degradation- Water Quality

The mitigation measures relating to the protection of water quality in receiving watercourses during construction are outlined above in Section 7.6.1.1, in Chapter 6, *Hydrology* and detailed in Section 7.6 of the CEMP.

7.6.1.10 Amphibians

Disturbance & Mortality Risk

If works to clear any of the habitat features suitable to support common frog are to begin during the season where frogspawn or tadpoles may be present (February – mid-summer), a pre-construction survey will be undertaken to determine whether breeding common frogs are present.

Any frog spawn, tadpoles, juvenile or adult frogs present will be captured and removed from affected habitat by hand net and translocated to the nearest area of available suitable habitat, beyond the Zol of the proposed road development.

Any capture and translocation works shall be undertaken immediately in advance of site clearance/construction works commencing and will require a licence from NPWS.

Habitat Degradation- Water Quality

The mitigation measures relating to the protection of water quality in receiving watercourses during construction are outlined above in Section 7.6.1.1, in Chapter 6, *Hydrology* and detailed in Section 7.6 of the CEMP.

7.6.1.11 Reptiles

Habitat Loss, Disturbance & Mortality Risk during Construction

Given the broad range of habitat types favoured by the common lizard, and that the majority of the proposed development contains mosaics of such habitats, site clearance works at any time of year in suitable habitat are highly likely to encounter the species, cause disturbance and have the potential to kill or injure individuals.

In order to minimise the risk of site clearance and construction works disturbing, or causing the mortality of, common lizard the following schedule of site clearance works will be followed in any areas of suitable habitat that will be removed (*i.e.* scrub, stone walls, exposed rock, dead wood):

- Grass or scrub vegetation will be removed during the winter period, where possible, avoiding potential common lizard hibernacula sites (dry sites which provide frost-free conditions *e.g.* stone walls, underground small mammal burrows, piles of dead wood or rubble).
- Where this is not possible and clearance will be undertaken during the active season (*i.e.* March through to September, inclusive), vegetation will be cut first to approximately 15cm, and then to the ground, under supervision of an ecologist. This will allow the opportunity for lizards to be displaced by the disturbance and leave the affected area.
- Stone walls (or other potential hibernacula sites) will be removed during the active season (*i.e.* March through to September, inclusive) under the supervision of an ecologist, when they are less likely to be in use by torpid lizards.

7.6.1.12 Fish

Habitat Degradation – Surface Water Quality

The mitigation measures relating to the protection of water quality in receiving watercourses during construction are outlined in above in Section 7.6.1.1, in Chapter 6 *Hydrology* and detailed in Section 7.6 of the CEMP.

Habitat loss

The culvert and headwall and mattress have been designed in consultation with IFI and in accordance with the design criteria set out in *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters* (IFI, 2016).

To minimise the effects of habitat loss on fish species, all sections of river/stream channel within the proposed development boundary, but not within the footprint of the proposed Project and associated infrastructure, will be protected from site clearance and construction works. Rivers/streams will be fenced off at a minimum distance of 5m from the riverbank and within this zone the natural riparian vegetation will be retained.

7.6.1.13 Invertebrates

White-clawed crayfish

The mitigation measures relating to the protection of water quality and to reduce the impact of habitat loss in receiving watercourses during construction are outlined above in Section 7.6.1.1 and detailed in Section 7.6 of the CEMP.

7.6.2 Operational Phase

7.6.2.1 European sites

The mitigation measures that are specifically required to ensure that the proposed development will not adversely affect the integrity of the European sites within the Zol (*i.e.* Lower River Shannon SAC, Dromore Woods and Loughs SAC, Old Domestic Building (Keevagh) SAC, Old Domestic Buildings, Rylane SAC, River Shannon and River Fergus Estuaries SPA, Ballyallia Lough SPA, and Corofin Wetlands SPA) are presented in the NIS and below. Following a consideration and assessment of the proposed development on the identified relevant European sites, the following mitigation measures were development to address potential impacts that were identified:

Measures to protect surface water quality during operation and prevent impacts on SCI/QI species

Foul water

A temporary trench excavation along the Tulla road will be undertaken to facilitate pipe laying for connection with the existing public wastewater sewer and mains water supply.

There is no trade effluent proposed for this development. Foul sewage will be collected from site (*i.e.* from the data storage facility, offices and energy centre washroom facilities and canteen) and discharged through a new pumping station which will be constructed as part of this proposed development, to the foul drainage network which

runs along the Tulla Road and ultimately discharges to Ennis North (Clonroadmore) WWTP Reg D0048. Ennis North WWTP has no capacity issues and consultation with Clare County Council has confirmed that sufficient wastewater capacity is available and a pre-connection enquiry PCE application form has been submitted to Irish Water (IW).

Surface water

The proposed surface water drainage service to the development comprises various drainage components including positive stormwater networks, attenuation systems and several Sustainable Drainage System (SuDS) elements. Stormwater will be attenuated on site for the 1:1,000 year flood event. An over flow subsurface pipeline will discharge at current discharge rates (greenfield) to the Spancelhill Stream (Ballymacahill River).

The roofs, yards and internal access roads proposed throughout and within the footprint of the proposed development will be drained through a sealed drainage system that will ultimately be collected by gullies and conveyed through a series of proposed storm water pipes prior to discharging into a proposed open attenuation basin. The proposed stormwater drainage networks will range from 225mm to 1050mm pipe diameter depending on the required flow capacity. It is proposed to drain the site using a network of SuDS swales along the edge of the internal road network where possible. Reinforced grass-crete or similar will also be used along parts of the road network to increase infiltration on less heavily trafficked access roads. These drains and swales will discharge to a surface water retention pond/attenuation pond where the discharge will be controlled using a vortex flow control to limit the maximum discharge for the 0.1% Annual Exceedance Pollution event (1:1000-year return period). The attenuation pond to be constructed to retain a constant volume of water to promote settling and reduce conveyance of suspended solids and other particles to the receiving waters. An attenuation volume of 6864 m³ is designed as part of the proposed development. Further details are provided in Chapter 7 of the EIAR and within the CSEA engineering report prepared for planning.

Measures to prevent disturbance and displacement of lesser horseshoe bats

During operation, the strategies in place are to limit the duration of the lighting at night and also limit lux levels wherever possible. However, there is potential for light spill from the proposed development on suitable areas of foraging and/or commuting habitats used by lesser horseshoe bats. There will also be the addition of lighting along new pathways on the Tulla Road, which will be turned on during the hours of darkness for safety reasons. A light spill modelling drawing has been used to indicate where any areas of light spill may be within and beyond the proposed development, prior to mitigation⁵⁶. The following mitigation measures will be in place to ensure the habitats on site remain suitable for lesser horseshoe bats:

- Street lighting within the development is required for safety and will not be operational at night unless in an emergency and site evacuation, and will consist of minimal number of light fixtures and installed on short poles with the use of shields to restrict beam angles and avoid light spillage where illuminance is not required;
- Tree and hedgerow planting will be implemented around the buildings and along the access roads to screen the development, planted at pre-construction to ensure sufficient screening is in place to prevent any light spill on areas of sensitivity for bats within the proposed development;
- The use of berms along adjacent to the main entrance of the site will further screen any lighting on Tulla Road, by increasing the height of initial planting carried out;

- Office lighting will be controlled to avoid light spill to the outdoors through the glass windows, using black-out blinds from dusk until dawn;
- External lighting for pedestrian pathways and low-traffic roads will be controlled and dimmed and will only be at higher Lux levels when required, i.e. during emergencies, and with the use of shields to limit the light emitted to above or to the sides;
- LED luminaries will be used to ensure light pollution is kept to a minimum and to avoid uplighting. Where practical, directional luminaries will be utilised to enable precise projection of light;
- External lighting will normally be turned off, and internal building lighting will be controlled by PIR switching;
- The light spill model demonstrates that prior to mitigation light spill from the Tulla Road lighting will be more than 0.1 Lux in areas of bat sensitivity, this does not take into account the planting that will be in place, which will develop over time, reducing any light spill onto adjoining areas used by local bat species to negligible levels (0.1 Lux or lower);
- During night-time hours, lighting will only be provided for circulation areas with no lighting on surrounding areas, including protected important foraging and/or commuting areas for bats; and
- There will be no light trespass over 0.1 Lux on surrounding areas beyond the buildings by the use of shielded luminaries, lighting beam angles, low height street lighting columns, and minimal numbers of luminaries used.

7.6.2.2 National sites

The mitigation measures that are specifically required to ensure that the proposed development will not adversely affect the integrity of the National sites within the Zol, and that overlap with previously described European sites (i.e. Fergus Estuary and Inner Shannon, North Shore pNHA, Old Domestic Building (Keevagh) pNHA, Ballyallia Lake pNHA, and Dromore Woods and Loughs pNHA), are presented in the NIS and summarised above in 7.5.1.1. Therefore, the mitigation measures outlined above in Section 7.6.2.1, and as detailed in the NIS, will prevent the proposed development resulting in a significant negative effect on these pNHA sites at the national geographic scale.

Durra Castle pNHA

The mitigation strategy in relation to potential impacts arising from the proposed development on Durra Castle pNHA includes mitigation to prevent disturbance and displacement impacts on lesser horseshoe bats on suitable foraging and/or commuting grounds, within the normal foraging range of this species (See Section 7.6.2.1)

7.6.2.3 Habitats

Measures to Protect Surface Water Quality during Operation

Mitigation measures to protect surface water in the receiving local environment during operation are detailed above in Section 7.6.2.1, in Chapter 6: Hydrology, and in the Construction Environmental Management Plan (CEMP), and include: -

- Continued management, monitoring and maintenance of the waste water pumping system in accordance with Irish Water requirements.
- Runoff from the site will be attenuated within the on-site attenuation tanks, swales, and a hydrobrake will also be employed to control the rate of discharge. In

combination, these SuDS measures significantly reduce the volume and rate of surface water discharging from the site.

- The SuDS treatment train will pre-treat the surface water discharging to the Spancelhill Stream, removing pollutants and hydrocarbons from the surface water runoff.
- There will be no direct run-off from hard stand areas to the karst conduit systems or Toureen lough.

These mitigation measures are for the protection of the water quality within Toureen Lough, Spancelhill Stream, River Fergus, and for the protection of European Sites downstream as there are significant effects likely to arise on European sites as a result of water quality impacts associated with the proposed development, as discussed above in Section 7.5.1.

Habitat Degradation- Air Quality

As described in Section 7.5.2.3, the operational phase impact of the proposed development on designated sites is considered to be not significant at any geographic level, and therefore requires no mitigation measures.

7.6.2.4 Bats

Measures to Control and Reduce Light Spill During Operation

A light spill model study of the proposed development site was undertaken by Hurley Palmer Flatt (June 2021) to determine the effects of artificial light and Artificial Light At Night (ALAN) on bats as a result of the proposed development and identify how to reduce or eliminate ALAN onsite, based on information from both Eurobats Guideline No.8, the Institution of Lighting Professionals (ILP) Guidance Note No.8. and Bat Conservation Ireland Guidance Notes for: Planners engineers, architects and developers. The mitigation as described above in Section 7.6.2.1, also applies for all bat species using the proposed development site.

To ensure important bat corridors are maintained throughout the site before, during and after construction, a 30m dark zone buffer will be in place along hedgerows and treelines within the site wherever possible, and along the Clare County Council Ecological buffer zones (Figure 7.24).

7.6.2.5 Otter

As the otter populations that utilise the proposed development are considered to be part of European site populations downstream and hydrologically connected to the site (i.e. Lower River Shannon SAC and Dromore Woods and Loughs SAC), any mitigation measures required to prevent impacts on this species are discussed in Section 7.6.2.1 above, and in Section 7 of the NIS produced as part of this planning application (Scott Cawley, 2021).

7.6.2.6 Badgers

The operation of the proposed development is not predicted to result in any significant effects to populations of badger in the vicinity of the proposed development. Therefore, no mitigation is proposed.

7.6.2.7 Other Mammals (including pine marten and Irish hare)

The operation phase of the proposed development is not deemed to affect the local mammal population and will not result in a likely significant negative effect, at any geographic scale. As such, no mitigation is proposed.

7.6.2.8 Breeding Birds

Habitat Loss and Loss of Breeding / Resting Sites

Re-planting of treeline, hedgerow and scrub habitats within/alongside the proposed project boundary as detailed in the landscape drawings will over time provide suitable compensatory habitat for the breeding bird species to expand, and disturbance/displacement impacts occurring during the construction phase should reduce.

To further minimise the effects of breeding habitat loss, a total of 15 nest boxes will be erected by a qualified ecologist. The siting and type of nest boxes will be decided on by an ecologist at locations adjacent to where new trees will be planted or at suitable retained vegetation along the proposed development. More detail on location, and type of bird box can be found in the Landscape and Biodiversity Management Plan⁴⁰ submitted as part of this development.

7.6.2.9 Wintering birds

Habitat Degradation- Surface Water

In areas where the proposed development will result in an increase in the impermeable surface area, SuDS measures in the form of bioretention areas, swales, filter drains, rain gardens/ bioswales, tree pits oversized pipes and flow control devices, will be installed. These SuDS systems will reduce both the volume and rate of surface waters discharging into the existing surface water drainage network, as well as improving the environmental quality of any such discharges.

Measures to prevent to Disturbance and Displacement Impacts to Wintering Bird species

As part of the landscape plan and following on from completion of works in particularly sensitive and areas of suitable habitat, namely Toureen Lough, the M18 attenuation pond in the western boundary, and wetlands in the east and north of the site; the re-establishment of vegetation in a timely manner will be critical. It will be done outside of the wintering bird season, and will be done during the early stages of the phasing of the development. This early planting will screen off the development from important features and areas of suitable habitat for wintering birds, and there will not be any significant impact on wintering birds as a result of disturbance and displacement impacts, at any geographic scale.

7.6.2.10 Amphibians

In areas where the proposed development will result in an increase in the impermeable surface area, SuDS measures in the form of bioretention areas, swales, filter drains, rain gardens/ bioswales, tree pits oversized pipes and flow control devices, will be installed. These SuDS systems will reduce both the volume and rate of surface waters discharging into the existing surface water drainage network, as well as improving the environmental quality of any such discharges.

7.6.2.11 Fish

Habitat Degradation – Surface Water

The mitigation measures relating to the protection of water quality in receiving watercourses during operation are detailed above in Section 7.6.2.1 and in Section 7.6 of the CEMP.

Habitat Severance/Barrier Effect

The culvert with headwall and mattress have been designed in consultation with IFI and the design criteria set out in the Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016). This will maintain fish passage during the operation of the proposed development and therefore, will result in a neutral impact to fish species.

7.7 COMPENSATION

There are a number of compensation measures that will be utilised as part of the proposed development site, that will ensure that habitats and biodiversity found within the site are maintained and enhanced where possible, and additional measures proposed as part of the mitigation strategy provided above in Section 7.6 will be implemented in full and in accordance with best practice guidelines.

Hedgerows are a key habitat within the proposed development site, valued as being of local (higher) importance, and forming a key network of green corridors across the site. The retention of as many of these corridors as possible and the enhancement of the existing green network through new additional corridors has been a key consideration in the design of the landscape around the Data Centres. New woodland belts and hedgerows that provide new and replacement connections across the site are utilised, with 4.86km of new native hedgerow planting proposed, as well as c. 58,567m² of woodland planting. Only native species, and species that are already found within the site, will be planted. The retention and enhancement of existing hedgerows, with additional planting of native hedgerows will provide commuting and foraging routes for local bat species across the site, and will maintain access to/from roost sites and particularly active foraging areas of the site (Toureen Lough, woodland in the north west, hedgerows in the east). These hedgerows will also provide commuting corridors, foraging areas and suitable habitat for a range of other mammals, birds, invertebrates, and reptiles.

There will be a loss of dry meadows and grassy verges within the footprint of the proposed development. Whilst this habitat is valued as being of local (lower) importance based on the common species found here and availability of this habitat in the wider environs, compensation for the loss of this habitat is included. Meadow grasslands are proposed around the edges of the Data Centres, with c. 5.5ha

proposed. These grasslands will include wildflowers such as *Lotus corniculatus*, *Medicago lupulina*, *Hypochaeris radicata*, *Lythrum salicaria*, *Silene flos-cuculi*, *Trifolium pratense*, *Agrostemma githago*, and *Succisa pratensis* (full list of species can be found in the Landscape Design Strategy Report⁴¹). These meadow grasslands will provide opportunities for a range of pollinators and other invertebrates, in addition to provide habitat for foraging birds, bats and other mammals. Feature trees and smaller tree species are also proposed within this habitat, the majority of which are seed or fruit bearing, which will offer foraging habitat for birds and mammal species.

The proposal also includes the implementation of woodland embankments, planted up with a mixture of native woodland trees, of varying ages, and structure. The embankment ground beneath the trees will be left bare to provide a suitable attractive habitat for solitary bees, further contributing to the biodiversity of the site.

A SuDS basin is proposed in the west of the site, with a swale proposed along the new road network to the south of DC3. These two features will be seeded with meadow grassland and will form part of the wider meadow grassland landscape. The base of the SuDS basin will be seeded with a wetland meadow mix that is tolerant of flooding. The SuDS basin will add to the wetland areas around the site further contributing to the biodiversity and wildlife of the area.

A Landscape and Biodiversity Management Plan⁴⁰ has been produced as part of this planning application 'to provide landscape, visual and environmental screening and enhancement measures through planting and design' (Clare County Council, 2019). This plan will provide a practical and comprehensive guide that can be referred to and consulted by the local authority, the developer, and their appointed contractors, and the future operator of the Data Centres.

7.8 CUMULATIVE IMPACTS

This section of the report presents the assessment carried out to examine whether any other plans or projects have the potential to act in combination with the proposed development to give rise to likely significant effects on biodiversity.

The majority of the immediately surrounding lands are not zoned currently. However the area described as 'Buffer Space' by Clare County Council (2019), is currently designated as an ecological protection area and free from development. The lands to the north of the proposed development site are zoned as O2 – *General*; to the immediate east is the substation, zoned as N3.2 – *Electricity*; and further east towards Ennis is mainly zoned as R2 - *Existing residential*. To the south east, there is a site zoned as C2.1 - *Industrial, enterprise, employment*, and to the west, there is a site also zoned for O2 – *General*. Beyond the residential zoning south east of the site, is a large area of land zones as G3 - *Conservation, amenity or buffer space, corridor/belt, landscape*. The most likely cumulative effect of other future development with the proposed development on the receiving environment is the potential for other pollution sources within the Fergus River sub-catchment, the Shannon Estuary North catchment and the River Shannon Catchment, and any other catchments that also drain to the Shannon Estuary to cumulatively affect water quality in the receiving surface water, estuarine and marine environments (See Chapter 6 *Hydrology*).

There are a number of granted planning permissions, and appealed planning permissions, for residential or other small-scale developments, such as construction of housing developments, sporting facilities, renovation of a school, telecommunications services and residential renovations *etc.* in the vicinity of the proposed development site, as well as larger scale developments in close proximity to the proposed development site, some of which may be in construction at the same time as the proposed development. A list of these projects considered in the cumulative impacts assessment is included in Chapter 3, Appendix 3.1.

Potential cumulative impacts may arise during construction and operation, as a consequence of the proposed development acting in-combination with other plans and projects, on water quality in the downstream surface water environment, disturbance to birds, bats, small mammals and badger, otter as well as loss of potentially important habitats and subsequently habitat loss to bats, birds, small mammals, otters and badger.

There is potential for cumulative impacts to arise with other local developments that would also result in increased noise, vibration, human presence and lighting. However, as any disturbance effects from other such local developments are likely to be of a minor nature, temporary, localised and over a short-duration, they are not likely to cumulatively affect the local badger, small mammal, breeding bird, otter or bat populations in conjunction with the proposed development.

This NIS has examined and analysed the potential impact sources and pathways from the proposed development on European sites, and how these could impact on European sites' qualifying interests/special conservation interests and whether the predicted impacts would adversely affect the integrity of; Lower River Shannon SAC, Dromore Woods and Loughs SAC, Old Domestic Building (Keevagh) SAC, Old Domestic Buildings, Rylane SAC, River Shannon and River Fergus Estuaries SPA, Ballyallia Lough SPA, Slieve Aughty Mountains SPA, and Corofin Wetlands SPA. This is in light of the best scientific knowledge, and with respect to those European sites

within the zone of influence of the proposed development. There are no other European sites at risk of effects from the proposed development.

Avoidance, design requirements and mitigation measures are set out within the NIS [and its appendices] and they ensure that any impacts on the conservation objectives of European sites will be avoided during the construction and operation of the proposed development such that there will be no risk of adverse effects on these European sites.

It has been objectively concluded by Scott Cawley Ltd., following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the proposed development, that the proposed development, either alone or in combination with other plans or projects, will not adversely affect (either directly or indirectly) the integrity of any European site.

There is the potential for other pollution sources within the Spancellhill Stream, the River Fergus, the Shannon Estuary North WFD catchment and any other catchments that also drain to the Fergus Estuary to cumulatively affect water quality in the receiving estuarine and marine environments.

The potential for in combination effects to arise in Fergus Estuary from any existing or proposed land use plans or developments is regulated and controlled by the environmental protective policies and objectives of the *Clare County Development Plan 2017-2023*. Any existing/proposed plan or project that could potentially affect Lower River Shannon SAC, Dromore Woods and Loughs SAC, Old Domestic Building (Keevagh) SAC, Old Domestic Buildings, Rylane SAC, River Shannon and River Fergus Estuaries SPA, and Ballyallia Lough SPA, or any other European site, in combination with the proposed development, must adhere to these overarching environmental protective policies and objectives. These policies and objectives will ensure the protection of the European site within the zone of influence of the proposed development, and include the requirement for any future plans or projects to undergo Screening for Appropriate Assessment and/or Appropriate Assessment to examine and assess their effects on European sites, alone and in combination with other plans and projects.

There are specific objectives and policies in the *Clare County Development Plan 2017-2023 Variation no. 1* to protect biodiversity, and specifically European sites. Policies CDP2.1, CDP14.2, CDP14.3, relate to the protection of European sites, AA and commitments to not permitting projects giving rise to adverse effects on the integrity of European sites without demonstrating there are no alternatives, there are imperative reasons of overriding public interest, and undertaking all compensation measures necessary to ensure the overall coherence of the network of European sites. The *Limerick County Development Plan 2010-2016* also includes policies to protect (from risk of pollution), manage and enhance the counties' surface water and groundwater resources, protect, conserve and enhance habitats, species and areas of European and national importance (CP 10, SE 01, ED P7, EH 01, EH 02, EH 03, EH 04, CP 10, SE 01, IN P11).

The environmental protective policies and objectives set out in the *Clare County Development Plan 2017-23* are mirrored in the Shannon Town and Environs Local Area Plan 2012-2018 in terms of the protection of European sites (policy B2) and the protection of County Clare's surface water and groundwater resources (policy W1, W2, W4, W5, W7).

Land use plans for the other local authorities (e.g. Galway County Council and Kerry County Council) whose functional areas include surface water features which drain to

Fergus and Shannon Estuaries, were examined and analysed and those land use plans also include protective environmental policies to protect European sites (Policy NHB 1 in Galway, and Policies NE-2, NE-11, NE-12 and NE-30 in Kerry) and the receiving surface water environments (i.e. policies FL 1, WW 1, WS 5, and NHB 4 in Galway, and Policies NE-18, NE-19, NE-20, NE-22, NE-23, NE-24 and NE-26 in Kerry).

7.9 RESIDUAL IMPACTS

The assessment, presented in the NIS, of the potential for the proposed development to impact upon the Lower River Shannon SAC, Dromore Woods and Loughs SAC, Old Domestic Buildings (Keevagh) SAC, Old Domestic Buildings, Rylane SAC, Ballyallia Lough SPA, River Shannon and River Fergus SPA, Sieve Aughty Mountains SPA and Corofin Wetlands SPA concluded that, with the implementation of the mitigation measures proposed, the proposed development, either on its own or in combination with other plans or projects, does not pose a risk of adversely affecting (either directly or indirectly) the integrity of these, or any other, European sites.

As discussed above, the proposed development has the potential to affect nationally designated areas for nature conservation downstream of the proposed development site due to the potential for effects on the receiving aquatic environment prior to mitigation. The proposed development will result in some habitat loss within the proposed development site. The proposed development has the potential to affect habitats indirectly as a result of habitat loss, hydrological, air quality, and disturbance and displacement impacts. It also has the potential to result in likely significant effects on amphibians, breeding birds, bats, badgers, wintering birds, other mammals, invertebrate, fish and reptiles at a local level, and the lesser horseshoe bat, otter, QI fish species, and SCI wintering birds at the international level.

The above impacts will not result in any significant residual negative effects on biodiversity, following the implementation of mitigation measures that will be undertaken. The landscape plan will ensure that the biodiversity value of the habitats to be retained and created as part of the proposed development are maximised in support of their important functions. A comprehensive suite of mitigation measures is proposed, in addition to the extensive and stringent environmental control measures that have been incorporated into the design of the proposed development. The development has been designed by an iterative process, to ensure that potential impacts are minimised and mitigated by design. These measures are included in Section 7.4. All of the mitigation measures will be implemented in full and are best practice, and tried and tested, effective control measures to protect biodiversity and the receiving environment.

Considering the elements included within the design of the proposed development (as described in the Project Description), and the implementation of the mitigation measures proposed in the EIAR and the associated planning application documents, to avoid or minimise the effects of the proposed development on the receiving environment, no likely significant residual effects on biodiversity are predicted. See Table 7.13 below for summary of potential impacts, mitigation, compensation and enhancement measures, and residual impacts of the proposed development.

Table 7.13 Summary of potential impacts, mitigation, compensation and enhancement measures, and residual impacts of the proposed development

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation and Enhancement Measures	Significance of Residual Effects
Designated Sites					
Lower River Shannon SAC	International	<p>Accidental pollution event during construction draining to watercourses and degrading habitats/QI species</p> <p>Otter habitat loss/fragmentation in the Spancelhill Stream</p> <p>Disturbance and/or displacement of otter</p> <p>Habitat degradation as a result of introducing non-native invasive species</p>	International	<p>Water protection measures on water quality for downstream QI habitats and species</p> <p>Pre-construction checks of Spancelhill Stream</p> <p>No night working adjacent to suitable otter habitat</p> <p>Measures to prevent introduction of non-native invasive species</p>	None
Dromore Woods and Loughs SAC	International	<p>Otter/lesser horseshoe bat habitat loss/fragmentation</p> <p>Accidental pollution event during construction draining to watercourses and degrading habitats for QI species (otter)</p> <p>Disturbance and/or displacement of QI species (otter/lesser horseshoe bat)</p>	International	<p>Water protection measures on water quality for downstream QI species</p> <p>Pre-construction checks of Spancelhill Stream</p> <p>Replacement planting of native hedgerows. Planting will be carried out in the first phase of construction, prior to any removal of vegetation.</p> <p>No lighting is permitted during night time construction works, and lighting for operation has been designed to result in no light spill on surrounding features used by lesser horseshoe bats. Lighting will be off in normal</p>	None

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation and Enhancement Measures	Significance of Residual Effects
				circumstances and only used during emergencies	
Old Domestic Building (Keevagh) SAC	International	Lesser horseshoe bat habitat loss/fragmentation Disturbance and/or displacement of QI species (lesser horseshoe bat)	International	Replacement planting of native hedgerows. Planting will be carried out in the first phase of construction, prior to any removal of vegetation. No lighting is permitted during night time construction works, and lighting for operation has been designed to result in no light spill on surrounding features used by lesser horseshoe bats. Lighting will be off in normal circumstances and only used during emergencies	None
Old Domestic Buildings, Rylane SAC	International	Lesser horseshoe bat habitat loss/fragmentation Disturbance and/or displacement of QI species (lesser horseshoe bat)	International	Replacement planting of native hedgerows. Planting will be carried out in the first phase of construction, prior to any removal of vegetation. No lighting is permitted during night time construction works, and lighting for operation has been designed to result in no light spill on surrounding features used by lesser horseshoe bats. Lighting will be off in normal circumstances and only used during emergencies	None
River Shannon and River Fergus Estuaries SPA	International	Accidental pollution event during construction draining to watercourses and degrading habitats for SCI species	International	Water protection measures on water quality for downstream QI habitats and species	None

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation and Enhancement Measures	Significance of Residual Effects
		Disturbance/displacement of SCI species using the proposed development as ex-situ sites			
Ballyallia Lough SPA	International	Accidental pollution event during construction draining to watercourses and degrading habitats for SCI species Disturbance/displacement of SCI species using the proposed development as ex-situ sites	International	Water protection measures on water quality for downstream QI habitats and species	None
Slieve Aughty Mountains SPA	International	Accidental pollution event during construction draining to watercourses and degrading habitats for SCI species Disturbance/displacement of SCI species using the proposed development as ex-situ sites	International	N/A	None
Corofin Wetlands SPA	International	Accidental pollution event during construction draining to watercourses and degrading habitats for SCI species Disturbance/displacement of SCI species using the proposed development as ex-situ sites	International	Water protection measures on water quality for downstream QI habitats and species	None
Fergus Estuary and Inner Shannon, North Shore pNHA	National	Accidental pollution event during construction draining to watercourses and degrading habitats and supporting habitats for designated species	National	Water protection measures on water quality for downstream habitats and species Pre-construction checks of Spancelhill Stream	None

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation and Enhancement Measures	Significance of Residual Effects
		<p>Otter habitat loss/fragmentation in the Spancelhill Stream</p> <p>Disturbance and/or displacement of otter/bird species</p> <p>Habitat degradation as a result of introducing non-native invasive species</p>		<p>No night working adjacent to suitable otter habitat</p> <p>Measures to prevent introduction of non-native invasive species</p>	
Old Domestic Building (Keevagh) pNHA	National	<p>Lesser horseshoe bat habitat loss/fragmentation</p> <p>Disturbance and/or displacement of QI species (lesser horseshoe bat)</p>	National	<p>Replacement planting of native hedgerows. Planting will be carried out in the first phase of construction, prior to any removal of vegetation.</p> <p>No lighting is permitted during night time construction works, and lighting for operation has been designed to result in no light spill on surrounding features used by lesser horseshoe bats. Lighting will be off in normal circumstances and only used during emergencies</p>	None
Ballyallia Lake pNHA	National	<p>Accidental pollution event during construction draining to watercourses and degrading habitats for bird species</p> <p>Disturbance/displacement of bird species using the proposed development as ex-situ sites</p>	National	Water protection measures on water quality for designated bird species of this pNHA using downstream watercourses as ex situ sites	None
Dromore Woods and Loughs pNHA	National	<p>Otter/lesser horseshoe bat habitat loss/fragmentation</p>	National	Water protection measures on water quality for otter using downstream	None

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation and Enhancement Measures	Significance of Residual Effects
		<p>Accidental pollution event during construction draining to watercourses and degrading habitats for otter</p> <p>Disturbance and/or displacement of otter/lesser horseshoe bat</p>		<p>watercourses to which the proposed development drains to</p> <p>Pre-construction checks of Spancelhill Stream</p> <p>Replacement planting of native hedgerows. Planting will be carried out in the first phase of construction, prior to any removal of vegetation.</p> <p>No lighting is permitted during night time construction works, and lighting for operation has been designed to result in no light spill on surrounding features used by lesser horseshoe bats. Lighting will be off in normal circumstances and only used during emergencies</p>	
Newpark House (Ennis) pNHA	National	N/A	N/A	N/A	N/A
Lough Cleggan pNHA	National	<p>Accidental pollution event during construction draining to watercourses and degrading habitats for bird species</p> <p>Disturbance/displacement of bird species using the proposed development as ex-situ sites</p>	National	Water protection measures on water quality for designated bird species of this pNHA using downstream watercourses as ex situ sites	None
Durra Castle pNHA	National	<p>Lesser horseshoe bat habitat loss/fragmentation</p> <p>Disturbance and/or displacement of designated species (lesser horseshoe bat)</p>	National	Replacement planting of native hedgerows. Planting will be carried out in the first phase of construction, prior to any removal of vegetation.	None

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation and Enhancement Measures	Significance of Residual Effects
				No lighting is permitted during night time construction works, and lighting for operation has been designed to result in no light spill on surrounding features used by lesser horseshoe bats. Lighting will be off in normal circumstances and only used during emergencies	
Habitats					
Hedgerows (WL1)	Local (High)	Loss of habitat (c. 2.7km) Degradation of habitat from dust emissions	Local (High)	Replacement planting of 4.86km of native hedgerow Root Protection Zones Protection from dust emissions and construction activities by dust screens and fencing Landscape and Biodiversity Management Plan Enhancement of existing hedgerows	None
Marsh (GM1)	Local (High)	Degradation of habitat from runoff from construction activities	Local (High)	N/A	None
Wet grassland (GS4) including the Annex I habitat <i>Molinia</i> Meadows [6410]	Local (High) - National	Loss of habitat (c. 1.4ha) Degradation of habitat from runoff from construction activities Degradation of habitats dependent on groundwater and	Local (High)	Additional planting of swale above attenuation pond with plant species that are typically associated with seasonally flooded habitats Protection from dust emissions and construction activities by dust screens and fencing	None

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation and Enhancement Measures	Significance of Residual Effects
		subsequently degradation on groundwater regime Degradation of habitats due to changes in air quality from dust		Surface water and groundwater protection measures Non-native invasive species prevention measures	
Lowland/Depositing Rivers (FW2)	Local (High)	Loss of habitat (2m ²) Degradation of habitat from runoff from construction activities	Local (High)	Surface water protection measures Protection from dust emissions and construction activities by dust screens and fencing	None
Annex I habitat 'semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometea) (*important orchid sites) (6210)'	National	Relocation of habitat (c. 0.79ha) Degradation of habitats due to changes in air quality from dust emissions	National	Retention of habitat outside the development footprint Relocation and restoration of habitat Protection from dust emissions and construction activities by dust screens and fencing Landscape and Biodiversity Management Plan Planting of native wildflower meadows elsewhere in the site	None
Mesotrophic Lake (FL4)	Local (High)	Degradation of habitat from runoff from construction activities Degradation of habitat from dust emissions	Local (High)	Protection from dust emissions and construction activities by dust screens and fencing Surface water protection measures	None
Other Artificial Lakes and Ponds (FL8)	Local (High)	Degradation of habitat from runoff from construction activities		Protection from dust emissions and construction activities by dust screens and fencing	

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation and Enhancement Measures	Significance of Residual Effects
		Degradation of habitat from dust emissions		Surface water protection measures	
Reed and Large Sedge Swamps (FS1) including the Annex I habitat <i>Cladium</i> Fens [*7210]	Local (High) - International	Degradation of habitat from runoff from construction activities Degradation of habitat from dust Degradation of habitats dependent on groundwater and subsequently degradation on groundwater regime	International	Protection from dust emissions and construction activities by dust screens and fencing Surface and ground water protection measures	None
Rich Fen and Flush (PF1) including the Annex I habitat Alkaline Fens [7230]	National	Degradation of habitat from runoff from construction activities Degradation of habitat from dust emissions	National	Protection from dust emissions and construction activities by dust screens and fencing Surface water protection measures	None
Riparian Woodland (WN5) including the Annex I habitat Alluvial Woodland [*91E0]	International	Degradation of habitat from runoff from construction activities Degradation of habitat from dust emissions Degradation of habitats dependent on groundwater and subsequently degradation of groundwater regime		Protection from dust emissions and construction activities by dust screens and fencing Surface and ground water protection measures	
Wet Willow-Alder-Ash Woodland (WN6) including the Annex I habitat Alluvial Woodland [*91E0]	International	Degradation of habitat from runoff from construction activities		Protection from dust emissions and construction activities by dust screens and fencing	

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation and Enhancement Measures	Significance of Residual Effects
		<p>Degradation of habitat from dust emissions</p> <p>Degradation of habitats dependent on groundwater and subsequently degradation of groundwater regime</p>		Surface and ground water protection measures	
Fauna Species					
Bats	Local (High) - International	<p>Tree roost loss</p> <p>Habitat loss</p> <p>Disturbance from lighting</p> <p>Roost loss</p>	Local (High) - International	<p>Layout designed to protect and retain confirmed bat roost buildings</p> <p>Demolition of structures/felling of trees following seasonal restrictions</p> <p>Roost presence/absence surveys prior to demolition of structures/felling of suitable bat roost trees and buildings</p> <p>Soft felling of suitable bat roost trees</p> <p>No night works will be normally undertaken during construction. Any lighting required during construction will be minimal and will avoid suitable foraging/roosting areas. Lighting will be off in normal circumstances and only used during emergencies</p> <p>Planting of native hedgerows and woodlands prior to any removal of vegetation to ensure commuting and/or foraging areas are retained throughout development and operation</p>	None

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation and Enhancement Measures	Significance of Residual Effects
				Lighting during operation designed to be as close to 0 Lux as possible on sensitive bat foraging and/or commuting routes, with lighting only used for emergencies at night and for egress through the site using torches/headlights.	
Otter	International	Otter habitat loss/fragmentation Accidental pollution event during construction draining to watercourses and degrading otter habitat Disturbance and/or displacement of otter	International	Surface water protection measures Pre-construction checks of Spancelhill Stream No night works adjacent to Spancelhill Stream	None
Badgers	Local (High)	Habitat loss Disturbance/Displacement	Local (High)	Pre-construction checks for new setts	None
Other mammal species	Local (High)	Habitat loss Disturbance and displacement	Local (High)	Planting of meadows and woodlands providing additional habitat for commuting and foraging mammal species Inclusion of ramps in excavation pits and/or covering of pits for small mammal egress	None
Breeding Birds	Local (High)	Disturbance and mortality during breeding season Habitat loss	Local (High)	Seasonal vegetation clearance Landscape planting of hedgerows and woodland areas	None

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation and Enhancement Measures	Significance of Residual Effects
		Disturbance and displacement		Buildings with confirmed nests are being retained within the design of the development Nest boxes placed in areas of suitable habitat away from the development	
Wintering birds	Local (High) - International	Habitat loss Habitat degradation (surface water quality)	Local (High) - International	Seasonal vegetation clearance Surface water quality protection measures Construction compound situated away from suitable wintering bird habitat	None
Amphibians	Local (High)	Disturbance and Mortality Habitat degradation (Surface water quality)	Local (High)	Surface water protection measures Pre-construction checks of any suitable habitat features	None
Reptiles	Local (High)	Mortality during vegetation clearance	Local (High)	Seasonal clearance of vegetation ECoW supervision of vegetation clearance	None
Fish	Local (High) - International	Habitat degradation from an accidental pollution event Habitat loss Direct Injury/Mortality	Local (High)	Surface water protection measures Culvert and headwall and mattress designed in consultation with IFI Fencing off of surface water features from construction	None

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation and Enhancement Measures	Significance of Residual Effects
				Specific measures to protect lamprey within the Spancelhill Stream by use of silt curtain and spill boom	
White-clawed crayfish	Local (High)	Habitat degradation from an accidental pollution event	Local (High)	Surface water protection measures ECoW supervision of any instream works, and silt curtain and spill boom	None
Other Invertebrates	Local (High)	Habitat loss	Local (High)	Protection from dust emissions and construction activities by dust screens and fencing off of calcareous grassland Relocation of calcareous grassland Wildflower meadows and swale species planted in regard to pollinator species Woodland embankments with bare ground for solitary bee species	None

7.10 INTERACTIONS

The most significant interactions for the Biodiversity Chapter are with the Hydrology Chapter (Chapter 6), the Land, Soils, Geology & Hydrogeology Chapter (Chapter 5), the Air Quality and Climate Chapter (Chapter 8), The Landscape and Visual Chapter (Chapter 10) and the Noise and Vibration Chapter (Chapter 9). The Hydrology Chapter was reviewed in terms of effects on water quality in the local and downstream receiving environment, and to ensure that there is no change in the overall water regime at water dependent habitats on site. The Land, Soils, Geology and Hydrogeology Chapter was reviewed in terms of the groundwater dependent habitats on site, and to ensure there is no change in the overall groundwater regime within and outwith the proposed development site. The Air Quality and Climate Chapter and the assessment of NO_x and SO₂ levels in the nearby sensitive ecological areas and the resultant deposition levels presented in the chapter have been reviewed and assessed. The Landscape and Visual Chapter details the removal and addition of the planting regime proposed within the proposed development, this has been reviewed to ensure there will be no impact on the habitats and species within the proposed development site. The Noise and Vibration Chapter was assessed to determine and quantify the likely effects on sensitive species within the proposed development site, and propose suitable mitigation measures to reduce this potential impact.

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