SECTION B - THE NATURAL ENVIRONMENT

This Section of the Environmental Impact Assessment Report deals with the potential effects of the proposed development on the natural environment. The effects have been grouped as follows:

Impacts on Biodiversity – Terrestrial Environment
Impacts on Water Quality and Aquatic Biodiversity
Impacts on Land – Soils, Geology, Hydrogeology and Hydrogeology

The various aspects of the natural environment interact to some degree with each other so that assessing one aspect in isolation can be misleading. For example, the survival of terrestrial fauna can be dependent on floral composition, which is in turn dependent on soil composition and groundwater levels. Similarly, the diversity of aquatic flora and fauna would be impacted by both hydrology and the quality of waters receiving drainage from the proposed scheme.

Human Beings also interact with the natural environment, often by altering land-use and landscape patterns for the purpose of agriculture and settlement.

9.0 BIODIVERSITY – TERRESTRIAL ENVIRONMENT

9.1 INTRODUCTION

This section outlines the terrestrial biodiversity currently present in the area of the proposed development and assesses the impact of the proposal on terrestrial habitats and species identified. This section should be read in conjunction with the site layout plans for the proposed development and project description sections of the EIAR. Mitigation measures have been proposed where required.

The ecological assessment involved a desktop review and the undertaking of field assessments of the site to identify habitats and species of flora and fauna present in order to determine the ecological diversity of this area. A Natura Impact Statement has been prepared for the proposed development and accompanies the planning application (Report Ref. PES_NIS_19_9201).

The objectives of the ecological assessment were as follows:

- To undertake a comprehensive desktop review to identify European sites within the vicinity of the proposed development and to determine previously recorded fauna for the area;
- To undertake field assessments of the proposed development site and surroundings;
- To evaluate the biodiversity value of the proposed development and surroundings;
- To determine and assess the potential impacts of the proposed development on terrestrial biodiversity;
- To propose mitigation measures for both the construction and operational phases of the development to reduce potential impacts upon terrestrial biodiversity.

9.2 LEGISLATIVE FRAMEWORK AND PLANNING POLICY

9.2.1 LEGISLATIVE CONTEXT

The main legislation pertaining to biodiversity and nature conservation in Ireland is outlined below.

The Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000

The Wildlife Act is the primary piece of Irish legislation providing for the protection and conservation of wildlife and provides for the control of specific activities which could adversely affect wildlife, for example the regulation of hunting and wildlife trading. Under the Wildlife Act, all bird species, 22 other fauna species and 86 flora species in Ireland are afforded protected status. The Wildlife Act, 1976 allows for the designation of specific areas of ecological value such as Statutory Nature Reserves and Refuges for Fauna. The Wildlife (Amendment) Act, 2000 provides for greater protection and conservation of wildlife and also provides for the designation and statutory protection of Natural Heritage Areas (NHA).

The Flora (Protection) Order, 2015 (S.I. 356 of 2015)

This order provides statutory protection to flora listed in Section 21 of the Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000. Under the Order, it is illegal to wilfully cut, uproot or damage the listed species or interfere in any way with their habitats.

European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477 of 2011)

These regulations transpose the European Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora (known as the "Habitats Directive") and the European Council Directive 2009/147/EC on the Conservation of Wild Birds (known as the "Birds Directive") into Irish Law. The regulations provide for the designation and protection of Natura 2000 sites comprising of Special Areas of Conservation (SAC) and Special Protection Areas (SPA). The regulations safeguard the SAC and SPA sites from developments with the potential to significantly impact upon them. The EC (Birds and Natural Habitats) Regulations also address invasive species, making it an offence without a licence to plant, allow to disperse, escape or spread, to reproduce or propagate, to transport, to sell or advertise invasive species specified in the regulations.

Planning and Development Regulations, 2001 to 2018

These regulations transpose the requirements of Directive 2014/52/EU (and previous Directive 2011/52/EU) on the assessment of the effects of certain projects on the environment into planning law. Under these regulations, development plans must include mandatory objectives for the conservation of natural heritage and for the conservation of European sites.

9.2.2 PLANNING POLICIES

National Policies

A number of documents have been published in relation to the Government's commitment to sustainable development, including the National Spatial Strategy 2002-2020 and the Sustainable Development: A Strategy for Ireland 1997.

Regional Policies

The Regional Planning Guidelines (RPGs) for the Midland Region 2010-2022, which includes the counties of Laois, Offaly, Westmeath and Longford, outlines the long-term spatial planning strategy for the area. As part of the guidelines, a number of policies relating to biodiversity, and relevant to the proposed development, were outlined, as per Table 9.1 below.

Table 9.1: Regional Policies Relevant to Biodiversity and the Proposed Development

STRATEGIC POLICY REFERENCE	POLICY
EP 12	Promote the protection, conservation and enhancement of the region's biodiversity and natural and geological heritage. This includes wildlife (flora and fauna), Species protected under the Wildlife Acts and listed for strict protection on Annex IV of the Habitats Directive; and Wildlife corridors and stepping stones as envisaged under Article 10 of the Habitats Directive, habitats, sites with no statutory protection, proposed National Heritage Areas, landscapes and/or landscape features of importance to wildlife or which play a key role in the conservation and management of natural resources such as water.
EP 13	Facilitate the protection of sites designated in National and European legislation, and in other relevant International Conventions, Agreements and Processes. This includes sites designated or proposed to be designated as: Ramsar sites, Special Areas of Conservation, Special Protection Areas, National Heritage Areas, nature reserves, and refuges for flora or fauna.

Local Policies and Objectives

Local planning policies and objectives are detailed in the Offaly County Development Plan, 2014-2020. Policies and objectives relating to biodiversity, and relevant to the proposed development, are outlined in Table 9.2.

Table 9.2: Local Policies and Objectives Relevant to Biodiversity and the Proposed Development

POLICY / OBJECTIVE REFERENCE	POLICY / OBJECTIVE
NHP-01	It is Council policy to prohibit any development that would be harmful to or that would result in a significant deterioration of habitats and/or disturbance of species in a Special Protection Area (SPA), Special Area of Conservation (SAC) and candidate Special Area of Conservation (cSAC), Natural Heritage Area (NHA) and Proposed Natural Heritage Area (pNHA)…
NHP-02	It is the policy of the Council to ensure an Appropriate Assessment in accordance with Article 6(3) and Article 6(4) of the Habitats Directive, and in accordance with the Department of Environment, Heritage and Local Government Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities, 2009 and relevant EPA and European Commission guidance documents, is carried out in respect of any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect on a European site(s), either individually or in combination with other plans or projects, in view of the site's conservation objectives.
NHP-04	It is Council policy to ensure that development proposals are screened to determine whether they are likely to have a significant direct, indirect or cumulative effect on the integrity or conservation objectives of any European Site and, where significant effects are likely or uncertain, there will be a requirement for consultation with the relevant environmental authorities as part of any Habitats Directive Assessment that may be required.
NHP-08	It is Council policy to protect, conserve and enhance the county's biodiversity and natural heritage including wildlife (flora and fauna), habitats, landscapes and/or landscape features of importance to wildlife or which play a key role in the

POLICY / OBJECTIVE REFERENCE	POLICY / OBJECTIVE
	conservation and management of natural resources such as water.
NHP-09	It is Council policy to promote the protection and preservation of existing hedgerows and to encourage planting of native hedgerow species. It is also Council policy to encourage the replanting and extension of the treescape within the county (in particular mixed forests and broadleaf forests) in order to ensure the preservation and enhancement of this attractive element of County Offaly's landscape.
NHP-11	It is Council policy to conserve, protect and enhance where possible wildlife habitats such as rivers, streams, canals, lakes, and associated wetlands including reed-beds and swamps, ponds, springs, bogs, fens, trees, woodlands and scrub, hedgerows and other boundary types such as stone walls and ditches which occur outside of designated areas providing a network of habitats and corridors essential for wildlife to flourish.
NHP-12	It is Council policy to ensure that peatland areas, which are designated for protection under international and national legislation, are conserved and managed appropriately to conserve their ecological, archaeological, cultural and educational significance.
NHP-13	It is Council policy to protect riparian corridors by reserving land along their banks for ecological corridors and maintain them free from inappropriate development, where appropriate clear span structures will be promoted where fisheries exist, and culverting and/or realignment of streams will be discouraged…
NHP-18	It is Council policy to encourage the retention, where possible, of hedgerows and other distinctive boundary treatments in rural areas. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, provision of the same type of boundary will be required of similar length set back within the site. The hedgerow will be composed of a variety of native species of Irish provenance…
NHP-19	It is Council policy to promote the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees
NHP-20	It is Council policy to use native species wherever possible in the county…
NHP-21	It is Council policy to discourage the felling of mature trees to facilitate development and to encourage tree surgery rather than felling where necessary.
NHP-22	It is Council policy to encourage, pursuant to Article 10 of the Habitats Directive, the management of features of the landscape, such as traditional field boundaries, important for the ecological coherence of the Natura 2000 site(s) network and essential for the migration, dispersal and genetic exchange of wild species.
NHP-24	It is Council policy to protect, conserve and enhance the county's biodiversity and natural heritage including wildlife (flora and fauna), habitats, landscapes and / or landscape features of importance to wildlife or which play a key role in the conservation and management of natural resources such as water.
NHO-01	It is an objective of the Council to ensure that any development proposal in the vicinity of, or affecting a designated site, complies with the provisions relating Appropriate Assessment and SEA requirements and the Council will consult with the appropriate statutory environmental authority in this regard.
NHO-02	It is an objective of the Council to conserve and protect the natural heritage of the county and to conserve and protect European and National designated sites within the county including Special Protection Areas (SPAs), Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSACs), Natural Heritage Areas (NHAs), Proposed Natural Heritage Areas (pNHAs), Ramsar Sites, Statutory Nature Reserves, Biogenetic Reserves and Wildfowl Sanctuaries.
NHO-03	It is an objective of the Council to protect, conserve and enhance the county's biodiversity and natural heritage and the principle of enhancement will be taken into account in the Development Management process. It is a particular objective to protect plants, animal species and habitats which have been identified by the Habitats Directive, Birds Directive, Wildlife Act and the Flora Protection Order.

Biodiversity Plans

Ireland's third National Biodiversity Plan 2017–2021, identifies actions towards understanding and protecting biodiversity with a vision that, "*biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally*".

A number of Local Biodiversity Action Plans have been prepared, including the Offaly Biodiversity Action Plan, which has been incorporated into the Offaly Heritage Plan 2018-2022.

All-Ireland Pollinator Plan

In 2015, Ireland joined a number of other European countries in developing a strategy to address pollinator decline and protect pollination services. 68 governmental and non-governmental organisations agreed a shared plan, the "All-Ireland Pollinator Plan", which identifies 81 actions to make Ireland pollinator friendly. The plan provides recommendations for six different sectors, including farmers, county councils, communities, businesses, homeowners and schools.

9.3 METHODOLOGY

9.3.1 RELEVANT GUIDELINES

The following guidance documents have been consulted for this assessment, with a full list of consulted documentation and guidelines included within Section 9.11:

- *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2016);
- *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Draft) (EPA, 2017);
- *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009);
- *A Guide to Habitats in Ireland* (Fossitt, 2000);
- *Best Practice Guidance for Habitat Survey and Mapping* (Smith *et al*., 2011);
- *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* (NRA, 2009);
- *Expedition Field Techniques: Bird Surveys* (Bibby *et al*., 2000);
- *Bird census and survey techniques* (Gregory *et al*., 2004);
- *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn.) (Collins 2016);
- *Bat Mitigation Guidelines for Ireland* (Kelleher and Marnell, 2006);
- *Bats and artificial lighting in the UK* (Bat Conservation Trust, 2018);

- *Bats & Lighting: Guidance Notes for Planners, Engineers, Architects and Developers* (Bat Conservation Ireland, 2010).

9.3.2 STUDY AREA / ZONE OF INFLUENCE

Following guidance set out by the Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) and the National Roads Authority (2009), a Zone of Influence should be determined, which identifies the area in which the development could potentially impact upon ecological receptors. The zone of influence takes into consideration the assigned ecological value of the receptors, which ranges from international, national, county to local, and potential pathways for impacts to occur.

Taking into consideration best practice guidance and the nature of the development, the study area for the assessment ranges from the site boundary for habitats, to buffers of 100m for specific species. However, it should be noted that these buffers were extended where required.

9.3.3 DESKTOP RESEARCH

Desktop research comprised of gathering information on designated sites within 15km of the proposed development, reviewing mapping sites to provisionally identify any potential ecologically important features prior to the site assessment and reviewing online resources to determine what notable species, including protected, rare or invasive, had previously been recorded for the proposed development area and environs. The following online resources were consulted as part of this process:

- National Parks and Wildlife Service (NPWS) website: mapping of designated sites and information on designated sites within the vicinity of the development;
- NPWS Wildlife Manuals for certain habitats and species;
- National Biodiversity Data Centre (NBDC) website: data on notable species (protected, rare or invasive) within a 10km radius of the development;
- NPWS reports on "*The Status of Protected EU Habitats and Species in Ireland*";
- NPWS Ireland Red Lists for species;
- Botanical Society of Britain and Ireland website: flora distribution maps;
- Data on the status of bird species from "*Birds of Conservation Concern in Ireland 2014-2019*", (Coulhoun and Cummins, 2013);
- Various mapping websites, including EPA Envision, Google Maps, Myplan and OSI;
- Meenwaun Wind Farm Ltd. (located adjacent the proposed development site): EIAR and NIS produced by Fehily Timoney and Company in 2015.

In addition to the above, the NPWS was contacted on the 2nd of January 2019 in relation to records for sensitive, rare, threatened and protected species within 10km of the development location. Results were returned on the 16th of January 2019.

A data request for bat records within 10km of the proposed development site was received from Bat Conservation Ireland (BCI) on the 20th of March 2019.

9.3.4 FIELD SURVEYS METHODOLOGY

Site assessments were undertaken on various dates in September and October 2018 and January 2019 to examine the ecological context of the proposed development, as outlined in Table 9.3 below. Surveys had due consideration for the relevant best practice guidelines as referenced in Section 9.3.1.

Table 9.3: Ecological Surveys Informing the EIAR

SURVEY	STUDY AREA	SURVEY DATES
Habitat Survey	100m	6th September 2018 21st September 2018
Fauna Survey	100m	21st September 2018
Daytime Assessment of Bat Roost Potential	20m	21st September 2018 4th January 2019
Bat Activity Survey	50m	26th September 2018
Bird Survey	50m	22nd October 2018 4th January 2019
Water Quality / Macroinvertebrate Monitoring	Monitoring points located within Feeghroe Stream onsite and on Rapemills River	24th September 2018

Habitats and Flora Survey

These assessments involved determining the habitats and flora present within the proposed development. The habitat survey was undertaken in accordance with the standard methodology outlined in Fossitt's "*A Guide to Habitats in Ireland*", (Fossitt, 2000), a hierarchical classification scheme based upon the characteristics of vegetation present. The Fossitt system also indicates when there are potential links with Annex I habitats of the E.U. Habitats Directive (92/43/EEC). Cognisance was also taken of the Heritage Council guidelines, "*Best Practice Guidance for Habitat Survey and Mapping*", (Smith *et al.*, 2011). The relative abundances of flora was determined using the DAFOR Scale, an acronym for the abundance levels – Dominant, Abundant, Frequent, Occasional and Rare.

During site walkovers, any notable flora species were recorded, with an emphasis on statutorily protected or rare species, species of conservation significance and invasive species.

Fauna Survey (Excluding Bats)

A dedicated fauna survey was undertaken during bright and dry weather conditions, with any signs of fauna activity detected during other ecological surveys also recorded. Direct observation methods were used for the survey of fauna, however, these methods may not be suitable for shy and nocturnal species. Therefore, indirect methods were also employed, focusing on evidence of fauna including tracks, burrows/setts/nests, droppings, food items

and hair. The habitats on site were assessed for signs of usage by fauna, and the potential to support protected or red-listed species.

A general invertebrate survey was included as part of the fauna survey. In particular, areas of the site with Devil's-bit Scabious (*Succisa pratensis*), or with the potential to support Devil's-bit Scabious, were surveyed for the presence of Marsh fritillary (*Euphydryas aurinia*).

Any fauna, or signs of fauna, encountered during other ecological assessments, such as the habitat and flora survey, were also recorded as part of this assessment.

Bat Survey

Areas within the proposed development site with the potential to support bat roosts and / or foraging / commuting routes, and which have the potential to be impacted upon by the proposed development were the main focus of the surveys outlined below. No assessments were undertaken for the parcel of land to the south of the L3010, as no works are proposed for this area.

Assessment of Bat Roost Potential

Two daytime assessments of individual trees, treelines and hedgerows within the proposed development site potentially affected by the proposed development were undertaken on the 21st of September 2018 and the 4th of January 2019. Assessments were also undertaken on the existing abattoir building scheduled for upgrade and the agricultural buildings onsite.

The assessments comprised of an external inspection of trees and external and / or internal inspection of buildings to identify potential roost features (PRFs) and evidence of bat activity, using close focusing binoculars. The criteria used to categorise the PRFs or suitability of trees and buildings as a potential roost are summarised in the table below, based upon the guidelines by Collins (2016) and Hundt (2012).

Table 9.4: Bat Roost Potential Categories

CATEGORY	DESCRIPTION
High Trees / buildings that are suitable for use by large numbers of bats on a regular basis	Features include holes, cracks or crevices that extend or appear to extend back to cavities suitable for bats. In buildings, examples include eaves, barge boards, gable ends and corners of adjoining beams, ridge and hanging tiles, behind roofing felt or within cavity walls. In trees, examples include hollows and cavities, rot holes, cracks/splits and flaking or raised bark which could provide roosting opportunities. Any ivy cover is sufficiently well-established and matted so as to create potential crevices beneath. **Further survey work would be required to determine whether or not bats are present, and if so, the species present. Appropriate mitigation and potential licencing requirements may then be determined.**
Moderate Moderate potential is assigned to trees /	From the ground, building / tree appears to have features (e.g. holes, cavities, cracks or dense ivy cover) that may extend back into a cavity. However, owing to the characteristics of the feature, they are

CATEGORY	DESCRIPTION
structures with potential to support bat roosts but supports fewer features than a high potential building / tree and is unlikely to support a roost of high conservation value.	deemed to be sub-optimal for roosting bats. **Further survey work would be required to determine whether or not bats are present, and if so, the species present. Appropriate mitigation and potential licencing requirements may then be determined.**
Low Low potential is assigned to structures and trees with features that could support individual bats opportunistically.	If no features are visible, but owing to the size, age and/or structure, hidden features, sub-optimal for roosting bats, may occur that only an elevated inspection may reveal. In respect of ivy cover, this is not dense (i.e. providing PRF in itself) but may mask presence of PRF features. **Further survey work may be required for buildings only or works may proceed using reasonable precautions (e.g. controlled working methods, under license or supervision of a bat worker).**

Bat Activity Survey

A bat activity survey was undertaken on the 26th of September 2018 to provide a sample of the species present at the site and the level of activity. The survey was undertaken in good weather conditions, in dry and calm conditions, with temperatures ranging from 14-16°C, which is above the guidance level of 10°C and above.

The main areas of focus for the bat activity survey comprised the area in which the main slaughtering facility would be constructed, which would require some hedgerow removal works and the installation of artificial lighting. A bat activity survey was not undertaken in the western and northern sections of the site as the change in site boundary occurred after the activity survey on the 26th of September 2018. This is further discussed in the "*Survey Limitations*" section below.

The bat activity survey commenced approximately 15 minutes before dusk, and continued for approximately two hours. The activity survey comprised of a series of transects, as shown in Attachment 9.1.1. The transects included listening points approximately every 60-80m along each transect, with the exception of Transect Line No. 3, which had listening points approximately every 100m. Transects were walked at a consistent pace, with surveyors stopping for approximately five minutes at each listening point. Bat activity and the use of potential foraging and commuting habitats were recorded along each transect using a handheld heterodyne bat detector.

Bird Survey

General bird usage of the proposed development site was assessed on the 22nd of October 2018 and the 4th of January 2019. The two bird surveys were undertaken using the point transect method (Gregory *et al.*, 2004), a combination of the line transect method and point count method, which increases the probability of detection of shyer bird species. Additional point counts were also undertaken on both occasions. Cognisance was also taken from Bibby *et al*. (2000) and Brown and Shepherd (1993).

As recommended by Bibby *et al*. (2000), the surveys were undertaken at least 30 minutes

after dawn, during a period of high bird activity, but when birds are not too vocal to make distinguishing them difficult. Pre-determined routes were walked at a standard pace of approximately 8-10m/minute, with a two minute stop approximately every 50-60 metres. During these intervals, the area was scanned with binoculars as far as the terrain or weather conditions allowed. Additional point counts lasted from five to ten minutes in duration. The locations of the point transect routes and point counts are included as Attachment 9.1.2.

Birds were identified by visual sightings and auditory identification of songs and calls and recorded on field sheets. Birds flying overhead were also included as part of the surveys. Given that the layout of the routes covered a large proportion of the proposed development site, distance bands were not used. Records of all bird species encountered were later transferred to summary tables and maps.

Field surveys were complemented by desktop research, including baseline assessments undertaken by Fehily Timoney and Company for the Meenwaun Wind Farm (located adjacent the proposed development site) in 2015. Bird species encountered during other ecological assessments, such as the habitat and flora survey, were also recorded as part of this assessment.

Water Quality / Macroinvertebrate Monitoring

This survey is discussed in detail in Section 10 of this EIAR.

Surveys Scoped Out

The following ecological features were scoped out:

Fish surveys: The aquatic features identified at the proposed development site comprise of drainage ditches and the Feeghroe Stream. The majority of the drainage ditches are limited in size and water volume, with many of the ditches dry during some of the ecological site assessments. It is not considered that the drainage ditches onsite would have the potential to support fish species. No works, with the exception of the construction of an outlet pipe, would take place within the vicinity of the Feeghroe Stream. It is considered that the water quality and macroinvertebrate monitoring undertaken as part of this EIAR, and discussed in Section 10, is sufficient in assessing the potential impact of the development upon current water quality, which would indicate if there is a potential for the proposed development to impact upon fish species present within the immediate area.

Reptile surveys: Areas of the study area may provide suitable basking and refuge habitat for protected viviparous lizard (*Zootoca vivipara).* The numbers of viviparous lizard, if present at the site, are likely to be low and unlikely to be picked up in survey.

Survey Limitations

Every effort has been made to provide an accurate assessment of the situation pertaining to the site. However, an ecological survey can only assess a site at a particular time, and is limited by various factors such as the season, timing of the survey, climatic conditions and species behaviour. Ecological surveys are therefore snapshots in time and should not be regarded as a complete study. Direct observations or evidence of protected species is not

always recorded during ecological surveys. However, this does not indicate that the species is absent from the site.

The project's timeframe resulted in site assessments being undertaken during the September – December period. Therefore, breeding bird surveys, including for breeding waders, were not undertaken as part of this project.

To ensure any limitations encountered did not significantly impact upon the findings of the ecological assessments, the ecological surveys undertaken also assessed the potential of the habitats to support protected species and breeding birds, and cognisance has been taken of available online baseline data (e.g. flora and fauna records from the NBDC, consultation with NPWS regarding protected / threatened species, previous surveys undertaken by Fehily Timoney and Company for the Meenwaun Wind Farm) and a precautionary approach taken.

Bats

The bat activity survey was undertaken at the end of the optimal survey season, May to September. While surveys undertaken in September may pick up mating or transitory roosts, they may fail to pick up maternity roosts which are best identified in May to July.

It should be noted that the extent of the proposed site boundary was increased in January 2019 to facilitate revisions in the proposed development design, the site access and the proposed ICW system. It was also established in February 2019 that road widening works from the Boheradurrow crossroads to the proposed site access would be required. As these amendments to the overall proposed development design arose after September 2018, outside of the optimal bat survey season, it was not possible to undertake a bat activity survey within these areas.

However, the above are not considered major limitations at the proposed development site, given that the PRF assessment was undertaken for all areas of hedgerow and treeline removal, in addition to the buildings onsite, and given that the bat activity survey undertaken for the eastern and central portions of the site would likely be representative of the proposed development site in general for its usage by bats for commuting and foraging. Furthermore, cognisance has been taken of available baseline data, including consultation with Bat Conservation Ireland, for records of bats and bat roosts in the area. While a number of trees scheduled for removal had dense ivy cover, mitigation measures are included in Section 9.8 to ensure trees are re-examined prior to felling.

9.3.5 ECOLOGICAL VALUATION CRITERIA

The ecological value of the habitats and species identified at the development site have been assessed following the criteria outlined in the 2009 NRA guidelines, and is consistent with *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal* (CIEEM, 2016).

9.4 CONSULTATION

Consultation has been undertaken with the following statutory bodies and competent authorities with regards biodiversity:

- National Parks and Wildlife Service (NPWS);
- Inland Fisheries Ireland (IFI);
- Offaly County Council.

Further details of consultations are included in Section 2.4 and Attachment 9.2.

9.5 DESCRIPTION OF EXISTING ENVIRONMENT

9.5.1 DESIGNATED SITES

The proposed development does not directly impinge on any designated site. In total, there are 26 designated sites located within 15km of the proposed development: 13 Special Area of Conservation (SAC), 5 Special Protection Area (SPA) and 8 Natural Heritage Area (NHA). There are also 25 proposed Natural Heritage Area (pNHA) sites.

It should be noted that a number (12) of NHA and pNHA sites are also designated as SAC or SPA sites. Furthermore, a small number of sites are designated as both SAC and SPA sites. Maps detailing these designated sites in relation to the proposed development are included in Attachment 9.3.

The following tables detail the SAC, SPA, NHA and pNHA sites located within 15km of the proposed development.

Table 9.5: SAC Sites within 15km of the Proposed Development

SITE NAME	SITE CODE	DISTANCE TO PROPOSED DEVELOPMENT	QUALIFYING INTERESTS
All Saints Bog and Esker SAC	000566	2.1km S-W	[6210] Orchid-rich Calcareous Grassland* [7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation [91D0] Bog Woodland*
River Shannon Callows SAC	000216	3.2km N-W	[6410] Molinia Meadows [6510] Lowland Hay Meadows [8240] Limestone Pavement* [91E0] Alluvial Forests* [1355] Otter (*Lutra lutra*)
Ridge Road, SW of Rapemills SAC	000919	3.7km S	[6210] Orchid-rich Calcareous Grassland*
Redwood Bog SAC	002353	7.9km S-W	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation
Ballyduff / Clonfinane Bog SAC	000641	9.5km S-W	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation [91D0] Bog Woodland*
Moyclare Bog SAC	000581	10.4km N	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation
Arragh More (Derrybreen) Bog SAC	002207	12.1km S-W	[7120] Degraded Raised Bog
Kilcarren-Firville Bog SAC	000647	12.9km S-W	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation
Lisduff Fen SAC	002147	13km S-E	[7220] Petrifying Springs* [7230] Alkaline Fens

SITE NAME	SITE CODE	DISTANCE TO PROPOSED DEVELOPMENT	QUALIFYING INTERESTS
			[1013] Geyer's Whorl Snail (*Vertigo geyeri*)
Sharavogue Bog SAC	000585	13.3km S	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation
Ferbane Bog SAC	000575	13.3km N-E	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation
Island Fen SAC	002236	14.km S-E	[5130] Juniper Scrub [7230] Alkaline Fens
Finn Lough (Offaly) SAC	000576	15km N	[7230] Alkaline Fens [1013] Geyer's Whorl Snail (*Vertigo geyeri*)

**Denotes a priority habitat*

Table 9.6: SPA Sites within 15km of the Proposed Development

SITE NAME	SITE CODE	DISTANCE TO PROPOSED DEVELOPMENT	SPECIAL CONSERVATION INTEREST
All Saints Bog SPA	004103	2.4km S-W	[A395] Greenland White-fronted Goose (*Anser albifrons flavirostris*)
Middle Shannon Callows SPA	004096	3.2km W	[A038] Whooper Swan (*Cygnus cygnus*) [A050] Wigeon (*Anas penelope*) [A122] Corncrake (*Crex crex*) [A140] Golden Plover (*Pluvialis apricaria*) [A142] Lapwing (*Vanellus vanellus*) [A156] Black-tailed Godwit (*Limosa limosa*) [A179] Black-headed Gull (*Chroicocephalus ridibundus*) [A999] Wetland and Waterbirds
River Little Brosna Callows SPA	004086	4.3km S-W	[A038] Whooper Swan (*Cygnus cygnus*) [A050] Wigeon (*Anas penelope*)

SITE NAME	SITE CODE	DISTANCE TO PROPOSED DEVELOPMENT	SPECIAL CONSERVATION INTEREST
			[A052] Teal (*Anas crecca*) [A054] Pintail (*Anas acuta*) [A056] Shoveler (*Anas clypeata*) [A140] Golden Plover (*Pluvialis apricaria*) [A142] Lapwing (*Vanellus vanellus*) [A156] Black-tailed Godwit (*Limosa limosa*) [A179] Black-headed Gull (*Chroicocephalus ridibundus*) [A395] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A999] Wetland and Waterbirds
Dovegrove Callows SPA	004137	4.8km S	[A395] Greenland White-fronted Goose (*Anser albifrons flavirostris*)
River Suck Callows SPA	004097	13.2km N-W	[A038] Whooper Swan (*Cygnus cygnus*) [A050] Wigeon (*Anas penelope*) [A140] Golden Plover (*Pluvialis apricaria*) [A142] Lapwing (*Vanellus vanellus*) [A395] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A999] Wetland and Waterbirds

Table 9.7: NHA Sites within 15km of the Proposed Development

SITE NAME	SITE CODE	DISTANCE TO PROPOSED DEVELOPMENT
River Little Brosna Callows NHA	000564	4.3km S-W
Kilnaborris Bog NHA	000284	7.4km N-W
Killeen Bog NHA	000648	8.8km S
Ballymacegan Bog NHA	000642	11km W
Arragh More Bog NHA	000640	12km S-W
Lorrha Bog NHA	001684	12.6km S-W
Meeneen Bog NHA	000310	13.1km W
Suck River Callows NHA	000222	13.1km N

Table 9.8: pNHA Sites within 15km of the Proposed Development

SITE NAME	SITE CODE	DISTANCE TO PROPOSED DEVELOPMENT
All Saints Bog and Esker pNHA	000566	2.1km S-W
Banagher (Domestic Dwelling) pNHA	000567	3km N-E
River Shannon Callows pNHA	000216	3.2km N-W
Ridge Road, SW of Rapemills pNHA	000919	3.7km S
Lough Coura pNHA	000909	3.8km E
Ross and Glenns Eskers pNHA	000920	4.1km S
Woodville Woods pNHA	000927	4.3km S-E
Grand Canal pNHA	002104	5.1km N
Dovegrove Callows pNHA	000010	5.4km S
Cloghanbeg pNHA	002059	5.5km W
Redwood Bog pNHA	000654	8km S-W
Birr (Domestic Dwelling No.1) pNHA	000569	8.5km S
Birr (Domestic Dwelling No.2) pNHA	000568	8.7km S-E
Ballyduff / Clonfinane Bog pNHA	000641	9.6km S-W
Bracken's Dwelling pNHA	002058	10.2km S-E
Moyclare Bog pNHA	000581	10.4km N
Clonfert Cathedral pNHA	000244	10.6km N-W
Lough Boora pNHA	001365	12.3km N-E
Kilcarren-Firville Bog pNHA	000647	13km S-W
Sharavogue Bog pNHA	000585	13.3km S
Ferbane Bog pNHA	000575	13.3km N-E
Clonlyon Glebe Bog pNHA	000893	13.9km N-E
Derrykeel Meadows pNHA	000897	14.1km S-E
Clorhane Wood pNHA	000894	14.7km N-W
Finn Lough (Offaly) pNHA	000576	15km N

There are no RAMSAR sites or national parks located within 15km of the proposed development. Redwood Bog, designated as an SAC and pNHA, is also designated as a nature reserve.

For this assessment, the SAC and SPA sites considered to be within the potential zone of influence of the proposed development are All Saints Bog and Esker SAC (Site Code: 000566), River Shannon Callows SAC (Site Code: 000216), Redwood Bog SAC (Site Code: 002353), All Saints Bog SPA (Site Code: 004103), Middle Shannon Callows SPA (Site Code: 004096), River Little Brosna Callows SPA (Site Code: 004086), Dovegrove Callows SPA (Site Code: 004137) and River Suck Callows SPA (Site Code: 004097), due to hydrological connectivity / potential hydrological connectivity, distances from the proposed development site and / or the potential for ex-situ impacts of the development upon wintering wildfowl.

The remainder of the SAC and SPA sites within 15km of the development site are not considered to be within the potential zone of influence of the proposed development, as they are not hydrologically connected to the site and / or are located a considerable distance from the site.

For this assessment, only one NHA site is considered to be within the potential zone of influence of the proposed development site, River little Brosna Callows NHA, given the potential ex-situ impacts of the proposed development upon wintering wildfowl. The remainder of the NHA sites within 15km of the proposed development site, as listed in Table 9.7 above, are not considered to be within the zone of influence of the proposed development, given that these NHA sites are not located within the same catchment or immediately downstream of the proposed site, and given their distances to development site and in the absence of hydrological connectivity.

All Saints Bog and Esker SAC (Site Code: 000566)

The conservation objectives for the SAC site are to maintain or restore the favourable conservation condition of the qualifying interests. An excerpt from the site's Natura 2000 Data Form is included below.

This site contains good examples of the Annex I priority habitats active raised bog, bog woodland and orchid-rich dry grassland. In addition it contains examples of the non-priority habitats degraded raised bog and Rhynchosporion vegetation. The Birch (*Betula* spp.) woodland is of high quality and is the best developed bog woodland of its type in Ireland. The site supports a rich invertebrate fauna, including several insect species which are rare in Ireland or found only on this site. Part of the Little Brosna flock of Greenland White-fronted Geese may occasionally use the site during disturbance on the Little Brosna Callows. Another species listed on Annex I of the Birds Directive, Merlin (*Falco columbarius*) is also found on the site. The esker grassland on the site supports a large population of the rare Green-winged orchid (*Orchis morio*). Other rare plant species, Blue Fleabane (*Erigeron acer*) and Red Hemp-nettle (*Galeopsis angustifolia*), the latter protected in Ireland, are found in a quarry on the southern side of the site.

The main site vulnerabilities, including any key pressures or trends within and around the All Saints Bog and Esker SAC that have been identified as impacting upon the site, may be summarised as:

- Burning;
- Peat extraction;

- Sand and gravel extraction;
- Human induced changes in hydraulic conditions.

River Shannon Callows SAC (Site Code: 000216)

The conservation objectives for the SAC site are to maintain or restore the favourable conservation condition of the qualifying interests. An excerpt from the site's Natura 2000 Data Form is included below.

This site is the largest area of semi-natural floodplain grassland in Ireland and Britain and has very many features of a natural ecosystem. It has been placed among the most 'natural' floodplains in western Europe. It is subject to regular and prolonged annual winter flooding. Wooded alluvial islands which flood regularly occur at one location. A number of Red Data Book and scarce plant species occur on the site, the scarce species including Summer Snowflake (*Leucojum aestivum*), Great water-parsnip (*Sium latifolium*) and Gibbous Duckweed (*Lemna gibba*). In addition, the site contains a very wide variety of native plant species. A small area of limestone pavement at Clorhane is of particular importance as it is the only example of this habitat in the region.

Along with its tributary the Little Brosna (designated separately) this is one of the great waterfowl sites in Ireland, with huge numbers of a wide range of species occurring in winter. A small flock of Greenland White-fronted Goose regularly use a few locations on the site and these are part of the Internationally Important flocks of both the Little Brosna and the River Suck. It is one of very few significant inland sites in Britain or Ireland for Dunlin (*Calidris alpine*). It is the top site in the country for Mute Swan (*Cygnus olor*) and close to that for Whooper Swan, Lapwing and Golden Plover. The E.U. Birds Directive Annex I species, Hen Harrier (*Circus cyaneus*), regularly uses the site for hunting in autumn and winter. Perhaps even more important are its nesting Corncrake, Quail and breeding waders. In 1987, 1204 pairs of breeding waders were recorded (including adjacent parts of the Shannon), mainly Lapwing, Snipe (*Gallinago gallinago*), Curlew (*Numenius arquata*) and Redshank (*Tringa totanus*). Corncrake has one of its last strongholds here with 70 and 66 calling birds present in 1998 and 1999 respectively. The Shannon Callows is one of the few areas in Ireland where Quail breeds. There are high populations of ground-nesting passerines, such as Skylark (*Alauda arvensis*), Meadow Pipit (*Anthus pratensis*), Grasshopper Warbler (*Locustella naevia*) and Reed Bunting (*Emberiza schoeniclus*) on the site. The River Shannon Callows is a breeding site for two Red Data Book waterbird species: Black-tailed Godwit and Shoveler. The Red Data Book species Pintail has also bred on the site though its current status is unknown. The E.U. Birds Directive Annex I species Merlin, bred on the site in 1996. Large rivers flowing unfettered through lowland floodplains are now rare anywhere in Europe. This river, and its associated habitats, are of the highest conservation importance.

The main site vulnerabilities, including any key pressures or trends within and around the River Shannon Callows SAC that have been identified as impacting upon the site, may be summarised as:

- Human induced changes in hydraulic conditions;
- Lack of grazing;
- Abandonment of cultivation, lack of mowing;

- Use of biocides, hormones and chemicals.

Redwood Bog SAC (Site Code: 002353)

The conservation objectives for the SAC are to restore the favourable conservation condition of the qualifying interests. An excerpt from the site's Natura 2000 Data Form is included below.

This extensive site contains good examples of active raised bog, degraded raised bog and Rhynchosporion vegetation. The area of active raised bog present is one of the largest in counties Tipperary and Offaly. The location of the bog within the flood-plain of the Shannon and Little Brosna rivers adds to its interest. Redwood Bog is a feeding site for the Little Brosna flock of Greenland White-fronted Goose, though its usage nowadays appears to be low. Overall, this site, part of which is a state-owned nature reserve, is considered as one of the most important, relatively intact raised bogs along the banks of the River Shannon.

The main site vulnerability, including any key pressures or trends within and around the Redwood Bog SAC that has been identified as impacting upon the site, may be summarised as peat extraction.

All Saints Bog SPA (Site Code: 004103)

The conservation objectives for the site are to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. An excerpt from the site's Natura 2000 Data Form is included below.

The site is an important raised bog site with good examples of active raised bog, degraded raised bog, Rhynchoporian vegetation, as well as orchid-rich calcareous grassland. All Saints bog was formerly an important refuge for part of the internationally important population of Greenland White-fronted Goose based on the Little Brosna. The geese would utilise the bog when disturbed from the callows. In recent years, however, there has been less use of All Saint's following a general trend of less usage of raised bogs and also probably due to disturbance from peat milling activities on the bog adjacent to the site. Merlin has been seen on the bog during the breeding season and probably nests. The site supports several rare invertebrate species and the esker ridge supports three Red Data plant species.

The main site vulnerabilities, including any key pressures or trends within and around the All Saints Bog SPA that have been identified as impacting upon the site, may be summarised as:

- Peat extraction;
- Sand and gravel extraction;
- Agricultural practices including fertilisation and grazing.

Middle Shannon Callows SPA (Site Code: 004096)

The conservation objectives for the SPA site are to maintain or restore the favourable conservation condition of the bird species and habitat listed as Special Conservation Interests for this SPA. An excerpt from the site's Natura 2000 Data Form is included below.

This site is the largest area of semi-natural floodplain grassland in Ireland and has very many features of a natural ecosystem. Along with its main tributaries the River Suck and River Brosna, it represents one of the most important wetland systems in the country. It is of International Importance for wintering waterfowl as numbers regularly exceed the 20,000 threshold. Of particular note is the presence of an Internationally Important population of Whooper Swan. A further five species have populations of national importance: Mute Swan, Wigeon, Golden Plover, Lapwing and Black-tailed Godwit.

The Shannon callows are also of high importance for breeding birds. In particular, it has the largest concentration of Corncrake in Ireland. Quail, a very rare species in Ireland, also breeds in the grasslands. Several wader species, notably Lapwing, Snipe and Redshank, have important breeding populations though these have declined substantially since the 1980s. The scarce breeding species, Shoveler, nests in small numbers each year. The callows is one of the very few sites in Ireland where Black-tailed Godwit has bred. The habitats also support a range of ground nesting passerine species, notably Grasshopper Warbler and Skylark. In autumn and winter, Hen Harrier is a regular visitor.

The main site vulnerabilities, including any key pressures or trends within and around the Middle Shannon Callows SPA that have been identified as impacting upon the site, may be summarised as:

- Grazing;
- Nautical sports;
- Human habitation.

River Little Brosna Callows SPA (Site Code: 004086)

The conservation objectives for the SPA site are to maintain or restore the favourable conservation condition of the bird species and habitat listed as Special Conservation Interests for this SPA. An excerpt from the site's Natura 2000 Data Form is included below.

The site follows the River Brosna from its confluence with the River Shannon for approximately 9km south-eastwards. The main habitat present is grassland that is improved to varying extents and which is seasonally flooded. The less improved areas are species-rich. The grassland is used mainly for pasture but some is used for hay-making. The river channel is fringed by swamp and marsh vegetation. The site adjoins several raised bogs and cutover bogs.

This site is of international importance because it regularly supports in excess of 30,000 waterfowl and is rated among the top five sites in the country for numbers of wintering birds. At a species level it supports internationally important populations of Greenland White-fronted Goose and Black-tailed Godwit. The Greenland White-fronted Goose flock is the largest outside of the Wexford Slobs, whilst the Black-tailed Godwit population accounts for over 15% of the national total and is the largest in the country. It has nationally important populations of a further seven species: Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover and Lapwing. The Wigeon population is over 10% of the national total, whilst the Pintail, Shoveler and Golden Plover populations are over 5% of the respective totals. The Dunlin population is notable as inland populations of this species are rare. It has substantial nesting populations of Snipe and Redshank, though the numbers of nesting waders has

decreased since the 1980s. Corncrake formerly bred but not since the early 1990s. This site provides one of the few remaining examples in the country of a large river system which still floods in a fairly natural way.

The main site vulnerabilities, including any key pressures or trends within and around the River Little Brosna Callows SPA that have been identified as impacting upon the site, may be summarised as:

- Mowing / cutting of grassland;
- Grazing;
- Agricultural fertilisation;
- Hunting.

Dovegrove Callows SPA (Site Code: 004137)

The conservation objectives for the SPA site are to maintain or restore the favourable conservation condition of the bird species and habitat listed as Special Conservation Interests for this SPA. An excerpt from the site's Natura 2000 Data Form is included below.

The site is situated on the Little Brosna River approximately 2km downstream of Birr and 11km from the confluence with the River Shannon. It is typical wet, callow grassland that floods regularly. Grazing is the principal landuse. Dovegrove Callows is of importance as a high water feeding site for the internationally important Little Brosna population of Greenland White-fronted Goose. Of particular significance is that it can support the entire flock when most other feeding sites are submerged by floodwater.

The main site vulnerability, including any key pressures or trends within and around the Dovegrove Callows SPA that has been identified as impacting upon the site is agricultural fertilisation.

River Suck Callows SPA (Site Code: 004097)

The conservation objectives for the SPA site are to maintain or restore the favourable conservation condition of the bird species and habitat listed as Special Conservation Interests for this SPA. An excerpt from the site's Natura 2000 Data Form is included below.

The River Suck is the largest tributary of the River Shannon. The site follows the river from Castlecoote, near Fuerty to its confluence with the River Shannon, a distance of approximately 70km. The main habitat is grassland, improved to varying extents, that is seasonally flooded. The less improved areas are species-rich. The grassland is used mainly for pasture but some is used for silage or occasionally hay-making. The river channel is fringed in places by swamp and marsh vegetation. The site adjoins several raised bogs and cutover bogs and there are turloughs in the vicinity.

The River Suck Callows is an important site for wintering waterfowl, with an internationally important population of Greenland White-fronted Goose centred within the site. This is one of the largest flocks in the country outside of the Wexford Slobs. Despite poor survey data for recent years, it is known that at least three species have populations of national importance:

Whooper Swan, Wigeon and Lapwing. Bewick's Swan (*Cygnus columbarius bewickii*) formerly occurred in significant numbers but has abandoned the site, in line with a marked contraction of range at a national level. Corncrake formerly bred but not since the early 1990s. This site provides one of the few remaining examples in the country of a large river system of which parts still flood in a fairly natural way.

The main site vulnerabilities, including any key pressures or trends within and around the River Suck Callows SPA that have been identified as impacting upon the site, are grazing and agricultural fertilisation.

River Little Brosna Callows NHA (Site Code: 000564)

The River Little Brosna Callows NHA is located 5km south-west of Banagher, Co. Offaly and stretches from the canal at the junction with the River Shannon, some 9km along the River Little Brosna. An excerpt from the site's Site Synopsis is included below.

The main habitat is the extensive area of low-lying callows on the floodplains of the River Little Brosna and River Shannon. These wet meadows are subject to prolonged flooding in winter and early spring. A wide range of callow pasture is present, with the vegetation influenced by the exact flooding regime and the peat content of the soil. The main grassland types present are alluvial, sedge-rich, calcareous and improved grasslands. Some improved agricultural pasture is included in the site and dry grassland occurs in the well-drained calcareous areas.

The raised bog habitat at Cloghan Demesne consists of a small dome of high bog with associated cutover, which supports characteristic raised bog vegetation and well developed hummock/ hollow complexes. A number of softer areas occur but none of these are quaking. There is a small flush to the east. Cutover surrounds all of the bog margins, and scrub encroachment has occurred to the north and north-east on old abandoned cutover. Mixed deciduous woodland, east of Cloghan Demesne is included in the site. Four remnants of raised bog are also included on the southern side of the Little Brosna with Annagh bog, the most easterly, being the largest and most intact.

The River Little Brosna Callows is an internationally important site for wintering waterfowl. Populations of Greenland White-fronted Geese and Black-tailed Godwit are of international importance. Populations of Whooper Swan, Wigeon, Teal, Pintail, Shoveler, Golden Plover and Lapwing are of national importance, while populations of Mute Swan, Mallard and Dunlin are of regional importance. The Brosna callows are also of importance for breeding waders, including Redshank, Snipe and Lapwing. The globally endangered Corn Crake formerly bred on the Brosna callows.

Damaging activities associated with this landuse include drainage and burning. These are all activities that have resulted in loss of habitat and damage to the hydrological status of the high bog, and pose a continuing threat to its viability.

The River Little Brosna Callows NHA is a site of considerable conservation significance, including as it does, a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. The site supports a good diversity of raised bog microhabitats including some hummock/hollow complexes. The presence of mature deciduous woodland adds to the overall habitat diversity. The close proximity to the River

Shannon increases the ecological interest and conservation value of the site. The site is of international importance for its waterfowl and is designated a Special Protection Area under the E.U. Birds Directive.

9.5.2 FLORA & HABITATS

The proposed development is located within a rural area, approximately 2.4km south-east of Banagher town, in an area primarily dominated by pasture land and peat bogs. The site is bordered to the north by bog woodland, to the south and east by agricultural grassland and to the west by the Feeghroe Stream and bog woodland.

Throughout the area, the land is farmed with fields enclosed with a varied mix of hedges, treelines, banks, drainage ditches and fences. Pasture is the primary agriculture type in the area. Residential property is generally dispersed along local roads. A number of one-off residences and farmyard complexes exist in the area. Meenwaun Wind Farm, currently comprising of four turbines, is located to the north of the proposed site, with the nearest turbine approximately 500m from the site boundary.

The proposed development site comprises of a number of agricultural fields, an existing abattoir with associated structures, agricultural buildings, two areas of previously disturbed ground, with field boundaries consisting of hedgerows, treelines, drainage ditches and the Feeghroe Stream.

During the site walkover, ten main habitats were identified. The dominant habitat at the site is improved agricultural grassland (GA1), measuring approximately 12 hectares in size. This habitat is dominated by ryegrasses (*Lolium* spp.), with some Buttercup (*Ranunculus* spp.), Clover (*Trifolium* spp.), Daisy (*Bellis perennis*), Dandelion (*Taraxacum* spp.), Dock (*Rumex* spp.), Ribwort Plantain (*Plantago lanceolata*) and Silverweed (*Potentilla anserina*) also present.

In the northern section of the site, wet grassland (GS4) habitat was identified, mainly comprised of rushes (*Juncus* spp.), including Soft Rush (*Juncus effusus*), and sedges (*Carex* spp.), with some Buttercup, Dock, Gorse (*Ulex europaeus*), Meadowsweet (*Filipendula ulmaria*), Nettle (*Urtica dioica*) and Silverweed.

A small section of the proposed site can be described as buildings and artificial surfaces (BL3) habitat, comprising of the existing abattoir and associated structures, the existing agricultural buildings and areas of hardstanding. Some vegetation has colonised certain areas of this habitat, including Cleavers (*Galium aparine*), Dandelion, Dock, Nettle and Ribwort Plantain.

Areas of previously disturbed ground, located to the north of the abattoir and in the surrounds of the agricultural buildings, were identified as recolonising bare ground (ED3) habitat, with frequently recorded grasses, including Cock's-foot (*Dactylis glomerata*), Yorkshire Fog (*Holcus lanatus*) and Bent grasses (*Agrostis* spp.), and frequently recorded Dock and Nettle. Other flora species present occasionally include Buttercup, Cleavers, Clover, Dandelion, Greater Plantain (*Plantago major*), Hedge Bindweed (*Calystegia sepium*), Knotgrass (*Polygonum aviculare*), Ribwort Plantain, Silverweed and Thistle (*Cirsium* spp.).

The field in the western portion of the development site was harvested and tilled, prior to the onsite habitat assessments. This area was not re-sown, and has been recolonised over time. It is now best characterised as recolonising bare ground, with various grasses, Cleavers, Daisy, Dandelion, Nettle, Shepherd's-purse (*Capsella bursa-pastoris*) and Thistle present.

The boundaries of the site and the internal field boundaries are comprised of hedgerows and treelines. Hedgerows (WL1) habitat at site mainly comprises of the internal field boundaries, in addition to the south-western boundary with the local L3010 road. Hedgerows (WL1) habitat at the site, with the exception of the south-western boundary, is mainly comprised of Blackthorn (*Prunus spinosa*) and Hawthorn (*Crataegus monogyna*). Tree and shrub species occasionally recorded include Ash (*Fraxinus excelsior*), Birch (*Betula* spp.), Elder (*Sambucus nigra*), Gorse and Willow (*Salix* spp.). The south-western boundary is mainly comprised of Blackthorn, Hawthorn and Elm (*Ulmus* sp.), with some Ash, Guelder-rose (*Viburnum opulus*), Sycamore (*Acer pseudoplatanus*) and Willow also present.

Ground and field layer flora recorded includes Bramble (*Rubus fruticosus*), Cleavers, Common Bird's-foot-trefoil (*Lotus corniculatus*), Cow Parsley (*Anthriscus sylvestris*), Nettle, Dandelion, Dock, Dog-rose (*Rosa canina agg.*), Hedge Bindweed, Herb-Robert (*Geranium robertianum*), Ivy (*Hedera helix*), Marsh Woundwort (*Stachys palustris*), Meadowsweet, Short-fruited Willowherb (*Epilobium obscurum*), Thistle and Vetch (*Vicia* spp.).

Treelines (WL2) habitat is located along the north-eastern boundary, and a small section (approximately 65m) of the western boundary. The north-eastern boundary is mainly comprised of Ash, Blackthorn and Hawthorn, while the western boundary is mainly comprised of Ash and Sycamore. Other trees / shrubs present include Birch, Elder, Guelder-rose, Oak (*Quercus* spp.) and Willow. Ground and field layer species recorded include Bramble, Dock, Dog-rose, Ferns, Herb-Robert, Hogweed (*Heracleum sphondylium*), Ivy, Nettle, Silverweed and Thistle. A section of treelines WL2 habitat is also present along the south-eastern boundary, and is comprised primarily of Alder (*Alnus glutinosa*) and Birch, with ground and field flora similar to that of the north-eastern boundary.

A section of bog woodland (WN7) habitat is present along the northern site boundary. This habitat is dominated by Downy Birch (*Betula pubescens*), with some Gorse, Hawthorn and Willow also present. Ground and field layer flora recorded includes Bramble, Bracken (*Pteridium aquilinum*), Ling (*Calluna vulgaris*), Marsh Woundwort, Meadowsweet and Silverweed.

An area of recently-felled woodland (WS5) occurs at the northern section of the site, where bog woodland (WN7) has been cleared. Brash and some tree stumps were noted in this area. The area has started to be recolonised by flora from adjacent habitats, comprising abundant sedges and rushes, including Soft Rush, frequently observed Purple Moor-grass (*Molinia caerulea*) and occasional Dock, Gorse and Ling.

Drainage ditches (FW4) habitat borders some sections of hedgerows and a section of treeline. Some sections of drainage ditches were dry during the habitat assessments on the 6th and 21st of September 2018, but contained water during other ecological surveys undertaken in October 2018 and January 2019. Flora noted within this habitat included Great Willowherb (*Epilobium hirsutum*), Redshank (*Persicaria maculosa*), Silverweed, Water-cress (*Rorippa nasturtium-aquaticum*) and Water Mint (*Mentha aquatica*).

The Feeghroe Stream, which flows along the north-western site boundary, was identified as depositing / lowland rivers (FW2) habitat. There was little to no aquatic vegetation within the stream itself, however flora recorded on the river margins included Bramble, Bulrush (*Typha latifolia*), Dock, Meadowsweet, Purple-loosestrife (*Lythrum salicaria*), Short-fruited Willowherb and Vetch.

The ten habitats identified as per the Fossitt habitat classification scheme for the proposed development are summarised in Table 9.9, and are shown on a habitat map included as Figure 9.1, and as Attachment 9.4. A photo log and full list of plants recorded are included in Attachments 9.5 and 9.6 respectively.

Table 9.9: Summary of Habitats Identified at the Proposed Development Site

HABITAT CLASSIFICATION HIERARCHY		
LEVEL 1	**LEVEL 2**	**LEVEL 3**
F – Freshwater	**FW** – Watercourses	**FW2 –** Depositing / lowland rivers
		FW4 – Drainage ditches
G – Grassland and marsh	**GA** – Improved grassland	**GA1** – Improved agricultural grassland
	GS – Semi-natural grassland	**GS4** – Wet grassland
W – Woodland and scrub	**WN** – Semi-natural woodland	**WN7** – Bog woodland
	WS – Scrub / transitional woodland	**WS5** – Recently-felled woodland
	WL – Linear woodland / scrub	**WL1** – Hedgerows
		WL2 – Treelines
E – Exposed rock and disturbed ground	**ED** – Disturbed ground	**ED3** – Recolonising bare ground
B – Cultivated and built land	**BL** – Built land	**BL3** – Buildings and artificial surfaces

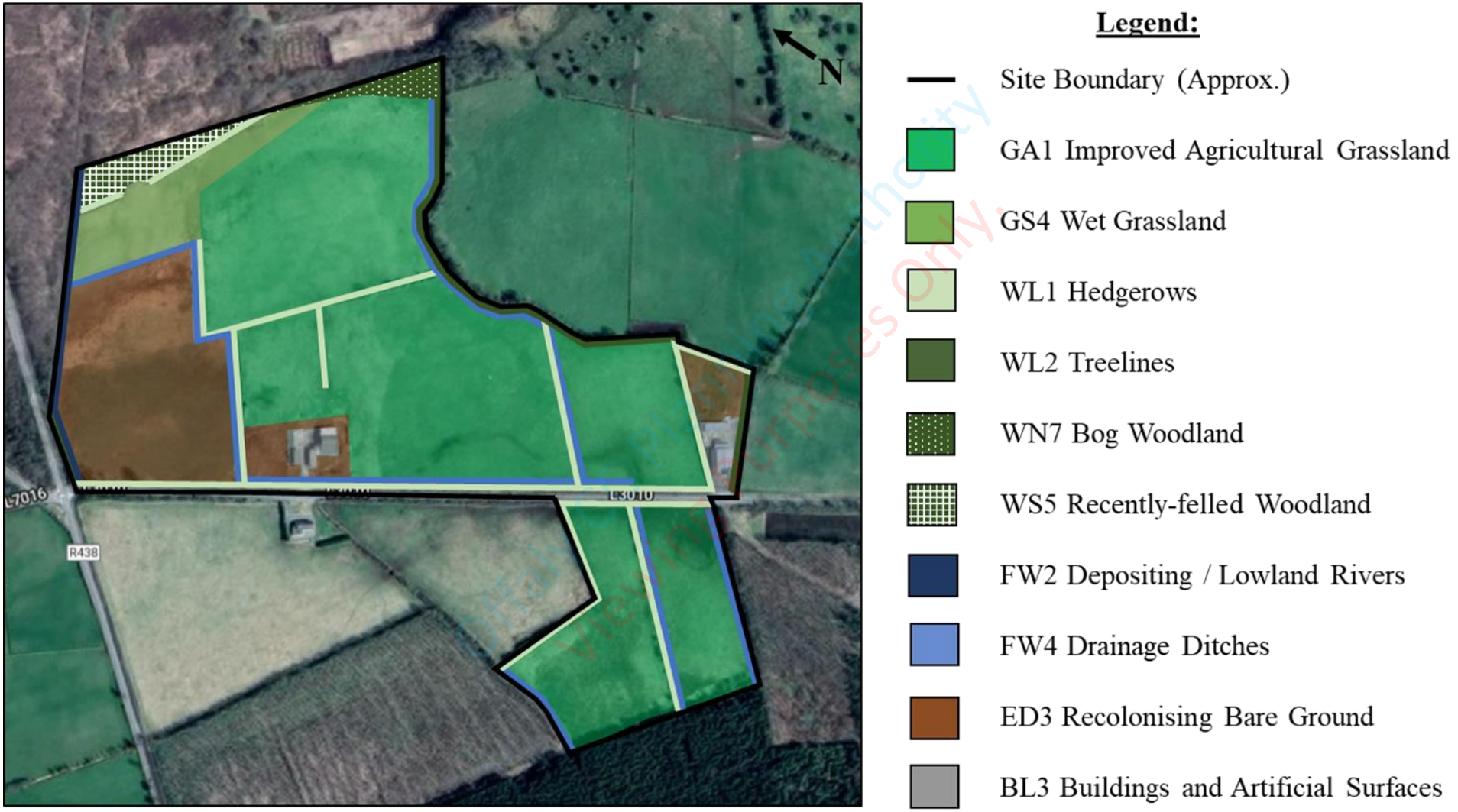

Figure 9.1: Habitat Map of Encountered Habitats at the Proposed Development Site, Banagher

The majority of the development site (approximately 80%), being comprised of improved agricultural grassland, buildings and artificial surfaces and recolonising bare ground habitat, can be considered to be of low ecological value. The remainder of the habitats of the site, comprising approximately 20% of the overall site, can be considered to be of moderate to high ecological value. No plant species of conservation significance or invasive plant species were noted during the site assessment.

Beyond the site boundary, improved agricultural grassland (GA1), dry siliceous heath (HH1), cutover bog (PB4), bog woodland (WN7) and conifer plantation (WD4) dominate.

9.5.3 FAUNA (EXCLUDING BATS)

Evidence of two species were recorded during ecological assessments of the development site; a Pine Martin (*Martes martes*) was observed on the 21st of September 2018, travelling along the southern site boundary, and Fox (*Vulpes vulpes*) tracks were recorded on the 4th of January 2019. There was no evidence of Badger (*Meles meles*), including setts or latrines, or of Otter (*Lutra lutra*), including spraints, tracks or holts, at the proposed development site.

Given the proposed development's location in a rural area, with agricultural land, bog woodland, hedgerows, treelines, peatlands and watercourses all within the surrounding area, mammals that would be expected to be found in the general area include Badger, Otter, Stoat (*Mustela erminea hibernica*), Hedgehog (*Erinaceus europaeus*), Irish Hare (*Lepus timidus hibernicus*), Rabbit (*Oryctalagus cuniculus*), Red Squirrel (*Sciurus vulgaris*), Grey Squirrel (*Sciurus carolinensis*), Pygmy Shrew (*Sorex minutus*), Wood Mouse (*Apodemus sylvaticus*), Common Rat (*Rattus norvegicus*), Red Deer (*Cervus elaphus*) and Fallow Deer (*Dama dama*).

Areas of the proposed development site may provide suitable basking and refuge habitat for Viviparous Lizard (*Zootoca vivipara*). The drainage ditches onsite, while limited in size and water volume, may have the potential to support Frog (*Rana temporaria*) and Smooth Newt (*Lissotriton vulgaris*). However, no evidence of these amphibians were recorded during the ecological site assessments.

With regards terrestrial invertebrates, the butterflies Small Copper (*Lycaena phlaeas*) and Speckled Wood (*Pararge aegeria*) were recorded. No Marsh Fritillary adults or caterpillars were recorded. It was considered that the study area does not contain suitable habitat for protected whorl snail species (*Vertigo* spp.).

9.5.4 FAUNA - BATS

Desk Based Review

Records of bat roosts were obtained from Bat Conservation Ireland (BCI) for the centre of the proposed development site to a distance of 10km. The consultation with BCI is provided in Attachment 9.7, in addition to the BCI bat records received within an approximate 10km radius of the proposed site. In summary, 11 known roosts have been recorded within 10km of the proposed development site, with the nearest known roost located approximately 4.5km to the west of the site close to Gortraven. This roost supported Leisler's Bat (*Nyctalus leisleri*). According to the BCI records for roosts, transects and ad hoc observations within 10km of the proposed development site, a total of eight species have been recorded, as follows:

- Common Pipistrelle (*Pipistrellus pipistrellus*);
- Soprano Pipistrelle (*Pipistrellus pygmaeus*);
- Nathusius' Pipistrelle (*Pipistrellus nathusii*);
- Daubenton's Bat (*Myotis daubentonii*);
- Natterer's Bat (*Myotis nattereri*);
- Whiskered Bat (*Myotis mystacinus*);
- Leisler's Bat (*Nyctalus leisleri*);
- Brown long-eared Bat (*Plecotus auratus*).

The NPWS's National Lesser Horseshoe Bat Roost Database was also consulted with regards any roost records for Lesser Horseshoe Bat (*Rhinolophus hipposideros*). The Lesser Horseshoe Bat is mainly confined to the west of Ireland, with the NPWS database indicating that this bat is absent from the midlands area.

Field Survey Results

Given the mainly agricultural use of the development site, with numerous hedgerows and some sections of treelines, the proposed development site can be considered to support suitable foraging and commuting habitat for bats.

Assessment of Bat Roost Potential – Trees

A total of nine mature trees were identified onsite which require removal to facilitate the proposed development, in addition to two areas which may require removal / thinning, as shown in Figure 9.2.

Figure 9.2: Locations of Proposed Tree Removal

The assessment of trees was based on external surveys undertaken visually from the ground. Five of the trees scheduled for removal were considered to have low potential to support a bat roost (see Table 9.10 below). Although no significant potential roost features were observed in any of the trees for removal, four mature trees were assessed as having moderate potential to support a bat roost, due to the fact that they had dense ivy cover which could provide suitable roosting opportunities for individual bats, or which could hide other suitable roost features.

Table 9.10: Trees Scheduled for Removal – Bat Roost Potential Categories

TREE NO.	SPECIES	PRF CATEGORY	COMMENT
1	Ash	Moderate	Young tree, unlikely to support significant PRFs. However, dense ivy cover obstructs view of potential PRF features.
2	Ash	Low	No PRFs visible. Limited ivy cover.
3	Sycamore	Low	No PRFs visible. Limited ivy cover.
4	Ash (dying)	Moderate	Unlikely to support significant PRFs. However, dense ivy cover obstructs view of potential PRF features.
5	Ash	Moderate	Unlikely to support significant PRFs. However, dense ivy cover obstructs view of potential PRF features.
6	Ash	Moderate	Unlikely to support significant PRFs. However, dense ivy cover obstructs view of potential PRF features.
7	Ash	Low	No PRFs visible. Some ivy cover.
8	Ash	Low	Young tree, unlikely to support significant PRFs. Some ivy cover.
9	Ash	Low	Young tree, unlikely to support significant PRFs. Some ivy cover.

The two areas of trees shown in Figure 9.2 above were also assessed for bat roost potential. Area 1 is comprised of young Alder and Birch, while Area 2 is comprised mainly of Downy Birch, Hawthorn and Willow. Given the relatively young age of the trees present in Areas 1 and 2, and in the absence of PRF features and ivy cover, these areas were assigned a "low" PRF category.

Assessment of Bat Roost Potential – Buildings

The existing abattoir building is constructed of concrete floors and walls, some metal cladding walls and a metal cladding roof. As this building was used for slaughtering and deboning activities, the building would have been appropriately sealed from a quality control perspective, with seals around openings (doors, windows, vents) and mesh screens over any vents or exhausts. An external inspection of the building confirmed that there were no potential bat access points to the main building. No evidence of bat usage (including droppings, urine staining, grease markings or prey remains) was recorded for this building. This building would therefore have a negligible potential to support a bat roost.

A small lean-to at the rear of the abattoir building was noted to have an opening in its roof. However, on inspection, this area was noted to be open in nature, uninsulated and unheated,

and would likely be penetrated by frost and damp during cold weather. Therefore, this area would have negligible bat roost potential.

The existing lairage, to the rear of the abattoir, was also considered to have a negligible potential to support a bat roost, given that it is open in nature, uninsulated and unheated, and would likely be penetrated by frost and damp during cold weather.

An assemblage of agricultural buildings / structures is located within the central portion of the site, comprising of a portal frame construction barn with concrete base walls and galvanised sheeting, with additional lean-to buildings. All roofs, with the exception of one lean-to structure, are comprised of steel and wood supports with galvanised sheeting. These structures therefore have negligible potential roost features, given their materials of construction and given that they are open in nature. One lean-to structure has a roof comprised of steel and wood supports with galvanised steel, similar to the other structures onsite, with the addition of roof felting. However, the roof felting was in disrepair and placed in contact with the galvanised sheeting, and therefore was considered to have negligible roosting potential. No evidence of bat usage (including droppings, urine staining, grease markings or prey remains) was recorded for these agricultural structures.

Figure 9.3: Example of structures at the proposed development site. Clockwise from top left: front of existing abattoir, lairage area, agricultural barn, agricultural structure.

Bat Activity

A total of three bat species were recorded using the proposed development site; Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat. The following table summarises the bat activity recorded onsite.

Table 9.11: Summary of Findings of Bat Activity Survey

TRANSECT NO.	SPECIES	TIME
1	Soprano Pipistrelle	20:01
	Soprano Pipistrelle	20:13
	Common Pipistrelle	20:21
2	Common Pipistrelle	20:26
3	Common Pipistrelle	21:05
	Leisler's	21:06
4	Leisler's	20:39
	Common Pipistrelle	20:45
	Soprano Pipistrelle	20:48
	Common Pipistrelle	20:51
	Leisler's	20:52

Bat activity was relatively low throughout the survey, which is not uncommon for the time of the year the survey was undertaken, when bats are starting to move into hibernation. Bat activity appeared to be the highest along Transect No. 4, which is an area of treeline habitat, with five recorded bat passes.

9.5.5 AVIFAUNA

Tables detailing all the bird species recorded during the two bird surveys, in addition to birds noted during other ecological assessments, are included within Attachment 9.8. A summary table of the species recorded is included below, which also details the protection and conservation concern statuses of the bird species encountered during the site assessments.

Table 9.12: Protection and Conservation Concern Statuses for Recorded Birds

COMMON NAME	SCIENTIFIC NAME	E.U. BIRDS DIRECTIVE	BOCCI* RED LIST	BOCCI* AMBER LIST
Blackbird	*Turdus merula*	-	-	-
Blue Tit	*Parus caeruleus*	-	-	-
Bullfinch	*Pyrrhula pyrrhula*	-	-	-
Buzzard	*Buteo buteo*	-	-	-
Chaffinch	*Fringilla coelebs*	-	-	-
Coal Tit	*Parus ater*	-	-	-
Dunnock	*Prunella modularis*	-	-	-
Goldfinch	*Carduelis carduelis*	-	-	-
Great Tit	*Parus major*	-	-	-
Hen Harrier	*Circus cyaneus*	✓	-	✓
Hooded Crow	*Corvus cornix*	-	-	-
House Sparrow	*Passer domesticus*	-	-	✓
Jackdaw	*Corvus monedula*	-	-	-
Jay	*Garrulus glandarius*	-	-	-
Kestrel	*Falco tinnunculus*	-	-	✓
Linnet	*Carduelis cannabina*	-	-	✓
Magpie	*Pica pica*	-	-	-
Meadow Pipit	*Anthus pratensis*	-	✓	-
Mistle Thrush	*Turdus viscivorus*	-	-	✓

COMMON NAME	SCIENTIFIC NAME	E.U. BIRDS DIRECTIVE	BOCCI* RED LIST	BOCCI* AMBER LIST
Pied Wagtail	*Motacilla alba*	-	-	-
Reed Bunting	*Emberiza schoeniclus*	-	-	-
Robin	*Erithacus rubecula*	-	-	✓
Rook	*Corvus frugilegus*	-	-	-
Snipe	*Gallinago gallinago*	-	-	✓
Starling	*Sturnus vulagaris*	-	-	✓
Swallow	*Hirundo rustica*	-	-	✓
Tree Sparrow	*Passer montanus*	-	-	✓
Woodpigeon	*Columba palumbus*	-	-	-
Wren	*Troglodytes troglodytes*	-	-	-

**The BoCCI (Birds of Conservation Concern in Ireland) List classifies bird species into one of three lists (Red, Amber or Green) based on their conservation status and conservation priority.*

A total of 29 bird species were recorded during the two bird surveys and other ecological assessments. One species, Meadow Pipit, is red listed under the BoCCI classification, while ten species are amber listed: Hen Harrier, House Sparrow, Kestrel, Linnet, Mistle Thrush, Robin, Snipe, Starling, Swallow and Tree Sparrow. One of the bird species recorded is listed under Annex I of the E.U. Birds Directive – Hen Harrier.

The species of birds with the most numbers recorded during the site assessments included Chaffinch, Linnet, Rook and Starling, all of which would be considered common in the area.

Three bird of prey species were recorded; Buzzard, Kestrel and Hen Harrier. A single sighting of a buzzard was recorded on the 21st of September 2018, with the individual passing over the proposed development site. A pair of kestrels was also recorded passing overhead on the 21st of September 2018, and were periodically observed hunting in the general area during the proceeding hour.

During the bird survey on the 4th of January 2019, a female hen harrier was recorded flying approximately 50m to the north of the site boundary at approximately 09:09, travelling in an east to west direction. The female was periodically observed flying over an area of bog to the north-west of the site from 09:09 to 10:20.

9.5.6 RECORDS OF PROTECTED, RARE AND INVASIVE SPECIES

National Biodiversity Data Centre Records

Flora and fauna records were reviewed on the National Biodiversity Data Centre (NBDC) website for the proposed development site and vicinity. Only one protected plant species under the Flora (Protection) Order, 2015 (S.I. No. 356 of 2015), Meadow Barley (*Hordeum secalinum*), was recorded within approximately 10km from the proposed development site.

A number of invasive plant species have been recorded within approximately 10km of the development site; Black Currant (*Ribes nigrum*), Canadian Waterweed (*Elodea canadensis*), Cherry Laurel (*Prunus laurocerasus*), Douglas Fir (*Pseudotsuga menziesii*), False-acacia (*Robinia pseudoacacia*), Fringed Water-lily (*Nymphoides peltata*), Giant Hogweed (*Heracleum mantegazzianum*), Giant Knotweed (*Fallopia sachalinensis*), Giant-rhubarb

(*Gunnera tinctoria*), Indian Balsam (*Impatiens glandulifera*), Japanese Knotweed (*Fallopia japonica*), Nuttall's Waterweed (*Elodea nuttallii*), Pitcherplant (*Sarracenia purpurea*), *Rhododendron ponticum*, Spanish Bluebell (*Hyacinthoides hispanica*), Sycamore (*Acer pseudoplatanus*), Three-cornered Garlic (*Allium triquetrum*), Traveller's-joy (*Clematis vitalba*), Wall Cotoneaster (*Cotoneaster horizontalis*) and Water Fern (*Azolla filiculoides*). Twelve of these invasive species are listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011); Canadian Waterweed, Fringed Water-lily, Giant Hogweed, Giant Knotweed, Giant-rhubarb, Indian Balsam, Japanese Knotweed, Nuttall's Waterweed, Rhododendron, Spanish Bluebell, Three-cornered Garlic and Water Fern.

Fauna records for the previous forty years were reviewed on the NBDC website for the two 2km squares (N01G and N01L) in which the proposed development is located. The bird species of note which may be present include Skylark (*Alauda arvensis*), House Sparrow, Starling, Woodpigeon, Stock Pigeon (*Columba oenas*), Golden Plover (*Pluvialis apricaria*), Northern Lapwing (*Vanellus vanellus*), Kestrel, Hen Harrier and Merlin (*Falco columbarius*), and the invasive species Greylag Goose (*Anser anser*).

Mammals of note include the protected species Otter, Badger, Red Squirrel, Pine Marten and Hedgehog, and the invasive species Grey Squirrel and Fallow Deer.

National Parks and Wildlife Services Records

Records of protected, rare or threatened flora and fauna species within 10km of the proposed development obtained from the NPWS are included in Tables 9.13 and 9.14 below.

Table 9.13: Records of Protected, Rare or Threatened Flora Species from the NPWS

COMMON NAME	SCIENTIFIC NAME	PROTECTION[1]	CONSERVATION STATUS[2,3]
Alder Buckthorn	*Frangula Alnus*	None	Least Concern
Blue Fleabane	*Erigeron acer*	None	Least Concern
Cephalozia macrostachya var. *macrostachya*	*Cephalozia macrostachya* var. *macrostachya*	None	Least Concern
Cladonia arbuscula	*Cladonia arbuscula*	None	Not Assessed
Cladonia ciliata	*Cladonia ciliata*	None	Not Assessed
Cladonia ciliate var. *ciliata*	*Cladonia tenuis*	None	Not Assessed
Cladonia ciliate var. *tenuis*	*Cladonia ciliate* var. *tenuis*	None	Not Assessed
Ephemerum hibernicum	*Ephemerum hibernicum*	None	Not Assessed
Fir Clubmoss	*Huperzia selago*	None	Not Assessed
Green-Winged Orchid	*Orchis morio*	None	Vulnerable
Henbane	*Hyoscyamus niger*	None	Near Threatened
Lustrous Bog-moss	*Sphagnum subnitens*	None	Least Concern
Magellanic Bog-moss	*Sphagnum magellanicum*	None	Least Concern
Meadow Barley	*Hordeum secalinum*	FPO	Vulnerable

COMMON NAME	SCIENTIFIC NAME	PROTECTION[1]	CONSERVATION STATUS[2,3]
Opposite-leaved Pondweed	*Groenlandia densa*	FPO	Near Threatened
Red Hemp-Nettle	*Galeopsis angustifolia*	FPO	Vulnerable
Reindeer Moss	*Cladonia rangiferina*	None	Not Assessed
Reindeer Moss	*Cladonia portentosa*	None	Not Assessed
Shepherd's-needle	*Scandix pecten-veneris*	None	Regionally Extinct
Smooth brome	*Bromus racemosus*	None	Near Threatened
Weissia controversa var. *densifolia*	*Weissia controversa* var. *densifolia*	None	Least Concern
Yellow Bird's-nest	*Monotropa hypopitys*	None	Near Threatened

Notes:
[1] HD II/IV = Habitats Directive Annexes II/IV; FPO = Flora Protection Order.
[2] Vascular flora from the Irish Red Data Book 1 Vascular Plants (Curtis and McGough, 1988; Wyse Jackson *et al.*, 2016); Bryophytes from the Irish Red List No. 8 (Lockhart *et al.*, 2012).
[3] IUCN Red list http://www.iucnredlist.org/ - accessed January 2019

Table 9.14: Records of Protected, Rare or Threatened Fauna Species from the NPWS

COMMON NAME	SCIENTIFIC NAME	PROTECTION[1]	CONSERVATION STATUS[2,3]
Badger	*Meles meles*	WA	Least Concern
Barn owl	*Tyto alba*	WA	High Concern - Red
Common Frog	*Rana temporaria*	WA	Least Concern
Fallow Deer	*Dama dama*	WA	Least Concern
Hedgehog	*Erinaceus europaeus*	WA	Least Concern
Irish Hare	*Lepus timidus hibernicus*	WA	Least Concern
Irish Stoat	*Mustela erminea hibernica*	WA	Least Concern
Marsh Fritillary	*Eurodryas aurinia*	HD II	Vulnerable
Otter	*Lutra lutra*	HD II/IV, WA	Near Threatened
Pine Marten	*Martes martes*	WA	Least Concern
Pygmy Shrew	*Sorex minutus*	WA	Least Concern
Red Squirrel	*Sciurus vulgaris*	WA	Near Threatened
Smooth Newt	*Lissotriton vulgaris*	WA	Least Concern
Viviparous Lizard	*Lacerta vivipara / Zootoca vivipara*	WA	Least Concern
White-clawed Crayfish	*Austropotamobius pallipes*	HD II, WA	Endangered

Notes:
[1] HD II/IV = Habitats Directive Annexes II/IV; WA = Wildlife Acts; BDI = Birds Directive Annex I.
[2] Terrestrial Mammal Red List (Marnell *et al.* 2009); Birds of Conservation Concern in Ireland 2014-2019 (Colhoun and Cummins, 2013); Red-listed Amphibians, Reptiles and Freshwater Fish (King *et al.* 2011); Red-listed Non-marine Molluscs (Byrne *et al.*, 2009).
[3] IUCN Red list http://www.iucnredlist.org/ - accessed January 2019

9.5.7 BASELINE ASSESSMENTS UNDERTAKEN FOR MEENWAUN WIND FARM

Ecological baseline assessments were undertaken by Fehily Timoney and Company for the Meenwaun Wind Farm in 2015, which is located adjacent the proposed development site.

Fauna – Excluding Bats

Fauna species recorded within the Meenwaun Wind Farm area, not recorded during onsite ecological assessments for the Banagher Chilling Limited proposed development, include the following:

- Red Squirrel: Two were observed in woodland within the Wind Farm site in January 2015;
- Irish Hare: Present throughout the Wind Farm site;
- Deer: Evidence of deer noted during winter surveys.

Fauna – Bats

The Meenwaun Wind Farm Bat Assessment Study notes that activity surveys were undertaken in June and August 2013. The results of these activity surveys were similar to the activity survey undertaken for Banagher Chilling Limited, with three species of bat (Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat) recorded for the area, with low activity. No roosts were identified for the area of trees within the vicinity of the wind turbine locations.

Avifauna

Bird species recorded within the Meenwaun Wind Farm area, not recorded during onsite ecological assessments for the Banagher Chilling Limited proposed development, are included within the following table:

Table 9.15: Protection and Conservation Concern Statuses for Recorded Birds during Baseline Studies for Meenwaun Wind Farm

COMMON NAME	SCIENTIFIC NAME	E.U. BIRDS DIRECTIVE	BOCCI* RED LIST	BOCCI* AMBER LIST
Blackcap	*Sylvia atricapilla*	-	-	-
Collared Dove	*Streptopelia decaocto*	-	-	-
Crossbill	*Loxia curvirostra*	-	-	-
Fieldfare	*Turdus pilaris*	-	-	-
Goldcrest	*Regulus regulus*	-	-	✓
Golden Plover	*Pluvialis apricaria*	✓	✓	-
Lesser Redpoll	*Carduelis cabaret*	-	-	-
Pheasant	*Phasianus colchicus*	-	-	-
Raven	*Corvus corax*	-	-	-
Redwing	*Turdus iliacus*	-	-	-
Siskin	*Carduelis spinus*	-	-	-
Song Thrush	*Turdus philomelos*	-	-	-
Sparrowhawk	*Accipiter nisus*	-	-	✓
Willow Warbler	*Phylloscopus trochilus*	-	-	-

The Environmental Impact Statement prepared for the Meenwaun Wind Farm notes that other bird species recorded in the general area, but not recorded within the wind farm development area, include the following:

- Whooper Swan (*Cygnus cygnus*): Flight observation of nine birds recorded flying overhead approximately 1.5km and 2km from the wind farm site;
- Golden Plover (*Pluvialis apricaria*): Maximum flock size of 41 birds recorded in an industrial bog to the north-east of the wind farm;
- Woodcock (*Scolopax rusticola*): Breeding territory identified within 500m of Turbine 1 (approximately 660m from the landholding boundary of Banagher Chilling Limited).

9.6 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development would comprise of the proposed upgrade and extension of an existing abattoir facility within the townlands of Meenwaun and Boheradurrow, at Banagher, Co. Offaly. The proposed development would also include the construction of stormwater and effluent drainage systems, water treatment plant, electrical sub-station, truck wash, security hut, waste and by-product area and gas compound, site access roads and all ancillary development including internal road surfacing, the provision of outdoor artificial lighting, an extension to the existing lairage facility and site landscaping.

Slaughtering activities at the proposed facility would typically operate Monday to Friday. However, slaughtering may be undertaken at weekends for reasons such as casualty animals and demand.

New stormwater and effluent drainage systems would be constructed. Stormwater from clean-yard areas and car parking areas would pass through a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system. From here, stormwater would be pumped to a manhole prior to discharge to the Feeghroe Stream.

All process drains, domestic drains and dirty yard surface water drains would be directed to the site's new WWTP, which would comprise of an inlet sump, meva screen, drum screen, balancing tank, dissolved air flotation (DAF) unit, sludge tank, anoxic tank, two aeration tanks, clarifier, sand filters and an outlet sump. From here, the treated final effluent would be directed to the proposed integrated constructed wetlands (ICWs), prior to discharge to the Feeghroe Stream.

The ICW system would comprise of a five-treatment cell system, with a functional wetland treatment area of 40,000m^2. Each cell would be densely planted with a selection of emergent plant species, including Reed Sweet-grass (*Glyceria maxima*), Common Sedge (*Carex riparia*), Reed Mace (*Typha latifolia*), Lesser Reedmace (*Typha angustafolia*) and Yellow Flag (*Iris pseudacorus*), along with a quantity of other suitable emergent plant species. The final cell, Cell 5, would differ from Cells 1-4, in that it would also be planted with a mixture of deciduous and evergreen tree species on mounds amongst the emergent wetland plants. These plants would assist in the many physical, chemical and biological processes that occur within the wetland system to reduce the through-flowing water of its various potential

pollutant contaminants, in addition to reducing the volume of final treated effluent discharging from the ICW to the receiving waters.

The replacement of agricultural land with the ICW system would add ecological value to the proposed development site, by providing wetland habitats for aquatic invertebrates, marginal and aquatic vegetation, amphibians and a range of breeding and wintering wildfowl.

Artificial outdoor lighting would be installed along the internal access network and within the main site yard. The lighting design for the development would be determined at a detailed design stage.

The expected construction timeframe would be approximately 18 months, with hours of operation from 7am to 7pm Monday to Friday, and 8am to 2pm on Saturdays. A temporary site compound would be established and would house the temporary offices, equipment and materials storage and construction staff welfare facilities. The temporary site compound would also be used for the storage of fuels and oils required for the various construction plant, in addition to housing waste receptacles.

To facilitate the proposed development, approximately 985m of hedgerow would require removal. This would include approximately 290m for the proposed abattoir extension, 265m for the ICW system and 430m to accommodate site access sightlines and road widening works. In addition to hedgerow removal works, an estimated 110m of treeline along the eastern boundary would require thinning to accommodate new boundary fencing, while an area of approximately 200m^2 of bog woodland would require removal to accommodate Cell 1 of the ICW system. The locations of hedgerow, treeline and woodland removal are detailed in Figure 9.4 below. It should be noted that a section of the hedgerow identified as "Hedgerow C" in Figure 9.4 below may not require removal, depending upon the final ICW design at the detailed design stage. However, for the purpose of the biodiversity assessment, it has been assumed that this section would be removed.

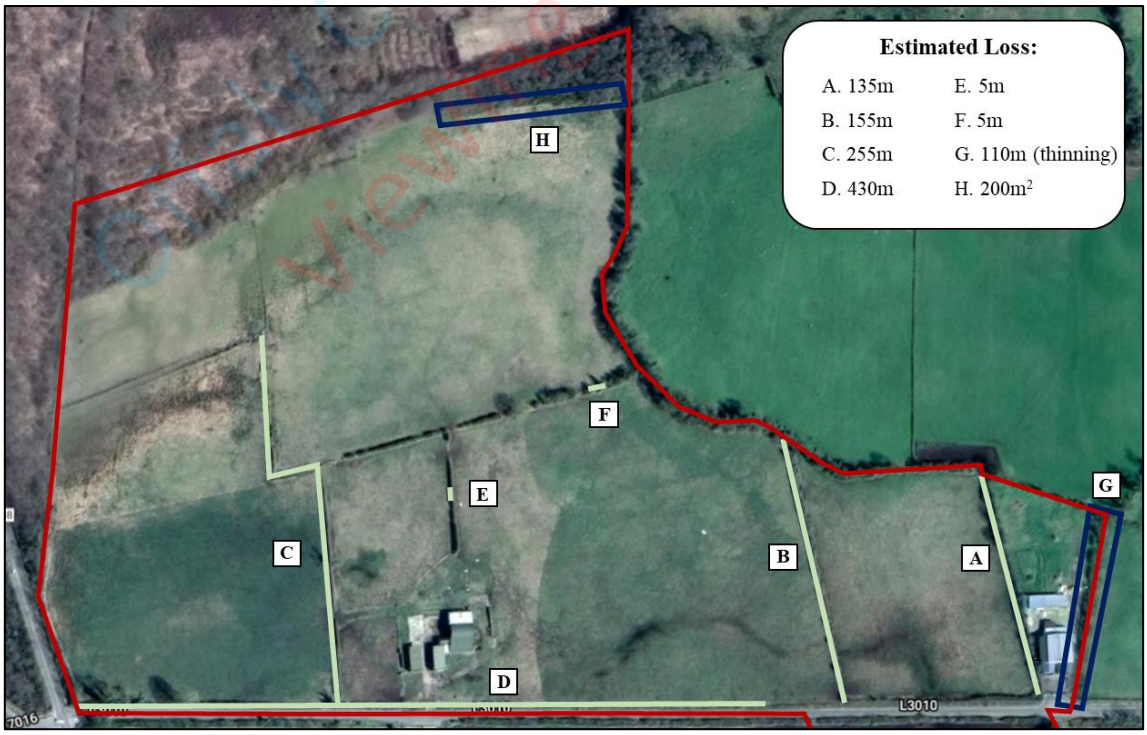

Figure 9.4: Locations of hedgerow, treeline and woodland removal

A landscaping plan has been prepared for the proposed development by Macro Works Ltd., and accompanies the application (Document Ref. LD.BNGHMPF). The landscape plan includes the replacement planting of approximately 400m of hedgerow, comprising of native species including Hawthorn, Blackthorn and Holly (*Ilex aquifolium*), along the southern site boundary, set-back from the site boundary, in addition to approximately 115m of hedgerow along the eastern ICW boundary.

Existing hedgerows and treelines would be bolstered with native tree species where required. The landscape plan also includes a section of proposed woodland planting adjacent the internal site access to the rear yard, which would be comprised of native species including Pendunculate Oak (*Quercus robur*), Scots Pine (*Pinus sylvestris*), Alder, Birch, Wild Cherry (*Prunus avium*), Crab Apple (*Prunus padus*), Hazel (*Corylus avellana*), Holly, Hawthorn, Blackthorn and Spindle (*Euonymus europaeus*).

Additional landscaping is proposed around the ICW site, using native trees and shrubs common to the area, including Hawthorn, Blackthorn, Birch, Alder and Willow.

9.7 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

9.7.1 DETERMINATION OF ECOLOGICAL VALUE

The ecological value of the habitat types and species identified at the proposed development site have been assessed following the criteria outlined in the National Roads Authority (NRA) guidelines (2009). Tables 9.16 and 9.17 below detail the habitats recorded and potential species, and their associated ecological value.

Table 9.16: Ecological Value of Identified Habitats of the Proposed Development

HABITAT TYPE	HABITAT RATING	KEY ECOLOGICAL RECEPTOR?
Depositing / lowland rivers (FW2)	Local importance, higher value	Yes. Joins with the River Shannon Callows SAC and Middle Shannon Callows SPA approximately 4km downstream of the site.
Drainage ditches (FW4)	Local importance, lower value	No. Mainly small in extent with limited volume. May provide suitable habitat for amphibians at times. Low ecological value.
Improved agricultural grassland (GA1)	Local importance, lower value	No. Species poor habitat. Low ecological value.
Wet grassland (GS4)	Local importance, higher value	Yes. May contain a high biodiversity.
Bog woodland (WN7)	Local importance, higher value	Yes. Area of semi-natural habitat, comprising mainly of native species.
Recently-felled woodland (WS5)	Local importance, higher value	No. While this area may contain a high biodiversity as flora recolonises from adjacent habitats, no works are proposed for this area.
Hedgerows (WL1)	Local importance,	Yes. Area of semi-natural habitat,

HABITAT TYPE	HABITAT RATING	KEY ECOLOGICAL RECEPTOR?
	higher value	comprising mainly of native species. May provide opportunities for bird nesting and foraging for bats.
Treelines (WL2)	Local importance, higher value	Yes. Area of semi-natural habitat, comprising of native and non-native species. May provide opportunities for bird nesting and foraging for bats.
Recolonising bare ground (ED3)	Local importance, lower value	No. Area of disturbed ground with recolonising vegetation. Low ecological value.
Buildings and artificial surfaces (BL3)	Local importance, lower value	No. Comprised of existing buildings and structures and areas of hardstanding. Low ecological value.

Table 9.17: Ecological Value of Species of the Proposed Development

SPECIES	SPECIES RATING	KEY ECOLOGICAL RECEPTOR?
Badger	Local importance, higher value	No. Not recorded within the vicinity of the proposed site.
Otter	Local importance, higher value	Yes. While not recorded within the vicinity of the development, it is possible otter are present within the area, given the presence of the Feeghroe Stream onsite and nearby Rapemills River and River Shannon.
Pine Marten	Local importance, higher value	Yes. One individual was sighted during a site walkover. Pine Marten are protected under the Wildlife Act.
Bats (foraging and commuting habitat only – no bat roosts identified)	Local importance, higher value	Yes. The hedgerows / treelines within and adjacent to the proposed development are likely to be utilised by bats for both foraging and commuting.
Other Fauna	Local importance, low to high value	No. Limited sightings / evidence of other fauna. Site has limited potential to support other fauna species.
Breeding Birds	Local importance, higher value	Yes. All birds, their nests, eggs and young are protected under the Wildlife Act.
Aquatic Fauna	Local importance, low to high value	Yes. Drainage ditches onsite may provide suitable habitat for amphibians, which are protected under the Wildlife Act.
Common Lizard	Local importance, higher value	Yes. Presumed present, but likely in low numbers. Protected under the Wildlife Act.

9.7.2 CONSTRUCTION PHASE

Designated Sites – SAC and SPA Sites

As discussed in detail in the NIS prepared for the project (Ref. No. PES_NIS_19_9201), and within Section 9.5.1 above, the SAC and SPA sites considered to be within the potential zone of influence of the proposed development are All Saints Bog and Esker SAC (Site Code: 000566), River Shannon Callows SAC (Site Code: 000216), Redwood Bog SAC (Site Code: 002353), All Saints Bog SPA (Site Code: 004103), Middle Shannon Callows SPA (Site Code: 004096), River Little Brosna Callows SPA (Site Code: 004086), Dovegrove Callows SPA (Site Code: 004137) and River Suck Callows SPA (Site Code: 004097), due to hydrological connectivity / potential hydrological connectivity, distances from the proposed development site and / or the potential for ex-situ impacts of the development upon wintering wildfowl.

The proposed development does not directly impinge on any part of a European site, and as such, would not be expected to have any in-situ effects upon a protected site through loss or destruction of habitat, fragmentation of habitat, disturbance of habitat or direct reduction in species density.

As the proposed development site is located in close proximity to a number of sites designated for wildfowl, the majority of which are wintering wildfowl, in addition to the River Shannon Callows SAC which is designated for otter, ex-situ habitat loss or fragmentation impacts due to the proposed development could occur.

While no evidence of otter (including holts, slides, spraints and tracks) were recorded during the ecological site assessments, given that the Feeghroe Stream passes along the western boundary of the site, and given that the development site is located in close proximity to the River Rapemills and River Shannon, it is likely that otter may be present within the vicinity. As noted in the NIS (Ref. No. PES_NIS_19_9201), the majority of the land-take required for the proposed development would comprise of habitats that are considered modified and of limited value to otter. The loss of wet grassland (GS4), hedgerows (WL1) and bog woodland (WN7) would not have a significant potential impact upon otter due to habitat loss or fragmentation, given the limited land-take required of these habitats and given the availability of more suitable otter habitat in the general area. Furthermore, the loss of these habitats would be mainly to facilitate the ICW system. The ICW system would be considered to benefit otter in the area by providing a wetland habitat that would support aquatic fauna, and which would potentially provide foraging opportunities for otters.

It is considered unlikely that the proposed development site would be of importance to the special conservation interests, given the distances from the SPA sites and given that no areas of fens, bogs, marshes, swamps, lakes or other open bodies of water are present on the proposed development site. However, in the unlikely event that designated wildfowl utilise the proposed development site, the proposed development would not have a significant adverse impact upon wildfowl due to habitat loss or fragmentation. The majority of the land-take required for the proposed development would comprise of habitats that are considered modified and of limited value to wildfowl. Furthermore, it is considered that the construction of the ICW system would be of benefit to wildfowl in the area by providing a wetland habitat, measuring approximately 40,000m^2 in size, which would provide suitable cover, resting and / or foraging areas.

The potential disturbance on protected species due to construction noise would not be considered significant, given transient nature of construction works and the distances between the development site and designated sites (with the nearest site with designated fauna, All Saints Bog SPA, located approximately 2.4km from the development site).

The potential disturbance on protected habitats and species due to dust during the construction phase would not be considered significant, given the transient nature of construction works, the scale of the proposed development and given the distances to the to the designated sites.

Activities as part of the construction of the development would not have the potential to cause a significant impact upon designated sites due to invasive species. There would be no significant import of materials with the potential to contain invasive flora species. Soils excavated during construction works would be stockpiled and re-used for site levelling and site landscaping where possible. Should topsoil be required to be imported to the site for landscaping purposes, this would be considered a low risk material, as vector materials containing invasive species are a "controlled waste" and would not be brought onto the site.

The proposed development is located within the Lower Shannon catchment (Shannon (lower) sub-catchment SC_040). Drainage from the site is currently directed to the Feeghroe Stream, with some drainage ditches to the south of the site either joining with the Feeghroe Stream or joining with the Milltown Stream. The Feeghroe and Milltown Streams join with the Rapemills River, which ultimately joins with the River Shannon.

Of the eight designated SAC and SPA sites considered to be within the potential zone of influence of the proposed development, three sites are located upstream of drainage from the site and are therefore not considered to be hydrologically connected: River Little Brosna Callows SPA, Dovegrove Callows SPA and River Suck Callows SPA. It is not considered that the proposed development would have the potential to impact upon Redwood Bog SAC, given that this site is located a considerable distance (13.25km) downstream of the development site and given the considerable dilution of the site's drainage within the Feeghroe Stream, Rapemills River and River Shannon. Furthermore, Redwood Bog SAC is located approximately 100m inland from the River Shannon watercourse.

During the construction phase of projects, a deterioration in water quality can arise through the release of uncured concrete, the release of suspended solids during soil disturbance works and the release of hydrocarbons (fuels and oils), which could potentially impact upon the River Shannon Callows SAC, Middle Shannon Callows SPA, All Saints Bog and Esker SAC and All Saints Bog SPA.

Construction works would last approximately 18 months in duration, and would be confined to the proposed development footprint. While the risk of water quality deterioration due to the proposed development would be considered low given the nature and scale of the development, the potential for construction works to impact upon the River Shannon Callows SAC, Middle Shannon Callows SPA, All Saints Bog and Esker SAC and All Saints Bog SPA cannot be ruled out in entirety, given that works would be undertaken in close proximity to the Feeghroe Stream and drainage ditches, in addition to the proposed outfall works at the Feeghroe Stream, which are hydrologically connected to the aforementioned designated sites.

Therefore, control measures are required to ensure that there would be no potential adverse impacts upon these designated sites. These control measures are outlined in Section 10.7.

Designated Sites – NHA Sites

As noted in Section 9.5.1, one NHA site, the River Little Brosna Callows NHA (Site Code: 000564), is considered to be within the potential zone of influence of the proposed development site. This NHA is also designated as the River Little Brosna Callows SPA, which is discussed above.

The proposed development does not directly impinge on this NHA site, and therefore would not be expected to have any in-situ effects through loss or destruction of habitat, fragmentation of habitat, disturbance of habitat or direct reduction in species density.

As noted in the section above, the NIS prepared for the development considered that there would be no significant adverse potential impact upon wildfowl due to habitat loss or fragmentation or due to potential disturbance including construction noise and dust.

It is not considered that the proposed development has the potential to impact upon this NHA site due to invasive species, given that there would be no significant import of materials with the potential to contain invasive flora species and excavated soils would be re-used in site levelling and landscaping. Should topsoil be required to be imported to the site for landscaping purposes, this would be considered a low risk material, as vector materials containing invasive species are a "controlled waste" and would not be brought onto the site.

It is not considered that the proposed development would have the potential to impact upon the River Little Brosna Callows NHA due to a potential deterioration in water quality, given that the NHA site is located upstream of drainage from the proposed development site, and therefore is not considered to be hydrologically connected to the development.

Habitats and Flora

The construction phase of the development would result in a direct and permanent loss of the existing habitats improved agricultural grassland (GA1), wet grassland (GS4), hedgerows (WL1), bog woodland (WN7), drainage ditches (FW4) and recolonising bare ground (ED3). While thinning / tree removal works would be required for a section of treelines (WL2) habitat along the eastern boundary, works would be minimal and would not result in the loss of this habitat. There would be no loss of the existing habitats depositing / lowland rivers (FW2), recently-felled woodland (WS5) or buildings and artificial surfaces (BL3). There would be no alternation in habitat use for the parcel of land to the south of the L3010, as there are no proposed development works for this area.

The majority of the land take would comprise of improved agricultural grassland and recolonising bare ground habitats, which are considered modified and of low ecological value. Some sections of drainage ditches (FW4) habitat would be lost to the proposed development, however, this habitat is considered to be of local importance (lower value) and is common to and typical of agricultural land in Ireland. Therefore, the loss of these habitats would not be considered significant.

The construction phase of the development would also result in a direct and permanent loss of some sections of habitats of local importance (higher value): wet grassland (GS4), hedgerows (WL1) and bog woodland (WN7). Approximately 2.3 acres of wet grassland, 985m of hedgerows and 200m^2 of bog woodland would be lost to the development footprint. It should be noted that a total of nine mature trees, comprised mostly of Ash, are present within the sections of hedgerows scheduled for removal to accommodate the proposed development.

However, the loss of the habitats considered as of local importance (higher value) at the site would not be considered significant, as the majority of these habitats would be lost to accommodate the integrated constructed wetlands (ICW) system, which may be best characterised as other artificial lakes and ponds (FL8) habitat. The ICW system would add ecological value to the development site, and may be considered as of local importance (higher value). As noted in Section 9.6, the area would be densely planted with a selection of native emergent species, including Reed Sweet-grass, Common Sedge, Reed Mace, Lesser Reedmace and Yellow Flag. The final cell, Cell 5, would be planted with a mixture of deciduous and evergreen tree species on mounds amongst the emergent wetland plants. It is estimated that approximately 77,500 emergent plant species and 2,500 native tree species would be planted within the ICW system, which would be a considerable positive impact of the development.

With regards hedgerow habitat loss and the removal of nine mature trees, it is proposed to replant approximately 400m of the hedgerow along the southern site boundary with native species, in addition to the replanting of approximately 115m of hedgerow along the eastern boundary of the ICW system. Furthermore, as outlined in the landscaping plan prepared for the site by Macro Works Ltd. (Document Ref. LD.BNGHMPF), existing hedgerows and treelines would be bolstered with native tree species where required, and a section of new woodland planting is proposed adjacent to the internal site access to the rear yard.

No rare plant species or protected flora under the Flora (Protection) Order 2015, were recorded within the proposed development area. Therefore, the proposed development would not be considered to impact upon any rare or protected flora species.

During construction works, there is potential for invasive species to be introduced to the proposed development site through the movement of materials, such as soil and stone, and the arrival of construction plant and equipment from an area with invasive species.

Under Regulation 49(2) of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), save in accordance with a licence granted under paragraph (7), any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place specified in relation to any plant which is included in Part 1 of the Third Schedule shall be guilty of an offence. Materials containing invasive species such as Japanese Knotweed are considered “controlled waste” and, as such, there are legal restrictions on their handling and disposal. Under Regulation 49(7) of the European Communities (Birds and Natural Habitats) Regulations 2011, it is a legal requirement to obtain a license to move “vector materials” listed in the Third Schedule, Part 3.

The potential risk of introducing invasive species during the construction phase would be considered low. No invasive flora species of concern were recorded during the onsite

ecological assessments. During the construction phase, there would be no significant import of materials with the potential to contain invasive flora species. Soils excavated during construction works would be stockpiled and re-used for site levelling and site landscaping where possible, to reduce the volume of material imported to the site. Where materials, such as topsoil or suitable soils for the lining of the ICW cells, may be required to be imported to the site, this would be considered a low risk material, as vector materials containing invasive species are a "controlled waste" and would not be brought onto the site. Any stone required would be sourced locally where possible and would be inspected prior to arrival onsite for the presence of invasive species.

The construction works contractor would also ensure that all equipment and plant would be thoroughly washed and inspected prior to arriving to the development site. Therefore, it is considered that there would be no significant risk of introducing invasive species during construction works from importation of materials or the arrival to site of construction plant and equipment.

Dust emissions may arise during construction activities, in particular during earth-moving works, which may have the potential to impact upon photosynthesis, respiration and transpiration processes of flora due to the blocking of leaf stomata. However, given the transient nature of construction works and standard working practices including dust control, the potential impact to flora would not be considered significant.

The potential impact upon flora and habitats due to a deterioration in water quality is discussed in detail in Section 10.

Fauna and Avifauna

As noted above, the majority of the land take required for the proposed development would comprise of improved agricultural grassland (GA1), recolonising bare ground (ED3) and drainage ditches (FW4), which are considered modified and of low ecological value. Therefore, the potential impact upon fauna due to habitat loss or habitat fragmentation would be reduced.

The loss of wet grassland (GS4), hedgerows (WL1) and bog woodland (WN7) habitats, identified as habitats of local importance (higher value), would be considered as having a moderate impact upon fauna species. However, as the loss of these habitats would be to facilitate the ICW system, the potential impact upon fauna species would be greatly reduced, given that the ICW system would be considered as of local importance (higher value) and would add ecological value to the proposed development site by providing wetland habitats for aquatic invertebrates, marginal and aquatic vegetation, amphibians and a range of breeding and wintering wildfowl. Significant planting would be undertaken at the ICW system, as discussed above, which would provide suitable cover and foraging areas for many species of fauna. Furthermore, it is proposed to replant approximately 400m of hedgerow habitat along the southern site boundary and approximately 115m of hedgerow along the eastern boundary of the ICW with native species, and the landscaping plan prepared for the site includes for the bolstering of existing hedgerows / treelines with native species, and the proposed planting of new woodland adjacent the internal site access to the rear yard area.

One protected fauna species, pine marten, was recorded as present on the proposed development site. Pine marten favour wooded areas and areas of good cover, therefore the

proposed ICW system, in particular Cell 5 which would be planted with approximately 2,500 trees, in addition to the proposed planting of a new woodland area adjacent the facility (as shown in Document Ref. LD.BNGHMPF), would benefit pine marten in the area. No other protected fauna, or evidence of protected fauna, were noted as present on the development site. There was no evidence of badger, including setts or latrines, or evidence of otter including holts, slides, tracks or spraints. Similar to the pine marten, it is considered that the construction of the ICW system would benefit these species once vegetation within the system has been established.

While no evidence of amphibians was recorded during the ecological site assessments, the drainage ditches onsite may have the potential to support amphibians. Should amphibians be present onsite, there would be no significant potential habitat loss or habitat disturbance due to the loss of sections of drainage ditches onsite, given that the construction of the ICW system would significantly increase the overall area of suitable habitat for amphibians.

In the event a protected species is encountered during construction or vegetation removal works, an officer of the NPWS would be notified prior to the resumption of construction works.

Direct mortality of fauna may occur due to the removal of vegetation at the site, in addition to the use of heavy construction plant and machinery. Mortality of fauna is most likely to occur during the mammal and bird breeding season, when young are at their most vulnerable.

Where possible, hedgerow / bog woodland removal would not take place during the bird nesting season (1st of March – 31st of August), greatly reducing the potential for mortality. However, it may be necessary to undertake some hedgerow / bog woodland removal works during the bird nesting season. In such instances, a suitably qualified ecologist would be engaged to carry out inspections for the presence of breeding birds prior to any clearance works taking place. Where nests are present, the ecologist would make a decision as to whether a "Licence to interfere with or destroy the breeding places of any wild animals", is required from the NPWS. Alternatively, the ecologist may establish a suitable buffer zone around an active nest, with removal works rescheduled until chicks have fledged. Where no evidence of nests are found during inspection, hedgerow / bog woodland removal works must be undertaken within three days of inspection.

Construction work has the potential to disturb fauna due to the generation of construction noise. However, construction noise would not be considered to pose a significant risk to fauna owing to the transient nature of works and given that all vehicles where possible would be equipped with mufflers to suppress noise, as is standard practice. Where possible, no construction works would be conducted outside of normal working hours, therefore there would be no disturbance to nocturnal species.

The potential impact upon fauna due to a deterioration in water quality is discussed in Section 10.

Bats

The construction phase of the proposed development has the potential to result in direct and indirect impacts on local bat populations, through habitat loss and disturbance which has the potential to impact upon foraging and commuting areas.

The majority of bat species utilise linear features, such as hedgerows and treelines, and areas of mature vegetation for foraging and commuting. The proposed development would result in the removal of approximately 985m of hedgerow habitat and the thinning of approximately 110m^2 of treeline along the eastern boundary, in addition to 200m^2 of bog woodland, the loss of which would be considered to have an adverse impact upon bat species. However, as noted in the "*Fauna and Avifauna*" section above, the proposed ICW system would be planted with a considerable number of emergent plants and approximately 2,500 native trees, approximately 400m of the southern site boundary and 115m of the eastern boundary of the ICW system would be replanted with native hedgerow species and the landscaping plan for the development site would include bolstering of existing hedgerows / treelines with native tree species where required and the proposed planting of new woodland adjacent the internal site access to the rear yard area. Therefore, the potential impact upon bats due to habitat loss would be greatly reduced.

There would be no loss of any known bat roosts during the construction phase. However, mitigation measures, outlined in Section 9.8.1, are proposed to ensure that the four trees assessed as having a moderate bat roost potential, due to dense ivy cover, are re-assessed prior to felling or soft-felled under the supervision of a suitably qualified ecologist (given the limitations to survey outlined in Section 9.3.4).

Artificial lighting during the construction phase has the potential to negatively impact upon bat species, as illumination can impact upon their roosting sites, commuting routes and foraging areas. While some bat species, such as Leisler's bats (*Nyctalus leisleri*), may take advantage of prey concentrating around light sources, other bat species are sensitive to lighting and will avoid artificially lit up areas. This can potentially sever commuting and foraging routes. As noted above, construction works are not anticipated to be conducted outside of normal working hours, which would considerably reduce the potential impacts upon bat species. However, measures with regards artificial lighting, as outlined in Section 9.8.1, would be required to be implemented to reduce the potential impact of light pollution.

9.7.3 OPERATIONAL PHASE

Designated Sites – SAC and SPA Sites

The potential impacts of the proposed development upon designated sites due to land-take is discussed in Section 9.7.2. As the development site does not directly impinge upon any part of a European site, no in-situ effects upon designated sites are expected due to loss or destruction of habitat, fragmentation of habitat, disturbance of habitat or direct reduction in species density.

As the proposed development site is located in close proximity to a number of sites designated for wildfowl, in addition to the River Shannon Callows SAC which is designated for otter, ex-situ impacts due to the proposed development could occur.

As outlined in the NIS and Section 9.7.2 above, it is not considered that there would be any potential adverse impacts upon the qualifying interest otter, or upon the special conservation interest wildfowl, due to a change in land-use at the development site. The proposed ICW system would be considered to benefit otter and wildfowl in the area by providing a wetland habitat which would also potentially provide foraging opportunities.

It is not envisaged that protected species would be adversely impacted upon by the proposed development due to noise generated by the proposed facility or by noise generated from the associated site traffic, given the nature of the proposed development and the distances to the designated sites (with the nearest site with designated fauna, All Saints Bog SPA, located approximately 2.4km from the development site).

It is not considered that the operational phase of the development would have the potential to adversely impact upon designated sites due to air emissions. As noted in the Odour, Air Quality and Greenhouse Gas Assessment report (Attachment 5.1) prepared for the proposed development, certain forms of atmospheric nitrogen and their deposition into the environment can potentially impact upon the biodiversity of European sites. However, the report concludes that ground-level concentrations of NO_2 due to the proposed development, in addition to ambient background levels, are predicted to comply with the criteria levels at all sensitive receptors, while ground-level concentrations of ammonia due to the proposed development are below the relevant criteria at European sites located within the vicinity of the development.

During the operational phase, final treated effluent and stormwater from the proposed development would be directed to the Feeghroe Stream. Therefore, during the operational phase, the development would be hydrologically linked to the River Shannon Callows SAC and Middle Shannon Callows SPA, both of which are located approximately 4km downstream of the site.

Both All Saints Bog and Esker SAC and All Saints Bog SPA were identified as Groundwater Dependant Terrestrial Ecosystems (GWDTE) sites, as discussed in Section 11. According to the EPA GIS Portal, the proposed development is mapped as a Groundwater in SAC Habitats as listed on the WFD Register of Protected Areas. While the SAC and SPA are located approximately 2.4km south-west of the proposed development, where a large scale groundwater abstraction is planned, it is unlikely that any measurable impact would occur to these sites by virtue of distance (2.4km).

It is not considered that the proposed development has the potential to adversely impact upon the remainder of the SAC and SPA sites within the zone of influence due to a potential deterioration in water quality, as the remainder of the sites are located either upstream of the proposed drainage for the site, or are located a considerable distance downstream.

There would be no anticipated impacts upon the River Shannon Callows SAC and Middle Shannon Callows SPA due to stormwater discharges from the site. Stormwater from the proposed development would comprise of clean rainwater run-off from clean-yard areas and car parking areas, and would be directed to a silt trap and Class 1 By-Pass Separator before being directed to a modular underground attenuation system.

The primary potential impact upon the River Shannon Callows SAC and Middle Shannon Callows SPA during the operational phase of the proposed development would be a deterioration in water quality arising from the proposed discharge of final treated effluent to the Feeghroe Stream.

As briefly discussed in Section 2.4, and outlined in detail in Section 10, the proposed treated effluent emission values have been calculated based upon the current water quality in the

Feeghroe Stream and the stream's assimilative capacity. The assimilative capacity assessment concluded that the proposed discharge of 250m^3 per day would not, in and of itself, result in the Feeghroe Stream failing to achieve good status. While it is considered that the proposed discharge of final treated effluent to the Feeghroe Stream would not have any significant impacts upon the River Shannon Callows SAC or Middle Shannon Callows SPA, measures would need to be implemented to ensure that the proposed final treated effluent meets the proposed emission limit values. These measures are included in Section 10.7.

Should effluent sludge, lairage sludge and belly paunch be directed for landspreading as use as organic fertiliser, the proposed development could result in a potential impact upon the biodiversity of designated sites, either through pollution of waterbodies or the enrichment of natural vegetation. However, should sludges and belly paunch be directed for landspreading, they would be collected by a registered contractor / farmer, for application to lands held by third parties in the area. It would be a legal requirement that the transport and spreading of sludges / belly paunch would be managed in compliance with the Nitrates Regulations (S.I. No. 605 of 2017). The regulations provide for controls designed to protect groundwater and surface water from impacts due to the application of fertiliser on agricultural lands. Acceptable spreading times are limited, prohibitions on weather and ground conditions are defined and set back distances from waterbodies and wells/springs and limitations for areas of extreme groundwater vulnerability are established.

The spreading of sludges / belly paunch would be undertaken in accordance with the setback distances from surface waterbodies and abstraction points specified in the Nitrates Regulations. This would minimise the risk of any pollution occurring and protected sites being impacted due to the spreading of organic fertilisers. As effluent sludge, lairage sludge and belly paunch from the development would be a replacement for other chemical and organic fertilisers on any future potential spreadlands, it is considered that the impact of sludges / belly paunch being used as a fertiliser would have a neutral to no significant additional impact upon the biodiversity of landspreading areas.

Designated Sites – NHA Sites

The proposed development does not directly impinge on the River Little Brosna NHA site, and therefore would not be expected to have any in-situ effects through loss or destruction of habitat, fragmentation of habitat, disturbance of habitat or direct reduction in species density.

As noted in the previous section, it is not considered that there would be any potential adverse impacts upon wildfowl due to land-use change at the development site.

It is not considered that the proposed development has the potential to impact upon wildfowl of the NHA site due to operational noise, given the nature of the proposed development and the distance to the River Little Brosna NHA site (approximately 4.3km south-west of the proposed site).

As noted in the previous section, it is not considered that the operational phase of the development would have the potential to adversely impact upon designated sites due to air emissions. The Odour, Air Quality and Greenhouse Gas Assessment (Attachment 5.1) notes that ground-level concentrations of NO_2 due to the proposed development are predicted to comply with the criteria levels at all sensitive receptors, while ground-level concentrations of

ammonia are below the relevant criteria at European sites located within the vicinity of the development.

The proposed development site is not hydrologically connected to the River Little Brosna Callows NHA. Therefore, the proposed development would not have the potential to impact upon the NHA due to a potential deterioration in water quality.

Should sludges and belly paunch generated by the proposed development be directed for landspreading, they would be landspread in accordance with the Nitrates Regulations, as discussed in further detail within the NIS and Section 10.

Habitats and Flora

The proposed extension to the existing abattoir and associated ancillary development would result in a change of habitat use a the development site, resulting in a loss of improved agricultural grassland (GA1), recolonising bare ground (ED3), hedgerows (WL1) and drainage ditches (FW4) to buildings and artificial surfaces (BL3), and potential scattered trees and parkland (WD5), ornamental / non-native shrub (WS3) and flower beds and borders (BC4) habitats associated with the proposed site landscaping.

In addition to the above, a loss of improved agricultural grassland (GA1), wet grassland (GS4), recolonising bare ground (ED3), hedgerows (WL1), bog woodland (WN7) and drainage ditches (FW4) would occur to other artificial lakes and ponds (FL8) habitat and limited sections (comprising of access roads to the ICW system) of buildings and artificial surfaces (BL3) habitat.

The loss of GA1, ED3 and FW4 habitats would not be considered significant, given that these habitats can be considered modified and of low ecological value. While there would be a loss of areas of habitat of local importance (higher value), including WL1, GS4 and WN7, this would not be considered as significant, given that the majority of these habitats would be replaced by a habitat of local importance (higher value), other artificial lakes and ponds (FL8) habitat, which would add ecological value to the development site.

As noted in Section 9.7.2, while the proposed development would result in a loss of approximately 985m of hedgerow, approximately 400m of hedgerow along the southern site boundary and 115m of hedgerow along the eastern boundary of the ICW system would be replanted with native species. The potential impact of hedgerow removal would be further reduced, given that approximately 2,500 native trees common to the area would be planted within Cell 5 of the ICW system. Furthermore, as outlined in the landscaping plan for the proposed development, existing hedgerows and treelines would be bolstered with native tree species where required, and a section of new woodland planting is proposed adjacent to the internal site access to the rear yard. Therefore, the potential impact upon flora and habitats due to hedgerow removal would not be considered significant.

Fauna and Avifauna

The alteration in habitat type at the site due to the proposed development would not be anticipated to have a significant impact upon the fauna of the area. The majority of the land take comprises of modified habitats of low ecological value (GA1, ED3 and FW4). Furthermore, the majority of the land take of habitats of higher ecological value (GS4, WN7

and WL1) would be to facilitate the ICW system, which, given its wetland habitat and considerable proposed planting scheme, would add ecological value to the development site, as discussed in Section 9.7.2.

The loss of sections of hedgerow and bog woodland habitat may result in a displacement of fauna, however, this would not be considered to have a significant impact upon fauna given that the proposed ICW system would incorporate considerable planting of native plants and trees, a 400m hedgerow section would be replanted with native species along the southern site boundary and a 115m hedgerow section would be replanted along the eastern boundary of the ICW system, and given that the proposed landscaping plan for the development site includes for the bolstering of existing hedgerows / treelines with native tree species where required and the proposed planting of new woodland adjacent the internal site access to the rear yard area, which would provide considerable areas of replacement habitat.

It is not envisaged that fauna would be significantly impacted upon by the proposed development due to noise generated by the proposed facility or by noise generated from the associated site traffic. The potential generation of noise has been considered in the design of the facility, for example the equipment with the greatest potential for noise generation, compressors and boilers, would be stored internally and the equipment sourced for the facility would be modern and of low noise generation. A noise management plan would be put in place for the development to ensure minimal noise pollution outside the site boundary, which would include measures such as a "closed door" policy and the regular maintenance of equipment.

The potential impact upon fauna due to a deterioration in water quality is discussed in Section 10.

Bats

Operational phase impacts on bats would be associated with permanent lighting associated with the existing slaughtering facility and new proposed development, including the carpark, yard areas and internal road network. No lighting is proposed for the ICW system. As noted in Section 9.7.2, artificial lighting can potentially impact upon bat roosting sites, commuting routes and foraging areas. In the absence of mitigation measures, operational lighting has the potential to result in an adverse impact upon bat species. Therefore, measures with regards artificial lighting, as outlined in Section 9.8.2, would be required to be implemented.

The operational phase of developments can result in an increase in human activity, which can potentially impact upon bat species due to increased noise and increased traffic. However, it is not considered that the proposed development would have a significant impact upon bat species, given that the majority of all slaughtering, boning and packaging activities would be during day-time hours (7am to 5pm), with only cleaning activities occurring after 5pm (5pm to 10pm). As it is anticipated that approximately ten cleaning staff would be employed, the associated noise and traffic movements would be minimal.

9.7.4 CUMULATIVE IMPACT

Considering the nature of the development and the surrounding agricultural landuse, it is considered that the main potential cumulative impact upon biodiversity would be a deterioration in water quality resulting in an impact upon aquatic flora and fauna species and / or loss or fragmentation of natural habitat.

Potential impacts arising from the development in relation to aquatic biodiversity are discussed in Section 10.

With regards potential habitat loss or fragmentation of habitat, the proposed development is not anticipated to result in a significant impact upon habitat loss / fragmentation during either the construction or operational phases, given that the majority of the land take would comprise of modified habitats of low ecological value, the construction of the ICW system would add ecological value to the proposed site and given that the landscaping plan includes for native tree and shrub planting. Therefore, there would be no cumulative habitat loss or fragmentation impacts which could pose a significant risk to biodiversity.

Another potential cumulative impact upon biodiversity during the operational phase would be the generation of noise emissions, particularly with the location of Meenwaun Wind Farm in close proximity to the site. However, it is considered that there would be no significant impact upon biodiversity due to noise generated by the proposed facility or by noise generated from associated site traffic, which could result in a cumulative impact with Meenwaun Wind Farm, given that the potential generation of noise has been considered in the design of the facility and given that a noise management plan would be put in place for the development (details are provided in Section 9.7.3 above).

9.7.5 "DO-NOTHING" IMPACT

Should the development not be built, there would be no change to the environmental impacts of the existing site. The lands would likely be continued to be used for agricultural purposes, while the existing facility and associated structures would either remain derelict or would be put into use once more in its current condition. Given that the majority of the proposed development site is comprised of either habitats of low ecological value or habitats which can be considered as modified, it is unlikely that the proposed site would be of significant ecological value in the future.

9.7.6 POTENTIAL IMPACTS PRE-MITIGATION

Table 9.18 below provides a summary of the potential impacts of the proposed development pre-mitigation, during the construction and operational phases.

Table 9.18: Summary of Predicted Impacts Pre-Mitigation

IMPACT	DEVELOPMENT PHASE	DIRECT / INDIRECT	LIKELIHOOD	DURATION	REVERSIBLE	SIGNIFICANCE	IMPACT TYPE
Habitat Loss	Construction & Operational	Direct	Certain	Permanent	No	Slight to Moderate significance	Negative
Introduction of Invasive Flora Species	Construction	Direct	Unlikely	Temporary	Yes	Slight significance	Negative
Fauna Disturbance	Construction	Indirect	Possible	Temporary	Yes	Slight significance	Negative
	Operational	Indirect	Unlikely	Permanent	Yes	Not significant	Neutral
Fauna Mortality	Construction	Direct	Dependent upon timing of works relevant to breeding season	Permanent	No	Moderate significance	Negative
Bats – Disturbance / Severance of Habitat	Construction	Direct & Indirect	Certain	Temporary	Yes	Adverse significance	Negative
	Operational	Indirect	Certain	Permanent	Yes	Adverse significance	Negative
Designated Sites	Construction	Indirect	Possible	Temporary	Yes	Moderate significance	Negative
	Operational	Indirect	Possible	Permanent	Yes	Slight to moderate significance	Negative

9.8 MITIGATION MEASURES

9.8.1 CONSTRUCTION PHASE

The mitigation measures outlined below would be implemented to ensure there is no significant impact upon the biodiversity of the area and designated sites during the construction phase of the development. These measures have also been incorporated into the Construction Environmental Management Plan, which has been prepared for the project. Mitigation measures for the protection of water quality are included in Section 10.7.

General Mitigation Measures

- All construction works would be confined as far as possible to the development footprint;
- All plant machinery and equipment would be maintained in good working order and regularly inspected;
- Where possible, no construction works would be conducted outside of normal working hours;
- The construction work contractor would prepare a detailed Construction Environmental Management Plan (CEMP) for all construction activities, in line with the outline CEMP prepared as part of this application. The CEMP would describe how construction work would be undertaken in an environmentally sensitive manner and would include measures for the protection of water quality.

Habitats and Flora

- Regular site inspections would be undertaken to ensure that no growth of invasive species has taken place;
- The construction works contractor would ensure that all equipment and plant is inspected for the presence of invasive species and thoroughly washed prior to arriving to the development site. All construction plant would pass through a wheel-wash system prior to entering or leaving the development site;
- All relevant construction personnel would be trained in invasive flora species (main species of concern, including Japanese Knotweed) identification and control measures;
- In the event of any invasive species listed in Part 1 of the Third Schedule appearing onsite, works within the immediate vicinity would cease until the invasive plant has been appropriately treated and disposed of, in accordance with Regulation 49 of the European Communities (Birds and Natural Habitats) Regulations 2011;
- Cognisance would be taken of National Roads Authority's Guidelines on "*The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*";
- Excavated soil during earth-moving activities and excavations would be segregated into subsoil and topsoil and reused in reinstatement and landscaping activities. Where possible, natural recolonisation would be allowed to take place;

- The ICW system would be planted with a considerable number of native emergent species, with approximately 2,500 native tree species to be planted within Cell 5;
- A 400m section of the southern site boundary and a 115m section of the eastern boundary of the ICW system would be replanted, using native flora species including Hawthorn, Blackthorn and Ash;
- The landscaping plan for the development site would include the bolstering of existing hedgerows / treelines with native tree species where required, in addition to the proposed planting of a new woodland area, using native species, adjacent the internal site access to the rear yard area.

Fauna

- As a minimum, the construction work contractor would comply with all legislative provisions relating to hedgerow / tree removal and the protection of birds, and would have regard to reducing impacts on nesting birds;
- In instances where hedgerow / bog woodland removal is required during the bird nesting season, the sections required for removal would be inspected by a suitably qualified ecologist prior to any removal works for the presence of breeding birds. Where nests are present, the ecologist would make a decision as to whether a "Licence to interfere with or destroy the breeding places of any wild animals", is required from the NPWS. Alternatively, the ecologist may establish a suitable buffer zone around an active nest, with removal works rescheduled until chicks have fledged. Where no evidence of nests are found during inspection, hedgerow / bog woodland removal works must be undertaken within three days of inspection;
- Should a protected fauna species such as badger or the common frog be found during the construction phase of the project, an officer of the NPWS would be notified prior to the resumption of construction works;
- Replacement habitat would be created via the construction of the ICW system, the replanting of a 400m hedgerow section along the southern site boundary and a 115m section along the eastern boundary of the ICW system using native species, the proposed bolstering of existing hedgerows / treelines with native tree species where required, and the proposed planting of a new woodland area, using native species, adjacent the internal site access to the rear yard area;
- To reduce the potential for disturbance due to noise, all plant and machinery would be maintained in good working order and regularly inspected, where possible vehicles would be equipped with mufflers to suppress noise and where possible, no construction works would be conducted outside of normal working hours.

Bats

Habitat Loss

- Replacement habitat would be created via the construction of the ICW system, including the planting of approximately 2,500 native trees within Cell 5, the replanting of a 400m hedgerow section along the southern site boundary and a 115m section along the eastern boundary of the ICW system using native species, the

proposed bolstering of existing hedgerows / treelines with native tree species where required, and the proposed planting of a new woodland area, using native species, adjacent the internal site access to the rear yard area.

Loss of Potential Roosts

- The four mature trees scheduled for removal, which have been assessed as having a moderate bat roost potential due to dense ivy cover, would be re-assessed by a suitably qualified ecologist prior to felling, or alternatively, would be soft-felled under supervision of a suitably qualified ecologist;
- Ivy on the four mature trees scheduled for removal would be cut in advance of re-assessment / soft-felling, to enable the ecologist to adequately assess the trees for any previously hidden potential roost features. Should potential roost features be identified, the ecologist would advise if further survey work would be required.

Artificial Lighting

- Construction works in the hours of darkness, when bats are active (April – October), would be kept to a minimum;
- Lighting of hedgerows, treelines and bog woodland would be avoided where possible;
- Should lighting be required during construction works, it would be of a low height (without compromising safe working conditions) to ensure minimal light spill. Where possible and where practicable to do so, timers or motion sensors would be used;
- Directional lighting would be used where possible, by use of louvres or shields fitted to the lighting;
- White light emitting diode (LED) would be used where possible, which is considered to be low impact in comparison to other lighting types.

9.8.2 OPERATIONAL PHASE

The design and operational measures outlined below would be implemented to ensure there is no significant impact upon the biodiversity of the area and designated sites during the operational phase of the development. Potential impacts upon biodiversity and European sites due to a potential deterioration in water quality are discussed in Section 10.

General Mitigation Measures

- Good housekeeping practices would be observed throughout the site during the operational phase;
- The proposed facility would prepare and put in place a documented Environmental Management System;
- The site would ensure that any fuels, oils or chemicals would be stored in accordance with the EPA guidance on the storage of materials, in designated, bunded areas, with adequate bund provision to contain 110% of the largest drum volume or 25% of the

total volume of containers. Bunds and bunded areas would undergo integrity testing every three years, as is best practice;

- The site would ensure that an adequate supply of spill clean-up material is readily available, in the event of any spillages onsite, thereby minimising the potential for spills / leaks to impact upon the biodiversity of the area;
- Rodent populations would be controlled by a combination of rodenticide (managed by an appointed pest control contractor), high spec buildings and good housekeeping;
- Native flora species would be incorporated in the landscaping plan as much as possible.

Bats

The lighting design for the proposed development would be finalised at the detailed design stage. The lighting design would take cognisance of the following mitigation measures:

- Lighting would be directed to where it is required only;
- Lighting of hedgerows, treelines and bog woodland would be avoided where possible;
- Building, carpark and site entrance lighting would be angled away from hedgerows, treelines and bog woodland;
- Lighting would be of low height where possible, to minimise light spill;
- Where possible and practicable to do so, timers or motion sensors would be used;
- White LED or amber coloured LED outdoor lighting would be used where possible, which is considered to be low impact in comparison to other lighting types.

9.8.3 "WORST CASE" SCENARIO

If the proposed development proceeded without the mitigation measures outlined in Section 9.8.1 and 9.8.2, there would be a potential adverse impact upon bat species due to the removal of commuting and foraging habitat, in addition to lighting impacts during the construction phase. There would also be a potential moderate impact upon fauna, should vegetation clearance be undertaken during the mammal and bird breeding season. However, this is unlikely to occur, given that there are legal restrictions under the Wildlife Act 1976 as amended, with regards the removal of vegetation from uncultivated land.

In the absence of mitigation measures, such as replacement hedgerow planting and native tree planting as part of landscaping, habitat loss due to the proposed development has the potential to have a slight to moderate impact upon biodiversity. However, the potential impact would be reduced, given that a proportion of the habitat loss would be to facilitate the ICW system, which would be considered to add ecological value to the site, providing wetland habitats for aquatic invertebrates, marginal and aquatic vegetation, amphibians and a range of breeding and wintering wildfowl. Furthermore, the ICW system, once established, would likely provide cover and foraging opportunities for fauna.

During construction works, there would be potential to inadvertently introduce invasive species to the area. However, even in the absence of mitigation measures, this would be

considered unlikely given that delivery of materials would be inspected prior to removal from the site of origin. Where invasive species are confirmed, the loads would be required to be adequately treated or disposed of appropriately and therefore, would not be transported to the proposed development site.

9.9 PREDICTED IMPACTS WITH MITIGATION

The following table provides a summary of the residual effects the proposed development may have, once recommended mitigation measures are implemented. It is not envisaged that there would be any considerable adverse impacts upon biodiversity due to the proposed development.

Table 9.19: Summary of Residual Impacts Post-Mitigation

IMPACT	DEVELOPMENT PHASE	SIGNIFICANCE	MITIGATION MEASURES	RESIDUAL SIGNIFICANCE	RESIDUAL IMPACT TYPE
Habitat Loss	Construction & Operational	Slight to moderate significance	• Excavated soils would be segregated into subsoil and topsoil, and reused in reinstatement and landscaping works. Where possible, natural recolonisation would be allowed to take place • The ICWs would be planted with a native emergent species, with Cell 5 planted with approximately 2,500 native tree species • A 400m section of the southern boundary and 115m section of the eastern boundary of the ICW system would be replanted using native species • The landscaping plan for the development site would include the bolstering of existing hedgerows / treelines with native species and the planting of a new woodland area using native species adjacent the internal site access to the rear yard area.	Not significant	Neutral
Introduction of Invasive Flora Species	Construction	Slight significance	• Construction plant would be inspected and washed prior to arriving onsite • Construction plant would pass through a wheel-wash system prior to entering/leaving the development site • Regular site inspections for the presence of invasive species would be undertaken • Should invasive species appear onsite, works would immediately cease until the plant was appropriately treated and disposed of	Not significant	Neutral
Fauna	Construction	Slight	• Where possible, no construction works would be	Slight	Minor

IMPACT	DEVELOPMENT PHASE	SIGNIFICANCE	MITIGATION MEASURES	RESIDUAL SIGNIFICANCE	RESIDUAL IMPACT TYPE
Disturbance		significance	conducted outside of normal working hours • All plant machinery and equipment would be maintained in good working order and regularly inspected • Where possible, vehicles would be equipped with mufflers to suppress noise • As a minimum, the construction work contractor would comply with all legislative provisions relating to hedgerow / tree removal • Should a protected fauna species be found during the construction phase, the NPWS would be notified prior to the resumption of construction works	significance	Negative
	Operational	Not significant	None required	Not significant	Neutral
Fauna Mortality	Construction	Moderate significance	• As a minimum, the construction work contractor would comply with all legislative provisions relating to hedgerow / tree removal • Where hedgerow removal works are required during the bird nesting season (1st March to 31st August), the sections for removal would be inspected by an ecologist for the presence of breeding birds. Where nests are present, a decision would be made as to whether a licence is required from the NPWS, or whether a suitable buffer zone could be established around the active nest with removal works rescheduled until chicks have fledged	Slight significance	Minor Negative
Bats – Disturbance / Severance of	Construction	Adverse significance	• Replacement habitat would be created via the construction of the ICW system, including the planting of approximately 2,500 native trees	Not significant	Neutral

IMPACT	DEVELOPMENT PHASE	SIGNIFICANCE	MITIGATION MEASURES	RESIDUAL SIGNIFICANCE	RESIDUAL IMPACT TYPE
Habitat			within Cell 5, the replanting of a 400m hedgerow section along the southern site boundary and a 115m section of the eastern boundary of the ICW system using native species, the proposed bolstering of existing hedgerows / treelines with native tree species where required, and the proposed planting of a new woodland area, using native species, adjacent the internal site access to the rear yard area • Trees classed as having moderate potential to support a bat roost would be re-assessed by a qualified ecologist prior to felling or soft-felled under supervision of a qualified ecologist. Ivy would be cut in advance of re-assessment / soft-felling, to enable an assessment for potential roost features which may be obscured due to ivy cover • Measures would be implemented to reduce the potential for light pollution • Construction works in the hours of darkness would be kept to a minimum		
	Operational	Adverse significance	• Lighting design measures would be implemented to reduce the potential for light pollution	Not significant	Neutral
Designated Sites	Construction	Moderate significance	• Mitigation measures are outlined in Section 10	Not significant	Neutral
	Operational	Slight to moderate significance	• Mitigation measures are outlined in Section 10	Not significant	Neutral

9.10 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

Survey limitations are discussed in detail in Section 9.3.4. No other difficulties were encountered in compiling this chapter.

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