5 Biodiversity

5.1 Introduction

This chapter provides an Ecological Impact Assessment (EcIA) which addresses the potential ecological impacts that may occur in the future on the terrestrial, avian and aquatic ecology of a proposed development at Glenloughaun, Co. Galway and its surrounding environs.

This report has been undertaken in accordance with the guidelines issued by the Environmental Protection Agency (EPA) and the Chartered Institute of Ecology and Environmental Management (CIEEM).

It follows a standard approach based upon the description of the existing baseline conditions within the proposed development site. An evaluation of the likely habitats and species currently present within the proposed development site is also given, along with the identification of the potential ecological impacts arising from the construction and operation of the proposed development. An assessment of the likely significance of the identified impacts on Valued Ecological Receptors (VERs), both within and close to the proposed development site is also made. Where a significant negative impact has been identified, suitable remedial mitigation measures are provided in order to prevent, reduce, or offset the impact.

The main objectives of this ecological assessment were:

- Undertake a desktop review of existing baseline ecological data for the proposed development site and the wider area, including European and National sites of biodiversity importance within the Zone of Influence of the proposed development site.
- Undertake a field survey of the receiving environment.
- Evaluate the features of biodiversity value within the proposed development site and within the Zone of Influence of the proposed development site.
- Evaluate the potential negative impacts of the proposed development site on features of biodiversity value within the proposed development site and its Zone of Influence.
- Evaluate potential significant effects upon European or National sites.
- Consider measures to mitigate the potential negative impact(s) of the project on the ecology of the receiving environment.

5.1.1 Legislative and Policy Context

The Habitats Directive ensures the conservation of a wide range of rare, threatened or endemic animal and plant species. Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora was adopted on the 21st of May 1992 and aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments.

The Natura 2000 network of protected areas are known as Special Areas of Conservation (SAC) and Special Protection Areas (SPA). In general terms, they are considered to be of exceptional importance in terms of rare, endangered or vulnerable habitats and species within the European Community. The requirements of the Habitats Directive have been transposed into Irish law through the European Communities (Birds and Natural Habitats) Regulations 2011 [S.I. No. 477/2011]. This legislation affords protection to both Special Protection Areas and Special Areas of Conservation.

Special Areas of Conservation (SAC) are designated under the Conservation of Natural Habitats and of Wild Fauna and Flora Directive 92/43/EEC (Habitats Directive) which is transposed into Irish law by the EC (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). Special Protection Areas (SPA) are classified under the Birds Directive (2009/147/EC on the Conservation of Wild Birds). Article 6(3) of the Habitats Directive requires an 'appropriate assessment' to be undertaken for any plan or project that is likely to have a significant effect on the conservation objectives of a Natura 2000 site. An 'appropriate assessment' is an evaluation of the potential impacts of a plan or project on the integrity of a Natura 2000 site, and the incorporation, where necessary, of measures to mitigate or avoid negative effects.
The European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374/2024) restrict the importation, distribution, sale or release of approximately 88 species of plants and animals considered to be the most harmful Invasive Alien Species.
Regulation 17 (1) states the following:

"*Subject to paragraph (3) and Regulation 18, a person shall not –*

1. *introduce into the State,*
2. *keep, including in contained holding,*
3. *breed, including in contained holding,*
4. *import into, export from or transport within the State, except for the transportation of species to facilities in the context of eradication,*
5. *place on the market,*
6. *use, exchange or offer to exchange,*
7. *permit to reproduce, grow or cultivate, including in contained holding, or*
8. *release into the environment, an invasive alien species of national concern*."

Regulation 17 (2) states the following:

"*A person shall not –*

1. *import or otherwise introduce into the State,*
2. *place on the market*
3. *use, exchange or offer for exchange, or*
4. *release into the environment,*

a vector material."

Regulation 17 (5) states the following:

"A person who breaches paragraph (1) or (2) commits an offence and shall be liable –

1. *on summary conviction, to a class A fine or to imprisonment for a term not exceeding 6 months or to both, or*
2. *on conviction on indictment, to a fine not exceeding €100,000 or to imprisonment for a term not exceeding 2 years or to both."*

It is also an offence under the Wildlife Acts 1976 – 2023 to plant or otherwise cause to grow in a wild state in any place in the State any species of (exotic) flora, or the flowers, roots, seeds or spores of (exotic) flora.

Flora and fauna in Ireland are also protected at a national level by the Wildlife Acts 1976 to 2023 and the Floral (Protection) Order 2015. Natural Heritage Areas (NHA) are areas that are considered to be important for the habitats present or for the species of plants and animals

supported by those habitats. Under the Wildlife Amendment Act 2000, NHAs are legally protected from damage from the date they were formally proposed for designation.

Section 19(1) of the Act states that:

'*Where there is a subsisting natural heritage area order in respect of any land, no person shall carry out, or cause or permit to be carried out, on that land any works specified in the order or any works which are liable to destroy or to significantly alter, damage or interfere with the features by reason of which the designation order was made*'.

In addition, a list of proposed NHAs (pNHAs) was published in 1995 but to date these have not had their status confirmed. Prior to statutory designation, pNHAs are subject to limited protection under various agri-environment and forestry schemes and under local authority planning strategies such as County Development Plans.

Ireland's National Biodiversity Action Plan 2023-2030 identifies actions that need to be taken in order to understand and protect biodiversity in Ireland. It states that biodiversity and ecosystems in Ireland should be conserved and restored, to deliver benefits that are essential to all sectors of society and that Ireland should contribute to the efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally.

5.1.2 Planning Policies

National

Nationally, the Government's commitment to sustainable development is set out in a number of documents including the National Planning Framework and the National Development Plan 2018 – 2027.

Regional

Planning at the regional level is now guided by the Regional Spatial and Economic Strategy (RSES). The RSES is a strategic plan which identifies regional assets, opportunities and pressures and provides appropriate policy responses in the form of Regional Policy Objectives.

Local

Planning policy at the local level is currently provided by the Galway County Development Plan 2022–2028. This plan contains a number of objectives and Development Management Requirements relevant to ecology, biodiversity, green infrastructure and nature conservation. These are summarised in **Table 5.1**.

Table 5.1: Development Management Requirements Relevant to Ecology and Nature Conservation

Policy No:	Biodiversity Policy Objectives
NHB 1	Protect and where possible enhance the natural heritage sites designated under EU Legislation and National Legislation (Habitats Directive, Birds Directive, European Communities (Birds and Natural Habitats) Regulations 2011 and Wildlife Acts) and extend to any additions or alterations to sites that may occur during the lifetime of this plan. Protect and, where possible, enhance the plant and animal species and their habitats that have been identified under European legislation (Habitats and Birds Directive) and protected under national Legislation (European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011), Wildlife Acts 1976-2010 and the Flora Protection Order (SI 94 of 1999). Support the protection, conservation and enhancement of natural heritage and biodiversity, including the protection of the integrity of European sites, that form part of the Natura 2000 network, the protection of

	Natural Heritage Areas, proposed Natural Heritage Areas, Ramsar Sites, Nature Reserves, Wild Fowl Sanctuaries (and other designated sites including any future designations) and the promotion of the development of a green/ ecological network.
NHB 2	To implement Article 6 of the Habitats Directive and to ensure that Appropriate Assessment is carried out in relation to works, plans and projects likely to impact on European sites (SACs and SPAs), whether directly or indirectly or in combination with any other plan(s) or project(s). All assessments must be in compliance with the European Communities (Birds and Natural Habitats) Regulations 2011. All such projects and plans will also be required to comply with statutory Environmental Impact Assessment requirements where relevant.
NHB 3	No plans, programmes, or projects etc. giving rise to significant cumulative, direct, indirect or secondary impacts on European sites arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects shall be permitted on the basis of this Plan (either individually or in combination with other plans, programmes, etc. or projects.*
NHB 4	Ensure, where appropriate, the protection and conservation of areas, sites, species and ecological/networks of biodiversity value outside designated sites. Where appropriate require an ecological appraisal, for development not directly connected with or necessary to the management of European Sites, or a proposed European Site and which are likely to have significant effects on that site either individually or cumulatively.
NHB 5	Support the protection and enhancement of biodiversity and ecological connectivity in non-designated sites, including woodlands, trees, hedgerows, semi-natural grasslands, rivers, streams, natural springs, wetlands, stonewalls, geological and geo-morphological systems, other landscape features and associated wildlife areas where these form part of the ecological network and/or may be considered as ecological corridors in the context of Article 10 of the Habitats Directive.
NHB 6	Support the implementation of any relevant recommendations contained in the National Heritage Plan 2030, the National Biodiversity Plan, the All Ireland Pollinator Plan and the National Peatlands Strategy and any such plans and strategies during the lifetime of this plan.
NHB 7	Require mitigating measures in certain cases where it is evident that biodiversity is likely to be affected. These measures may, in association with other specified requirements, include establishment of wildlife areas/corridors/parks, hedgerow, tree planting, wildflower meadows/marshes and other areas. With regard to residential development, in certain cases, these measures may be carried out in conjunction with the provision of open space and/or play areas.
NHB 8	Facilitate increased awareness of the County's biodiversity and natural heritage through the provision of information to landowners and the community generally, in cooperation with statutory and other partners.
NHB 9	Seek to protect bats and their roosts, their feeding areas, flight paths and commuting routes. Ensure that development proposals in areas which are potentially important for bats, including areas of woodland, linear features such as hedgerows, stonewalls, watercourses and associated riparian vegetation which may provide migratory/foraging uses shall be subject to suitable assessment for potential impacts on bats. This will include an assessment of the cumulative loss of habitat or the impact on bat populations and activity in the area and may include a specific bat survey. Assessments shall be carried out by a suitably qualified professional and where development is likely to result in significant adverse effects on bat populations or activity in the area, development will be prohibited or require mitigation and/or compensatory measures, as appropriate. The impact of lighting on bats and their roosts and the lighting up of objects of cultural heritage must be adequately assessed in relation to new developments and the upgrading of existing lighting systems.
NHB 10	Article 6(1) of the Habitats Directive requires that Member States establish the necessary conservation measures for European sites involving, if need be, appropriate management plans specifically designed for the sites or integrated into other development plans. The NPWS's current priority is to identify site specific conservation objectives; management plans may be considered after this is done. Where Integrated Management Plans are being prepared by the NPWS for European sites (or parts thereof), the NPWS shall be engaged with in order to ensure that plans are fully integrated with the Plan and other plans and programmes, with the intention that such plans are practical, achievable and sustainable and have regard to all relevant ecological, cultural, social and economic considerations, including those of local communities

NHB 11	Seek to manage any increase in visitor numbers in order to avoid significant effects including loss of habitat and disturbance, including ensuring that any new projects, such as greenways, are a suitable distance from ecological sensitivities, such as riparian zones. Where relevant, the Planning Authority and those receiving permission for development under the Plan shall seek to manage any increase in visitor numbers and/or any change in visitor behaviour in order to avoid significant effects, including loss of habitat and disturbance. Management measures may include ensuring that new projects and activities are a suitable distance from ecological sensitivities. Visitor/Habitat Management Plans will be required for proposed projects as relevant and appropriate.
WR 1	Protect the water resources in the plan area, including rivers, streams, lakes, wetlands, springs, turloughs, surface water and groundwater quality, as well as surface waters, aquatic and wetland habitats and freshwater and water dependant species in accordance with the requirements and guidance in the EU Water Framework Directive 2000 (2000/60/EC), the European Union (Water Policy) Regulations 2003 (as amended), the River Basin District Management Plan 2018 – 2021 and other relevant EU Directives, including associated national legislation and policy guidance (including any superseding versions of same) and also have regard to the Freshwater Pearl Mussel Sub-Basin Management Plans.
WR 2	It is a policy objective of the Planning Authority to implement the programme of measures developed by the River Basin District Projects under the Water Framework Directive in relation to: Surface and groundwater interaction, Dangerous substances, Hydro-morphology, Forestry, On site wastewater treatment systems, Municipal and industrial discharges, Urban pressures, Abstractions.
WTWF 1	Protect and conserve the ecological and biodiversity heritage of the wetland sites in the County. Ensure that an appropriate level of assessment is completed in relation to wetland habitats that are subject to proposals which would involve drainage or reclamation that might destroy, fragment or degrade any wetland in the county. This includes lakes and ponds, turloughs, watercourses, springs and swamps, marshes, fens, heath, peatlands, some woodlands as well as some coastal and marine habitats. Protect Ramsar sites under The Convention on Wetlands of International Importance (especially as Waterfowl Habitat).
P 1	Ensure that peatland areas which are designated (or proposed for designation) as NHAs, SACs or SPAs are conserved for their ecological, climate regulation, education and culture, archaeological potential including any ancient walkways (toghers) through bogs.
P 2	Work in partnership with relevant stakeholders on all suitable peatland sites to demonstrate best practice in sustainable peatland conservation, management and restoration techniques and to promote their heritage and educational value subject to Ecological Impact Assessment and Appropriate Assessment Screening, as appropriate.
P 3	Seek to support relevant agencies such as Bord na Mona in advancing rehabilitation works for the peatlands and related infrastructure, to provide for the future sustainable and environmentally sensitive use of peatlands sites including for amenity purposes.
IS 1	It is a policy objective of the Planning Authority to support measures for the prevention and eradication of invasive species.
IS 2	Ensure that proposals for development do not lead to the spread or introduction of invasive species. If developments are proposed on sites where invasive species are currently or were previously present, an invasive species management plan will be required. A landscaping plan will be required for developments near water bodies and such plans must not include alien invasive species
PO 1	To facilitate the delivery of the All Ireland Pollinator Plan where possible. In the interest of preserving and enhancing biodiversity and working in conjunction with the All Ireland Pollinator Plan - It shall be the policy objective of the Planning Authority to ensure that at least 20% of the green space on all housing estates being built will have to be dedicated, developed and maintained as a pollinator zone. The area dedicated can be confined to one single lot or various lots around the site providing that the total area of the lots meets the minimum requirement of 20%. The pollinator zones should be planted with a mix of pollinator friendly-bulbs, self seeding annuals and biennials, perennials, shrubs, trees, fruit trees and fruit bushes and the majority of this planting should consist of native plants.
TWHS 1	Protect and seek to retain important trees, tree clusters and tree boundaries, ancient woodland, natural boundaries including stonewalls, existing hedgerows particularly species rich roadside and townland boundary hedgerows, where possible and replace with a boundary type similar to the existing boundary. Ensure that new development proposals take cognisance of significant trees/tree stands and

	that all planting schemes developed are suitable for the specific site and use suitable native variety of trees of Irish provenance and hedgerows of native species. Seek Tree Management Plans to ensure that trees are adequately protected during development and incorporated into the design of new developments.
TWHS 2	Encourage and promote in co-operation with Coillte and the Department of Agriculture, Food and the Marine and other organisations, the planting of trees and woodlands, as an important means of contributing to its objective of sustaining, protecting and enhancing the County's biodiversity, natural resources, amenity, landscape and developing tourism product. Encourage community woodlands in urban/urban fringe areas utilising funding available through schemes such as the NeighbourWood and Native Woodland Schemes.
TWHS 3	Protect all substantial areas of deciduous forest, other than areas of commercial forestry. Proposals for development in these areas should seek to interact with the landscape character of the forested areas and its limits while also enhancing the forested areas so as to increase biodiversity value.
PG 1	Protect and conserve geological and geo-morphological systems, county geological heritage sites and features from inappropriate development that would detract from their heritage value and interpretation and ensure that any plan or project affecting karst formations, eskers or other important geological and geo-morphological systems are adequately assessed with regard to their potential geophysical, hydrological or ecological impacts on the environment.
PG 2	Support the implementation of recommendations made in the *Geological Heritage of County Galway – An Audit of County Geological Sites in County Galway (2019)*. Consult with the Geological Survey of Ireland when undertaking, approving or authorising developments which are likely to impact on County Geological Sites or involve significant ground excavations including sites identified as part of the *Geological Heritage of County Galway – An Audit of County Geological Sites in County Galway (2019).*
PG 3	Encourage greater awareness of the geological heritage sites of the county and promote, where appropriate, public access to geological and geomorphological sites and avoid inappropriate development.
ESK 1	Protect and conserve the landscape, natural heritage and biodiversity value of esker systems in the county. Assess applications for quarrying and other proposed developments with reference to their status or relative importance, for example, amenity, landscape and scientific value in the context of the overall esker system.
ESK 2	Have regard to the Landscape Character Assessment of the County of Galway and its recommendations relating to the Esker areas and any other subsequent relevant reports/ data.
IW 1	(a) Protect and conserve the quality, character and features of inland waterways by controlling developments close to navigable and non-navigable waterways in accordance with best practice guidelines. (b) Preserve, protect and enhance Galway's inland lakes and waterways for their amenity and recreational resource amenity. (c) Protect the riparian zones of watercourse systems throughout the County, recognising the benefits they provide in relation to flood risk management and their protection of the ecological integrity of watercourse systems and ensure they are considered in the land use zoning in Local Area Plans. (d) The Planning Authority will support in principle the development and upgrading of the Inland Waterways and their associated facilities in accordance with legislation, best practice and relevant management strategies, key stakeholders and bodies including Waterways Ireland. (e) Ensure all abstractions of water will be subject to assessment for compliance with the requirements of Article 6 of the Habitats Directive. (f) Seek to provide additional accesses to lake shores and rivers for public rights of way, parking and layby facilities, where appropriate. (g) Developments shall ensure that adequate soil protection measures are undertaken, where appropriate, including investigations into the nature and extent of any soil/groundwater contamination.
GBI 1	Require all proposals for large scale development to contribute to the protection, management and enhancement of the existing green/blue infrastructure of the County and the delivery of new green/blue infrastructure, where appropriate by including a green/ blue infrastructure plan as an integral part of any planning application. This plan should identify environmental and ecological assets, constraints and opportunities and shall include proposals which protect, manage, and enhance the development of green infrastructure resources in a sustainable manner.

GBI 2	Facilitate the ongoing development and improvement of a green/blue infrastructure network for urban and rural areas, connecting both natural and semi-natural corridors such as including green spaces, open spaces, green amenities, residual land, rivers and canals. Enhancements along natural features may include the provision of riparian buffers, community food programmes (allotments) and wild areas for pollination thus ensuring the provision of natural areas for the benefit of biodiversity, wildlife and climate adaptation.
BGP 1	Support the delivery of sustainable strategic Greenway/Blueway projects in the County in accordance with the *Strategy for the Future Development of National and Regional Greenways*, enabling legislation, best practice in a manner that is compatible with nature conservation and other environmental policies.
BGP 2	Support the development of an integrated Strategic Greenway Network of national and regional routes and maximise connectivity to existing greenways through linkages of cycling and walking infrastructure in a manner that is compatible with nature conservation and other environmental policies. This will include the following; • National Galway to Dublin Cycleway/ Greenway; • Connemara Greenway i.e., (Clifden to Oughterard, Galway to Oughterard); • Oranmore to Bearna Coastal Greenway; • Athenry to Tuam; • Clifden to Derrygimlagh; • Clifden to Letterfrack.
BGP 3	a) It is a policy objective to support the extension of greenways, blueways, peatways and trails within the county and the integration and linkage of them with other existing / proposed greenways, blueways, peatways and trails both within and outside the county. b) It is a policy objective to support where relevant the concept of Greenways to consider local travel infrastructure, and connectivity to local towns and villages in the design of any Greenway route.
PRW 1	a) Where requested, give consideration to the need to preserve public rights of way which give access to seashore, mountain, lakeshore, riverbank or other place of natural beauty or recreational utility. b) Seek to identify, map and protect verified existing public rights of way as they become available to the Planning Authority over the lifetime of the plan. c) It is a Policy Objective of the Planning Authority to map and establish, through public engagement, a register of Public Rights of Way in the County as resources permit within the lifetime of the plan. Maps will be drawn up as appropriate.
UGG 1	To continue to work in partnership with all relevant stakeholders to facilitate and support the ongoing work of the Joyce Country and Western Lakes aspiring Geopark and its application for full UNESCO Global Geopark status. Support initiatives in relation to the Burren Lowlands, The Burren and Cliffs of Moher UNESCO Global Geopark that relate to the county.
TWHS 1	Protect the Outstanding Universal Value of the tentative World Heritage Sites in County Galway namely the Western Stone Forts and the Burren that are included in the UNESCO Tentative List and engage with other national and international initiatives which promote the special built, natural and cultural heritage of places in the County. Collaborate with landowners, local communities and other relevant stakeholders to achieve World Heritage Site status for the sites identified in County Galway.

5.1.2.1 Heritage Plans

Ireland's National Biodiversity Plan identifies actions that need to be taken in order to understand and protect biodiversity in Ireland. It states that biodiversity and ecosystems in Ireland should be conserved and restored, to deliver benefits that are essential to all sectors of society and that Ireland should contribute to the efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally.

The Galway County Heritage and Biodiversity Plan 2024-2030 identified a number of objectives and policies in order to protect the natural heritage and biodiversity of County Galway.

5.2 Methodology

5.2.1 Statement of Competence

Lead Author

This Biodiversity Chapter was carried out by Olivia Hamilton BSc (Hons), MSc. Olivia holds an honours degree in Environmental Science from the University of Galway and a master's degree in Conservation Behaviour from ATU Galway. Throughout her education, Olivia developed a strong foundation in environmental management, environmental impact assessment, and ecological survey techniques. She has applied this knowledge in a variety of roles, including serving as the lead marine biologist aboard a research vessel, where she conducted and led marine mammal surveys.

Olivia has field experience in surveying bats, mammals, birds, habitats, plants, and invasive species. As a Qualifying Member of the Chartered Institute of Ecology and Environmental Management (CIEEM), she is well-versed in the latest ecological surveying methods, data collection practices, and scientific report writing. Her professional portfolio includes conducting Biodiversity Chapters for Environmental Impact Assessment Reports (EIARs), Environmental Impact Assessment Screening Reports, Flood Risk Assessments, as well as completing complex Appropriate Assessments (AA), Preliminary Ecological Appraisal Reports (PEARs), and Ecological Impact Assessments (EcIA) for a range of clients.

Reviewer

This chapter was reviewed by Seán Burke, BSc, MSc. Seán has a bachelor's degree in science – Single Honours Biology from Maynooth University and a master's degree in Ecology & Biodiversity from Stockholm University. His academic experience has provided fundamental training in scientific methods and a strong knowledge of the theoretical background of biological and ecological processes. Seán has previous experience working in the agri-food sector developing biological control agents for the suppression of fungal pathogens which provided hands on experience in learning laboratory techniques and studying ecological interactions. His more recent work experience with ORS has provided the opportunity to conduct a wide range of ecological services including macroinvertebrate sampling, bird surveying, habitat assessment and classification, preliminary bat surveying, mammal surveying, and ecological impact assessment. This experience has been applied to projects of varying sizes across commercial, industrial, and residential projects.

5.2.2 Study Area

The study area encompasses all the land within the area defined in the plan submitted for planning consent, i.e., the proposed development site. In addition, important ecological habitats and receptors within the Zone of Influence of the proposed development site were also studied.

5.2.3 Desk Based Studies

The desk study involved the examination of aerial photographs, current and historical maps and plans and drawings of the Proposed Development site. In addition, information was collated on designated nature sites within the Zone of Influence of the Proposed Development site and on protected and rare species within the 1km grid square of the site.

The following websites were used to access information and data:

- National Parks and Wildlife Service – www.npws.ie. Information held by NPWS on protected species within the Zone of Influence of the proposed development site was queried.
- National Biodiversity Data Centre – www.biodiversitycentre.ie. Data was gathered on rare, protected or threatened species located within the Zone of Influence of the proposed development site.
- Ordinance Survey Ireland – www.osi.ie. Current and historical maps, along with aerial photographs to ascertain current and past land-use and potential habitats within the proposed development site and surrounding lands.
- My Plan – www.myplan.ie – Additional mapping information.
- Google Maps & Street View – maps.google.ie – Aerial photographs.
- Environmental Protection Agency Ireland – www.epa.ie.The EPA Appropriate Assessment tool was used to gather information on Natura 2000 sites within the Zone of Influence of the proposed development site. Information on water quality was also obtained from this site.
- Galway County Council – Information pertaining to planning history in the area and other plans and projects to allow an assessment of the potential cumulative impacts.

5.2.4 Field Based Studies

Ecological field surveys were carried out at the proposed development site at Glenloughaun, Co. Galway on January 14th, February 4th, February 20th, and July 17th, 2025, by two ORS Ecologists. During these site visits, relevant field notes, species lists and photographs were taken.

5.2.4.1 Habitat Survey & Classification

The site was surveyed in accordance with 'Best Practice Guidance for Habitat Survey and Mapping', The Heritage Council (2011). Habitats within the application site were classified in accordance with 'A Guide to Habitats in Ireland', Fossitt (2000). The habitats recorded on site are denoted in the text along with their habitat code. Habitats were assessed for their potential to be protected habitats under Annex I of the EU Habitats Directive (92/43/EEC) and for their capacity to support rare, threatened, and endangered species. The methodology used in this report to assess the impact on habitats is based on NRA guidelines (2009).

The habitat mapping exercise had regard to the 'Best Practice Guidance for Habitat Survey and Mapping' (*Smith et al., 2011*) published by the Heritage Council. Scientific and common names for plants follow *Parnell et al. (2012)* and *Blamey et al. (1996)*, respectively. In addition to habitat identification, each habitat was assessed for its ecological significance, based on the National Roads Authority (NRA) Site Evaluation Scheme (NRA, 2009).

5.2.4.2 Flora Survey

A list of plant taxa was recorded as part of the habitat survey and mapping exercise. Habitats were characterised by examining the presence and abundance of indicator species. Any rare or threatened species encountered on site were recorded and mapped with suitable mitigation measures for their protection provided.

5.2.4.3 Fauna Survey

Birds

Bird activity on site during field survey was recorded on an ad hoc basis. Birds perching or flying overhead were identified by sight using binoculars or by identifying calls and birdsong. A list of species recorded was gathered and their conservation status was listed. Habitats were

assessed for their suitability to support nesting birds including trees, hedgerows, and holes/gaps in masonry, where present.

Terrestrial Mammals

Surveys for terrestrial mammals involved direct observation, track surveys, scat analysis, searches for scrapes, holts, setts, latrines, couches, spraint, footprints, hair, or evidence of feeding on particular foods. Habitats were assessed for their potential to support protected mammal species such as otter (*Lutra lutra)* or badger (*Meles meles*). For otters, survey effort was focused along the drainage ditches with evidence for otter investigated throughout the site to include features such as slides, resting areas and physical evidence of otter holts where they may be found under tree roots and under tunnels, rocks, culverts and bridges.

Bats

A preliminary bat roost potential survey was conducted as part of this EcIA. This consisted of surveying trees and structures within and surrounding the site for any signs of bat roosting and habitat suitability. The following indicators of bat presence was searched for:

- Live bats.
- Dead bats.
- Droppings.
- Urine/ grease stains.
- Feeding remains.
- Scratch marks.
- Clean timbers, crevices, holes, or gaps.
- Smell of bats.
- Audible squeaking.

Habitat suitability was based on the presence of linear features such as hedgerows, trees, rivers and streams, and old buildings and structures (especially ones constructed of stone).

5.2.4.4 Aquatic Surveys

Aquatic ecology surveys, including biological assessment (Q-values) of the Ballinure River, were also carried out in July 2025 by ORS. Macro-invertebrate sampling was employed, utilising kick sampling upstream and downstream of the proposed development site with a sweep net, followed by examination using a taxonomic key and stereoscopic microscope.

Surface water quality assessment is critical for maintaining ecosystem health and meeting regulatory standards such as the Water Framework Directive 2000/60/EC, the importance of assessing water quality, the regulatory framework in Ireland, and the significance of macroinvertebrates as indicators of ecological health. The primary objective of this study is to evaluate stream water quality in accordance with EPA licensing requirements. Specifically, the study aims to utilise macro-invertebrate sampling to gather Q-value ratings to obtain a biotic assessment of the water body. The biotic assessment will provide a Q-value rating and will be supplemented by examination of vegetative characteristics, including macrophytes present in the stream, to assess ecological health and support regulatory compliance. This assessment of the nearby stream is intended to inform the decision-making process when considering possible outflow into the stream and how additional load might affect its WFD status.

Sampling was conducted at 2 no. sites along the Ballinure River both upstream and

downstream of the proposed development site, using kick sampling with a sweep net and of standard 1mm fine mesh to catch invertebrates (**Figure 5.2.1**). At each site, three samples were taken to provide a representative profile of each downstream and upstream section.

Figure 5.2.1: The site location and biological quality sample locations.

Vegetative characteristics, including macrophytes, were compiled during sampling to provide additional ecological context. Substrate composition and water body characteristics including flow type, and water depth and width were also measured. Collected specimens were identified to the lowest taxonomic level possible using a taxonomic key and stereoscopic microscope, following standard procedures. Q-values were assigned to identify taxa based on their sensitivity to pollution. Q-value ratings were calculated for each sampling site based on the composition of macro-invertebrate communities.

Indicator groups were calculated from their relative abundance and then into their respective proportional values per grouping. The relative abundance value helps to assign the Q-Value score for each taxonomic group with the following methodology where:

- Present = 1/2 individuals
- Scarce/Few = <1%
- Small Numbers = <5%
- Fair Numbers = 5-10%
- Common = 10-20%
- Numerous = 25-50%
- Dominant = 50-75%
- Excessive = >75%

5.2.4.5 Limitations and Constraints

This report assesses potential impacts arising from the proposed development only. The proposed impacts are assessed in relation works carried out within the delineated proposed development site boundary.

Faunal or floral surveys were carried out as part of this EcIA, and all instances of faunal activity were recorded during site walkovers. The surveying was conducted during daylight hours.

During the winter months smooth newts (*Lissotrition vulgaris*) are likely to find winter refuge and hibernation under fallen trees and in long grasses and thick vegetation. This would make visual ID for newts difficult. In the winter, common frogs (*Rana temporaria*) hibernate, spending their time in a state of dormancy to conserve energy and avoid freezing. They typically seek out damp environments, like the mud at the bottom of ponds, under log piles, or in compost heaps, where they can find a sheltered and relatively stable temperature. Reptiles were searched for, but they are wide ranging. Habitats such as basking areas which catch the sun located next to grassy hummocks and long vegetation were searched as well as on walls and rocks. In order to negate any seasonal constraints that occurred during the winter surveying, additional surveying was undertaken in July to ensure flowering plants, amphibians, reptiles, and invertebrates were sufficiently recorded. Therefore, it is not considered that any seasonal constraints were impacting on the results of this EcIA.

5.2.5 Assessment Methodology

5.2.5.1 Evaluation of Ecological Features

The methodologies used to determine the value of ecological resources, to characterise the impacts of the proposed development, and to assess the significance of impacts and any residual effects are described below. This approach is in accordance with the following guidelines and methodologies:

- Guidelines for Ecological Impact Assessment in the UK and Ireland by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).
- Guidelines On the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022).
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009).
- Guidelines on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission, 2013).

CIEEM suggest that to ensure a consistency of approach, ecological features are valued in accordance with their geographical frame of reference, as defined below:

- International
- National (Ireland)
- Regional (West)
- County (Galway)
- District (Ballinasloe)
- Local/Townland (Glenloughaun)

The above categories are then applied to the ecological features identified. Ecological features can be defined as:

- Designated sites (i.e., SACs, SPAs, NHAs, pNHAs, National Nature Reserves) or non-statutory locally designated sites and features.
- Non-designated sites and habitats and features of recognised biodiversity value, such as rivers and streams. The features being evaluated can be considered in the context of the site and locality and thus a more accurate assessment of the impacts in the locality can be made.

5.2.5.2 Assessment of Impacts

The assessment of potential ecological impacts has been carried out using guidelines published by the EPA and the CIEEM. They can be summarised as:

- The identification of the range of potential impacts which can reasonably be expected to occur should the Proposed Development receive planning consent.
- The consideration of the systems and processes in place to avoid, reduce and mitigate the possible effects of these impacts.
- The identification of opportunities for ecological enhancement within the Proposed Development site.

Impacts are defined as being positive, negative, or neutral. A significant impact is defined as an impact upon the integrity of a defined ecosystem and/or the conservation status of a habitat or species within a given area. Where a potential negative impact has been identified, mitigation measures have been formulated using best practices techniques and guidance to prevent, reduce or offset the impact.

5.3 Characteristics of the Proposed Development

5.3.1 Description of the Proposed Project

The Applicant, CycleØ (IE) Limited, proposes to develop a Renewable Biogas Facility (herein referred to as the proposed development) on a site located in the townland of Glenloughaun, Co. Galway.

The Proposed Development comprises the construction and operation of an agricultural-feedstock anaerobic digestion (AD) facility and associated infrastructure on lands at Glenloughaun, c. 3 km south of Ballinasloe, Co. Galway. The development is designed to accept and treat up to 90,000 tonnes per annum of predominantly locally sourced agricultural manures and slurries, distillery and dairy processing residues and crop-based feedstocks, and to upgrade the resulting biogas to biomethane for injection into the national gas network.

From an ecological perspective, the key physical components of the project within the main site are:

- a feedstock reception / pre-treatment building and associated enclosed handling areas;
- a series of enclosed primary and secondary digester tanks and associated process tanks;
- a biogas upgrading unit and gas clean-up equipment;
- a combined heat and power (CHP) unit and auxiliary boiler;
- covered storage for digestate / biobased fertiliser (including tanks and, where relevant, enclosed clamps);
- an operations / control building with staff welfare and office accommodation;

- a weighbridge and security gatehouse;
- internal access roads, HGV turning and loading areas, and associated hardstanding;
- site fencing and security gates;
- on-site surface-water management infrastructure (including yard drainage, attenuation and SuDS features); and
- on-site foul drainage and an independent wastewater treatment system for domestic effluent from staff facilities.

5.4 Receiving Environment

This section provides an overview of the existing ecological conditions within the site and the surrounding environment.

5.4.1 Site Location & Surrounding Environment

The proposed works are located in Glenloughaun, Co. Galway. The Proposed Development site lies approximately 3 km south of Ballinasloe and approximately 22 km north-east of Loughrea, Co. Galway. The site is currently part greenfield/part brownfield and used as agricultural pastureland and comprises improved grassland with areas of recolonising bare ground and semi-natural grassland. It is bounded to the north by Torva Ireland Limited, a meat processing and preserving facility, with further agricultural land to the south, east and west. The R355 regional road and Whytes concrete plant are located approximately 225 m east of the Proposed Development. The site lies immediately south of the Glenloughaun Road (L-8412), from which access to the development will be provided.

Using up-to-date aerial photography and field survey, the land use and habitats surrounding the site were assessed. The site is situated in a rural area where the predominant land use is agriculture, and the dominant habitat associated with this use is improved agricultural grassland (GA1). Other habitats present in the wider area include semi-improved grasslands, hedgerows (WL1), treelines (WL2), wet grasslands (GS4), drainage ditches (FW4) and buildings and artificial surfaces (BL3).

Several watercourses occur in proximity to the site. Drainage ditches along the southern and eastern site boundaries discharge to the Ballinure River approximately 135 m south-east of the site. The Ballinure River flows for approximately 6.6 km east before joining the River Suck (IE_SH_26S071550). Prior to this confluence, the river flows through the River Suck Callows SPA, located approximately 5.4 km east of the Proposed Development. The River Suck then flows for a further 6.3 km east before discharging into the River Shannon (IE_SH_26S021920), where the Middle Shannon Callows SPA and River Shannon Callows SAC are located.

The wider landscape is predominantly rural, characterised by a patchwork of agricultural fields, hedgerows and scattered residential properties. A map showing the site and its surrounding environs is provided in Figure **5.4.1**.

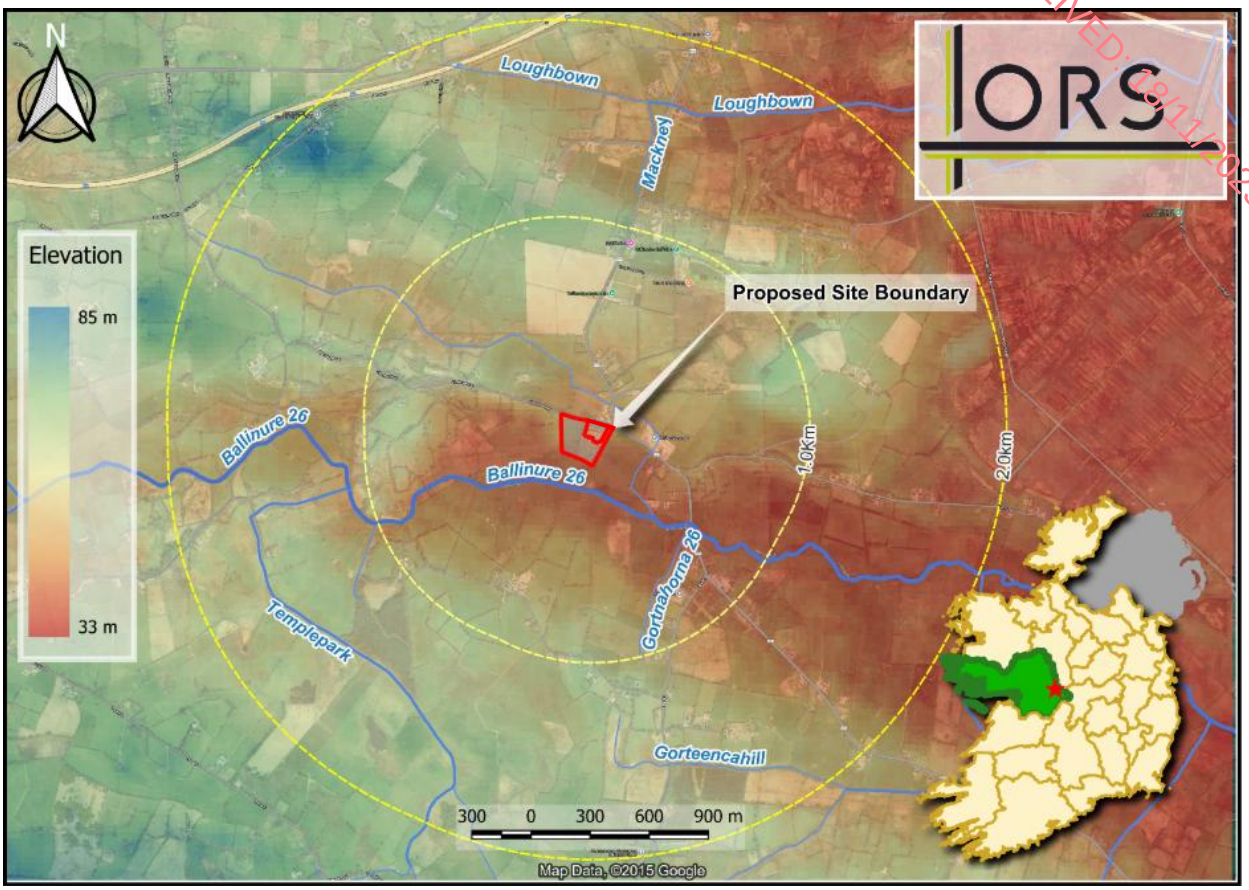

Figure 5.4.1: Proposed site boundary, location, and surrounding environs.

5.5 Designated Sites

5.5.1 Natura 2000 Sites

The proposed site is not within or immediately adjacent to any site that has been designated as a Special Area of Conservation (SAC) or a Special Protection Area (SPA) under the EU Habitats or EU Birds Directive.

There are seven Natura 2000 sites within the Zone of Influence of this Proposed Development site. These sites are summarised in **Table 5.5.2**. The location of the site in relation to these designated areas are shown in **Figures 5.5.1 and 5.5.2** and a full synopsis of these sites can be read online on the website of the National Parks and Wildlife Service (www.npws.ie).

Table 5.5.2: Natura 2000 Sites within 15km of the Proposed Development

Site Name & Code	Distance from Site	Qualifying Interests
Glenloughaun Esker SAC (002213)	Located *ca.* 740m west of the proposed development	• Semi- natural dry grasslands and scrubland facies on calcareous substrates (*Festuco- Brometalia*) (*important orchid sites) (6210)
River Suck Callows SPA 004097	Located ca. 3.5 km east of the proposed development (c. 5.4 km downstream along the Ballinure / River Suck corridor).	• Whooper Swan (*Cygnus cygnus*) [A038] • Wigeon (*Anas penelope*) [A050] • Golden Plover (*Pluvialis apricaria*) [A140] • Lapwing (*Vanellus vanellus*) [A142]

		• Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] • Wetland and Waterbirds [A999]
Ardgraigue Bog SAC 002356	Located *ca.* 12.8km south of the proposed development	• Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150]
River Shannon Callows SAC 000216	Located *ca.* 12.8km east of the proposed development	• *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] • Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) [6510] • Alkaline fens [7230] • Limestone pavements [8240] • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] • Otter (*Lutra lutra*) [1355]
Middle Shannon Callows SPA 004096	Located *ca.* 12.8km east of the proposed development	• Whooper Swan (*Cygnus cygnus*) [A038] • Wigeon (*Mareca penelope*) [A855] • Corncrake (*Crex crex*) [A122] • Golden Plover (*Pluvialis apricaria*) [A140] • Lapwing (*Vanellus vanellus*) [A142] • Black-tailed Godwit (*Limosa limosa*) [A156] • Black-headed Gull (*Chroicocephalus ridibundus*) [A179] • Wetland and Waterbirds [A999]
Castlesampson Esker SAC 001625	Located *ca.* 14.3km north of the proposed development	• Turloughs [3180] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210]
Killeglan Grassland SAC 002214	Located *ca.* 14.7km north of the proposed development	• Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210]

The generic conservation objectives of the SACs are:

To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.

The generic conservation objectives of the SPAs are:

To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.

The favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

As potential significant effects upon the sites identified could not be ruled out due to potential emissions arising from the operation of the proposed development, a separate NIS (Document Reference No.: **231960-ORS-XX-XX-EN-13d-002-005** as required under Article 6 of the EU Habitats Directive has been submitted as part of this application. This NIS will allow the competent authority to undertake its statutory obligations with regards to Appropriate Assessment.

Figure 5.5.1: Location of the proposed development site in relation to the nearby SACs.

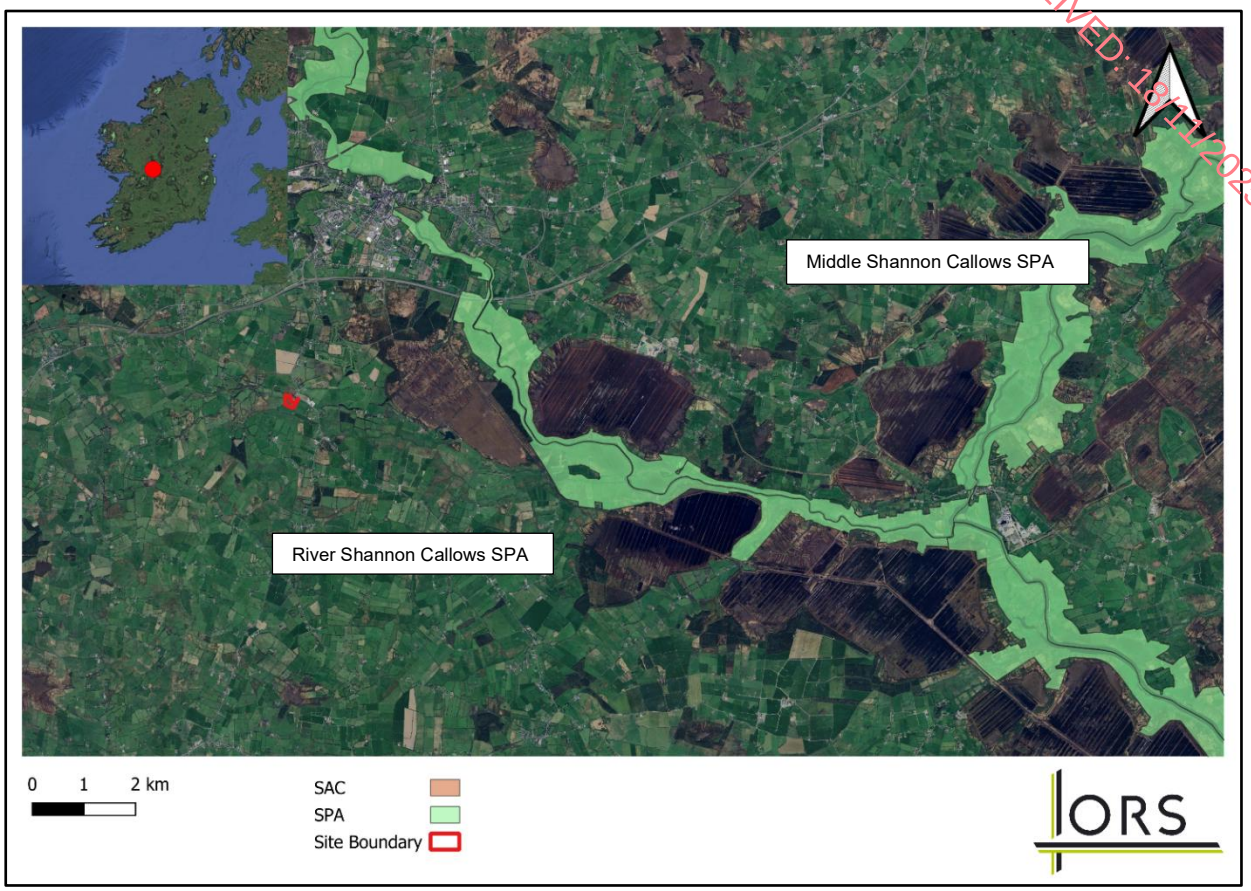

Figure 5.5.2: Location of the proposed development site in relation to the nearby SPAs.

5.5.2 Nationally Important Sites

The proposed development is not within or immediately adjacent to any nationally designated site, such as a Natural Heritage Area or a proposed Natural Heritage Area. It is within the Zone of Influence of 14 sites that have been designated as Natural Heritage Areas/ proposed Natural Heritage Areas. These sites are summarised in **Table 5.5.2** and a map showing their locations relative to the proposed development is shown in **Figure 5.5.3**.

Table 5.5.2 – Nationally Important Sites within 15km of the proposed development.

Site Name & Code	Distance from Site
Cloonascragh Fen and Black Wood pNHA 001247	2.9km east
Suck River Callows NHA 000222	3.4km east
Ballinasloe Esker pNHA 001779	3.6km north
Killure Bog NHA 001283	5.3km north
Crit Island West NHA 000254	7.5km northwest
Annaghbeg Bog NHA 002344	9.0km north
Cranberry Lough pNHA 001630	9.9km northeast
Moorfield Bog NHA 001303	10.3km south
Eskerboy Bog NHA 001264	10.6km southwest
Cloonoolish Bog NHA 000249	11.3km south

Ardgraigue Bog pNHA 001224	12.8km south
River Shannon Callows pNHA 000216	12.9km east
Callow Lough pNHA 001239	12.9km northwest
Castlesampson Esker pNHA 001625	14.3km northeast

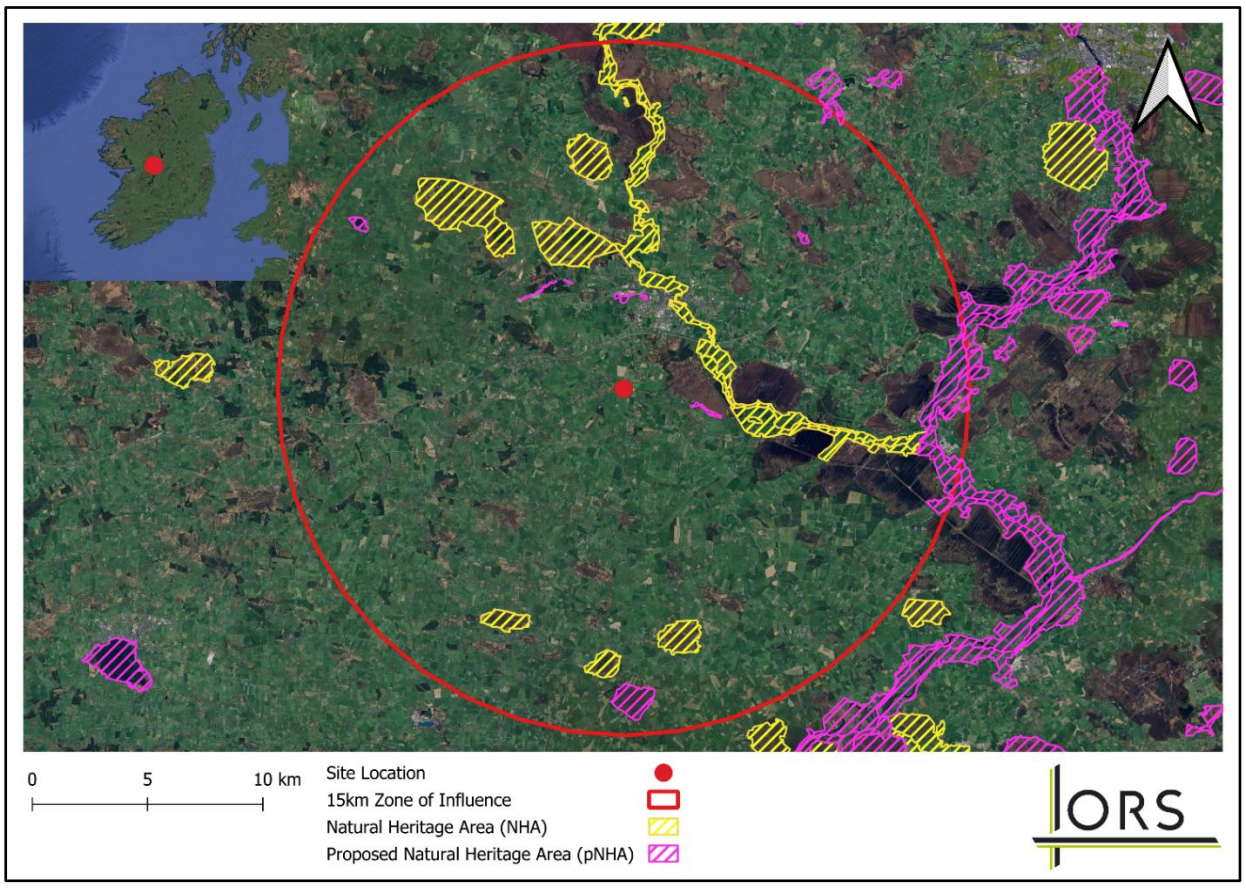

Figure 5.5.3: Proposed development in relation to Natural Heritage Areas and proposed Natural Heritage Areas within 15km.

5.6 Flora

5.6.1 Habitats within the Study Area

No part of the proposed development site lies within, nor is it immediately adjacent to any area that has been designated for nature conservation purposes.

The proposed development site is located within a rural agricultural landscape and is dominated by dry calcareous and neutral grassland, improved agricultural grassland, and wet grassland. The site is bordered by hedgerows, treelines, and drainage ditches which offer high value habitat on a local level. The drainage ditches flow into the Ballinure River, a tributary of the River Suck. This provides hydrological connectivity to the River Suck Callows SPA and the River Shannon and associated Natura 2000 sites.

Ecological surveys were carried out in January, February, and July 2025. This is in line with best practice methodologies as it eliminates seasonal variation in data and allows the

identification of habitats or species of conservation concern. In addition to the general habitat assessment, targeted surveys were undertaken for mammals (bat, badger and otter), breeding birds, invasive species, and signs of other species of conservation concern. A map noting the habitats present at the proposed development site can be seen in **Figure 5.6.1**.

Figure 5.6.1: Habitat Map of the Proposed Study Area.

The dry calcareous and neutral grassland (GS1) area consists of typical species for this habitat such as Yarrow (*Achilliea millefolium*), Selfheal (*Prunella vulgais*), Oxeye Daisy (*Leucanthemum vulgare*), Common Knapweed (*Centaurea nigra*), and Red Clover (*Trifolium pratense*). This habitat is of high ecological value on a local scale.

The wet grassland (GS4) was waterlogged and consists of typical species such as rush species (*Juncus* spp.), Yellow Flag Iris (*Iris pseudocorus*), Creeping Buttercup (*Ranunculus repens*), Marsh Thistle (*Cirsium palustre*), Silverweed (*Potentilla anserina*), and Meadowsweet (*Filipendula ulmaria*). This habitat is of high ecological value on a local scale.

The improved agricultural grassland (GA1) was dominated by Perennial Ryegrass (*Lolium perenne*). Other species such as White Clover (*Trifolium repens*), Plantains (*Plantago* spp.), and Docks (*Rumex* spp.) were also present throughout this habitat. This habitat is of low ecological value.

The perimeters of the site consist of high value Hedgerows (WL1), Treelines (WL2), and Drainage Ditches (FW4). These features are of high ecological value on a local level. Native species such as Hawthorn (*Crataegus monogyna),* Blackthorn (*Prunus spinosa*), Elderberry (*Sambucus nigra*), Hazel (*Corylus avellana*), and Ash (*Fraxinus excelsior)* dominate this

habitat. This habitat is being retained and incorporated into the proposed design.

The drainage ditches on site are connected to the Ballinure River and were dried up on the survey days. The recolonising bare ground (ED3) habitat is located adjacent to the wet grassland, and it is recolonising with the wet grassland species mentioned above.

5.6.1.1 Overall Evaluation of Habitats within the Proposed Development Site

The habitats within the proposed development site have been evaluated and are characterised as dry calcareous and neutral grassland, wet grassland, improved agricultural grassland, recolonising bare ground, drainage ditches, and hedgerows and treelines.

The improved agricultural grassland and bare recolonising ground habitats have been highly modified and are considered to have low ecological value. The site is bordered by hedgerows and treelines, which are of high ecological value on a local scale. These are to be retained and incorporated into the design of the project. Drainage ditches border the southern and eastern edges of the site and are connected to the Ballinure River. Measures have been proposed for the protection of these habitats. These measures can be found in **Section 5.11**. The grassland habitats within the site will be partially/ completely lost due to the proposed development. The wet grassland and dry calcareous and neutral grassland are considered to be of high ecological value on a local scale, however they are not protected habitats and no protected or rare species were recorded during site surveying.

Overall, the biodiversity and ecology of this proposed development site is assessed as being of low conservation importance and varies from low-high local value. The hedgerows / treelines within the site are of the most important biodiversity value and they would provide suitable nesting sites for birds. These ecological features also form part of the local ecological networks. The retention of these features will allow these functions to continue.

5.6.2 Rare and Protected Plant Species

An examination of the website of the National Biodiversity Data Centre and the Online Atlas of Vascular Plants for Ireland revealed that there are no records for any plant species protected under the Flora Protection Order from within the 10km square (M82) of the proposed development site. The plant species recorded on site were consistent with wet grassland, dry calcareous and neutral grassland, improved grassland, and common hedgerow species. No orchids of conservation concern were recorded during site visits. The site is considered to be of local importance (higher value) according to the ‘Guidelines for Assessment of Ecological Impacts of National Roads Schemes’, NRA (2009).

5.6.3 Invasive Species

NBDC records indicate the presence of certain regulated invasive species (e.g. Japanese Knotweed (*Fallopia japonica*) and *Rhododendron ponticum* within the wider 10km grid, however neither of these were located on site. The northern hedgerow on the site boundary contains cherry laurel (*Prunus laurocerasus*). Red-osier Dogwood (*Cornus sericea*) was also located within the site. The locations of these invasives can be seen in **Figure 5.6.2**.

Figure 5.6.2: Locations of invasive species at the proposed development site.

5.7 Fauna

5.7.1 Mammals

Records from the National Biodiversity Data Centre reveal the presence of the following protected mammals from within the 10km square (M82) of this proposed development site:

- Brown Long-eared Bat (*Plecotus auritus*)
- Eurasian Badger (*Meles meles*)
- Eurasian Red Squirrel (*Sciurus vulgaris*)
- European Otter (*Lutra lutra)*
- Lesser Noctule (*Nyctalus leisleri*)
- Pine Marten (*Martes martes*)
- Common Pipistrelle (*Pipistrellus pipistrellus sensu stricto*)
- Pipistrelle (*Pipistrellus pipistrellus sensu lato*)
- Soprano Pipistrelle (*Pipistrellus pygmaeus*)
- West European Hedgehog (*Erinaceus europaeus*)
- Wood Mouse (*Apodemus sylvaticus*)

No evidence of the presence of these species were recorded during site surveying.

5.7.1.1 Badger

Badger surveys were undertaken throughout the proposed development site. Within this area

of search, all fence lines, treelines, and hedgerow habitats were systematically surveyed for evidence of badgers in the form of:

- Faeces: badgers usually deposit faeces in characteristic excavated pits, concentrations of which (latrine sites) are typically found at home range boundaries.
- Setts, comprising either single isolated holes or a series of holes, likely to be interconnected underground.
- Paths between setts or leading to feeding areas.
- Scratching posts at the base of tree trunks.
- Snuffle holes (small scrapes where badgers have searched for insects, earthworms and plant tubers).
- Day nests (bundles of grass and other vegetation where badgers may sleep above ground).
- Hair traces.
- Footprints.

No signs of badger activity - such as setts, tracks, latrines, or snuffle holes - were identified on site. The site was assessed as having limited suitability for sett creation due to suboptimal habitat conditions.

5.7.1.2 Otter

Surveys conducted along the drainage ditches on the southern and eastern boundaries of the site found no signs of otter activity (e.g., holts, couches, spraints, droppings, or tracks). While the Ballinure River contains suitable habitat for otter, the drainage ditches are not considered a core habitat and lack features suitable for holt creation or feeding. No signs of otter activity were recorded during the surveys.

However, having regards to the natural habitats that are present in the lands surrounding the site, the site may be of local importance to mammal species.

5.7.1.3 Bats

Bat Suitability Index

The National Biodiversity Data Centre (NBDC) has produced a landscape suitability index for bat species in Ireland, and this is based on work by *Lundy et al (2011).* The results are provided as maps, where the area of concern is coloured to indicate the overall suitability of the landscape for bats. The index ranges from 0 to 100 with 0 being least favourable and 100 most favourable for bats. The overall assessment of bat habitats for the current study area is given as 31.67, which is moderately high. **Table 5.7.1** gives the suitability of the study area for the bat species found in the study area (based on NBDC).

Table 5.7.1: Bat Suitability Index for the Proposed Development (NBDC).

Bat Species	Suitability Index
All Species	31.67
Brown Long-Eared Bat *Plecotus auritus*	39
Soprano Pipistrelle *Pipistrellus pygmaeus*	47
Natterer's *Bat Myotis nattereri*	38
Nathusius' Pipistrelle *Pipistrellus nathusii*	2
Daubenton's Bat *Myotis daubentonii*	38

Whiskered Bat *Myotis mystacinus*	28
Leisler's Bat *Nyctalus leisleri*	45
Lesser Horseshoe Bat *Rhinolophus hipposideros**	2
Common Pipistrelle *Pipistrellus pipistrellus*	46

** Annex II Species*

Bat Features within the Proposed Development Site

There are no buildings within the site, however there are some mature trees present along the site boundaries that have bat roosting potential. Overall, the landscape is considered to be of high local importance for bats due to the network of hedgerows and treelines around the fields in the wider area. These ecological features are important for commuting and foraging bats.

5.7.2 Birds

The following bird species were heard singing, within the proposed development site, or flying overhead. Overall, there was moderate bird activity at the proposed development site. The current conservation status of the birds is also given, where green status is of low conservation concern, amber is of medium concern and red is of high concern (*Gilbert et al., 2021*).

Table 5.7.2: Bird species recorded on site.

Species	Conservation Status
Blackbird (*Turdus merula)*	Green Status
Great tit (*Parus major)*	Green Status
Wren (*Troglodytes troglodytes)*	Green Status
Robin (*Erithacus rubecula*)	Green Status
Chaffinch (*Fringilla coelebs)*	Green Status
Starling (*Sturnus vulgaris)*	Green Status
Pied Wagtail (*Motacilla alba yarrellii)*	Green Status
Buzzard (*Buteo buteo)*	Green Status
Jackdaw (*Corvus monedula*)	Green Status
Feral Pigeon (*Columba livia f. domestica)*	Green Status
Wood Pigeon (*Columba palumbus*)	Green Status
Long-tailed Tit (*Aegithalus caudatus*)	Green Status
Stonechat (*Saxicola rubicola*)	Green Status
Song Thrush (*Turdus philomelos*)	Green Status
Magpie (*Pica pica*)	Green Status
Dunnock (*Prunella modularis*)	Green Status
Rook (*Corvus frugilegus*)	Green Status
Siskin (*Spinus spinus*)	Green Status
Blue Tit (*Cyanistes caeruleus*)	Green Status
Goldfinch (*Carduelis carduelis*)	Green Status

Hooded Crow (*Corvus cornix*)	Green Status
Pheasant (*Phasianus colchicus*)	Green Status

Having regards to the network of treelines and hedgerows that surround the site, the site and its surrounding habitats are likely to be of medium-high local importance for birds.

5.7.3 Amphibians, Reptiles and Invertebrates

No amphibians or reptiles were observed during surveys, and no evidence of their presence was recorded on site. The drainage ditches and Ballinure River may provide habitat for amphibians such as the common frog (*Rana temporaria*), but not for the smooth newt (*Lissotriton vulgaris*) as the drainage ditches were mostly dried up during site visits and the flow in the Ballinure River would render it an unsuitable habitat for the newts, although features such as uncut long grass can provide suitable overwintering habitat.

The grassland habitats offer value for invertebrates, while the hedgerows and unmanaged margins provide localised foraging habitat for pollinators. Butterfly species recorded during surveys include meadow brown (*Maniola jurtina*), green-veined white (*Pieris napi*), and painted lady (*Vanessa cardui*).

5.8 Aquatic Environment

5.8.1 Water Features and Quality

5.8.1.1 Surface Waters – Water Framework Directive Status

The site is within the Upper Shannon Hydrometric Area (26) and Catchment (26D), the Suck_SC_100 Sub-Catchment (26D_3) and the Ballinure (010) Sub-Basin. There are drainage ditches along the southern and eastern perimeter of the fields within the site. These drains merge with the Ballinure River *ca*. 135m southeast of the site. The Ballinure River flows east until its confluence with the River Suck at a point *ca*. 6.6km downstream of the site.

The Water Framework Directive (WFD) operates on six-year cycles, with the most recent data covering the period from 2016 to 2021. The Directive assesses rivers, lakes, estuaries, groundwater, and coastal waters, assigning each waterbody one of five ecological statuses: High, Good, Moderate, Poor, or Bad. Additionally, each waterbody is assigned a risk category ("At Risk," "Not At Risk," or "Review"), indicating the likelihood of failing to meet WFD objectives by 2027.

Based on data available on EPA maps and in accordance with the Water Framework Directive, the BALLINURE_010 river which is located *ca*. 128m south of the site has a WFD status of “Good”, with the risk level is under review. The BALLINURE_020 river located *ca*. 590m southwest of the site has a WFD status of “Poor” and a risk level of “At Risk”. This indicates that the ecological status and chemical status of rivers in the vicinity of the proposed development site are unstable. An overview of the ecological status of the watercourse in the area and surrounding catchments is presented in **Figure 5.8.1**.

EPA Maps were also consulted to determine whether any WFD River Network Routes in the vicinity are designated as Salmonid Waters under *S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations 1988*. None of the nearby riverine waterbodies are included in this designation, meaning that no adverse impacts on salmonid habitats are anticipated from the site.

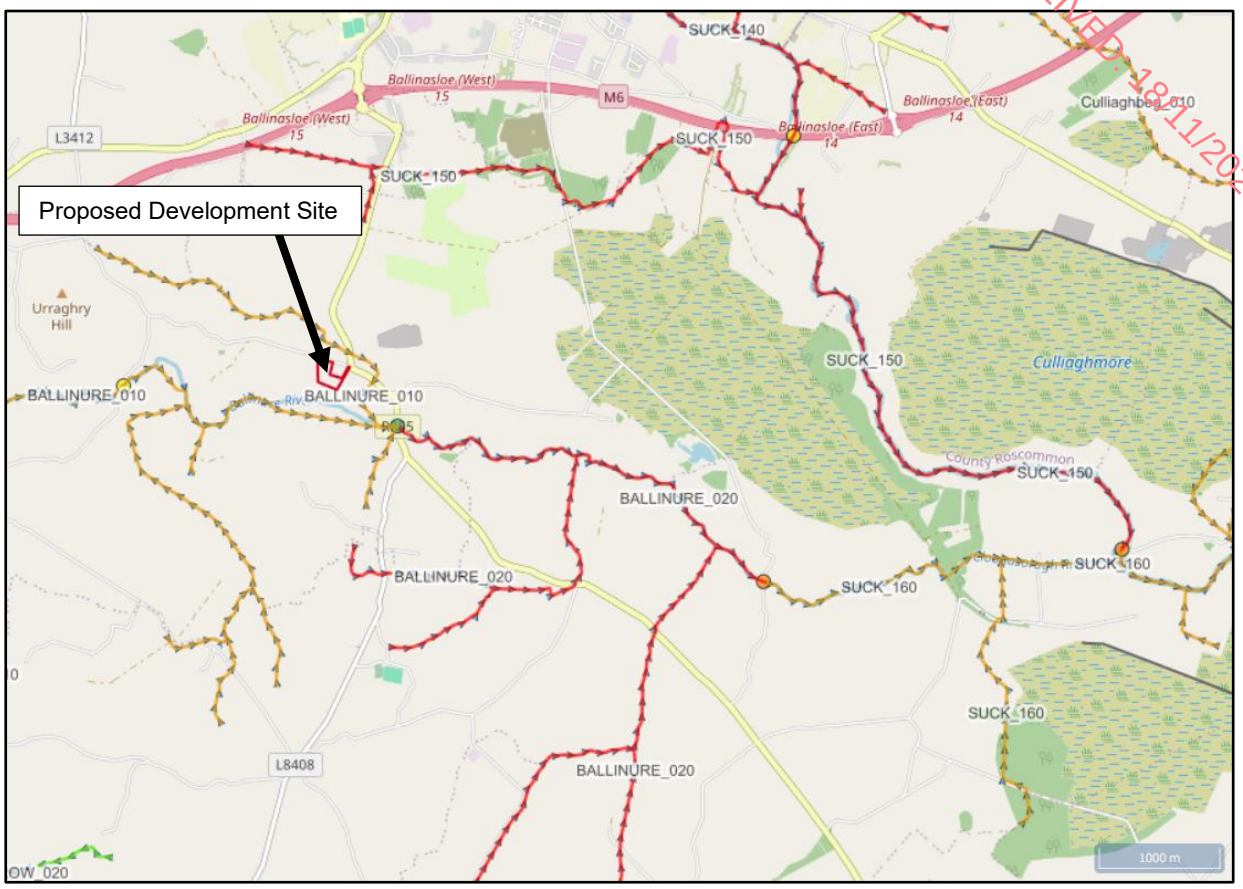

Figure 5.8.1: The site (Outlined in red) and local WFD Status [Green – Good Status; Yellow – Moderate Status; Red – Poor Status].

5.8.1.2 Surface Waters – Biological Quality Assessment

Sampling was conducted at two locations, upstream and downstream of the proposed development site, along the Ballinure River (**Figure 5.2.1**). Sampling at both locations were undertaken using kick sampling methods with a sweep net, with a standard 1mm fine mesh to catch invertebrates. At each location, three samples were taken to provide a representative profile of both the downstream and upstream section. The assessment focused on macroinvertebrate populations as biological indicators of water quality, following the EPA's methodology for deriving Q-values and assessing ecological status. Collected specimens were identified to the lowest taxonomic level possible using a taxonomic key and stereoscopic microscope, following standard procedures. Q-value ratings were calculated for each sampling location based on the composition of macroinvertebrate communities. The presence of highly sensitive species was emphasised as an indictor of good water quality.

Both sites exhibited moderately sensitive and pollution-tolerant taxa, including *Gammaridae*, *Chironomidae*, and *Ephemera*. While some highly sensitive taxa such as *Trichoptera* was present, its relative abundance was lower in both samples. This suggests that there are minimal pressures present between the two sampling sites.

The results of the biological water quality assessment from the Ballinure River at points upstream and downstream are presented below in **Table 5.8.1**.

Table 5.8.1: Q Values Results of the Ballinure River

Station ID	Q-Value	Ecological Status

Station 1 – Upstream	Q3-4	Moderate
Station 2 – Downstream	Q3-4	Moderate

5.8.1.3 Ground Water

The Proposed Development site is within the Aughrim Groundwater Body and the current status of this waterbody is noted as Good. This groundwater body is currently considered as "Not At Risk". Within the proposed development site itself, groundwater vulnerability is classed as Moderate.

5.9 Ecological Evaluation

5.9.1 Summary of the Value of the Site

The proposed development site is within the Zone of Influence of four sites designated under the Natura 2000 network (SACs / SPAs). The closest of these is the Glenloughaun Esker SAC, which is located *ca*. 740m west of the site. The drainage ditches on the site flow into the Ballinure River *ca*. 135m southeast of the site. The Ballinure River flows for approximately 6.6km east, where it joins the River Suck. Before the Ballinure River joins the River Suck, it flows into the River Suck Callows SPA, *ca*. 5.4km from the proposed development site. The River Suck then flows for a further 6.3km east before discharging into the River Shannon. The Middle Shannon Callows SPA and River Shannon Callows SAC are also located at this point. Two no. NHAs are also hydrologically connected via this route; Suck River Callows NHA and River Shannon Callow NHA.

Within the proposed development site itself the dominant habitats are dry calcareous and neutral grassland, improved agricultural grassland, and wet grassland. The site is bordered by hedgerows, treelines, and drainage ditches. The treelines and hedgerows that occur within and along the perimeters of the site are important ecological features - these areas provide important nesting areas and safe commuting corridors for local populations of birds and small mammals, including potentially bats. They also provide ecological connectivity to the surrounding area.

The NRA guidelines on the Assessment of Ecological Impacts on National Road schemes (NRA, 2009) provides a rationale for the evaluation of ecological receptors within a site. **Table 5.9.1** lists the habitats that have been described within the proposed development site and their associated ecological value, based on the NRA guidelines.

Table 5.9.1: Ecological Features and their Evaluation.

Habitat	Rating	Criteria
Wet Grassland – GS4	Local Importance (Higher Value)	Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality.
Dry Calcareous and Neutral Grassland – GS1	Local Importance (Higher Value)	Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality.

Improved Agricultural Grasslands – GA1	Local Importance (Lower Value)	Sites or features containing non-native species that are of some importance in maintaining habitat links.
Well Structured Hedgerow – WL1 Well Structured Treelines – WL2	Local Importance (Higher Value)	Semi-Natural Habitat that is higher in biodiversity value in a local context. Provides value for local populations of bats and birds.
Drainage Ditch – FW4	Local Importance (Higher Value)	Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Recolonising Bare Ground – ED3	Local Importance (Lower Value)	Sites or features containing non-native species that are of some importance in maintaining habitat links.
Suck River Callows NHA	National Importance	Site designated or proposed as a Natural Heritage Area (NHA).
River Shannon Callows NHA	National Importance	Site designated or proposed as a Natural Heritage Area (NHA).
Glenloughaun Esker SAC	International Importance	'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
River Shannon Callows SAC	International Importance	'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
River Suck Callows SPA	International Importance	'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
Middle Shannon Callows SPA	International Importance	'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.

5.10 Impact Assessment

The information gathered as part of the desk study and field survey for the proposed development has been used to complete an Ecological Impact Assessment (EcIA). This EcIA has been undertaken following the latest guidelines set out by CIEEM (2018) and the EPA.

The identification of potential impacts and the assessment of their significance typically requires the identification of the type and magnitude of the impacts. For example, will the impacts be short term or long term, direct, indirect or cumulative and will they occur during construction or operation. This section will establish whether ecological impacts of the proposed development are likely to occur and whether or not they are significant. These potential impacts will be examined with respect to the ecological receptors identified in the previous section.

The emphasis in EcIA is on “significant” effects, rather than all ecological effects (CIEEM, 2018). For the purpose of EcIA, a “significant effect” is an effect that either supports or undermines biodiversity conservation objectives for important ecological features for biodiversity in general. Conservation objectives may be specific (e.g., for a designated site) or broad (e.g., national / local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local.

A significant effect is an effect that if sufficiently important to require assessment and reporting so that the decision maker (i.e., Local Authority) is adequately informed of the environmental consequences of permitting the project. In broad terms, significant effects encompass impacts on structures and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance, and distribution). (CIEEM, 2018).

5.10.1 Impacts upon Designated Sites

5.10.1.1 Natura 2000 Sites

The location of the proposed development is deemed to be within the Zone of Influence of four Natura 2000 sites, due to their distance to the proposed development site and hydrological connectivity with the Ballinure River. As such and in accordance with Article 6(3) of the EU Habitat’s Directive (Council Directive 92/43/EEC) regarding Appropriate Assessment, the screening exercise for Appropriate Assessment was carried out to identify whether any significant impacts on designated sites are likely. The exercise was used to determine the appropriateness of the proposed project, in the context of the conservation status of the designated sites. The distance to the proposed development site and presence of a continuous hydrological pathway means that significant effects cannot be definitively excluded and thus Glenloughaun Esker SAC, River Suck Callows SPA, River Shannon Callows SAC and Middle Shannon Callows SPA were screened in for further evaluation under Stage 2 Appropriate Assessment, as required under the Habitats Directive, namely the Natura Impact Assessment.

By adhering to good housekeeping practices, implementing the measures outlined in the Natura Impact Statement (NIS) and Construction Environmental Management Plan (CEMP), and ensuring effective pollution control and surface water management, potential negative impacts can be mitigated. Through these precautions, the ecological integrity of Glenloughaun Esker SAC, River Suck Callows SPA, River Shannon Callows SAC and Middle Shannon Callows SPA can be safeguarded.

5.10.1.2 Natural Heritage Areas

The proposed development will not lead to the loss or fragmentation of protected habitats within any pNHA or NHA. However, two NHAs occur downstream of the Ballinure River i.e. the Suck River Callows NHA and River Shannon Callow NHA. In the absence of mitigation measures, significant effects upon these NHAs cannot be ruled out due to pollution of the Ballinure River. The impacts are the same as those which were previously described in the preceding section on the Natura 2000 sites.

5.10.2 Impacts During the Construction Phase

In the absence of suitable design and mitigation measures, the following impacts could occur during the site preparation and construction of the proposed development.

5.10.2.1 Habitat Loss and Fragmentation

The proposed development site is located within a rural agricultural landscape and is dominated by dry calcareous and neutral grassland, improved agricultural grassland, and wet grassland. The site is bordered by hedgerows, treelines, and drainage ditches which offer high value habitat on a local level. The drainage ditches flow into the Ballinure River, a tributary of the River Suck. This provides hydrological connectivity to the River Suck Callows SPA and the River Shannon and associated Natura 2000 sites.

Grassland habitat within the site will be converted to Buildings and Artificial Surfaces. Wet grassland and dry calcareous and neutral grassland have high ecological value on a local scale and therefore its loss constitutes a negative ecological impact. Plans indicate that the hedgerows and treelines within and along the perimeters of the proposed development site will be retained, and this will mitigate against any impacts due to the direct loss of these ecological features. However, damage to these existing hedgerows and mature trees and a subsequent reduction in their lifespan may arise if any root compaction occurs due to works or storage of heavy vehicles or spoil in the root protection zone (RPA) of these features. Any loss or damage to these features would have a negative impact upon the local biodiversity value e.g. alteration or disturbance of semi-natural habitats on or adjacent to the site may reduce their suitability for species such as otter or overwintering birds, which move between designated and undesignated areas.

5.10.2.2 Impacts on Local Wildlife

In the absence of mitigation, any removal of vegetation within the field during the bird nesting season could result in direct mortality of birds. In addition, during site preparation and construction, local populations of birds may be disturbed by the increase in noise, traffic and human activity.

During site preparation and construction, local populations of mammals may be disturbed by the increase in noise, traffic and human activity. Increased nighttime lighting could particularly impact local bat populations, disrupting their foraging behaviour. Nocturnal mammals such as foxes, badgers, and small rodents may experience disturbances from continuous noise during movement or foraging, and some species may avoid the area altogether if noise levels are high enough. Bats, which rely on echolocation for hunting, are particularly vulnerable to prolonged exposure to low-frequency noise, which could interfere with their navigation and foraging abilities, leading to reduced activity in the area.

There will be no loss or fragmentation of any habitats used by roosting or hibernating bats

during construction.

There are no significant effects anticipated for Amphibians, Reptiles and Insects.
In the absence of appropriate design and mitigation measures, local wildlife could be impacted by noise and lighting disturbances. Birds are generally more sensitive to noise during the day, may be disturbed if they nest near the site, although they can typically adapt to moderate background noise. Long-term effects are unlikely unless the noise is exceptionally loud or intermittent.

5.10.2.3 Pollution to Surface and Ground Water

Site preparation and construction will occur on lands that have drainage ditches that are hydrologically connected to the Ballinure River, thus may have the potential to degrade water quality within the River Suck Callows SPA, River Shannon Callows SAC and Middle Shannon Callows SPA via hydrological connections through the River Suck and River Shannon. Site preparation activities such as excavation, soil stripping, and earthworks can mobilise sediments, especially during rainfall events. Sediment-laden runoff may enter local drains that flow into the Ballinure River, increasing turbidity and potentially leading to siltation downstream. This could affect aquatic habitats supporting sensitive species such as otter.

Additional risks include the accidental release of hydrocarbons or concrete washings from plant and machinery, which could alter water chemistry or introduce pollutants with high biological oxygen demand (BOD). If such substances reach connected surface waters, they may adversely impact habitat suitability for qualifying aquatic species. These risks are elevated during wet weather and where drainage is not properly controlled.

It is not foreseen that significant effects on this water feature will occur if adherence to mitigation measures contained in this chapter, NIS, CEMP, and good housekeeping are observed to a high standard.

The site is in an area of moderate groundwater vulnerability. Any deep excavations that are required for the construction could lead to pollution of the groundwater with hydrocarbons or other pollutants.

5.10.3 Impacts During the Operational Phase

In the absence of suitable design and mitigation measures, the following impacts may arise during the operation of the proposed development that could affect the ecology / biodiversity of the proposed development site and its surrounding environs.

5.10.3.1 Impacts on Local Wildlife

In the absence of appropriate design and mitigation measures, local wildlife could be impacted by noise and lighting disturbances. Birds, generally more sensitive to noise during the day, may be disturbed if they roost near the site, although they can typically adapt to moderate background noise. Long-term effects are unlikely unless the noise is exceptionally loud or intermittent.

Mammals may also be affected, with human activity potentially causing disturbances. Increased nighttime lighting could particularly impact local bat populations, disrupting their foraging behaviour. Nocturnal mammals such as foxes, badgers, and small rodents may experience disturbances from continuous noise during movement or foraging, and some species may avoid the area altogether if noise levels are high enough. Bats, which rely on echolocation for hunting, are particularly vulnerable to prolonged exposure to low-frequency

noise, which could interfere with their navigation and foraging abilities, leading to reduced activity in the area.

5.10.3.2 Pollution to Surface and Ground Water

Run-off from impermeable areas storage yards, or vehicle wash zones may carry nutrients (e.g., nitrogen or phosphorus), oils, or suspended solids. Without adequate treatment, this runoff could enter the site's drainage system and eventually discharge into the Ballinure River. In addition, structural weaknesses in any of the tanks could lead to pollution of the groundwater.

5.10.4 Cumulative Impacts

Cumulative impacts or effects are changes in the environment that result from numerous human-induced, small-scale alterations. Cumulative impacts can be thought of as occurring through two main pathways: first; through persistent additions or losses of the same materials or resource, and second, - through the compounding effects as a result of the coming together of two or more effects (*Bowers-Marriott, 1997*).

The proposed application was considered in combination with other developments or proposed developments in the general area and potential cumulative impacts were considered. The proposed development may have cumulative impacts upon designated sites when considered in combination with other developments that have been screened properly for AA (Stage I) or where AA has taken place (Stage II). Any future individual application that has the potential to impact upon a Natura 2000 site will be subject to Appropriate Assessment as required under Articles 6(3) of the Habitats Directive. In the immediate vicinity of Glenloughaun there are a small number of other permitted or proposed developments. None of the identified permitted / proposed developments involve significant additional discharges or habitat loss within the Ballinure/Suck catchment; cumulative effects are therefore assessed as neutral / slight.

The creation of new areas of biodiversity within the proposed development site and the retention and protection of the existing hedgerows and treelines, will provide local ecological corridors and networks that will reduce the overall cumulative impact of this development in the Glenloughaun area.

5.11 Mitigation Measures

5.11.1 Introduction

To avoid and mitigate impacts, and to protect the ecological integrity of the surrounding environment, watercourses, and nearby designated sites, a comprehensive suite of mitigation measures will be implemented for the proposed anaerobic digestion facility at Glenloughaun. These measures specifically target potential impacts on water quality, air quality, pollution, and on impacts on Glenloughaun Esker SAC, River Suck Callows SPA, River Shannon Callows SAC, and Middle Shannon Callows SPA. As such, these mitigation measures will be incorporated into a Construction and Environmental Management Plan (CEMP) and will be contractually binding for the developer and contractors. The operational phase will also include controls required under the Environmental Protection Agency's licensing regime. Measures have also been suggested that will help to protect or enhance the local biodiversity of the surrounding area and to ensure the protection of local wildlife. The implementation of these site-specific mitigation measures will ensure the protection of Natura 2000 habitats and species, nationally important sites, and the local non-designated ecological receptors. These mitigation measures are also included in the accompanying NIS report (Document Reference No: **231960-ORS-XX-XX-RP-EN-13d-005**).

5.11.2 Pre-Construction and General Requirements

- Construction activities at Glenloughaun, Co. Galway will be confined to the approved site footprint to avoid unnecessary clearance or habitat loss within the site boundary.
- Prior to the commencement of developments on site, the site engineer and the contractors will be made aware of the ecological sensitivity of the proposed development site and its connection to Glenloughaun Esker SAC, River Suck Callows SPA, River Shannon Callows SAC, and Middle Shannon Callows SPA and will be made familiar with the mitigation measures outlined in this Chapter and in the NIS. A signed statement saying that they have taken on board the mitigation measures contained herein should be presented to the local authority along with the Notice of Commencement. The applicant will be responsible for alerting the engineers and contractors to the sensitivity of the habitats and water receptors surrounding the proposed development site. This will be done prior to the commencement of any site works.
- All works will adhere to the following best-practice guidelines:
  - Inland Fisheries Ireland (IFI) – Guidelines on Protection of Fisheries During Construction Works (2016).
  - Construction Industry Research and Information Association (CIRIA) – Environmental Good Practice on Site (C692).
  - Environmental Protection Agency (EPA) – Waste Classification & Pollution Prevention Guidelines.
  - Consultation with IFI: Coordination with Inland Fisheries Ireland will ensure that construction activities avoid sensitive periods for aquatic species, and no in-stream works will occur without prior approval.

5.11.3 Mitigation Measures During Construction

5.11.3.1 Protection of Water Quality and Management of Pollutants

- Efficient construction practices and sequences should be employed on site, and this will minimise soil erosion and potential pollution of local watercourses with soil and sediment.
- Unnecessary clearance of vegetation will be avoided and only areas necessary for building works will be cleared. The retention of these areas will also help retain storm water runoff from the site during construction and operation.
- No deterioration in water quality is permitted in local drainage channels or in downstream water bodies hydrologically connected to the screened in Natura 2000 sites. Strict sediment and pollution controls will include attenuation measures, silt traps and geotextile curtains.
- Guidelines in the following best practice documents should be adhered to:
  - Construction Industry Research and Information Association (CIRIA) (2005) Environmental Good Practice on Site (C692).
  - Construction Industry Research and Information Association (2001) Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532).
  - Construction Industry Research and Information Association (2000) Environmental Handbook for Building and Civil Engineering Projects (C512).
  - Environmental Protection Agency (2015) List of Waste and Determining if Waste is Hazardous or Non-Hazardous.
  - Environment Agency et al. (2015) Guidance on the Classification and Assessment of Waste, Technical Guidance WM3.
- Works will be avoided during periods of heavy rainfall.
- There will be no uncontrolled discharges of contaminated waters to ground or surface waters from this development, either during the construction or operation of the development. The control and management of hydrocarbons on site will be vital to prevent deteriorations in surface and groundwater quality locally.

- During construction, re-fuelling of equipment and machinery will be done off site. If this is not possible, then a dedicated re-fuelling location must be established on site in the compound area away from ground clearance or rock-breaking activities.
- Spill kits stations will be provided at the fuelling location for the duration of the works.
- Staff will be provided with training on spill control and the use of spill kits.
- All fuel storage containers will be appropriately bunded, roofed, and protected from vehicle movements. These bunds will provide added protection in the event of a flood event on site.
- All chemicals will be stored as per manufacturer's instructions. A dedicated chemical store within a building must be provided on site if chemicals are to be stored on site.
- Procedures and contingency plans will be established on site to address cleaning up small spillages as well as dealing with an emergency incident. A stock of absorbent materials such as sand, spill granules, absorbent pads and booms will be kept on site, on plant working near the drainage ditches and water.
- Daily plant inspections will be completed by all plant operators on site to ensure that all plant is maintained in good working order. Where leaks are noted on these inspection sheets, the applicant must remove the plant from operations for repairs.
- All personnel shall observe standard precautions for handling of materials as outlined in the Safety Data Sheets (SDS) for each material, including the use of PPE. Where conditions warrant, emergency spill containment supplies should be available for immediate use.
- Best practice concrete/ aggregate management measures will be employed on site during construction.
- It is important that run-off from the construction works does not enter the Ballinure River. Therefore, silt fences will be installed along the southern and eastern boundaries. The silt fences should be sturdy and constructed of a suitable geotextile membrane (Hy-Tex Terrastop Premium silt fence, or similar) to ensure that water can pass through, but that silt will be retained. The silt fences must be capable of preventing particles of 425mm from passing though. The footing of the fencing to be buried into the ground and the visible fencing to be ca. 0.5m high.
- The silt fences should be monitored daily to ensure that they remain functional throughout the construction of the proposed development. Maintenance of the fences should be carried out regularly. Fences should be inspected thoroughly after periods of heavy rainfall. **Figure 5.13.1** provides an indicative overview of where silt fencing should be installed.

Figure 5.13.1: Proposed site boundary with silt fencing.

- Concrete Washout Skip: Chutes of concrete trucks will only to be washed out into an impermeable lined (polythene) skip. The washout water is to be removed off-site for treatment.
- Excavations lined with an impermeable liner are not permitted as concrete washout bays on the site.
- Excavations will be backfilled as soon as possible.
- Landscaping will be carried out as soon as possible to minimise weathering.
- Large excess loads of concrete are to be returned to the supplier or poured into concrete block modules (Betonblock or similar design), in order to minimise waste and reduce the risk of concrete being dumped throughout site.
- Best practice in bulk-liquid concrete management will be employed on site, addressing pouring and handling, secure shuttering, adequate curing times etc.
- Stockpile areas for sands and gravel will be kept to a minimum size, well away from the drainage ditches bordering the site.
- Covers will be provided over soil stockpiles when high wind and inclement weather are encountered.
- Where concrete shuttering is used, measures will be put in place to prevent against shutter failure and control storage, handling and disposal of shutter oils.
- Activities which result in the creation of cement dust will be controlled by dampening down the areas.
- Raw and uncured waste concrete will be disposed of by removal from the site.
- Sustainable Urban Drainage Systems (SuDS) such as swales, permeable surfaces, and vegetated buffer strips will be incorporated to slow and filter runoff.
- A temporary drainage system will be established complete with oil interceptors and

settlement ponds to remove contaminants from run-off, prior to discharge off-site.
- Harmful materials and stockpiles will be stored well away from the drainage ditches on site.

5.11.3.2 Management of Construction Waste and Soil

- All construction waste will be removed from site by a registered contractor to a registered site. Evidence of the movement and safe disposal of the construction waste must be retained and presented to the Local Authority upon request. Removal of the construction waste will occur as soon as possible after construction works. There will be no disposal of construction waste or topsoil in any designated site or site of biodiversity value.
- All topsoil generated from site works will be stored within the proposed development site until it is required for landscaping. It must not be stored outside the proposed development site boundaries, and it must not be used for the infilling of any area outside of the proposed development site. If there is more topsoil than is needed for landscaping, it must be removed from site by a registered contractor for appropriate use elsewhere. The end location of the topsoil will be identified and records presented to the Local Authority if requested.
- No soil/ spoil material should deposit in an area designated as an SAC/ SPA.

5.11.3.3 Accidental Spills of Harmful Substances

All spill prevention measures are designed to prevent any release of hydrocarbons or contaminants to surface water or groundwater.
- Establishment of bunded oil and chemical storage areas.
- Refuelling of mobile plant in designated areas provided with spill protection.
- Fuel bowsers to be in bunded areas which can cater for 110% of the primary vessel capacity or 25% of the total volume of the substance which could be stored withing the bunded area and to be located away from the drainage ditches and Ballinure River.
- Only appropriately trained site operatives permitted to refuel plant and machinery on site.
- Regular inspections will be carried out on plant and machinery for leaks and general condition.
- Emergency Response Plan will be implemented.
- Spill kits will be readily available throughout the site.
- Use of ready-mixed supply of wet cement products.
- Scheduling cement pours for dry days.

5.11.4 Biodiversity Protection

5.11.4.1 Terrestrial & Aquatic Habitat Protection

- The treelines and hedgerows will be incorporated into the development where feasible.
- Where removal of hedgerow sections is required to facilitate site access and construction, removal should be minimised, and compensatory planting should be implemented using native species.
- In order to prevent damage to treelines/ hedgerows that are to be retained, protective barrier fencing should be erected at a minimum 2m out from these boundaries to protect these features prior to the commencement of site clearance works. There must be no dumping or storage of construction waste or machinery in this zone during construction.
- Any tree or shrub that require removal or trimming should be removed outside of the bird nesting season (March – August).
- Any existing gappy hedges should be enhanced with native shrubs, if possible, such as hawthorn and blackthorn.
- Planting should focus on providing year-long interest for pollinators.

- Selected areas around the site are to be seeded with species rich grassland to promote biodiversity.
- Upon completion of the work, the soil should be reinstated, and grassy verge vegetation should be allowed to recolonise naturally.

5.11.4.2 Protection of Species

- Otter: Construction activities near watercourses will be scheduled to avoid nighttime works, minimising disturbance.
- Bats: Low-intensity warm-spectrum LED lighting (<2700K) will be used to prevent disruption to bat foraging routes. Lights will be directed away from riverbanks and mature vegetation.
- Aquatic Species: Sediment controls will prevent runoff to the Ballinure River and downstream waters hydrologically connected to the River Suck Callows SPA, River Shannon Callows SAC, and Middle Shannon Callows SPA, thereby protecting sensitive aquatic QIs, including otter, and aquatic habitats used by foraging SPA bird species.

5.11.5 Management of Noise Pollution to Minimise Disturbance

The assigned registered contractor will be obliged to comply with BS 5228 “Noise Control on Construction and open sites Part 1”, and shall implement the following measures to eliminate or reduce noise levels where possible:

- The best means practicable, including proper maintenance of plant and machinery, will be employed to minimise the noise produced by on site operations.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working for the duration of the contract.
- Compressors will be attenuated models, fitted with properly lined and sealed acoustic convers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.
- During the construction programme, supervision of the works will include ensuring compliance with noise limits, using methods outlined in BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.
- All site staff shall be briefed on noise mitigation measures and the application of best practicable means to be employed to control noise.
- Ensure that each item of plant and equipment complies with the noise limits quoted in the relevant European Commission Directive 2000/14/EC.
- Use all plant and equipment only for the tasks for which it has been designed.
- Locate movable plant away from noise sensitive receptors, specifically, hedgerows, treelines, and the drainage ditches on site.
- Given the distance of >3.5 km to the River Suck Callows SPA, and >12.8km to the River Shannon Callows SAC and Middle Shannon Callows SPA, no direct disturbance to SPA bird populations or SAC species are anticipated during the construction phase. Glenloughaun Esker SAC is designated for habitats, not specific species.

5.11.6 Mitigation Measures during Operation

5.11.6.1 Environmental Management System (EMS)

An Environmental Management System (EMS) will be prepared and implemented by the operating company during the operational phase. This is a practical document which will include detailed procedures to address the main potential effects on surface water and groundwater.

The proposed development will operate under an Industrial Emissions Licence (IEL) issued by the Environmental Protection Agency (EPA). The licence will contain several conditions which the operator must remain in compliance with for the entire duration of the Anaerobic Digestion Facility's lifespan. Typical conditions relating to the protection of water receptors include:

- Emissions Limit Values for all emissions including surface water.
- Monitoring requirements for surface waters.
- Resource use and energy efficiency.
- Waste management control and documentation.
- Storage and transfer of substances.
- Facility management.
- Accident prevention and emergency response including fire water retention.
- Operational Controls.

Other conditions of relevance to uncontrolled releases will include:

- Dedicated hard standing for off-loading areas, with a minimum separation distance from adjacent water courses.
- Use of spill kits, bunded pallets and secondary containment units, as appropriate.
- All bunds sized to contain 110% of the volume of the primary storage vessel.
- Environmental Management System to include site specific standard operating procedures pertaining to waste management and emergency response.
- There will be no process water discharges to surface or groundwater bodies during the operational phase.
- The entire digestion tank area of the Proposed Development site will be underlain by an impermeable bund structure, acting as secondary containment in the event of a catastrophic failure.
- Tanks and bunds will be subject to integrity assessments by a suitably qualified engineer.

5.11.6.2 Surface Water & Wastewater Management and Groundwater Protection

Protection of Aquatic Habitats:
All operational phase mitigation measures have been designed to ensure no deterioration of water quality entering the Ballinure River and downstream aquatic habitats connected to the River Suck and River Shannon. Therefore, robust surface water, wastewater and groundwater management measures are essential to avoid significant effects on these qualifying interests.

Surface Water Management and Sediment Control:

- Cover manholes and gullies with silt fencing material and/or sandbags to prevent silt entry.
- Use temporary measures during rainfall events (sandbags, silt fencing) to control run-off before the permanent drainage system is in place.
- A temporary drainage system with settlement ponds and oil interceptors will be installed.
- Ponds must be sized and maintained in line with CIRIA SuDS Manual (C753).
- Silt chambers may be blocked off after heavy rain to reduce silt discharge.
- Install silt fencing along the southern and south-eastern perimeters (and elsewhere if needed), consisting of geotextile fabric buried 150 mm into the ground, supported by stakes at 2 m intervals, and extending 400–500 mm above ground level.
- Use supplementary erosion controls (geotextiles, vegetated buffers) where appropriate.
- Regular inspection and maintenance of all surface water infrastructure will be undertaken to prevent blockages and maintain system efficiency.

- The attenuation pond located at the south of the site will provide storage for the entire site, including controlled discharge from sump levels. The pond and attenuation tanks will include overflow headwalls discharging to hydrobrake manholes, flow control devices at outlet manholes to regulate discharge and maintain greenfield runoff rates, penstocks on inlets to facilitate future maintenance, and slit traps below inlets to capture sediment.

Rainwater Harvesting:

- Three rainwater harvesting tanks will collect runoff from buildings and paved areas, reused for non-potable applications such as washdown, fire suppression, and greywater supply, thereby reducing runoff volumes.

Wastewater Management:

- Regular desludging, inspection, pressure testing, and CCTV surveys will ensure the integrity and performance of the system.
- The digestate storage tanks, waste storage areas, and tank farm will be bunded to provide a minimum of 110% of the volume of the largest vessel within the bunded area, in line with EPA guidance.
- The only foul flows proposed from the site are generated from the office unit and will discharge to an inspection chamber adjacent to the building and then discharge to a proprietary water treatment system. From there it will be transferred via pressurised pipe to a tertiary water treatment system/percolation area with 60m^2 of attenuation, provided to 350mm depth using clean 20mm graded stone.

Firewater Protection:

- A Firewater Risk Assessment will be conducted and completed prior to commencement of operation, and the necessary firewater containment infrastructure will be fully installed, commissioned, and operational before the facility becomes operational.
- Automatic isolation valves will activate upon fire alarm activation to prevent contaminated runoff from entering the drainage system or surface waters.

Pollution Control and Emergency Response:

- Spill kits, bunded pallets, and secondary containment will be available throughout the site.
- Site-specific Emergency Response Procedures, integrated within the EMS, will address spill containment and cleanup.
- Ongoing monitoring of stormwater discharge quality will be conducted to ensure no deterioration of receiving waters.
- Monitoring of stormwater discharge will include periodic sampling for parameters such as pH, Total Suspended Solids (TSS), Total Organic Carbon, conductivity, and ammonia, with trigger levels established to ensure no deterioration in receiving waters.

5.11.6.3 Uncontrolled Releases and Spillages

- Use of spill kits, bunded pallets and secondary containment units, as appropriate.
- All bunds sized to contain 110% of the volume of the primary storage vessel or 25% of the total volume of the substance which could be stored withing the bunded area (in compliance with Guidance to storage and Transfer of Materials for Scheduled Activities, EPA 2004)
- EMS to include site specific standard operating procedures pertaining to waste management and emergency response.

- All bunds and underground pipelines (foul and process) will be subject to integrity assessments every 3 years by a suitably qualified engineer.
- Ongoing monitoring of stormwater discharge to the local hydrologic system.

5.11.6.4 Landscaping and Lighting

The landscaping of the site offers the potential for biodiversity enhancements within the site. Future landscaping of the site should adhere to the following recommendations:

- Treelines and hedgerows that are to be retained will be protected and enhanced where possible to support local biodiversity. Enhancements will include gap planting with native species, retention of existing mature trees, and installation of bird and bat boxes where appropriate. Buffer planting using native shrubs or wildflower margins can further improve habitat quality.
- Removal of hedgerows, mature trees or shrubs should be carried out outside of the bird nesting season (March to August). Where feasible, compensatory planting of native hedgerows should be incorporated elsewhere within the site boundary, in accordance with the Landscape Plan.
- Management of retained and new planting will avoid disturbance during the bird nesting season and include long-term maintenance to prevent habitat degradation. Planting will focus on providing year-round interest for pollinators and native species. All planting will be delivered in accordance with the Landscape Plan which accompanies this application.
- The landscaping and planting scheme for the site will incorporate actions from the All-Ireland Pollinator Plan (AIPP), specifically the Farmland Guidelines. This will include provision of native flowering plants to support pollinators, creation of wildflower margins where feasible, and management of grassland areas to allow flowering. The selected measures will be incorporated into the Landscape Plan and will be implemented in full during site landscaping and maintained thereafter.
- Nesting areas for solitary bees will be included by providing south or east-facing banks or areas of bare earth. Bee boxes for cavity-nesting bees will be created by drilling holes in untreated wooden blocks and attaching them to an outdoor structure. The holes should be 10cm in depth and 4-8mm in diameter at a height of at least 1.5-2m. It is important to have holes of different sizes for the different species.
- Bat boxes are recommended to be installed around the site, on walls, tree trunks and posts. They should be located as high as possible (at least 4m off the ground) in a sunny but sheltered location. If erecting on a mature tree, choose one that has clean bark (no ivy) with no branches for 1m radius around the location of the box. If erecting on a building, erect as close as possible to the eaves.
- When erecting bat boxes externally (i.e. on a tree or external wall of a building), a minimum of three boxes facing in different directions should be put up to provide a range of temperature conditions. For example, boxes facing from south-east to south-west allow the sun to fall on each box for part of the day. During very hot days a south-facing box may overheat, but the other boxes should have some shade. Three boxes can be arranged around the trunk of large, mature and clean trunk trees.
- When erecting bat boxes, erecting three different types of bat boxes will increase the chance of catering the different species likely to be found foraging on the site. Guidelines for the construction of bat boxes can be obtained on Bat Conservation Irelands website.
- The use of herbicides within the site will be minimised. Where spraying is necessary, it should be done with a knapsack sprayed to minimise spray and target required areas only.
- Lighting will be kept to a minimum around the remaining trees on the site. A dark corridor for movement of bats along the grounds of the site should be incorporated. Guidelines from Bat Conservation Ireland will be provided for considering how to avoid light pollution of the

hedgerows to allow for feeding, commuting and roosting. Planting shall provide areas of darkness suitable for bats to feed and commute.
- There should be no lighting directed from the site towards mature vegetation, drainage ditches, or Ballinure River.
- Lighting shall be controlled to avoid light pollution of green areas and shall be targeted to areas of human activity and for priority security areas. Motion-activated sensor lighting is preferable to reduce light pollution. None of the remaining mature trees or trees proposed for planting shall be illuminated. Tree crowns shall remain unilluminated.
- All luminaires shall lack UV elements when manufactured and shall be LED.
- A warm white spectrum (ideally <2700 Kelvin) to reduce blue light component.
- Luminaires shall feature peak wavelengths higher than 550nm.

5.11.6.5 Management of Noise to Minimise Disturbance During Operation

- Feedstock will only be accepted between the hours of 0700 and 1900 Monday to Friday, and 0800 to 1600 on Saturday, in order to minimise noise disturbances to nocturnal wildlife such as bats, during their active hours.
- Noise producing equipment should be located as far as possible from ecological corridors like the drainage ditches and treelines to minimise the transmission of operational noise to sensitive ecological areas.
- Vegetation buffers should be incorporated around the site as a natural noise barrier.
- Where possible, low noise models of equipment will be selected.

5.11.6.6 Use of the Biobased Fertilisers by Customer Farmers

Compared to untreated manures and slurries, the biobased fertiliser (digestate) produced at the facility will pose a lower risk of nutrient leaching into surface waters and groundwater. The balanced nutrient composition and slow-release characteristics of the digestate will reduce the likelihood of excess nutrients entering watercourses. When used in accordance with best agricultural practice, the use of digestate can contribute to improved nutrient management on farms and a reduction in diffuse nutrient losses to the wider catchment, thereby supporting objectives for Glenloughaun Esker SAC, River Suck Callows SPA, River Shannon Callows SAC, and Middle Shannon Callows SPA.
- To avoid any reductions in water quality within the catchment, all digestate (biobased fertiliser) must be used in accordance with S.I. 113 of 2022 European Communities (Good Agricultural Practice for Protection of Waters Regulations, 2022).
- The spreading of the biobased fertiliser on the customer farms must be done in accordance with the specific Nutrient Management Plan for that farm.
- Biobased fertiliser will be pasteurised in accordance with Regulation (EU) 142/2011 on use of animal by products as organic fertiliser.

5.12 Residual Effects

According to Environmental Protection Agency guidelines, Residual Effect is described as '*the degree of environmental change that will occur after the proposed mitigation measures have taken place*.' The mitigation strategy above recommends actions to be taken to reduce or offset the scale, significance, and duration of the effects on the surrounding ecological receptors.

5.12.1 Construction Phase and Operational Phase

A summary of the predicted effects associated with the construction phase in terms of quality, significance, and duration, along with the resulting residual effects incorporating proposed mitigation measures are summarised in **Table 5.12.1**.

A summary of the predicted effects associated with the operational phase in terms of quality, significance, and duration, along with the resulting residual effects incorporating proposed mitigation measures are summarised in **Table 5.12.2**.

Table 5.12.1 - Summary of predicted construction phase effects, mitigation measures and residual impact.

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Habitat Loss and Fragmentation	Dry calcareous and neutral grassland (GS1)	Areas of dry calcareous and neutral grassland will be converted into buildings and artificial surfaces.	Negative	Significant	Permanent	• The landscaping of the site offers the potential for biodiversity enhancements within the site. • Any existing gappy hedges should be enhanced with native shrubs, if possible, such as hawthorn and blackthorn. • Planting should focus on providing year-long interest for pollinators. • Selected areas around the site to be seeded with species rich grassland to promote biodiversity.	**Neutral, Slight, Permanent**
	Wet grassland (GS4)	Areas of wet grassland will be converted into buildings and artificial surfaces.	Negative	Significant	Permanent		**Neutral, Slight, Permanent**
	Improved agricultural grassland (GA1)	There is an area of improved agricultural grassland within the site. This will be converted to buildings and artificial surfaces. This habitat has limited ecological value and therefore its loss constitutes a negligible ecological impact.	Negative	Negligible	Permanent		**Positive, Slight, Permanent**
	Recolonising bare ground (ED3)	There is an area of recolonising bare ground within the site. This will be converted to Buildings and Artificial Surfaces. This habitat has limited ecological value and therefore its loss constitutes a negligible ecological impact.	Negative	Negligible	Permanent		**Positive, Slight, Permanent**
	Drainage ditches (FW4)	The existing drainage ditches will be retained.	Negative	Slight	Permanent		**Neutral, Slight, Temporary**

	Hedgerows x Treelines mosaic (WL1 x WL2)	Hedgerows and treelines will be retained where possible. Some may need to be cut back	Negative	Slight	Temporary	• Hedgerows and treelines must be left intact where possible, and the root systems must not be damaged. • If removal is unavoidable, replacement native hedgerow planting (e.g. Hawthorn, Blackthorn, Hazel) should be implemented as soon as possible. • Upon completion of the work, the soil should be reinstated, and grassy verge vegetation should be allowed to recolonise naturally.	**Neutral, Slight, Temporary**
Disturbance to Local Wildlife	Mammals Bats Birds Amphibians and Reptiles	Any removal of vegetation during the bird nesting season could result in disturbance of birds. In addition, during site preparation and construction, local populations of	Negative	Moderate	Temporary	• The existing hedgerows and treelines must be incorporated into the development. • In order to prevent damage to treelines / hedgerows in the site that are to be retained, then protective barrier fencing should be erected at a	**Negative, Slight, Temporary**

		birds and mammals may be disturbed by the increase in noise, traffic, and human activity.				minimum 2m out from these boundaries to protect these features prior to the commencement of site clearance works. There must be no dumping or storage of construction waste or machinery in this zone during construction. • Any small tree or shrubs that require removal should be removed outside of the bird nesting season (March - August). • In order to maintain dark Corridors for bats, no artificial lighting directed toward hedgerows, trees, or the Ballinure River. Warm white LED lighting must be used (< 2700K, no UV, peak wavelength > 550 nm). • Install downward- facing lights only, with shield to prevent light spill into natural areas. • Ensure tree crowns remain unilluminated. • The best means practicable, including proper maintenance of plant and machinery, will be employed to minimise the noise produced by on site operations. • All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working for the duration of the contract. • Compressors will be attenuated models, fitted with proper lines and sealed acoustic convers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers. • During the construction programme, supervision of the works will be include ensuring compliance with noise limits, using methods outlined in BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise. • All site staff shall be briefed on noise mitigation	

						measures and the application of best practicable means to be employed to control noise.	

Pollution	**Surface Water** Waterbodies: Ballinure River, River Suck, and River Shannon. Protected sites: Glenloughaun Esker SAC, River Suck Callows SPA, River Shannon Callows SAC, Middle Shannon Callows SPA, Suck River Callows NHA, River Shannon Callows NHA	The clearing of the site and the construction of an anaerobic digestor and associated works will generate sediment and without due care this sediment could be mobilised into the Ballinure River via the drainage ditches bordering the site on days of excessively heavy rainfall. These works could also result in the pollution of the water with cement or other hydrocarbons.	Negative	Significant	Temporary	• Strict controls of erosion, sediment generation and other pollutants associated with the construction process should be implemented, including the provision of attenuation measures, silt traps or geotextile curtains to reduce and intercept sediment release into any local watercourses. • Works should be avoided during periods of heavy rainfall. • During construction re-fuelling of equipment and machinery must be done off site. If this is not possible, then a dedicated re-fuelling location must be established on site in the compound area away from ground clearance or rock-breaking activities. • Spill kits stations must be provided at the fuelling location for the duration of the works. • Staff must be provided with training on spill control and the use of spill kits. • All fuel storage containers must be appropriately bunded, roofed and protected from vehicle movements. These bunds will provide added protection in the event of a flood event on site. • All chemicals must be stored as per manufacturer's instructions. • All personnel shall observe standard precautions for handling of materials as outlined in the Safety Data Sheets (SDS) for each material, including the use of PPE. Where conditions warrant, emergency spill containment supplies should be available for immediate use. • Best practice concrete / aggregate management measures must also be employed on site during construction. • It is important that run-off from the construction works does not enter the Ballinure River or any drains that lead to this river. Therefore, it is	**Neutral, Slight, Temporary**

						recommended that silt fences are installed along the south and eastern boundaries of the construction site area. • All construction waste removed from site by a registered contractor to a registered site. Evidence of the movement and safe disposal of the construction waste must be retained. Removal of the construction waste should occur as soon as possible after construction works. • Establish a designated concrete washout area at least 20 m from water features. • Ready-mixed concrete will be used to reduce the risk of on-site handling and waste. • Sustainable Urban Drainage Systems (SuDS) will be installed to filter and slow surface water prior to discharge.	

	Groundwater Aughrim Groundwater Body	The site is in an area of moderate groundwater vulnerability. In the absence of mitigation, any deep excavations that are required for the construction could lead to pollution of the groundwater with hydrocarbons or other pollutants.	Negative	Moderate	Long Term	• Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and the aquifer. • Works should be avoided during periods of heavy rainfall. • The control and management of hydrocarbons on site will be vital to prevent deteriorations in surface and groundwater quality locally. During construction re-fuelling of equipment and machinery must be done off site. If this is not possible, then a dedicated re-fuelling location must be established on site in the compound area away from ground clearance or rock-breaking activities. • Spill kits stations must be provided at the fuelling location for the duration of the works. • Staff must be provided with training on spill control and the use of spill kits. • All fuel storage containers must be appropriately bunded, roofed and protected from vehicle movements. These bunds will provide added protection in the event of a flood event on site. • All chemicals must be stored as per manufacturer's instructions. A dedicated chemical store within a building must be provided on site if chemicals are to be stored on site. • Procedures and contingency plans must be established on site to address cleaning up small spillages as well as dealing with an emergency incident. A stock of absorbent materials such as sand, spill granules, absorbent pads and booms should be kept on site, on plant working near the water and at the refuelling area. • Daily plant inspections will be completed by all plant operators on site to ensure that all plant is maintained in good working order. Where leaks are	**Neutral, Slight, Temporary**

						noted on these inspection sheets, the applicant must remove the plant from operations for repairs. • All personnel shall observe standard precautions for handling of materials as outlined in the Safety Data Sheets (SDS) for each material including the use of PPE. Where conditions warrant, emergency spill containment supplies should be available for immediate use. • Best practice concrete / aggregate management measures must also be employed on site during construction.	
	Air	Glenloughaun Esker SAC is located <1km from the proposed development site. Construction activities could produce airborne pollutants such as cement dust.	Negative	Slight	Temporary	• Activities which result in the creation of airborne pollutants such as cement dust will be controlled by dampening down the areas. • Addition mitigation measures addressing air pollution are contained in **Chapter 9 Air, Odour & Climate**	**Neutral, Negligible, Temporary**

Table 5.12.2 - Summary of predicted operational phase effects, mitigation measures and residual impact.

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Disturbance to Local Wildlife	Mammals Bats Birds	The operation of the site will be associated with an overall increase in human activity, noise and	Negative	Moderate	Long-term	• Treelines and hedgerows that are to be retained will be protected and enhanced where possible to support local biodiversity. Enhancements will	**Neutral, Slight, Temporary**

	Amphibians and Reptiles	lighting on the site. However, having regards to the overall low value of the site to mammals, this impact is not considered significant. However, mitigation measures will be included to ensure that all lighting used within the site is of a low level to ensure minimum disruption to bats and other nocturnal mammals.be disturbed by the increase in noise, traffic, and human activity.				include gap planting with native species, retention of existing mature trees, and installation of bird and bat boxes where appropriate. • Buffer planting using native shrubs or wildflower margins can further improve habitat quality. Management should avoid disturbance during the bird nesting season and include long-term maintenance to prevent habitat degradation. Planting should focus on providing year-long interest for pollinators. Planting should be delivered in accordance with the Landscape Plan which accompanies the application. • It is recommended that further actions that are outlined as part of the National Pollinator Plan should be implemented. There is a specific guide for farms (Farmland: Actions to help pollinators - //pollinators.ie/farmland). • Nesting areas for solitary bees could be included by providing south or east-facing banks or areas of bare earth. Bee boxes for cavity-nesting bees could be created by drilling holes in untreated wooden blocks and attaching them to an outdoor structure. The holes should be 10cm in depth and 4-8mm in diameter at a height of at least 1.5-2m. It is important to have holes of different sizes for the different species. • Bat boxes could be installed around the site, on walls, tree trunks and posts. They should be located as high as possible (at least 4m off the ground) in a sunny but sheltered location. If erecting on a mature tree, choose one that has clean bark (no ivy) with no branches for 1m radius around the location of the box. If erecting on a building, erect as close as possible to the eaves. • When erecting bat boxes externally (i.e. on a tree or external wall of a building), put up a minimum	

						of three boxes facing in different directions to provide a range of temperature conditions. For example, boxes facing from south-east to south-west allow the sun to fall on each box for part of the day. During very hot days a south-facing box may overheat, but the other boxes should have some shade. Three boxes can be arranged around the trunk of large, mature and clean trunk trees. When erecting bat boxes, erecting three different types of bat boxes will increase the chance of catering the different species likely to be found foraging on the site. Guidelines for the construction of bat boxes can be obtained on the website of Bat Conservation Ireland. • The use of herbicides within the site should be minimised. The clearance of vegetation around fences should be done by hand if possible. Where spraying is necessary, it should be done with a knapsack sprayed to minimise spray and target required areas only. • All rodenticides use on the site should be in accordance with the Campaign for Responsible Rodenticide use. • Lighting should be kept to a minimum around the remaining trees on the site. Guidelines from Bat Conservation Ireland will be provided for considering how to avoid light pollution of the hedgerows to allow for feeding, commuting, and roosting. • A bat-sensitive lighting design will be implemented including downward-facing luminaires, <2700K LED only, unilluminated treetops, and maintenance of dark corridors. • There should be no lighting directed from the site towards mature vegetation or the drainage ditches.	

						• Lighting shall be controlled to avoid light pollution of green areas and shall be targeted to areas of human activity and for priority security areas. Motion-activated sensor lighting is preferable to reduce light pollution. None of the remaining mature trees or trees proposed for planting shall be illuminated. • Dark corridor for movement of bats along the grounds of the site. Lighting shall be directed downwards away from the treetops. • All luminaires shall lack UV elements when manufactured and shall be LED. • A warm white spectrum (ideally <2700 Kelvin) to reduce blue light component. • Luminaires shall feature peak wavelengths higher than 550nm. • Tree crowns shall remain unilluminated. • Planting shall provide areas of darkness suitable for bats to feed and commute. • Feedstock will only be accepted between the hours of 0700 and 1900 Monday to Friday, and 0700 to 1600 on Saturday, in order to minimise noise disturbances to nocturnal wildlife such as bats, during their active hours. • The best means practicable, including proper maintenance of plant and machinery, will be employed to minimise the noise produced by on site operations. • All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working for the duration of the contract. • Compressors will be attenuated models, fitted with properly lines and sealed acoustic convers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted	

						with suitable silencers. • Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use. • All site staff shall be briefed on noise mitigation measures and the application of best practicable means to be employed to control noise. • Ensure that each item of plant and equipment complies with the noise limits quoted in the relevant European Commission Directive 2000/14/EC. • Use all plant and equipment only for the tasks for which it has been designed. • Locate movable plant away from noise sensitive receptors, specifically, hedgerows, treelines and the drainage ditches on site.	
Pollution	**Surface Water** Waterbodies: Ballinure River, River Suck, and River Shannon. Protected sites: Glenloughaun Esker SAC, River Suck Callows SPA, River Shannon Callows SAC, Middle Shannon Callows SPA, Suck River Callows NHA, River Shannon Callows NHA	In the absence of mitigation, run-off from impermeable areas within the proposed development site such as roads and car parking areas may contain potentially polluting substances such as hydrocarbons etc. This run-off could be mobilised to the Ballinure River. Structural weaknesses in any of the tanks could lead to pollution of the groundwater.	Negative	Significant	Long-term	• An Environmental Management System (EMS) will be prepared and implemented by the operating company during the operational phase. This is a practical document which will include detailed procedures to address the main potential effects on surface water and groundwater. • The proposed development will operate under an Industrial Emissions Licence (IEL) issued by the Environmental Protection Agency (EPA). The licence will contain several conditions which the operator must remain in compliance with for the entire duration of the AD facility's lifespan. Including: Emissions Limit Values for all emissions including surface water Monitoring requirements for surface waters Storage and transfer of substances Facility management	**Neutral, Slight, Long-term**

	Groundwater Aughrim Groundwater Body	Structural weaknesses in any of the tanks could lead to pollution of the groundwater. .				Accident prevention and emergency response including fire water retention Operational Controls • Other conditions of relevance to uncontrolled releases will include: Dedicated hard standing for off-loading areas, with a minimum separation distance from adjacent water courses. Use of spill kits, bunded pallets and secondary containment units, as appropriate. All bunds sized to contain 110% of the volume of the primary storage vessel. • Environmental operating plan to include site specific standard operating procedures pertaining to waste management and emergency response. • There will be no uncontrolled discharges to surface or groundwater bodies during the operational phase. • The entire digestion tank area of the site will be underlain by an impermeable bund structure, acting as secondary containment in the event of a catastrophic failure. • Tanks and bunds will be subject to integrity assessments by a suitably qualified engineer. • Firewater retention capacity will be provided via harvesting tanks and bunds, with isolation valves activated automatically in the event of fire. • All bunds will be designed and constructed in accordance with BS EN 1992-3:2006 (Eurocode) for watertightness. • Site-specific stormwater discharge trigger levels will be developed for early detection of pollution risks.	

	Air	Glenloughaun Esker SAC is located <1km from the proposed development site. Construction activities could produce airborne pollutants such as cement dust.	Negative	Slight	Long-term	• Mitigation measures to prevent air pollution during the operational phase of this development are available in **Chapter 9 Air, Odour & Climate**.	**Neutral, Slight, Long-term**

5.12.2 Potential In-Combination Effects

In-combination effects take into consideration the potential impacts to the surrounding environment arising from the proposed development in conjunction with additional developments in the local area that are anticipated to be carried out within a similar timeframe. When considering developments granted planning within the vicinity of the site, **Table 5.12.3** summarises planning applications in the site vicinity and provides a prediction of their potential in-combination effect with the proposed development. The predicted in-combination effect assumes the implementation of all relevant mitigation measures proposed within this report, i.e., it factors in the residual effect of the proposed development against any project identified to have the potential for in-combination effects.

Table 5.12.2: Summary of Operational Phase Residual Effects.

Reg. Ref / ABP Ref	Description of Development	Location	Decision/ Status	Cumulative Effects Likely/ Significant?
16/596	To retain filled area and to relocate dwellinghouse, domestic garage & proprietary treatment system on a site with revised boundaries (gross floor space 224.60sqm	East of site	Grant	Unlikely. Localised and small-scale; unlikely to meaningfully interact with AD facility.
15/319	To construct a dwellinghouse, domestic garage & proprietary treatment system (Gross floor space 224.60sqm)	East of site	Grant	Unlikely. Localised and small-scale; unlikely to meaningfully interact with AD facility.

5.13 Conclusion

This Ecological Impact Assessment (EcIA) was undertaken to determine the potential ecological effects of the proposed anaerobic digestion facility at Glenloughaun, Co. Galway. The assessment process included a desktop study, habitat mapping and classification, flora and fauna surveys, and an evaluation of the ecological significance of identified features.

The drainage ditches on site are connected to the Ballinure River located *ca*. 130m south of the site. This river has Source-Pathway-Receptor connectivity with four Natura 2000 sites and two Natural Heritage Areas (NHAs). As a result, a Natura Impact Statement has been completed (Document Reference: **231960-ORS-XX-XX-RP-EN-13d-005**) including mitigation measures to ensure no adverse effects on designated European sites occur. Ecological features of local importance were identified within the site boundary and surrounds, including species-rich hedgerows, and treelines. These habitats are to be retained and protected throughout the construction and operational phases. Adherence to the accompanying Landscape Plan will enhance the quality and longevity of existing high value ecological features at the site.

Adherence to measures proposed for the mitigation of noise, light, and air pollution will ensure

the minimisation of disturbance to local ecological receptors. Mitigation and management of surface water and sediment runoff during development is imperative to ensure the protection of water quality of the Ballinure River and sensitive downstream receptors.

The proposed development will not result in the loss of any protected habitats. The habitats recorded on site did not display substantial evidence of protected species utilising the site for nesting or burrowing.

There were no signs of amphibian or reptile activity during the survey of the site, and it is not predicted that the proposed development will lead to significant effects upon reptile or amphibian species during the construction or operational phases. The hedgerow and treeline network were confirmed to be of high ecological value on a local level, particularly as corridors for foraging and commuting bats, and for nesting and foraging bird species. No signs of mammal presence were recorded. The proposed development, with mitigation, is not expected to result in significant impacts on local wildlife populations.

5.13.1 Summary of Significant Effects

While negative effects on habitats and wildlife are anticipated as part of the proposed development, the implementation of the mitigation measures provided will ensure that significant, negative, long-term effects do not arise on protected sites or species. With the implementation of the recommended measures the overall effects on the ecology of the surrounding area do not encroach beyond a local geographic scale. Where a potential effect has been identified, mitigation measures have been provided which, if implemented, reduce the significance, likelihood, and duration of the effect.

Appendix 5.1: References

Bailey, M. & Rochford, J. (2006) Otter survey of Ireland 2004 / 2005. Irish Wildlife Manuals No. 23. National Parks & Wildlife Service. DoEHLG.

Bowers Marriott, B. (1997) Practical Guide to Environmental Impact Assessment: A Practical Guide. Published by McGraw-Hill Professional, 1997, 320 pp.

CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. CIEEM, 2018

Cummins, S; Fisher, J; Gaj McKeever, R; McNaghten, L & Crowe, O. (2010) Assessment of the Distribution and abundance of Kingfisher Alcedo atthis and other riparian birds on six SAC river systems in Ireland. NPWS & Birdwatch Ireland.

Department of the Environment, Heritage and Local Government (2009) Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities.

Dwyer, (2000) Protecting Nature in Ireland, The NGO Special Areas of Conservation Shadow List. Published by the Irish Peatland Conservation Council, Dublin.

EPA (2001) Parameters of Water Quality - Interpretation and Standards. Environmental Protection Agency, Ireland.

EPA (2002) Guidelines on the Information to be contained in Environmental Impact Statements. Environmental Protection Agency, Ireland.

EPA (2003) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements. EPA, Wexford, Ireland.

EPA (2012) Guidance on the setting of trigger values for storm water discharges to off site surface waters at EPA licensed IPPC and waste facilities. EPA, Wexford.

Fossitt, J.A. (2000) A Guide to Habitats in Ireland. The Heritage Council, Carrick-on-Suir.
Hayden, T. & Harrington, R. (2000) Exploring Irish Mammals. Dúchas the Heritage Service, Town House Dublin.

Institute of Environmental Assessment (1995) Guidelines for Baseline Ecological Assessment. Institute of Environmental Assessment, Great Britain.

IUCN (2003) Red List of Threatened Species. International Council for Conservation of Nature and Natural Resources.

Kurz, I. and Costello, M.J. (1999) An Outline of the Biology, Distribution And Conservation Of Lampreys In Ireland. F. Marnell (ed.), Irish Wildlife Manuals, No. 5.

Ó Néill L. (2008) Population dynamics of the Eurasian otter in Ireland. Integrating density and demography into conservation planning. PhD thesis. Trinity College, Dublin.

Natura Environmental Consultants (2005) Draft Habitat Survey Guidelines: A Standard Methodology for Habitat Survey and Mapping in Ireland. The Heritage Council, Carrick-on-

Suir.
NPWS (2008) Conservation Status in Ireland of Habitats and Species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC

NRA (2004) Guidelines for Assessment of Ecological Impacts of National Road Schemes. National Roads Authority, Dublin.

Smith G. F., O'Donoghue P., O'Hora K. and Delaney E. (2010.) Best Practice Guidance for Habitat Survey and Mapping. Heritage Council.

Whilde, A. (1993) Threatened Mammals, Birds, Amphibians and Fish in Ireland. Irish Red Data Book 2: Vertebrates. HMSO, Belfast.