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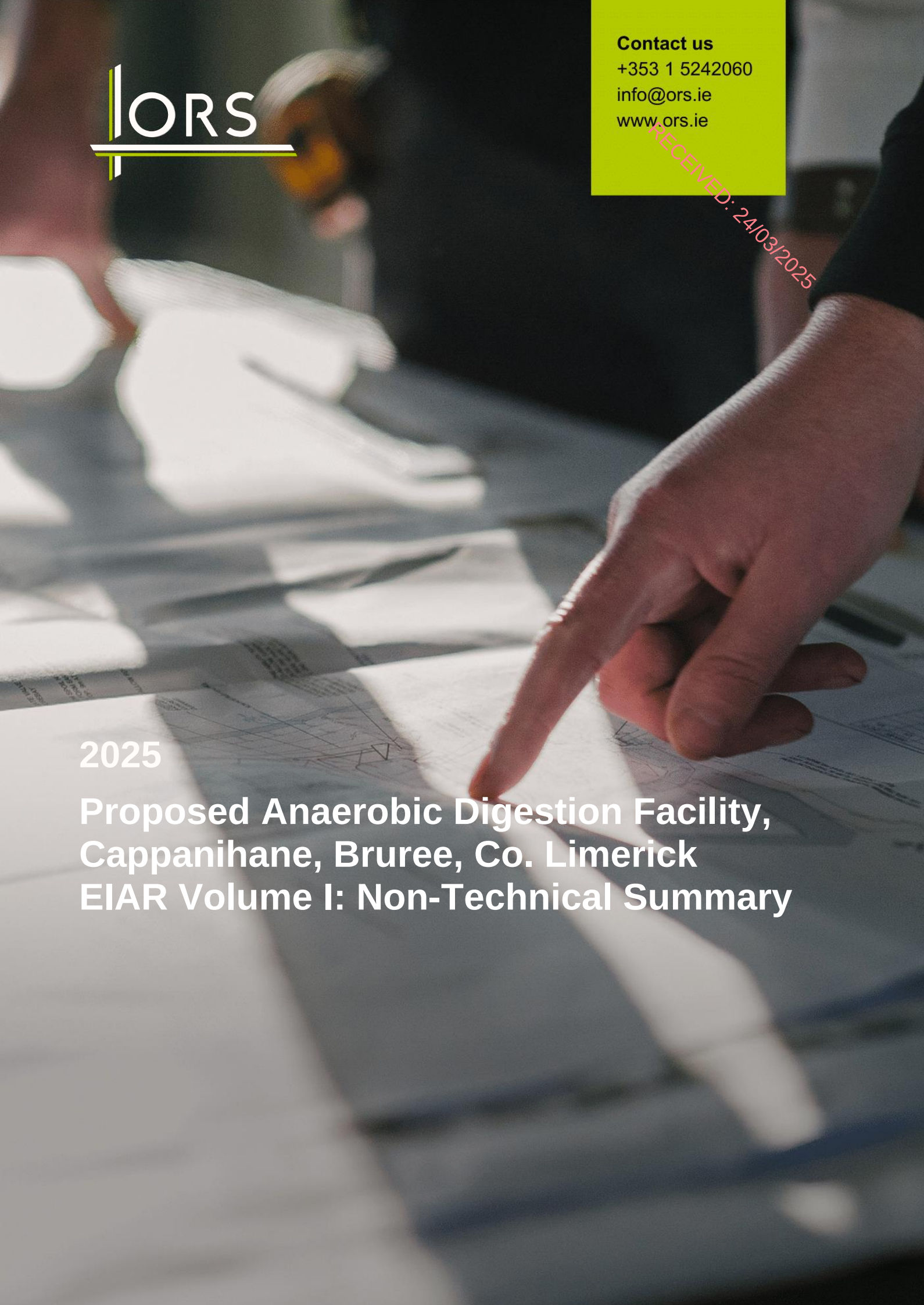

2025

Proposed Anaerobic Digestion Facility, Cappanihane, Bruree, Co. Limerick
EIAR Volume I: Non-Technical Summary

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Proposed Anaerobic Digestion Facility, Cappanihane, Bruree, Co. Limerick

EIAR Volume I: Non-Technical Summary

Document Control Sheet

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1 Introduction

1.1 Introduction

Cycle0(IE) Limited (the Applicant) are pleased to submit this EIAR in support of a planning application for the construction and operation of a Renewable Biogas Facility at a site in Cappanihane, Bruree, Co. Limerick.

The Proposed Development, spanning approximately 5.29 hectares, is designed to process up to 90,000 tonnes annually of locally sourced agricultural manures, slurries, dairy processing residues, and crop-based feedstocks. Its primary objective is to produce grid-quality biomethane (renewable natural gas), which will be transported via a virtual pipeline for injection into the Gas Networks Ireland (GNI) distribution system. This renewable natural gas (RNG) will directly replace conventional natural gas, contributing to the Government's target of generating 5.7 TWh of domestic biomethane annually.

The facility will also produce a nutrient-rich, biobased fertiliser, offering a sustainable alternative to conventional, fossil fuel-derived fertilisers. Additionally, the facility is designed to capture and recover biogenic carbon dioxide (CO_2).

The development will consist of the following:

- Construction of 2 no. primary digesters (with an overall height of c. 9.1m), a pump house (with a gross floor area (GFA) of c. 279.8 sq.m), and 2 no. post digester tanks (with an overall height of c. 9.1m), located in the northeastern section of the site.
- Construction of 2 no. prepits (c. 4.8m in height), a pasteurisation buffer tank (c. 4.8m in height), and a pasteurisation unit (with a maximum height of c. 4.2m), located west of the primary digesters, within the northern section of the site.
- Construction of a digestate storage tank (c. 11.3 in height) located centrally on site, to the south of the primary and post digester tanks.
- Construction of a digestate treatment building and a feedstock reception building (with a height of c. 12m and a GFA of c. 2,797.2 sq.m) with odour abatement system (with a height of c. 11.0m to odour abatement stack), located in the northwestern section of site.
- Construction of combined heat and power (CHP) unit (c. 2.6m in height and c. 5.6m in height to flue, with a GFA of c. 38.53 sq.m), a biogas boiler (c. 2.6m in height and c. 5.6m in height to flue, with a GFA of c. 12.74 sq.m), a backup boiler (c. 2.6m in height), a gas treatment system (c. 4.2m in height), a biomethane compression system (c. 4.2m in height), and a safety flare (c. 11.3m in height), located south of the digestate storage tank, in the south-east section of the site.
- Construction of a CO_2 liquefactor (with an overall height of c. 10.7m to top of storage vessels), a propane tank compound accommodating 2 no. propane tanks (c. 1.6m in height), and an ESB substation (with a GFA of c. 23.5 sq.m and a height of c. 3.4m), located in the south-eastern section of the site.
- Construction of roofed silage clamps (with a GFA of c. 2,424 sq.m and a height of c. 8.7m) and a fuel storage tank (c. 2m in height), located in the western section of the site.
- Construction of a two storey office building (with a GFA of c. 327.4 sq.m and a height of c. 11m) within the western section of the site, adjacent to the site entrance.

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- Alterations to the adjacent local road including a new site entrance and access arrangements, provision of a passing bay, boundary setbacks and replacement planting, and road improvements to allow for improved access and safety.
- Associated and ancillary works including parking (8 no. standard, 3 no. EV and 1 no. accessible parking spaces and bike storage for 10 no. bikes), a new site entrance and gate, a weighbridge, solar PV arrays at roof level, wastewater treatment equipment, bunding and surface treatments, attenuation pond, boundary treatments, lighting, services, lightning protection masts, drainage, landscaping, and all associated and ancillary works.

A detailed description of the Proposed Development is provided in **Chapter 2 – Project Description** of Volume I: EIAR.

1.2 The Applicant

Cycle0 (IE) Limited

CycleØ (IE) Limited is an end-to-end biomethane provider delivering innovative solutions to slow the pace of global warming. CycleØ focus on capturing methane from the agri-food, industrial and municipal sectors and upgrading it to biomethane for vehicle use or grid injection. As experts in biomethane, CycleØ develop, build, own and operate plants to the benefit of farmers, the local communities and in support of local decarbonisation targets.

CycleØ are fully committed to developing four projects in Ireland to help achieve the 5.7TWh biomethane target set out in the government climate action plan 2030 and the biomethane strategy, published in 2024.

1.3 Site Location

The Proposed Development site (herein referred to as ‘the site’) is located in the townland of Cappanihane approximately 13km west of Kilmallock, Co. Limerick, 20km east of Newcastle West, Co. Limerick and 25km southwest of Limerick City. The approximate grid reference location for the centre of the site is R 48890 31642, ITM: 548844, 631675.
The site location is depicted in **Figure NTS 1.1**

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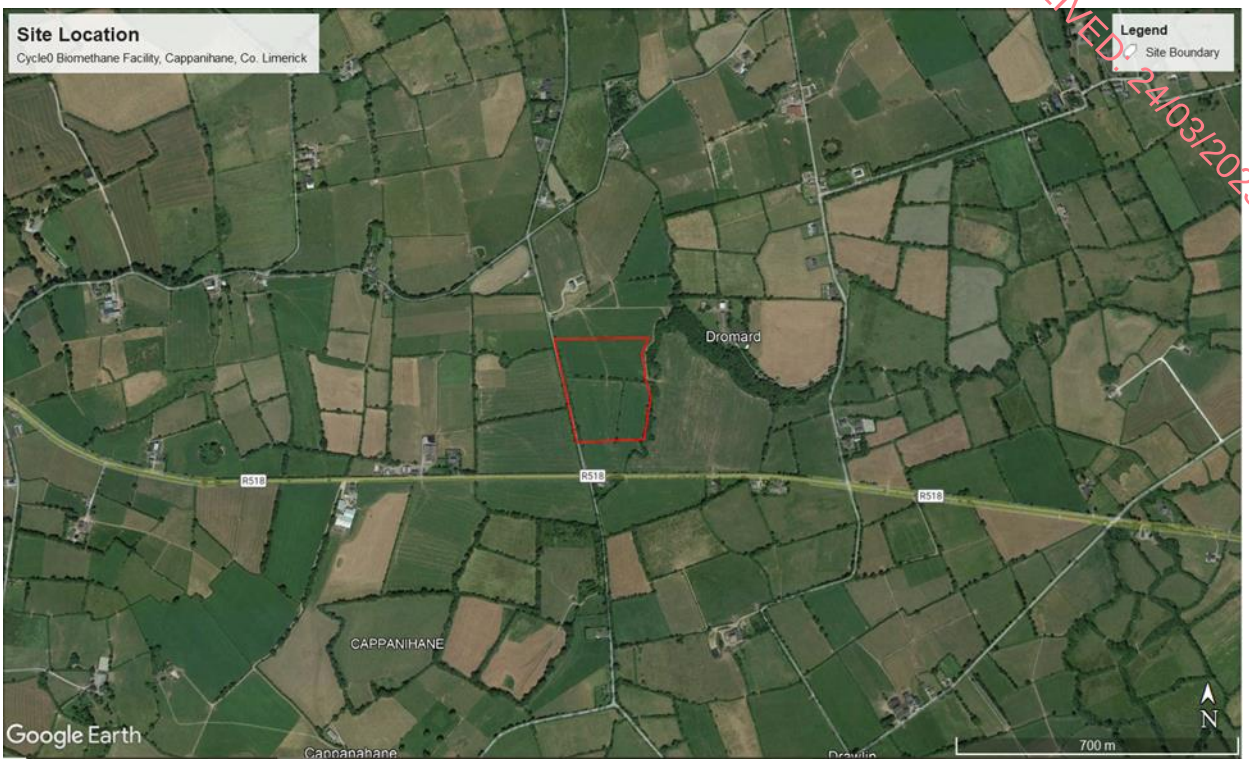

Figure 1: Site Location

The total site area measures ca. 5.29ha. The site is currently used as agricultural pastureland and bounded to the north, south, east, and west by further agricultural pastureland.

The site is located along the Road/R518 regional road which links O'Rourke's Cross and Lees Cross, Co. Limerick. An L8258 local road is located immediately west of the site. The Proposed Development will be accessed via the L8258 local road.

1.4 Site Layout

The site layout is displayed in **Figure 2.** Detailed site layout and structural drawings are included in **Volume IV: Drawings**.

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Figure 2: Proposed Site Layout Plan

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1.5 3D Image of the Site Layout

A 3D model image of the site layout is included in **Figure 3**.

Figure 3: 3D Image of Site Layout

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2 Process and Design Description

2.1 Anaerobic Digestion Process

Anaerobic Digestion (AD) is a natural biological decomposition process which takes place in an oxygen-free environment, where micro-organisms (bacteria and archaea) break down organic matter.

2.2 Biogas

Biogas is the product of this complex biological decomposition of organic materials, mainly consisting of 55-70% by volume methane (CH_4), 30-45% carbon dioxide (CO_2), together with traces of other gases, i.e., nitrogen (N_2), hydrogen (H_2), hydrogen sulphide (H_2S), ammonia (NH_3), as well as water vapour. The exact composition of biogas is dependent on the type of feedstock being digested.

2.3 Feedstock

The Proposed Development has been designed to accept and treat up to 90,000 tonnes per year of predominantly locally sourced agricultural manures, slurries, food processing residues and crop-based feedstocks.

2.4 Odour Treatment System

An Odour Treatment System will recover and treat all odours arising from potentially odorous activities occurring on site. All potential odour sources, including the Feedstock Reception Building, Digestate Treatment Building, Pre-Pit 01, Pre-Pit 02 and the Pasteurisation Tasks are all connected to the Odour Treatment System.

2.5 Primary and Post Digestion Tanks

In a two-stage anaerobic digestion (AD) process, digestion occurs sequentially in primary digestion and post digestion tanks. This process will be facilitated by four Continuously Stirred Tank Reactor (CSTR) tanks. The Digestion Tanks will be fitted with mechanical mixers that use a series of paddles driven by externally mounted units.

2.6 Digestate Treatment

The Digestate Separation System is designed to treat a minimum of 78,000 tonnes of whole digestate per annum. Following treatment, approximately 24,500 tonnes of digestate fibre and 53,500 tonnes of liquid digestate will be produced.

2.7 Biogas Upgrading

The primary goal is to separate carbon dioxide (CO_2) from methane (CH_4) to produce renewable biomethane and CO_2. Biogas upgrading removes trace impurities in the biogas stream. The proposed Biogas Upgrading Unit will recover over 99.9% of the biomethane present.

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2.8 Virtual Pipeline

A 'virtual pipeline' refers to an alternative system for transporting biomethane where traditional pipeline infrastructure is unavailable. Instead of sending the biomethane through fixed pipelines, the biomethane is compressed, and transported in containers known as Multi Element Gas Containers (MEGC) by road to a grid injection unit, where it is decompressed to gas network pressure and injected.

2.9 CO2 Liquefaction

By extending the Biogas Upgrading Unit with a CO_2 Liquefaction system, the gaseous CO_2 that is produced during the biogas upgrading process can be captured and liquefied.

2.10 Licensing Requirements

Environmental Protection Agency (EPA)

Having regard to current law and practice, the Proposed Development will require an application for an Industrial Emissions (IE) licence to the EPA in accordance with Class 11.4 (b) of the First Schedule of the EPA Act 1992 as amended.

Department of Agriculture, Food and Marine (DAFM)

The Anaerobic Digestion Facility will be a 'Type 1' plant under the European Union (Animal By-Products (ABP)) Regulations (S.I. No. 187 of 2014). The application process for approval and operation of the Proposed Development by the DAFM will commence upon receipt of planning consent.

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3 Consideration of Alternatives

A detailed site selection process was undertaken by the Applicant, with reference to the following criteria:

- **Accessibility & Transport** – Proximity of the site to well-developed road infrastructure, ensuring efficient transport of materials and access to key routes.
- **Feedstock Supply** – Availability of at least 80% of the required feedstock within a 25km radius, supporting operational sustainability and cost efficiency.
- **Digestate Receiver Proximity** – Availability of sufficient land within a 25km radius for the distribution and management of digestate, ensuring regulatory compliance.
- **Land Use & Zoning** – Classification of the site as Greenfield, Brownfield, or Industrial, determining its suitability for development and planning constraints.
- **Landscape & Visual Impact** – Assessment of the site's visual impact on the surrounding environment, including proximity to scenic areas and potential mitigation measures.
- **Site Visibility & Exposure** – Evaluates whether the site is highly visible or concealed within the landscape, affecting potential opposition or planning restrictions.
- **Topography** – Physical terrain characteristics of the site, including elevation changes, flatness, and feasibility of engineering solutions for site preparation.
- **Archaeological Sensitivity** – Proximity of the site to known archaeological sites, assessing potential constraints and compliance with heritage regulations.
- **Infrastructure & Utilities** (Gas Grid Access) – Distance to the nearest gas grid connection, determining feasibility for direct integration with energy networks.
- **Infrastructure & Utilities** (Electricity Grid Access) – Distance to the nearest electricity grid connection, assessing power supply availability and connection costs.
- **Stormwater Discharge Access** – Proximity to a suitable watercourse for the discharge of attenuated stormwater, ensuring environmental and regulatory compliance.
- **Sensitive Receptor Proximity** – Distance from residential areas or other sensitive receptors that could be affected by noise, emissions, or other site activities.
- **Land Availability & Suitability** (Size) – Total available land size, ensuring the site meets the spatial requirements for development and operational efficiency.
- **Land Availability & Suitability** (Ownership & Lease Options) – Status of land availability, indicating whether the site is owned, available for lease, or subject to financial constraints.
- **Water Factors** – Proximity to watercourse for discharge of stormwater post-attenuation.
- **Designated Protected Sites Proximity** – Proximity to conservation areas such as Special Areas of Conservation (SAC) or Special Protection Areas (SPA), ensuring minimal environmental impact.
- **Flood Risk Classification** – Assessment of the site’s location relative to flood risk zones, determining vulnerability and the need for flood mitigation strategies.

3 no. alternative site locations within County Limerick were assessed under the above criteria, with the site at Cappanihane, Co. Limerick scoring highest overall.

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4 Planning and Policy

4.1 Introduction

This chapter of the EIAR examines the relevant waste management, energy, climate change and planning policy, and the legislative context at European, national, regional, and local levels with relevance to the Proposed Development. Further analysis of the consistency of the proposed development with the relevant national, regional, and local planning policy context is provided within the Planning Report prepared by John Spain Associates.

4.2 Application Site: Planning History

A planning history search was conducted using the Limerick City and County Council ('LC&CC' hereafter) online planning search system. The search included the planning history of the Site and relevant surrounding permissions. As a result of the rural nature of the Site, there is no planning history for the Site.

4.3 European Policy and Legislation\

The Paris Agreement

Under the Paris Agreement (COP21), the EU has pledged to achieve climate neutrality by 2050. Reaching this objective will require a transformation of Europe's energy supply, society, and economy. The Proposed Development represents renewable energy development which will contribute to achieving this goal.

European Green Deal

The European Green Deal recognises that renewable and low-carbon gases, such as biomethane, will play a central role in achieving climate neutrality. The Green Deal notes that biogas and biomethane, in addition to green hydrogen, have the potential to displace fossil fuel gas.

EU Common Rules on Renewable Gasses

The Common Rules on Renewable Gasses seek to ensure that EU Member States take all necessary steps to assist in the wider use of sustainable biomethane, and to ensure that biomethane can be injected into and transported via the natural gas system.

Renewable Energy Directive

The current directive (2018/2001/EU, amended by Directive EU 2023/2413), or RED III sets a binding renewable energy target of at least 42.5% by 2030. It includes measures to facilitate renewable energy projects and strengthen bioenergy sustainability criteria. Under the amended Directive, member states must identify areas for the acceleration of renewables where projects will undergo a simplified and fast-track procedure.

REPowerEU Energy Plan

Introduced by the European Commission on the 18th May 2022, the Plan aims to accelerate the EU's clean energy transition and reduce dependency on Russian fossil fuels. It includes a Biomethane Action Plan to achieve 35 billion cubic meters of biomethane production by 2030 and recommends measures to facilitate renewable gas injection.

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EU Strategy to Reduce Methane Emissions

Published in 2020, this strategy identifies the agricultural sector as a major contributor to methane emissions. It highlights the benefits of biogas from organic agricultural wastes, supports the development of the EU biogas market, and promotes sustainable farming practices.

Waste Management Legislation

The Waste Framework Directive (2008/98/EC, amended by Directive (EU) 2018/851) and the Landfill Directive (1999/31/EC) encourage the use of anaerobic digestion (AD) as a sustainable waste management method. The directives emphasise the diversion of waste from landfills and the separate collection of organic waste for biological treatment

4.4 National Planning, Climate, and Waste Policy and Legislation

Chapter 4 (EIAR Main Report) provides an overview and analysis of the following relevant pieces of national policy and legislation, as summarised below.

- **National Biomethane Strategy:** The National Biomethane Strategy was finalised and published in May 2024. The Strategy seeks to promote delivery of a biomethane industry at scale in Ireland and sets out the significant benefits (both environmental and economic) that developments of this nature can realise. The Strategy also acknowledges the importance of biomethane production to ensure security of energy supply. It notes that without the development of biomethane production, Ireland is unlikely to meet its legally binding climate targets.

- **National Planning Framework:** The NPF supports low-carbon and energy-efficient initiatives in rural areas, aiming to strengthen rural towns through sustainable development and renewable energy projects.

- **The National Development Plan 2021-2030:** The National Development Plan provides further policy support for the transition to a climate neutral and climate resilient society, and the strengthening of the rural economy and communities. The proposed development delivers strongly on these objectives.

- **Climate Action Plan 2024:** The 2024 Climate Action Plan is the third annual Climate Action Plan, and provides direct policy support for biomethane development, noting a target of 5.7 terrawatt hours of biomethane by 2030, with one terawatt hour to be delivered by 2025. The proposals will contribute to meeting this ambitious target.

- **Climate Action and Low Carbon Development Act:** Section 15 of this piece of climate legislation requires that Planning Authorities and An Bord Pleanála carry out their functions, in as far as is practicable, with key climate action policies, including the relevant Climate Action Plan. Chapter 4 outlines the compliance of the development with those relevant policies.

- **Sectoral Emissions Ceilings:** The Sectoral Emissions Ceilings represent binding limits on the greenhouse gas emissions for various sectors of the economy, including agriculture and energy. The proposed renewable energy development will assist in reducing greenhouse gas emissions in these sectors.

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- **Support Scheme for Renewable Heat:** This Support Scheme seeks to advance the generation of energy from renewable sources in the heat sector, including biomass boilers and anaerobic digestion heating systems.

- **White Paper: Ireland's Transition to a Low Carbon Energy Future 2015–2030:** The White Paper sets out a framework for policy actions of the Government from 2015-2020, it includes support for the further development of bioenergy. It recognises that anaerobic digestion projects can improve air quality and reduce odour emissions in rural areas, by diverting slurry from being spread on the land.

- **Biomethane Energy Report (Gas Networks Ireland):** While not strictly a policy document, this report published by GNI details the significant potential for biomethane development in the State, noting the ability of such development to improve security of supply, boost rural employment, and rapidly reduce climate emissions across hard to abate sectors of the economy.

- **Energy Security in Ireland to 2030:** This policy was published by Government following the invasion of Ukraine by Russia and the resulting energy crisis. The new National Biomethane Strategy is recognised as an important move towards improved energy security within this policy document.

- **National Policy Framework on Alternative Fuels Infrastructure for Transport in Ireland:** The Policy Framework highlights the importance of alternative fuels in decarbonising the transport sector, including via the incorporation of biomethane as a transport fuel.

- **Ag Climatise – National Climate & Air Roadmap for the Agriculture Sector:** This Roadmap includes an action for the promotion of anaerobic digestion for the agriculture sector.

- **National Energy and Climate Plan (NECP) 2021-2030:** This Plan included further policy support for biomethane development and included a target for 1.6 terawatt hours of biomethane production, which has since been revised upward under the 2023 and 2024 Climate Action Plans.

- **The Planning and Development Act 2000 (as amended):** The Planning and Development Act includes legislative recognition of the need to respond to climate change and to promote renewable energy development. It also provides the overall legislative framework for the Irish Planning System and Environmental Impact Assessment.

- **Whole of Government Circular Economy Strategy 2022 – 2023:** This Strategy directly targets the increased recycling of bio-waste and further renewable gas development, to enhance the circularity and sustainability of agriculture in the state.

- **A Waste Action Plan for a Circular Economy Strategy 2020-2025:** This Waste Action Plan recognises that anaerobic digestion plays a role in providing opportunities for regional development with benefits for local communities while producing renewable energy domestically.

- **National Policy Statement on the Bioeconomy (2018):** This Policy Statement notes that

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Ireland has a strong competitive advantage for the development of a more coherent and stronger bioeconomy.

- **Common Agricultural Policy (CAP) Strategic Plan 2023 – 2027:** The Common Agricultural Policy Strategic Plan provides support for farmers and contributes to improved sustainability in agriculture and agricultural practices.

- **European Union (Waste Directive) Regulations 2020:** This legislation regulates how waste compost and digestate are recycled into fertiliser products.

- **Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations, 2013:** These Regulations introduce a class of licence known as an Industrial Emissions Licence. The proposed development will require an Industrial Emissions Licence from the EPA to operate.

- **Animal By-Product Regulations:** These Regulations set out requirements which must be met in order to build and operate a biomethane development, including in relation to design, feedstock, and equipment requirements.

4.5 Regional Planning Policy

The Regional Spatial and Economic Strategy for the Southern Region (RSES) supports renewable energy projects and highlights the importance of regional bio-economy initiatives and proposals to strengthen the rural economy. It encourages the sustainable management of waste and the development of new facilities to generate renewable energy.

4.6 Local Planning Policy

Limerick Development Plan 2022-2028

The relevant 'Objectives' of the County Development Plan include the following:

- *Grow Limerick's economy and create opportunity through maximising the potential for development through the promotion and enhancement of the competitive advantages of Limerick, including its strategic location, connectivity and accessibility to international markets, a skilled workforce and a high quality of life*

- *Transition to an environmentally sustainable carbon neutral economy.*

- *Create a competitive environment in which to do business. Promote, support and enable sustainable and economic development, enterprise and employment generation. Focus in particular on areas which are accessible by public and sustainable modes of transport. Enable settlements and rural areas to become self-sustaining through innovation and diversification of the rural economy.*

- *Protect, enhance and ensure the sustainable use of key infrastructure, through the provision of support to utility providers including water supplies and wastewater treatment facilities, energy supply including renewables, broadband and transportation. This plan will also foster the linkages to transition from linear model to a circular model which keeps resources in use for as long as possible.*

The Proposed Development will contribute to achieving the vision, key ambitions, and strategic

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objectives of the CDP by delivering renewable energy in a manner which directly benefits the local community and economy, while also helping to decarbonise the agricultural sector in the locality, enhancing climate resilience.

Of highest relevance to the proposed development are the following objectives, taken from Chapter 8 (infrastructure) of the CDP:

Objective IN O13 (Energy and Gas Networks) states, "*It is an objective of the Council to:*

a) ***Support the sustainable reinforcement and provision of new energy infrastructure*** *by infrastructure providers (subject to appropriate environmental assessment and the planning process),* ***ensuring the energy needs of future population and economic expansion across Limerick and the wider Southern Region can be delivered in a sustainable and timely manner. [Emphasis added].***

b) ***Support the transition of the gas network to a carbon neutral network by 2050, thereby supporting Limerick to become carbon neutral. [Emphasis added].***

Objective IN O16 (Gas Development) states:

"*It is an objective of the Council to support GNI's Network Development Plan 2018 – Assessing Future Demand and Supply Position to serve the future needs of Limerick.* ***This includes the delivery, integration and connection of renewable energy proposals to the grid in a sustainable and timely manner****, subject to appropriate environmental assessment and the planning process."* ***[Emphasis added].***

The following CDP objectives promote the production of biogas:

- **Objective CAF O26** (Bio Energy): ***"I****t is an objective of the Council* ***to support the development of bio energy and projects in suitable locations*** *and subject to adequate assessment. The development of grid injection, where this is necessary for renewable energy input will also be supported."* ***[Emphasis added].***

- **Objective CAF O27** (Renewable Energy Production)**:** ***"****It is an objective of the Council to encourage and facilitate the production of energy from renewable sources, such as from* ***bioenergy****, solar, hydro, tidal, geothermal and wind energy, subject to appropriate levels of environmental assessment and planning considerations."* ***[Emphasis added].***

- **Objective CAF O38** (Emerging Technologies): "I*t is an objective of the Council to facilitate and encourage future renewable energy technologies, such as hydrogen electrolysis, pumped storage and small-scale* ***anaerobic digestion*** *and any other source of renewable energy technologies, that are viable as a means of energy security, subject to compliance with all relevant planning criteria."* ***[Emphasis added]****.*

4.7 Limerick City and County Council – Local Authority Climate Action Plan 2024-2029

- The 'Strategic Vision' of the Limerick City and County Council Climate Action Plan, formally known as the 'Local Authority Climate Action Plan 2024-2029' ('LACAP' hereafter) is outlined as follows: "*Limerick – A Green City Region on the Waterfront By 2030, Limerick will become a green City region on the Shannon Estuary connected*

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through people and places. This will be achieved through engagement, innovation, resilient urban development and self-sustaining rural communities."

the vision for the LACAP is as follows: "*Limerick City and County Council will lead the transition to a low carbon and climate resilient society. This will be achieved through engagement, innovation and a just transition*."

- The following is the 'Mission' of the LACAP: "*We will strive to achieve this by focusing on the key sustainability pillars of energy, transport, waste, behavioural change, land use, ecosystems and the built and natural environments. We will achieve this by supporting innovation and co-creation with all stakeholders in a collaborative environment across the county*."

The Proposed Development will support the LACAP vision of transitioning to a low carbon society. This proposal will support an increase in renewable energy sources across the County. The LACAP references anaerobic digestion specifically, as a source to be promoted for the increased production in renewable energy.

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5 Biodiversity

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 Cappanihane, Limerick and its surrounding environs.

5.1 Methodology

The assessment followed CIEEM, EPA, and NRA guidelines, evaluating ecological features and potential impacts, which were classified as positive, negative, or neutral, with mitigation measures proposed.

5.2 Designated Sites

Natura 2000 Sites

The proposed site is not within or immediately adjacent to any designated sites.

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. Flora, Fauna, Aquatic Environment.

Habitats within the Study Area

- The site does not lie within or adjacent to any designated nature conservation areas and is considered to have low local biodiversity value.
- The main habitat is improved agricultural grassland, dominated by ryegrasses, with no wetland indicators present.
- Low-value hedgerows (WL1) are present throughout the site. These hedgerows are relatively species poor and primarily function as boundary features, offering limited ecological significance.

Overall, the biodiversity and ecology of this Proposed Development is of low value.

Flora

- The Proposed Development site consists of primarily low- biodiversity improved grassland, with hedgerows throughout the site and a stream at its perimeter.
- No protected or invasive plant species were identified within the site.

Fauna

Protected Mammals

- Records indicate the presence of various protected mammals in the wider 10km area, including several bat species, Eurasian badger, European otter, European Hedgehog, and more.
- Records revealed that the European Badger has been recorded within a 2km grid square of the planning site. This species is protected under Irish Wildlife acts. The field survey of the

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Proposed Development site found no Badger setts present within the Proposed Development site, and no obvious worn tracks or trails that could be attributed to badgers were noted.

Bats

- The landscape suitability index for bats in the study area is moderate (25.44).
- No buildings for bat roosts are within the site. However, there are mature trees suitable for bat roosts just outside the site boundary.
- The hedgerows throughout the site and the Lower Ballyteige stream flowing through the eastern boundary provide some connectivity to the wider landscape. These features may allow bats to commute or forage in the area, although the site itself is of limited value for these activities.

Birds

- Limited bird activity was noted, with common species such as blackbird, robin, wren, and Jackdaw observed.
- 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 local importance for birds.

Amphibians, Reptiles, and Invertebrates

- No common frogs (*Rana temporaria*) were observed on the site walkover. The flow at the stream in which the discharge calculations were made would likely be suitable for frogs and smooth newts (*Lissotriton vulgaris*) to inhabit.
- The site provides limited value to pollinating insects, though hedgerows offer some foraging habitats.

Aquatic Environment

Water Features and Quality

- The Lower Ballytiege stream flows south to north along the eastern permitter of the Proposed Development. It then flows east until its confluence with the River Glenma approximately 2 km from the proposed site.
- The EPA have classed the ecological status of the Lower Ballytiege stream as moderate.
- The Proposed Development site is within the Ballingarry Groundwater Body and the status of this waterbody is noted as good overall. However, according to the EPA database, groundwater vulnerability at the site is classified as moderate.

5.3 Ecological Evaluation

5.3.1 Summary of the Value of the Site

The Proposed Development is within the Zone of Influence of three sites under the Natura 2000 network (SACs / SPAs).

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The closet of these is Tory Hill SAC which is 11.2 km north-east of the site. There is no hydrological connectivity between these areas.

Within the Proposed Development site itself the dominant habitats are improved agricultural grasslands and hedgerows. The hedgerows that occur within the site are important ecological features.

According to the NRA guidelines for assessing ecological impacts, the ecological features of the site are evaluated as follows:

- Improved Agricultural Grasslands and Fragmented Hedgerows: Rated as having no to low local importance due to limited biodiversity.
- Well Structured Hedgerows / Treelines: Rated as having local importance (higher value).
- Watercourses (Lower Ballytiege stream): Rated as having local importance (higher value).

5.4 Impact Assessment

Impacts upon Designated Sites

- The site at Cappanihane, Limerick is 15 km upstream of the Lower River Shannon SAC and connectivity is provided by the Maigue River. Due to the distance from the site and adherence to good housing keeping and the CEMP protocols, potential significant effects can be ruled out and an NIS not required.

Impacts within the Site

Construction Phase

Habitat Loss and Fragmentation: The dominant habitat within the Proposed Development site is Improved Agricultural Grassland. This habitat will be converted to Buildings and Artificial Surfaces. This habitat has limited ecological value and therefore its loss constitutes a negligible ecological impact.

The proposed development site contains existing hedgerows that run through the middle of the site. Construction activities may result in the partial removal or disturbance of these hedgerows, which could impact local biodiversity and habitat connectivity. However, a landscaping plan is included which will enhance biodiversity and habitat within the site.

Disturbance to Wildlife: Construction noise and activity may disturb local wildlife, including nesting birds.

Water Pollution: Construction could lead to sediment and pollutant runoff into the Lower Ballytiege Stream.

Operational Phase

Disturbance to Local Wildlife: Increased activity, noise, and lighting could disturb local wildlife. Mitigation will ensure minimal disruption, particularly for bats.

Pollution to Surface and Groundwater: Operational runoff may contain pollutants. Structural weaknesses in tanks could lead to groundwater contamination.

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Flood Risk: The site is at low flood risk, but flood events could overwhelm drainage systems, leading to potential off-site contamination.

Cumulative Impacts: Other local developments could reduce habitat availability. However, the creation of new areas of biodiversity within the Proposed Development and the retention and protection of treelines, will provide local ecological corridors and networks that will reduce the overall cumulative impact of this development in the Cappanihane area.

5.5 Mitigation Measures

In order to avoid any reductions in water quality in the area surrounding the site, a number of mitigation measures must be implemented and followed. These measures will protect the surface and ground water quality locally.

The implementation of these site-specific mitigation measures will ensure the protection of the local ecological receptors. These mitigation measures are outlined in **Table NTS 5.1** below.

Table NTS 5.1: Mitigation Measures

Stage	Details
Pre-Construction and General Requirements	Site preparation and construction must be confined to the Proposed Development only and all mitigation measures must be adhered to.
	Contractors must be made aware of the ecological sensitivity and mitigation measures. This will be done prior to the commencement of any site works
Protection of Terrestrial Habitats and Features	Existing green infrastructure must be incorporated into the development. There must be no dumping or storage of construction waste or machinery in this zone during construction
	Removal of trees/shrubs should be outside the bird nesting season (March-August)
Protection of Water Quality and Management of Pollutants	The unnecessary clearance of vegetation should be avoided and only areas necessary for building works should be cleared.
	It is vital that there is no deterioration in water quality in the Lower Ballytiege Stream. Efficient construction practices to minimise soil erosion and pollution must be implemented.
	Avoid works during heavy rainfall.
	Control of hydrocarbons on site with specific measures. All chemicals must be stored as per manufacturer's instructions.
	Best practice concrete / aggregate management measures must also be employed on site during construction.
	It is recommended that silt fences are installed along the buffer zones of all watercourses within the site. An interceptor trench will be required in front of this silt fence.
Management of Construction Waste and Soil	All construction waste must be removed from site by a registered contractor to a registered site
	All topsoil generated from site works should only be stored within the Proposed Development until it is required for landscaping
Mitigation Measures during Operation	An Environmental Management System (EMS) will be prepared and implemented by the operating company during the operational phase.
	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
Landscaping and Lighting	The hedgerows around the site are important ecological corridors. These features should be enhanced and maintained for the benefit of wildlife.
	The existing gappy hedges should be enhanced with some more native shrubs if possible
	It is recommended that further actions that are outlined as part of the National Pollinator Plan should be implemented

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	Nesting areas for solitary bees will be included and bee boxes for cavity-nesting bees will be created.
	Bat boxes will be installed around the Proposed Development
	The use of herbicides and rodenticides within the Proposed Development will be minimised and should be in accordance with relevant guidelines.
	There should be no lighting directed from the site towards mature vegetation or the Lower Ballytiege Stream.
	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.
Use of the Biobased Fertilisers by Customer Farmers	In order to avoid any reductions in water quality within the catchment as a whole, all biobased fertilisers must be used in accordance with S.I. 113 of 2022 European Communities
	The spreading of the biobased fertiliser on the customer farms must be done in accordance with the specific Nutrient Management Plan for that farm

5.6 Residual Impacts

Construction Phase

A summary of the predicted effects associated with the construction phase in terms of quality, significance, and duration, along with the proposed mitigation measures and resulting residual effects are summarised in **Table 5.7** in Chapter 5 of the EIAR – Main Report.

The overall impact anticipated by the construction phase of the project following the implementation of suitable mitigation measures is considered to be ***neutral***, ***slight***, and ***temporary to long term.***

Operational Phase

A summary of the predicted effects associated with the operational phase in terms of quality, significance, and duration, along with the proposed mitigation measures and resulting residual effects are summarised in **Table 5.8 in Chapter 5 of the EIAR – Main Report.**

The overall impact anticipated by the operational phase of the project following the implementation of suitable mitigation measures is considered to be ***neutral***, ***slight***, and ***short-term*** to ***long-term.***

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6 Population and Human Health

Chapter 6 of Volume 2 of the EIAR assesses the likely significant effects of the proposed development on Population and Human Health. The assessment methodology involves a thorough desktop study and fieldwork, utilizing guidelines from the EPA, European Commission, the Institute of Public Health, and the Institute of Environmental Management and Assessment (IEMA). The primary goal is to ensure that the development's effects on human health and welfare are comprehensively evaluated and mitigated.

6.1 Description of the Receiving Environment

Population & Employment

The health status of the population in the study area, as reported by the Central Statistics Office (CSO) in the 2022 Census, shows that 44.41% of the area self-reports their health as 'very good', which is slightly lower than county and national trends, and comparable with the figure for the nearest settlement, Bruree town (44.93%).

The study area has experienced population growth between the 2016 and 2022 censuses, with a significant increase in growth rate (52.46%) compared with county and State levels. However that significant growth has been attributed to primarily to the designated small area: A127015001, being amalgamated with small area: A127015002.

According to the Pobal HP Deprivation Index, the ED within which the Proposed Development is situated is marginally below average, indicating moderate population sensitivity.

There is a relatively low age dependency ratio, therefore a large proportion of the population is within working age range in the ED, thus considered as largely independent and judged to be not sensitive to change. The data shows that the study area has a relatively consistent percentage of persons with a disability (although slightly higher than the national average), indicating that for persons within the area, there are relatively few restrictions on daily activities.

Overall, the population within the study area is not particularly sensitive to change, with an overall ranking of ***low*** to ***moderate sensitivity***.

Community

The two principal aspects of the community surrounding the subject site can be defined as follows:

- The site of the Proposed Development is located along the northern side of the R518. The closest established residential area along the R518 is approximately 5.9km to the east of the Site, at Bruree. There are also residential units sparsely located on all sides of the Site, but none in immediate proximity to the site boundary.
- The working community in the vicinity of the Site comprise primarily agricultural-based employment. Other employment within the wider vicinity includes a truck repair shops (c. 750m northeast), a motorcycle dealership (c. 800m north), Dairygold agricultural product wholesaler (c. 1.45km north), a quarry (c. 2km northeast), a catering business (c. 3.05km southeast), a tyre shop (c. 3.4km southeast) and a wholesale food store (c. 2.65km south).

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Human Health (Off-Site)

There is a low age dependency ratio, therefore a large proportion of the population is within working age, thus considered as largely independent and judged to be not sensitive to change. The information presented above for the study area shows, a high proportion describes their health status as 'very good', slightly lower than national trends. The data shows that the study area has a slightly higher percentage of persons with a disability than the national average: indicating that for persons within the area, there are relatively few restrictions on daily activities. The population within the study area is therefore not particularly sensitive to change, with an overall ranking of low to moderate sensitivity.

Human Health (On-Site)

An anaerobic digestion plant is considered to be a biological treatment facility, the operation of which can have the potential for a variety of exposure scenarios involving a range of factors including:

- Pest Control
- Engineering specification
- Abatement technologies
- Hydrogeology
- Topography
- Type and quantity of waste accepted.
- Biogas generation

In the absence of appropriate mitigation, the primary hazards to human health at a biogas facility is mainly associated with uncontrolled air and water discharges

6.2 Likely Significant Effects

Do-Nothing Scenario

Under the 'Do Nothing' scenario, the current land use of the Proposed Development site would remain unchanged, with no additional effects on the following receptors:

Local Population & Employment: The local population and employment levels would remain unaffected, but the opportunity to create additional jobs and contribute to specific objectives in the Limerick County Development Plan and the 2024 Climate Action Plan would be lost.

Community: Community perceptions would remain unchanged, but the potential economic and social benefits from the development would be foregone.

Land Use: The land would likely continue to be used for agriculture.

Human Health (Off-Site Receptors): There would be no effects on human health, as the site would remain in its existing greenfield state. However, the opportunity to provide renewable energy to the national grid and address rising energy costs would be missed.

Human Health (On-Site Receptors): It is likely that the risks associated with uncontrolled pests and vermin on the surrounding the area, livestock and ecological receptors will be significantly reduced (in the absence of mitigation).

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Overall, the 'Do Nothing' scenario is sub-optimal in the context of national and county renewable energy targets and efforts to mitigate climate change. in the context of the national and county targets for the adoption of renewable energy sources, and in the context of anthropogenic climate change. Furthermore, an opportunity to introduce a bio-based fertiliser, with reduced pathogen content into to local bioeconomy will be missed.

Receptor Sensitivity

Sensitivity of the receptors identified are summarised in **Table 6.11** (extracted from Chapter 6)

Table 6.11 – Receptor Sensitivity

Receptor	Receptor Importance	Receptor Sensitivity	Rationale
Local Population & Employment	Low to moderate	High	The Proposed Development provides employment opportunities to the local area and surrounds, also with the potential to provide renewable energy.
Community	Low to moderate	Low	The overall economic and social benefits that the development would bring to the area would not be experienced by the community in the event of the development not occurring.
Human Health (Off-Site)	Low to moderate	Moderate	If the Proposed Development were not to proceed this greenfield site would remain in its existing form and the unique opportunity of providing renewable energy will be missed.
Human Health (On-Site)	High	High	The development will result in a situation where human health will be put at risk due to typical hazards associated with the construction and operation of the proposed facility in the absence of mitigation.

Sources

Construction Phase

Population

The construction phase is not considered to have any significant effect on the population of the surrounding area, as it is expected that the work force will primarily travel from their existing place of residence to the construction site. As such, activities associated with the construction phase are anticipated to have **positive, slight, temporary** effects on the local population.

Employment

The Proposed Development will provide important construction/engineering and related employment. The construction phase will also have secondary and indirect 'spin-off' effects on ancillary support services in the area of the Proposed Development, such as retail services, together with wider benefits in the aggregate extraction (quarry) sector, building supply services, professional and technical professions etc. As such, activities associated with the construction phase are anticipated to have **positive, moderate, temporary** effects on employment within the area.

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Community

It is acknowledged that the construction phase of the project may have some short-term negative effects on local residents. These effects are dealt with separately and assessed in other technical chapters of the EIAR. It is expected that these short term temporary localised effects may be experienced by those residing, working, and visiting the area. Such effects would include an increase in daytime noise levels in the area as a result of the machinery being used for construction purposes. Activities associated with the construction phase are anticipated to have **negative, slight, temporary** effects on the local community.

Human Health

The Health and Safety policy, procedures and work practices of the Proposed Development will conform to all relevant health and safety legislation both during the construction and operational stages of the Proposed Development. The Proposed Development will be designed and constructed to best industry standards, with an emphasis being placed on the health and safety of employees, visitors, local residents and the community at large. Activities associated with the construction phase are anticipated to have **negative, slight, temporary** effects.

Operational Phase

Potential operational phase effects are considered in detail below and summarised in **Table 6.13** in Chapter 6 of the EIAR – Main Report.

Table 6.13 Operation Phase Effects Summary

Receptor	Sensitivity Rating	Potential Environmental Effects	Quality	Significance	Duration
Local Population	Low to moderate	No material impact on the existing local population. Likely to have a positive impact on the population in terms of employment and economic benefit in the long term.	**Positive**	**Moderate**	**Long-term**
Employment	Low to moderate	Creation of significant employment benefit for the local study area. Further indirect employment will be created as a result of the induced benefits of the development.	**Positive**	**Significant**	**Long-term**
Community	Low to moderate	The community may experience a slight change in mobility as a result of increased traffic on the road network.	**Neutral**	**Slight**	**Long-term**
Human Health (Off-Site)	Low to moderate	Air emissions from CHP, Biomethane Boiler and Odour Treatment System.	**Neutral**	**Imperceptible**	**Long-term**

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		Projected ambient concentrations including background levels fall within all National and EU ambient air quality limit values and, thus, will not cause any effect on human health.			
Human Health (On-Site)	Moderate	**Pests** The presence of vermin and insect pests in or around any waste management facility is a health hazard. Management must have a pest, and vermin control standard operating procedure in place, which effectively controls any such presence and prevents possible contamination risk.	**Negative**	**Moderate**	**Long-term**
Local Population	Low to moderate	No material impact on the existing local population. Likely to have a positive impact on the population in terms of employment and economic benefit in the long term.	**Positive**	**Moderate**	**Long-term**

6.3 Mitigation Measures

Construction Phase

Potential effects during the construction phase will be minimised through the implementation of the Construction Environmental Management Plan which will be submitted to the council prior to construction.

Population

It is considered that the Proposed Development is unlikely to generate any significant adverse effects on the demographics of the area No mitigation measures are required during the construction phase.

Employment

The Proposed Development will have a positive effect on employment levels in the area and as such no mitigation measure are required.

Community

It is considered that the Proposed Development is unlikely to generate any adverse effect on the community of the area either during the construction phase or the operational phase and

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would actually have positive economic effects. No mitigation measures are required during the operational phase.

Human Health

Adverse health and safety effects during the construction phase will be minimised through the implementation of the Construction Management Plan to be prepared by the main contractor.

Operational Phase

Potential effects to the local population, employment and community are neutral to positive hence no mitigation measures are recommended for these receptors. A robust set of measures are proposed for the following operational aspects relating to Human Health, outlined in detail in section 6.7 of the main EIAR Report and within Chapter 16 - Schedule of Mitigation. Mitigation measures are provided where relevant for the following:

- Pest Control
- Fugitive Emissions
- Hazardous Substance
- Biological Agents
- Electrical Hazards
- Gas Hazards
- Explosion and Fire Hazards
- Malpractice.

6.4 Cumulative Effects

The cumulative effects of the proposed construction and operation of a biogas facility near Bruree and Ballyagran with other developments in the area are reviewed in this section with specific regard to the local population.

Construction Phase

The mitigation measures outlined in the CEMP and in Chapter 6 of the EIAR – Main Report, should be applied throughout the construction phase of the Proposed Development. This will ensure any significant cumulative effects on the local population and the greater environment are prevented.

Operational Phase

The cumulative effects on the local population and human health during the operational phase of the Proposed Development are expected to be minor. These effects primarily stem from a slight increase in demand for local services and increased employment, aligning with broader employment trends. Mitigation measures and sustainable use of resources will help manage this increased demand.

6.5 Residual Effects

The mitigation strategy above recommends actions which can be taken to reduce or offset the scale, significance, and duration of the effects on the surrounding population.

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Population

The Proposed Development is not expected to have any significant adverse effect on the local population.

Employment

The development will create new employment opportunities, boosting local businesses and services.

Community

The Proposed Development is unlikely to adversely affect the local demography and will have positive economic effects.

Human Health

Provided the actions and procedures outlined in **Section 6.7** are rigidly adhered to, the Proposed Development will have no likely significant adverse effect in relation to pest control, whether direct or indirect on the surrounding areas during the construction or operational phases. Following implementation of the mitigation measures proposed in **Section 6.7**, the residual effects are anticipated to be ***negative, slight and long-term*** effects on Pest Control.

Various human health parameters discussed in this chapter also interact with many other aspects of the environment e.g. air, odour, climate, noise and vibration. The residual effects in relation to these aspects has been discussed in **Chapter 9 – Air, Odour and Climate,** and **Chapter 10 - Noise and Vibration.**

Following implementation of the mitigation measures as outlined in those chapters, the residual effects to human health as a result of air, odour and climate, and noise and vibration, are anticipated to be, **neutral to negative, imperceptible to slight, and temporary to long term.**

Residual Effects Summary

The overall effect anticipated during the construction phase of the project following the implementation of suitable mitigation measures is considered to be ***neutral to positive, imperceptible to slight,*** and ***long-term***.

6.6 Summary of Significant Effects

The aspects for this assessment are considered to be the Population, Employment, Community, and Human Health. Whilst the development proposals have the potential to cause detriment to the sensitive receptors identified, the recommended mitigation measures will ensure that the risk of potential effects are reduced to ***negligible***.

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7 Land, Soils & Geology

ORS conducted an assessment of the likely impact of the Proposed Development on the Land, Soil and Geology within the proposed development site and the wider region.

The Proposed Development is located in the townlands of Cappanihane, Bruree, County Limerick.

7.1 Receiving Environment

The following aspects relating to land, soils and geology were addressed;

- Topography
- Drift Geology
- Local Bedrock Geology
- Regional Bedrock Geology

The land, soils and geology of the Proposed Development site was considered to be of low environmental sensitivity in all instances.

Topography

The proposed development site is located in the Landscape Character Type 1: Agricultural Lowlands. The Proposed Development locality is characterised as being flat to undulating sediments, in keeping with the landscape character description for the area.

The topography of the site is relatively uniform. The highpoint on site is *ca*. 92.49m AOD which occurs at the northwestern corner of the site. Along the western site boundary, there is a slight gradient from north (92.49m AOD) to the south (92.98m AOD). The land gradually falls from 92.37m AOD at the northeastern corner of the site to 91.53m AOD at the southeastern corner. Across the centre of the Proposed Development the topography demonstrates minor variations in elevation and is approximately 92.2m – 92.3m AOD. A low occurs at the southeast of the site (90.98m AOD). The water level of the stream adjacent to the eastern boundary of the site ranges from 89m AOD to 90m AOD. The topography of the region to the east of the site begins to rise again beyond the banks of the adjacent watercourse.

Drift Geology

The Proposed Development lies at the intersection of two broad physiographic divisions identified by the Second Edition General Soil Map of Ireland. The Proposed Development is located within association no. 34, described as comprising Minimal Grey Brown Podzolics (70%)" with associated soils including "Gleys (20%)" and "Brown Earths (10%)". Regarding association no. 39 of which the principal soil is "Gleys (75%)" associated soils include "Acid Brown Earths (15%)" and "Peaty Gleys (10%)". Parent material is proposed to consist of Limestone Glacial Till. However, according to GSI data, the Proposed Development overlays till derived from Devonian sandstones (TDs). The soils which are likely to be affected by the development are characteristic in the local and regional context and occur in abundance.

Regional Bedrock Geology

The majority of the Proposed Development is located on a narrow terrane of Dinantian (early) Sandstones, Shales and Limestones which stretches from Mayne (W) to the northeast past Castletown, continuing towards the site location at Cappanihane and terminates at Coolrus (NE). The southern boundary of the Proposed Development is located within a wider formation

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of Dinantian Lower Impure Limestones.

Local Bedrock

The underlying bedrock for the majority of the Proposed Development consists of sandstone, mudstone and thin limestone, from the Lower Limestones and Shales Formation. This formation is bordered to the north by an Old Red Sandstone Formation. A number of exposers are located along this Old Red Sandstone formation, the closest of which is located *ca.* 450m to the northeast of the proposed site. Beyond this formation is a wide terrane of Lower Limestone Shales. To the northeast, within the Old Red Sandstone formation is a Volcaniclastic Formation, described as Volcaniclastic rocks among the Dinantian limestones

A portion of the southern site boundary overlies the Ballysteen formation, which consists of fossiliferous dark-grey muddy limestone. The formation is described as irregularly bedded and nodular bedded argillaceous bioclastic limestones (wackestones and packstones), interbedded with fossiliferous calcareous shales. Exposers of the Ballysteen formation occur *ca.* 750m to the southwest of the Proposed Development.

A number of faults can be observed within the 2km study area. The closest unconformity is located *ca.* 1.1m north of the site and runs from west to east. This fault separates two Old Red Sandstone (undifferentiated) formations and marks the beginning of the Volcaniclastic Rocks formation which extends north-eastwards and terminates below another fault.

Depth to Bedrock

An assessment of the GSI groundwater vulnerability maps and local groundwater wells data was undertaken. There are 19 recorded groundwater wells within the 2km study area, the closest of which is located *ca.* 250m southeast of the Proposed Development. These groundwater wells are defined as a combination of dug wells and boreholes and have a varying yield class from excellent to poor. The lands on which the site location has been proposed have been assigned a groundwater vulnerability rating of moderate.

The recorded depth to bedrock encountered for the corresponding wells in the study area are generally between 1.8m to 40.2m below ground level (bgl).

Site investigations consisted of six no. trial pits excavated to depths between 2.4m to 3.4m across the site location. Bedrock was not encountered in any of the trial pits, although groundwater was observed at 1.0m bgl in trial pit 4, located at the centre of the site.

Karst Features

County Limerick has a low density of karst features due to the presence of sandstones, shales, volcanics and impure limestones throughout the county. There are no recorded karst features within the 2km study area or within 5km of the Proposed Development.

Soils & Subsoils

The Proposed Development site is characterised by low permeability subsoil overlain by a poorly-drained (mainly acidic) (AminPD) soils derived mainly from non-calcareous parent materials. The soil groups associated with this category are surface water gleys and ground water gleys. Based on the GSI vulnerability guidelines which consider soil permeability and groundwater vulnerability, a soil depth of 3-8m is estimated for the lands underlying the site.

The Teagasc representative soil profile description for the underlying soil, the Howardstown Series is described as clayey drift with limestones. A humic layer is noted from 0-19cm bgl.

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Texture remains relatively consistent throughout the four distinct soil horizons, with an exception in the 19-30cm range being described as clay loam instead of clay. The proportion of stones in the profile increases with depth from few to abundant.

The EPA database indicates the parent material for the subsoils on site are till derived chiefly from Devonian Sandstones (TDSs). The till is described as unsorted to poorly sorted and contains particles ranging in size from clay to boulders, suspended in an unconsolidated matrix of mud or sand. This unsorted matrix is due to glaciation. Areas of acid brown earths and brown podzolics are noted *ca.* 100m east, 300m north and *ca.* 650m to the southwest. Regions where bedrock is at or close to the surface are noted *ca.* 450m to the northwest of the Proposed Development in addition to some areas of peat subsoils *ca.* 1.05km to the west.

Soil Contaminants

No contaminants were observed on site during the site investigations. The site is greenfield with no previous development recorded within the site boundary. No Licensed Integrated Pollution Prevention Control (IPPC) facilities are located within the 2km study radius of the Proposed Development.

Site Investigation

The results of the trial pits installed as part of the site investigation are shown below in **Table NTS 7.1**.

Table NTS 7.1: Soil Profile of Trial Pits

Location	Depth (m)	Ground Profile	Comments
TP-01	0.0 – 0.3 0.3 – 1.8 1.8 – 2.4 2.4	Topsoil – Dark Brown Earths. LOAMY/CLAY. Gravel abundant, lighter brown colouring. Dark CLAY (more compact), mottling evident throughout the layer, abundant rounded large cobbles. End of TP.	Trial Pit located at proposed tank farm area. Fluctuating water table likely, evident through signs of mottling and saturated impermeable CLAY. Proximity to drainage, seasonal changes and lack of recent rainfall may contribute to not observing Groundwater strike. No Bedrock encountered.
TP-02	0.0 – 0.2 0.2 – 1.7 1.7 – 2.75 2.75	Topsoil – Dark Brown Earths. Dark brown gravelly CLAY / Gley soils with higher silt content than other locations. Mottling (grey/orange) present throughout. Compacted impermeable CLAY with grey mottling throughout suggesting gleying of soils, evidence of seasonal high-water table. Occasional rounded large cobble present. The river to the east likely contributes to high water table & recharged by groundwater. End of TP.	Trial Pit located at proposed digestate storage tank area. Fluctuating water table likely, evident through signs of mottling and saturated impermeable CLAY. Proximity to drainage, seasonal changes and lack of recent rainfall may contribute to not observing Groundwater strike. No Bedrock encountered.
TP-03	0.0 – 0.3 0.3 – 2.1	Topsoil - Dark Brown Earths	Trial Pit located at Digestate Treatment Building/ Feedstock building.

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	2.1 – 2.4 2.4	Compacted gravelly CLAY, mottling evident but not as much as other locations. High Large Rounded/ angular Cobble content, impermeable CLAY. End of TP	Fluctuating water table likely, however determined to be lower than TP01/TP02, evident through weak signs of mottling and saturated impermeable CLAY/ Groundwater Gley soils. Proximity to drainage, seasonal changes and lack of recent rainfall (last 3 months below LTA) may contribute to not observing Groundwater strike. No Bedrock encountered.
TP-04	0.0 – 0.2 0.2 – 2.8 2.8	Topsoil – Dark Brown Gravelly Earths. GROUNDWATER observed @ 1.0mbgl. Impermeable sticky Groundwater Gley (characterised by grey colour and upper layers are oxidised & typical brown). End of TP.	Groundwater observed @ 1.0mbgl. Gleying is prominent in the subsoil, with greyish-blue colours throughout. Gleying typically caused by prolonged or permanent saturation from a high water table (with seasonal variation). No bedrock encountered.
TP-05	0.0 – 0.2 0.2 – 1.6 1.6 – 3.4 3.4	Topsoil – Dark Brown Earths Saturated Groundwater Gley soils, evident through grey colouring and lighter brown mottling (anaerobic soils). Compacted darker brown impermeable CLAY, small cobbles present End of TP.	Fluctuating water table likely evident through signs of gleys, mottling and saturated impermeable CLAY/ Groundwater Gley soils. Proximity to drainage Glossy sheen & mottled grey/ orange colour – evidence of saturated gley soils. Proximity to drainage (river to east), seasonal changes and lack of recent rainfall (last 3 months below LTA) may contribute to not observing Groundwater strike. No Bedrock Encountered.
TP-06	0.0 – 0.3 0.3 – 2.4 2.4 – 2.7 2.7	Topsoil – Dark Brown Earths Gravelly impermeable brown CLAY, small signs of mottling. Compacted darker brown impermeable CLAY, cobbles/ small boulders present End of TP.	Fluctuating water table likely evident through signs of saturated impermeable CLAY/ Groundwater Gley soils. Proximity to drainage (river to east), seasonal changes and lack of recent rainfall (last 3 months below LTA) may contribute to not observing Groundwater strike. No Bedrock Encountered.

7.2 Assessment of Impacts

Receptor Sensitivity

The sensitivity of the receptors identified during the study of the land, soil & geological features within the vicinity of the site are summarised in **Table NTS 7.2**.

Table NTS 7.2: Receptor Sensitivity

Receptor	Receptor Importance	Receptor Sensitivity	Rationale
Topsoil	Local Level	Low	The local topsoil is a groundwater gley / surface water gley which is abundant in the vicinity of the

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			development. The site topsoil contains no known pollutants. The soil is of poor agricultural quality, being a poorly drained 'Gley' and would not be a highly sought-after topsoil for any infill agricultural lands.
Underlying Deposits	Local Level	Moderate	The development has been designed to utilise the existing site topography as far as possible (**231240-ORS-ZZ-00-DR-CE-480**), minimising the disturbance to the subsoil to achieve the desired site levels. Where possible drift deposits will remain on site and be utilised as infill material. The underlying till deposit is a diamicton (poorly sorted containing particles ranging in size from clay to boulder) of Devonian sandstone parent material which is in abundance within the wider area. The development site is located across a GSI designated area of flat to undulating glacial sediments with a varying range in soil depth from moderate to deep.
Bed Rock Geology	Regional Level	Moderate	The underlying bedrock formation for much of the site is characterised as Lower Limestone Shale and is described as sandstone, mudstone and shale. A portion of the southern boundary overlies bedrock of the Ballysteen Formation which is described as fossiliferous dark-grey muddy limestone. Karst features have not been recorded within the 5km study area of site but are found within the wider region to the northwest of the Proposed Development ca. 7.5km northwest of the site. Karst features are not prevalent throughout County Limerick as much of the County is underlain by Sandstone bedrock and impure limestones. This rock is in abundance with the wider region. It is not envisaged that bedrock will be encountered. The majority of the site is underlain by a Regionally Important Aquifer - Fissured bedrock. A portion of the southern boundary of the site is underlain by a Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones.

Construction Phase

The construction phase is likely to yield the most potential impacts on the surrounding land, soil & geology. Potential construction phase impacts are considered in detail in **Section 7.5.3** of the **EIAR – Main Report Chapter 7** and summarized in **Table NTS 7.3.**

Table NTS 7.3: Construction Phase Effects (Unmitigated)

Receptor	Potential Environmental Effects	Quality	Significance	Duration
Topsoil	Topsoil Removal	**Negative**	**Slight/ Moderate**	**Reversible**
	Access roads and Gas Pipeline	**Negative**	**Slight**	**Temporary**

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Underlying Deposits/ Subsoil	Construction of Built Structures	**Negative**	**Moderate**	**Long-term**
	Excavation/ Subsoil Removal	**Negative**	**Moderate**	**Permanent**
	Contaminated Soils	**Negative**	**Not Significant**	**Temporary**
	Access roads and Gas Pipeline	**Negative**	**Slight**	**Permanent**
Bed Rock Geology	Excavation of Bedrock	**Negative**	**Significant**	**Permanent**

Operational Phase

The operational phase effects anticipated and considered throughout the lifetime of the operation of the facility are considered in detail in **Section 7.5.4** of the **EIAR – Main Report** and are summarized in **Table NTS 7.4** below.

Table NTS 7.4: Operational Phase Effects (Unmitigated)

Receptor	Potential Environmental Effects	Quality	Significance	Duration
Topsoil	Nutrient Leaks	**Negative**	**Slight**	**Short-term**
	Land Spreading of Biobased Fertiliser	**Positive**	**Slight**	**Long-term**
Bed Rock Geology	Hydrocarbon Contamination	**Negative**	**Moderate/ Significant**	**Long-term**

7.3 Mitigation Measures

Construction Phase

General Mitigation Measures

A summary of all mitigation measures for the construction phase to ensure maximum protection of land, soil & geology receptors are listed below:

- Adherence to the site-specific Construction Environmental Management Plan (CEMP).
- Site preparation and construction will be confined to the Proposed Development.
- Prior to the commencement of works on site, the PSCS/ ECoW will ensure that contractors will be made aware of the sensitive receptors identified in the EIAR. A signed statement saying that they have taken on board the mitigation measures should be presented to the local authority along with the Notice of Commencement.
- A wheel wash/ power wash facility will be established.
- Dirty equipment will be refused entry to site.

Topsoil Removal

- Slight compaction of stockpiles to minimise erosion.
- Running stockpiles in the direction of prevailing wind.
- Construction of silt fences around topsoil stockpiles.
- Minimise the export of topsoil off site by incorporating in the final landscape design.
- Minimise handling and tracking of material to maintain optimum soil structure.
- Landscaping to take place as soon as possible to reduce exposure of subsoil and topsoil stockpiles.

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- Works will be avoided during periods of extended rainfall.
- All topsoil generated from site works should be stored within the Proposed Development until it is required for landscaping. It must not be stored outside the Proposed Development boundaries.
- Excess topsoil will be removed from site by a registered contractor.

Excavation

- Stockpiling material in appropriate locations, away from water sources, with a silt fence surrounding it to reduce the rate of run-off from hydraulic conditions.
- Light compaction of stockpiles to minimise erosion.
- Stockpile heights should be kept to a minimum.
- Excavations will be postponed in high rainfall conditions to reduce the risk of excavation collapse.
- Excavations to be backfilled as soon as possible.
- All long-term soil stockpiles are to be planted with a vegetative cover to bind the soil and improve slope stability.
- All temporary excavations will be conducted in a safe manner to ensure sidewall stability and prevent collapse of excavations. Mobile shoring equipment will be utilised to this end where required.
- Engineered retaining walls are to be installed where required to ensure stability of contiguous and Proposed Development topography.
- “Mole Plough” installation method will be utilised to limit trenching requirements and reduce the risk of sediment laden run-off.

Soil Compaction

- Construction of a hardcore gravel access road on and around the site.
- Confine site traffic to designated routes.
- Minimise traffic flows on site and establish a construction stage parking compound.
- Avoid the use of oversized machinery when and where possible.
- Prevent movement of vehicles on site during and after periods of rainfall.
- Driving machinery on topsoil stockpiles will be avoided.
- Works will be avoided during periods of extended rainfall.

Run-Off

- Silt fencing will be erected along the eastern extents of the Proposed Development site. Fencing is to be made of a permeable filter fabric (Hy-Tex Terrastop Premium silt fence, or similar), with the footing of the fencing to be buried into the ground and the visible fencing to be *ca.* 0.5m high.
- An interceptor trench will be installed in front of the silt fence.
- The silt fence will be visually inspected daily. Maintenance of the fences will be carried out regularly.
- Excavated and/or imported material will be stockpiled and silt fencing will be constructed around stockpile locations to contain/ reduce any sediment run-off.
- Slight compacting of stockpiles to reduce erosion.
- Stockpile areas for sands and gravel should be kept to minimum size, well away from storm water drains and gullies leading off-site.
- Silt Fences to be erected where excavation works are required in close proximity to water features and along depressions in land where there is increased surface water flow rates.

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- Chemicals to be stored in bunded compounds well away from storm water drains and gullies.
- Refuelling of machinery should be carried out using drip trays.
- A temporary drainage system will be established complete with a settlement pond to remove contaminants from run-off, prior to discharge.
- Temporary staff welfare facilities will be installed on site.

Concrete

- **Concrete Washout Skip**: Chutes of concrete trucks are only to be washed out into an impermeable lined (polythene) skip. The washout water is to be treated prior to discharge.
- The concrete washout skip is to be located to the east of the site, where the overburden is greater.
- Excavations lined with an impermeable liner are not permitted as concrete washout bays.
- Large excess loads of concrete are to be returned to the supplier or poured into concrete block moulds (Betonblock or similar design) in order to minimise waste and reduce the risk of contaminants leaching into the surrounding environment.
- Best practice in bulk-liquid concrete management should be employed on site addressing pouring and handling, secure shuttering, adequate curing times etc.
- 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.

Construction Contaminants

- Fuels, oils and other environmental deleterious chemicals are to be stored in a bunded well-ventilated chemical stores.
- Use of such chemicals and fuels is to be contained to bunded areas, where possible.
- Fuel bowsers to be located in bunded areas which can cater for 110% of the primary vessel capacity.
- Any spills or leaks to the soil is to be immediately contained and the soil in question is to be removed by a licensed contractor and disposed of in a registered facility.
- Oil spill containment kits are to be situated near areas of potential spills.
- Regular inspections carried out on plant and machinery for leaks and general condition.
- Use of ready-mixed supply of wet cement products.
- Scheduling cement pours for dry days.
- Maintenance and repair works will be carried out at least 10m from any collection of surface water.
- No refuelling will be undertaken within 50m of the Maigue Stream to the east.
- Ancillary machinery equipment such as hoses, pipes and fittings which contain hydrocarbons will be stored within a bund or drip tray.
- Any repair works required on machinery involving fuel and oil control will be carried out off-site where practical, if not possible then repairs will be undertaken on a clean hardcore area of site. Unless unavoidable, repair works carried out in the field where machinery is operational will use spill trays and absorbent materials to prevent release of contaminants to the ground.
- Daily pre-start checks prior to start-up of plant and machinery.

Importation of Contaminated Materials

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- Any deliveries found to be contaminated will be refused access to deposit on site.
- Any contaminated materials deposited on site will be removed immediately from site. If this is not possible then it will be stored in a “quarantine zone”.
- The quarantine zone is to be lined with an impermeable liner which the material will be stored on. A cover will be placed over the liner to avoid hydraulic run-off of contaminated materials.
- The quarantine zone is to be fenced off and surrounded by silt fencing, as a secondary containment measure.

Excavation of Contaminated Soils

- All excavated materials will be visually assessed for contamination. Any contaminated material detected will be sent for analysis to a suitable environmental laboratory and subsequently quantified, segregated and transported for disposal by a licenced contractor.

Operational Phase

A summary of all mitigation measures for the operational phase to ensure maximum protection of land, soil & geology receptors are listed below:

General Mitigation Measures

- An Environmental Management System (EMS) will be prepared and implemented
- The proposed facility will operate under an Industrial Emissions Licence (IEL)
- 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

Contaminated Run-off

- 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 Plan (EMP) to include site specific standard operating procedures pertaining to waste management and emergency response.
- There will be no intentional discharge of untreated storm water to surface or ground waters.
- The Digestion Tanks and Digestate Storage tanks will be located within a bunded location to the east of the site, this will act as a secondary containment in the event of loss of tank contents.
- All primary pipelines and bunded structures will be inspected and integrity tested prior to handover from the appointed construction contractor. All works will be installed to Construction Quality Assurance (CQA) plan.

Land Spreading of Biobased Fertiliser

- All biobased fertilisers must be used in accordance with S.I. 113 of 2022 European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2022).

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- The spreading of the biobased fertiliser on the customer farms must be done in accordance with the specific Nutrient Management Plan for that farm.
- Application of biobased fertiliser to be conducted in compliance with the Nitrates Action Programme (e.g. prohibited periods and nitrogen application rates).
- All biobased fertiliser is to be pasteurised prior to removal from the Proposed Development to comply with Regulation (EU) 142/2011 on Animal By-Products in Organic Fertilisers.

7.4 Residual Impacts

Construction Phase

A summary of the predicted impacts associated with the construction phase in terms of quality, significance, and duration, along with the proposed mitigation measures and resulting residual impacts are summarised in **Table 7.13** in Chapter 7 of the EIAR – Main Report.

The overall impact anticipated by the construction phase of the project following the implementation of suitable mitigation measures is considered to be ***neutral to negative***, ***slight to moderate*** and ***temporary to permanent***.

Operational Phase

A summary of the predicted impacts associated with the operational phase in terms of quality, significance, and duration, along with the proposed mitigation measures and resulting residual impacts are summarised in **Table 7.14** in Chapter 7 of the EIAR – Main Report.

The overall impact anticipated by the operational phase of the project following the implementation of suitable mitigation measures is considered to be ***positive to neutral***, ***imperceptible to slight***, and ***temporary to permanent***.

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8 Hydrology & Hydrogeology

ORS conducted an assessment of the likely impact of the proposed development on the hydrological and hydrogeological environment (collectively known as the water environment) within the proposed development site and the wider region.

The Proposed Development site is located in the townlands of Cappanihane, Clonee, Co. Limerick.

The objectives of this chapter (Chapter 8 - Hydrology & Hydrogeology) are:

- To provide a baseline assessment of the receiving water environment in terms of surface water (hydrological) and groundwater (hydrogeological) receptors.
- To identify any potential negative effects posed by the construction and operational phases of the Proposed Development.
- To propose suitable mitigation measures to prevent or reduce the significance of the negative effects identified.
- To consider any significant residual effects of cumulative effects posed by the Proposed Development.

8.1 Receiving Environment

The following aspects relating to hydrology & hydrogeology were assessed:

- Topography
- Drift Geology
- Regional & Local Bedrock Geology
- Regional & Local Hydrology
- Regional & Local Hydrogeology
- Protected Areas
- Flood Risk
- Water Quality

The site sensitivity was considered to be low in most instances with the exception of: Local Hydrology & Hydrogeology. The site is adjacent to the Lower Ballyteige Stream, which runs along its eastern boundary and eventually connects to the River Glema and River Maigue downstream. All of these water bodies are currently classified as unpolluted, indicating good water quality status. Furthermore, the site lies above the Ballingarry Groundwater Body, which is designated as a Regionally Important Aquifer with fissured bedrock.

Local Hydrology

The Proposed Development is located in the Shannon Estuary South Catchment (Hydrometric Area 24), within the sub-catchment 24_8, also identified as Maigue_SC_040 sub-catchment.

The Lower Ballyteige Stream is the primary hydrological feature near the site. The site naturally follows the surrounding topography and is drained by this watercourse, which runs along its eastern boundary.

The Lower Ballyteige Stream continues downstream for about 2.15 km before discharging into the River Glenma, which flows northeast until it joins the River Maigue between Bruree and Croom, approximately 5.2 km northeast of the site. From there, the River Maigue flows to the Shannon Estuary, west of Limerick City, a total hydrological distance of approximately 40 km

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from the site.

Two drainage ditches are present in the centre of the site. The ditches' direction follows the local topography, connecting the drainage network along the road to the Lower Ballyteige Stream. They assist on the management of surface runoff from the site and its surrounding area, therefore, does not meet the criteria to be classified as a watercourse.

The proposed site is not located near any Arterial Drainage Scheme (ADS), Drainage District (DD), or their benefitting lands.

Protected Areas

Three Natura 2000 sites fall within the Zone of Influence of the Proposed Development. The closest designated sites include Heathfield Wood pNHA, located approximately 8.7 km west of the site, and Tory Hill SAC, situated around 11.2 km to the northeast. Additionally, the Adare Woodlands lie within 15 km of the site. No hydrological connection has been identified between the site and these protected areas.

A hydrological pathway exists between the site and both the Lower River Shannon SAC and the River Shannon and River Fergus Estuary SPA. However, given their considerable distances—approximately 20 km and 30 km, respectively—it is unlikely that the Proposed Development would pose any significant risk to these protected sites.

Flood Risk

The Preliminary Flood Risk Assessment (PFRA) identified no significant risk of groundwater or pluvial flooding near the proposed site. Regarding fluvial flooding, the site is not within the flood mapping extent, meaning that the risk of fluvial flooding at the area is low. Coastal flooding is not applicable to this project.

The nearest potential fluvial flooding is 550m away, with no predicted risk of extension toward the site, even under future scenarios. No groundwater flooding is expected on or near the site. As a result, the site is classified as Flood Zone C, where flood risk is low. Construction is not expected to increase flood risk.

Biological & Chemical Water Quality

The River Glenma, along with its tributaries (including the Lower Ballyteige Stream) and the section of the River Maigue downstream of their confluence, is generally classified as having good water quality under the Water Framework Directive (WFD) and is not considered at risk. However, the most recent EPA data from August 2023 gives it a moderate status, indicating slight pollution and moderate water quality. According to the 3rd Cycle Draft Shannon Estuary South Catchment Report (HA 24), published in August 2021, agriculture is the main factor affecting water quality in the area around the proposed development.

A Q-value assessment was performed on the Lower Ballyteige Stream both upstream and downstream of the site. The upstream sample received a Q-value of Q4, which suggests a WFD status of "Good," a pollution status of "Unpolluted," and a condition rating of "Satisfactory." In contrast, the downstream sample was assigned a Q-value of Q3-4, indicating a WFD status of "Moderate," a pollution status of "Slightly Polluted," and a condition rating of "Unsatisfactory."

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On November 1st, 2024, ORS carried out a site visit and collected water samples from the Lower Ballyteige Stream at points both upstream and downstream of the proposed development. These samples were tested at an accredited laboratory (Eurofins), and the results are detailed in **Table 8.7** of ***Chapter 8*** in the ***EIAR Main Report***.

The results show that the stream does not meet the 'Good' water quality standard set by EU regulations, aligning with ORS's on-site assessment, which classified the downstream sample as having a Moderate ecological status. However, since this was a one-time measurement, it may not fully represent the stream's overall condition. Importantly, as the Proposed Development will not discharge any process-related water, it is not expected to have a negative impact on the Lower Ballyteige Stream or its downstream areas.

Local Hydrogeology

The site is situated above the Ballingarry Groundwater Body, a Regionally Important Aquifer with fissured bedrock. Groundwater vulnerability at the site is classified as moderate, with subsoil thickness ranging between 5 and 10 meters.

There are no groundwater wells within the site boundaries. However, the GSI database identifies 19 groundwater wells within a 2 km radius, mostly boreholes. Of these, only two specify their primary use, both for domestic purposes. The depth to bedrock for these wells ranges from 0.6 to 40.2 meters below ground level (mbgl), with overall depths varying between 1.8 and 73.2 mbgl. A full list of these wells is provided in **Table 8.10** of **Chapter 8** in the **EIAR Main Report**.

No karstic features are present within or immediately around the site. The nearest identified feature is a cave, located approximately 7.11 km southwest of the site.

There are no Source Protection Areas (SPAs) in the immediate vicinity. The closest is the Group Scheme Preliminary Source Protection Area (IE1191), about 1.5 km north of the site. Additionally, two Public Supply Source Protection Areas are located within 5 km: 'Ballygaran PWS' (3.0 km southwest) and 'Rockhill PWS' (3.25 km southeast).

Site-Specific Ground Investigations

A ground investigation was carried out by a chartered ORS environmental scientist at Cappanihane on November 22, 2024. The key findings are:

- Trial pits ranged in depth from 2.4 m to 3.4 m below ground level.
- No bedrock was encountered.
- Groundwater was found only in TP04, at a depth of 1.0 m.
- The topsoil in all pits was dark brown, with TP04 containing some gravel.
- Subsoil conditions varied slightly: clay layers were found in TP01, TP03, and TP06, while TP04 and TP05 contained gley soils. As depth increased, the soil became more compact and contained more cobbles. The lower clay layers had poor drainage, and mottling was observed in several pits, indicating variable moisture levels.
- Cobbles were found at depths of 1.6 to 1.7 m, with TP06 also containing small boulders at 2.4 m.

These findings are consistent with existing soil data, showing that the area consists mainly of mineral-rich, poorly drained, and acidic soils formed from non-calcareous materials. The bedrock beneath the site (sandstone, mudstone, and thin limestone) is also poorly draining,

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with low-permeability subsoil and overlying wet topsoil.

Water was found at 1.0 m in TP04. Due to the compacted subsoils and recent rainfall, this may indicate perched groundwater, a common feature of the local aquifer.

A percolation test was carried out in TP05, confirming that the site meets the standard requirements for safe groundwater protection.

Site Vulnerability

From desktop and field investigations it can be determined that the Proposed Development is located on a regionally important aquifer and has been assigned a vulnerability rating of moderate. The groundwater protection response matrix assigns the site a vulnerability rating of "R1," indicating that the development location is acceptable in terms of groundwater protection.

The results obtained from the site investigation indicate a uniform hydrogeological profile across the site. It is not anticipated that the proposed facility's operation will have any adverse effects on the underlying aquifer or nearby wells. Further trial pits are recommended to determine soil depth around TP-04 location before work commences on site.

No land spreading will occur on site. The farms of the customer farmers have been identified. All farmers will use the biobased fertiliser on lands that have an agronomic requirement for fertiliser.

8.2 Assessment of Impacts

Receptor Sensitivity

The sensitivity of the receptors identified during the study of hydrological and hydrogeological features within the vicinity of the site are summarised in **Table NTS 3-1**.

Table NTS 3-1: Receptor Sensitivity

Receptor	Receptor Importance	Receptor Sensitivity	Rationale
Groundwater Ballingarry Groundwater Body	Regional Level	High	The site is underlain by the Ballingarry Groundwater Body, which is a Regionally Important Aquifer – Fissured Rock. This classification reflects regional hydrogeological importance. Groundwater vulnerability is rated as "Moderate" across the site, as per the GSI map viewer. Trial pits excavated to 2.4 m below ground level (bgl) did not encounter bedrock, confirming a minimum of 2 m of soil/subsoil cover. Seasonal variations in the groundwater table are expected due to the presence of gley soils. Groundwater infiltration was observed at 1.0 mbgl in TP-04, while TP-05 exhibited soil mottling, indicating a fluctuating water table. Based on the response matrix (Error! Reference source not found.), the site is classified as "R1 Acceptable, subject to normal good practice", meaning the proposed development is considered suitable in terms of groundwater protection.

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Receptor	Receptor Importance	Receptor Sensitivity	Rationale
Surface Water Lower Ballyteige Stream and downstream receptors, River Glenma & River Maigue.	Local Level	High	The Lower Ballyteige Stream, along with downstream receptors—the River Glenma and River Maigue (designated as MAIGUE_050 by the EPA)—currently hold a "Good" status under the Water Framework Directive (WFD) 2016–2021 assessment and are not classified as at risk. However, the most recent Q-value (Q3-4) indicates a Moderate status under the WFD, categorizing the water as Slightly Polluted, suggesting existing pressures on the local hydrological system. Although a hydrological pathway exists to the Lower River Shannon SAC and the River Shannon and River Fergus Estuary SPA, both protected under EU legislation, significant effects from the Proposed Development are not anticipated. The considerable downstream distance (approximately 20 km and 30 km, respectively) is expected to allow for dispersion and dilution of any potential pollutants, minimising the impact on these protected areas.

Construction Phase

The construction phase is likely to yield the most potential impacts on the surrounding hydrology and hydrogeology. Potential construction phase impacts are considered in detail in **Section 8.5.3** of ***EIAR – Main Report*** and summarised in **Table NTS 3-2** below.

Table NTS 3-2: Construction Phase Effects (Unmitigated)

Receptor	Potential Environmental Effects	Quality	Significance	Duration
Groundwater Ballingarry Groundwater Body	Increased Run-off and Sediment Loading	**Negative**	**Moderate**	**Temporary**
	Accidental Spillages of Harmful Substances	**Negative**	**Moderate**	**Short-Term**
	Increased Groundwater Vulnerability	**Negative**	**Significant**	**Long-Term**
	Excavation of Bedrock Aquifer	**Negative**	**Significant**	**Long-Term**
Surface Water Lower Ballyteige Stream and downstream receptors, River Glenma & River Maigue	Excavation of Contaminated Soils	**Unlikely**	**Negligible**	**Unlikely**
	Increased Run-off and Sediment Loading	**Negative**	**Moderate**	**Temporary**
	Accidental Spillages of Harmful Substances	**Negative**	**Moderate to Significant**	**Temporary**
	Excavation of Contaminated Soils	**Unlikely**	**Negligible**	**Unlikely**
	Conversion of Permeable Soils to Hard standing	**Negative**	**Moderate**	**Long-Term**

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Operational Phase

The operational phase effects anticipated and considered throughout the lifetime of the operation of the facility are considered in detail in **Section 8.5.4** of ***EIAR – Main Report*** and summarised in **Table NTS 3-3** below.

Table NTS 3-3: Operational Phase Effects (Unmitigated)

Receptor	Potential Environmental Effects	Quality	Significance	Duration
Groundwater Ballingarry Groundwater Body	Contaminated Run-off	**Negative**	**Moderate**	**Short-Term**
	Foul Water	**Negative**	**Moderate to Significant**	**Short-Term**
	Increased Groundwater Vulnerability	**Negative**	**Significant**	**Temporary**
	Uncontrolled Releases & Spillage of Digestate and Feedstocks	**Negative**	**Slight to Moderate**	**Temporary**
	Fire and Resultant Firewater	**Negative**	**Significant**	**Short-Term**
	Landspreading of Biobased Fertiliser	**Negative**	**Slight**	**Short-Term**
	Attenuation Tanks	**Negative**	**Moderate**	**Temporary**
Surface Water Lower Ballyteige Stream and downstream receptors, River Glenma & River Maigue	Contaminated Run-off	**Negative**	**Moderate to Significant**	**Temporary**
	Foul Water	**Negative**	**Moderate to Significant**	**Short-Term**
	On-Site Flooding	**Negligible**	**Not significant**	**Unlikely**
	Conversion of Permeable Soils to Hard standing	**Negative**	**Moderate**	**Long-Term**
	Uncontrolled Releases & Spillage of Digestate and Feedstocks	**Negative**	**Slight to Moderate**	**Temporary**
	Fire and Resultant Firewater	**Negative**	**Slight to Moderate**	**Temporary**
	Landspreading of Biobased Fertiliser	**Negative**	**Slight**	**Temporary**
	Attenuation Tanks	**Neutral**	**Moderate**	**Long-Term**

8.3 Mitigation Measures

8.3.1 Construction Phase

A summary of all mitigation measures for the construction phase to ensure maximum protection of groundwater and surface water receptors is listed below:

General Mitigation Measures

A Construction Environmental Management Plan (CEMP) will be prepared and implemented by the main contractor during the construction phase. This is a practical document which will include detailed procedures to address the main potential effects on surface water and groundwater.

Increased Run-off and Sediment Loading

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- 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.
- Stockpile areas for sands and gravel should be kept to minimum size, well away from storm water drains, gullies leading off-site, and the adjacent stream.
- Covers are to be provided over soil debris stockpiles when high wind and inclement weather are encountered if required.
- Harmful materials and stockpiles should be stored well away from the adjacent watercourse and the drainage ditches on-site, as these ditches provide a direct pathway to the Lower Ballyteige Stream.
- Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and the aquifer.
- Landscaping should be carried out as soon as possible to minimise weathering.

Accidental Spillages of Harmful Substances

- Establishment of bunded oil and chemical storage areas.
- Refuelling of mobile plant in designated areas provided with spill protection.
- Fuel bowsers to be located 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 adjacent stream.
- Only appropriately trained site operatives permitted to refuel plant and machinery on-site.
- Regular inspections carried out on plant and machinery for leaks and general condition.
- Emergency response plan.
- Spill kits readily available throughout the site.
- Use of ready-mixed supply of wet cement products.
- Scheduling cement pours for dry days.

Increased Groundwater Vulnerability / Excavation of Bedrock Aquifer

- Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and the aquifer.
- Landscaping should be carried out as soon as possible to minimise weathering.
- Additional trial pits are recommended prior to construction in the area around TP-04 in order to verify the presence of groundwater. If possible, trial pits should aim to be excavated after periods of heavy rain.
- Installation of impermeable liner is recommended under the attenuation Tanks.

Excavation of Contaminated Soils

- All excavated materials will be visually assessed for contamination.
- Any contaminated material detected will be sent for analysis to a suitable environmental laboratory and subsequently quantified, segregated and transported for disposal by a licenced contractor.

Conversion of Permeable Soils to Hard standing

- Regrade the existing western boundary ditch to flow to the north and to turn to the east at the northeast corner of the proposed development footprint. The proposed ditch will fall from the southwest corner of the development boundary to the stream on the western boundary at a gradient of approximately 1:500.

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- The rate of discharge to the stream will be restricted to a maximum permissible rate of 13.3l/s for the Upper level (service yard) and 6.50 l/s for the Lower level (sump). This rate is calculated in accordance with criteria defined in the Greater Dublin Strategic Drainage Study ['GDSDS'] to ensure the proposed development will not affect the flow / flood regimes in the receiving environment
- Pipes are designed for small catchment areas as defined in GDSDS, based on the modified rational method and a rainfall intensity of 50mm/ hour onto impermeable surfaces.
- All surface water pipes have been designed to achieve a minimum self-cleansing velocity of 0.75m/s
- Surface water pipework will be laid to a gradient no flatter than 1:500
- Backdrop heights will be greater than 0.6m where practicable
- The GDSD requirements with respect to interception volume, long-term storage volume and treatment volume have been considered.
- Minimum surface water pipe size of 225mm
- Minimum depth of cover to pipework of 1.2m below trafficked area, or where this cannot be achieved, adequate protection will be provided.
- Maximum depth of pipework of 5m
- Roughness value for surface water pipework, ks, 0.6mm
- Attenuation tanks will accommodate the total catchment area capacity and will provide a minimum storage capacity of 468 m^3(Lower Level – Sump) and 964 m^3(Upper Level – service yard).

8.3.2 Operational Phase

A summary of all mitigation measures for the operational phase to ensure maximum protection of groundwater and surface water receptors is listed below:

General Mitigation Measures

An Environmental Management System (EMS) will be prepared and implemented by the operator 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 facility's lifespan. Typical conditions relating to the protection of water receptors include:

- Site specific trigger levels will be established and agreed with the EPA.
- 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

Contaminated Run-off

- Drainage systems will be designed to attenuate excess surface water runoff with suitable

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storage volumes

- All surface water run-off will discharge to the attenuation tanks. The tank will be shaped to allow for the retention of silts.
- Regular inspection and maintenance of all treatment measures to remove accumulated silts and disposed of to an appropriately licenced landfill
- The digestion process area will be completely bunded and constructed to Eurocode standard (BS EN 1992-3)
- Pipes are designed for small catchment areas as defined in GDSDS, based on the modified rational method and a rainfall intensity of 50mm/ hour onto impermeable surfaces.
- All surface water pipes have been designed to achieve a minimum self-cleansing velocity of 0.75m/s
- Surface water pipework will be laid to a gradient no flatter than 1:500
- Backdrop heights will be greater than 0.6m where practicable
- The GDSD requirements with respect to interception volume, long-term storage volume and treatment volume have been considered.
- Minimum surface water pipe size of 225mm
- Minimum depth of cover to pipework of 1.2m below trafficked area, or where this cannot be achieved, adequate protection will be provided.
- Maximum depth of pipework of 5m
- Roughness value for surface water pipework, k_s, 0.6mm
- The Proposed Development will have two rainwater harvesting tanks to collect runoff from buildings, the service yard, and parking areas. The harvested water will be reused for wheel washing, washdown activities, fire suppression, and treated for potable and greywater use in office facilities.
- Any excess runoff from impermeable surfaces will be directed to two attenuation tanks before being released at a controlled rate using a Hydrobrake or similar device.
- Runoff from the bunded area will be managed separately, with an automated penstock in place to isolate and prevent the release of contaminated water in the event of a digester or digestate tank failure.

Foul Water

- A domestic scale wastewater treatment plant is proposed to cater for the foul water arising from staff facilities on-site only.
- The wastewater treatment plant will comprise a tertiary treatment system, followed by a 6PE EuroTank TER3 Percolation Unit.
- The system is proposed with discharge to a Ter3 packaged tertiary unit with a minimum 100m2 attenuation layer. Distribution layer to be placed on 144m2 of imported soil 300m depth with suitable percolation values.
- Imported soil to be tested for suitable percolation values as per EPA COP 2021.
- The treatment plant will be specified and installed by an appropriately qualified technician and in accordance with EPA COP 2021. It also will be subject to regular desludging and maintenance, as per manufacturers recommendations. Pressure tests and CCTV surveys will be carried out prior to commissioning to ensure absence of defects.
- Programme of inspection and maintenance to ensure any defects are repaired.

Increased Groundwater Vulnerability

- The site bunding is designed in accordance with IPC Guidance Note on storage and Transfer of Materials for Scheduled Activities (EPA, 2004)

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- The tank farm area will be bunded in its entirety to ensure enough containment is provided in the unlikely event of a leak.
- The bund will be impermeable and provide the required storage volume i.e., a minimum of 110% of the largest single tank volume.
- 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.
- All bunds and pipelines (foul & process) will be subject to integrity assessments every 3 years by a suitably qualified engineer.

On-Site Flooding

- The proposed Finished Floor Levels are above the estimated 1 in 1000-year return period fluvial flood event placing the units within Flood Zone C
- The proposed stormwater management system is designed in accordance with industry standards and is projected to emulate the current greenfield runoff rates calculated at the site.

Uncontrolled Releases & Spillage

- 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.
- Impermeable membrane liner will be installed under the attenuation Tanks to limit percolation of contents into the underlying regionally important aquifer.
- The entire tank farm area of the Proposed Development will be bunded.
- The Reception Hall, Digestate Treatment building a will each be self-bunded.
- 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.

Fire and Resultant Water

- A Firewater Risk Assessment will be commissioned within the first six months of operation and will determine the volume of firewater retention storage require on site.
- Adequate firewater retention capacity is installed and maintained on-site in the event of a worst-case scenario fire event.
- Firewater retention will be the containment bund and underground tank in the reception building.
- All retention infrastructure systems will be automatically activated in the event of a fire alarm being triggered.
- All retention tanks, etc., shall be maintained empty, or at least to a point where the required retention capacity is available.

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- Bunds and tanks will be constructed to Eurocode standard (BS EN 1992-3:2006).

Uncontrolled Release of Discharge

Since no process water will be discharged off-site, the implementation of specific mitigation measures is not required.

Conversion of Permeable Soils to Hard standing

- Regrade the existing western boundary ditch to flow to the north and to turn to the east at the northeast corner of the proposed development footprint. The proposed ditch will fall from the southwest corner of the development boundary to the stream on the western boundary at a gradient of approximately 1:500.
- The rate of discharge to the stream will be restricted to a maximum permissible rate of 13.3l/s for the Upper level (service yard) and 6.50 l/s for the Lower level (sump). This rate is calculated in accordance with criteria defined in the Greater Dublin Strategic Drainage Study ['GDSDS'] to ensure the proposed development will not affect the flow / flood regimes in the receiving environment
- Pipes are designed for small catchment areas as defined in GDSDS, based on the modified rational method and a rainfall intensity of 50mm/ hour onto impermeable surfaces.
- All surface water pipes have been designed to achieve a minimum self-cleansing velocity of 0.75m/s
- Surface water pipework will be laid to a gradient no flatter than 1:500
- Backdrop heights will be greater than 0.6m where practicable
- The GDSD requirements with respect to interception volume, long-term storage volume and treatment volume have been considered.
- Minimum surface water pipe size of 225mm
- Minimum depth of cover to pipework of 1.2m below trafficked area, or where this cannot be achieved, adequate protection will be provided.
- Maximum depth of pipework of 5m
- Roughness value for surface water pipework, ks, 0.6mm
- Attenuation tanks will accommodate the total catchment area capacity and will provide a minimum storage capacity of 468 m^3(Lower Level – Sump) and 964 m^3(Upper Level – service yard).
- The Proposed Development will have two rainwater harvesting tanks to collect runoff from buildings, the service yard, and parking areas. The harvested water will be reused for wheel washing, washdown activities, fire suppression, and treated for potable and greywater use in office facilities.
- Any excess runoff from impermeable surfaces will be directed to two attenuation tanks before being released at a controlled rate using a Hydrobrake or similar device.
- Runoff from the bunded area will be managed separately, with an automated penstock in place to isolate and prevent the release of contaminated water in the event of a digester or digestate tank failure.

Land Spreading of biobased fertiliser

- Nutrient management plans to avoid excess fertiliser application
- Farmers to comply with the Nitrates Action Plan
- "Lay-off" period of 21 days for grazing or harvesting following application
- Biobased fertiliser will be pasteurised in accordance with Regulation (EU) 142/2011 on use

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of animal by products as organic fertiliser.

Attenuation Tank

- The attenuation tank is designed for a 1:100 year event and well as to regulate the outflow from the site.
- Installation of Sustainable Urban Drainage Systems (SuDS) features such as Sumps in gullies and catchpits collect silts in run-off from roads, filter drains, discharge bypass separator and an attenuation Tank.

8.4 Residual Impacts

Construction Phase

A summary of the predicted effects associated with the construction phase in terms of quality, significance, and duration, along with the proposed mitigation measures and resulting residual effects are summarised in **Table 8.18** of the ***EIAR – Main Report***.

The overall impact anticipated by the construction phase of the project following the implementation of suitable mitigation measures is considered to be ***neutral*** to ***negative***, ***imperceptible*** to ***sligh***t, and ***temporary.***

Operational Phase

A summary of the predicted effects associated with the operational phase in terms of quality, significance, and duration, along with the proposed mitigation measures and resulting residual effects are summarised in **Table 8.19** of the ***EIAR – Main Report***Error! Reference source not found.**.**

The overall impact anticipated by the operational phase of the project following the implementation of suitable mitigation measures is considered to be ***neutral*** to ***negative***, ***imperceptible*** *to* ***slight***, and ***short-term*** to ***long-term***.

There are no controlled or uncontrolled emissions anticipated as a result of the Proposed Development.

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9 Air, Odour and Climate

ORS conducted an assessment of the likely impact of the proposed development on the air quality, odour and climate within the proposed development site and the wider region.

The proposed development site is situated in Cappanihane, Clonee, Co. Limerick.

The objectives of this chapter (Chapter 9 – Air, Odour and Climate) are:

- To provide a baseline assessment of the receiving air environment in terms of air quality receptors.
- To identify any potential negative effects posed by the construction and operational phases of the Proposed Development.
- To propose suitable mitigation measures to prevent or reduce the significance of the negative effects identified.
- To consider any significant residual effects of cumulative effects posed by the Proposed Development.

9.1 Receiving Environment

Site Location and Receptor Identification

A qualitative assessment of construction dust has been undertaken in line with the IAQM 2024 guidance. The study area for this assessment was 250m from the Proposed Development boundary and or within 50m of the roads used by construction vehicles on the public road up to 250m from the site entrance.

The first stage is to assess the requirement for an evaluation. The requirement for an assessment is based on distances of human and/or ecological receptors of the site.

Human receptors are within 250m of the site boundary with one of those also being within 50m of the trackout route; consequently, construction dust does have the potential to cause an effect on these receptors. No designated ecological receptors are within 50m of the trackout route or site boundary; therefore, construction dust will not have the potential to effect adversely on ecological receptors.

There are 6 sensitive receptors within 250 meters of the site boundary and 1 sensitive receptor within 50 metres of the applicable construction routes.

The nearest human and residential receptor to the site is a residential house located approximately 120m South of the proposed site boundary. Dust will be created during the construction of the Proposed Development which may have adverse effects on local sensitive receptors e.g., residents living nearby.

The construction dust assessment study area including identified receptors is included as part of **Figure 9.1.**

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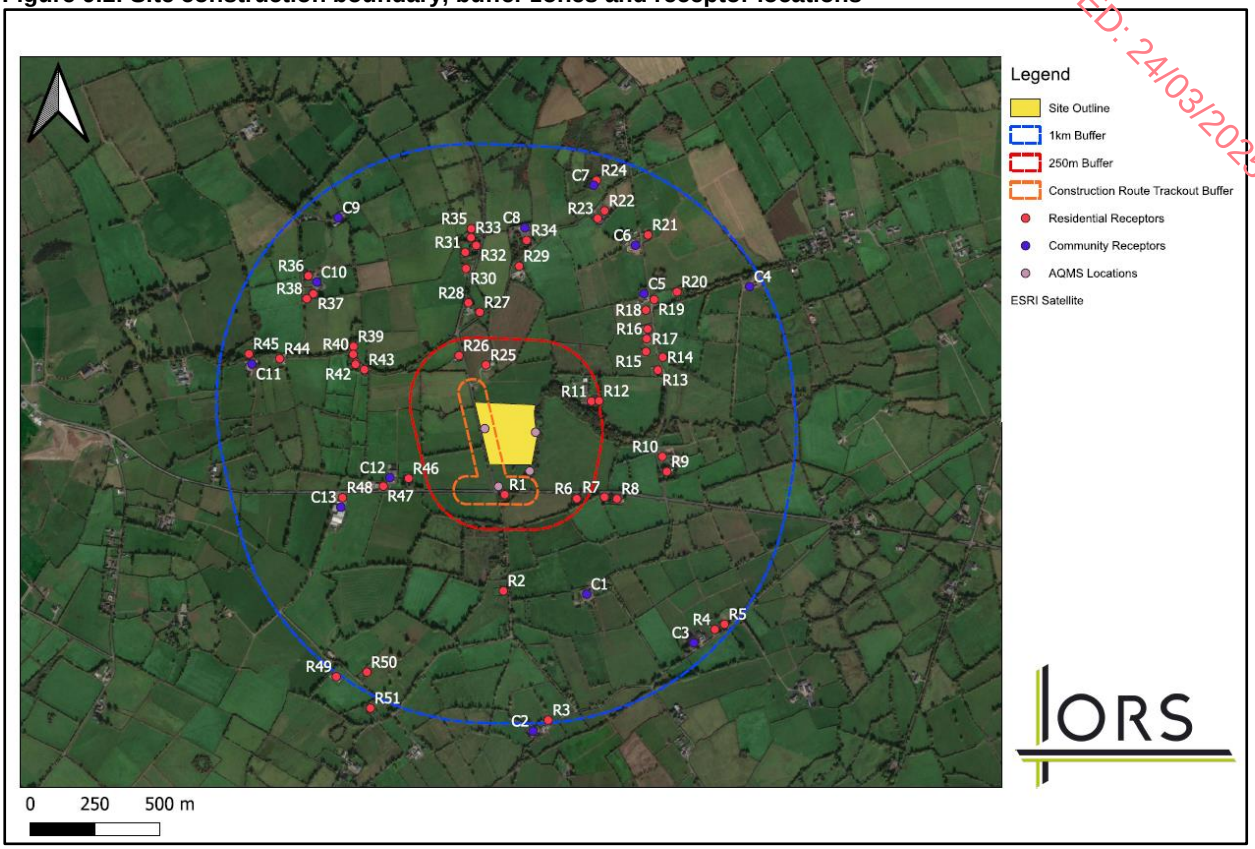
Figure 9.1: Site construction boundary, buffer zones and receptor locations



Air Quality

Air quality monitoring programs are routinely undertaken by the EPA and Local Authorities. The most recent annual report on air quality "Air Quality in Ireland Report 2023" (EPA 2024), details the range and scope of monitoring undertaken throughout Ireland. As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes.

Onsite monitoring (and subsequent lab analysis as necessary) was carried out for the below parameters to evaluate background levels for the site. To remain as conservative and robust as possible figures obtained from EPA monitoring were utilised, as per AG4, which are greater than results obtained from the onsite monitoring. Onsite results for NH_3 and H_2S were utilised in the absence of data generated from EPA monitoring locations. Data from the Shannon Town monitoring station was utilised for the Carbon Monoxide values and data from the Askeaton monitoring station was utilised for the $PM_{10/2.5}$ values. Fieldwork was completed September/October 2024 and consisted of the following elements;

- $PM_{2.5}$ and PM_{10} Monitoring (EPA Monitoring Station)
- NO, NO2 and NOx Monitoring
- SO2 Monitoring
- H2S Monitoring
- NH3 Monitoring
- CO Monitoring (EPA Monitoring Station)

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Results can be seen in **Table NTS 9.1** below:

Table NTS 9.1: Baseline Air Quality Monitoring Data in the Vicinity of Proposed Plant

Compound	Site specific baseline monitoring 12th Sep 23 to 09th Oct 24
Carbon Monoxide 8-hr (Annual Mean) (1 Location)	0.8 (mg/m³)
Oxides of Nitrogen (Annual Mean) (4 locations)	Avg. 3.67 (Min 2.97 - Max 4.65) (µg/m³)
Sulphur Dioxide (Annual Mean) (4 locations)	Avg. < 0.11 (Min/Max < 0.11 (LOD)) (µg/m³)
Particulate matter as PM_{10} (Annual Mean) (1 Location)	Avg. 8.40 (Min 0.65 - Max 38.41) (µg/m³)
Particulate matter as $PM_{2.5}$ (Annual Mean) (1 Location)	Avg. 5.02 (Min 0.23 - Max 23.90) (µg/m³)
Ammonia (Annual Mean) (4 locations)	Avg 13.69 (Min 12.24 - Max 20.09) (µg/m³)
Hydrogen Sulphide (Annual Mean) (4 locations)	Avg <0.11 (Min <0.11 (LOD) - Max <0.11 (LOD)) (µg/m³)

* Average, minimum and maximum values from 4 individual monitoring locations are shown. Monitoring was performed for the month of January 2024. All analysis was performed in a UKAS certified laboratory for such analytes.

In summary, existing baseline levels of the pollutants based on extensive long-term data from the EPA and field monitoring locations are below ambient air quality limit values in the vicinity of the proposed development. This indicates there is a relatively good level of air quality in the area of the proposed development.

9.2 Effects of the Proposed Development

Operational Effects

Process Emissions

AERMOD has been utilised to evaluate the air quality impact from the planned odour abatement emission source and also the from the two combustion sources positioned onsite i.e. the CHP and biomethane boiler.

There is also the possibility of emissions to air being generated from the planned gas upgrading plant, planned pressure relief valves, digestor vents at the site however, due to the nature and / or the infrequent use of these emission sources air dispersion modelling was not required to evaluate the possible impact from these sources. Digestor vents contain air only and are used to control the pressure within the gas dome. There is no release of biogas through the digestor air vents. Pressure relief valves are not intended for routine use onsite. The PRV are only used in the event of all other gas outlets being simultaneously out of service. The usage of the emergency flares is envisaged to be infrequent and would operate for approximately 6% operating time/annum. The existence of a gas flare is for times when the gas injection unit is not in operation, when the storage of gas has reached maximum capacity and that the CNG compression unit requires maintenance. Both Compressor and GIU would need to be down at the same time. The flare will have a capacity of 110% of the estimated maximum hourly biogas produced and will safeguard the secure and complete combustion of biogas where necessary. Flaring of gas is an infrequent occurrence and will only take place as a final option during a period of irregular operation i.e., during maintenance or breakdown.

AERMOD results give rise to the following conclusions:

Table NTS 9.2 below compares the highest annual average predicted levels at the residential receptors where:

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- The Process contribution (PC)- the maximum modelled concentration of the substance due to process emissions alone
- Predicted Environmental Concentration (PEC) – that is, the maximum modelled concentration due to process emissions combined with estimated baseline concentrations.

In relation to the predicted short-term peak 1-hr concentrations, twice the background concentration level was added to the predicted environmental concentration (PEC) (UK Environment Agency).

Table NTS 9.2: Air Quality Summary

Pollutant	Limit Type	Value (µg/m^3)	Baseline (µg/m^3)	Max Level (µg/m^3)	PEC (µg/m^3)	PC of limit (%)	PEC of Limit (%)
Nitrogen Dioxide (NO_2)	99.8% max 1-hr	200	14.6	22.0	36.6	**11.0**	18.3
	Annual Avg	40	7.3	2.10	9.4	**5.2**	23.5
Carbon Monoxide (CO)	8-hr mean	10,000	0.3	224.6	224.9	**2.2**	2.2
Odour	98th %tile of 1-Hour	3	0	1.60	1.60	**53.5**	53.5

**The maximum annual average levels for Nitrogen Dioxide and Carbon Monoxide are predicted when the volume flow from the proposed facility is at 75%, rather than a maximum. Full details of the assessment undertaken at 75% volume flow are included in Appendix 9.5.*

It can be seen that the worst case predicted level at any residential locations in the vicinity of the development do not exceed the limit level when considered as a PC or PEC.

It should also be noted that the PC under maximum operations does not exceed 75% of the ambient air quality standards, based on the maximum emission limits of the stacks.

Nitrogen Deposition

A review has been completed with regard to emissions from the proposed development on critical levels and loads for designated sites within 15 km of site. The PC at all locations is less than 0.3kg.N/ha/yr, and as a result would be considered negligible for the purposes of the Nitrogen assessment.

In addition, it can be seen that the maximum predicted Nitrogen deposition is significantly <1% at all of the locations assessed, and the Critical Level of Nitrogen is not exceeded at any location.

Traffic

LA105 DMRB guidance gives details for assessing significance of air quality effects of a development in relation to nitrogen dioxide (NO_2) and particulate matter (PM_{10}). The table below describes the corresponding terms used to describe the level of significance from the DMRB in conjunction with EPA EIAR guidance.

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Table NTS 9.3 Traffic air quality effects (Operational Stage)

Magnitude of change in annual mean NO_2 or PM_{10} ($\mu g/m^3$)	Magnitude (DMRB)	Significance (EPA)
>4 (>10%)	Large	Significant, Very Significant, Profound
>2 (>5%)	Medium	Moderate
>0.4 (>1%)	Small	Slight
<0.4 (<1%)	Negligible	Not significant, Imperceptible

Traffic input data is included in **Appendix 9.3**. The DMRB Screening Method spreadsheet was used to forecast pollution concentrations at a receptor position. A robust and conservative approach was utilized when assuming background concentrations (i.e. 12.4 µg/m3 for NO2 and 11.2 µg/m3 for PM10 – average values taken from EPA Monitoring locations). **Table NTS 9.4** (shown below) shows the results of "Do Minimum" (DM) and "Do Something" scenarios for 2025 assuming (as a worst-case scenario), receptors are 5m away from road links.

Table NTS 9.4 Projected NO_2 and PM_{10} traffic concentrations

Receptor	NO_2				PM_{10}			
	DM (µg/m3)	DS (µg/m3)	Change (µg/m3)	Magnitude	DM (µg/m3)	DS (µg/m3)	Change (µg/m3)	Magnitude
R1	26.0	27.3	1.3	Negligible	38.40	38.70	0.30	Negligible

Climate

Due to the production of *ca.* 510 - 580 Nm^3 of biomethane per hour which will be exported and used as an alternative fuel to fossil fuels for regional energy and heat production, the net effect of the Proposed Development during the operational phase will be a slight, positive, long-term impact on climate and regional air quality. The (Gas Network Ireland) GNI predict that by achieving a net zero carbon gas network by 2050, at least 18.7 Mt per annum of CO_2 emissions would be saved which equates to circa 31% of Ireland's current emissions.

Construction Effects

Dust

Construction dust usually deposits within 200m of a construction area; however the bulk of this deposition will occur within the first 50m. There are no sensitive receptors (residential receptors) within 50m of the site. There are receptors within the construction traffic route however bulk deposition will have likely occurred within the first 50m. Therefore, the surrounding area can be classified as low risk with respect to construction dust effect in this regard. Emission effects from planned construction are finite and short-term, mitigation measures (outlined in **Section 9.6**) will also be in place through this stage, leading to air quality effects that will temporary, negligible and short-range.

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Traffic / Emissions

Construction traffic and embodied energy of construction materials are likely to be a possible cause of greenhouse gas emissions because of construction related to the Proposed Development. Construction plant and machinery will lead to CO_2 and NO_2 emissions during construction of the planned development. Due to the period, nature and scale of construction, CO_2 and NO_2 emissions from construction plant, machinery and embodied energy of construction resources will have a short-term and imperceptible impact on climate.

9.3 Mitigation Measures

Construction

Dust

The constant control of fugitive dust will maintain the prevention of significant emissions, instead of an inefficient attempt to manage them once they have been released. The main elements with respect to control of dust will be:

- The design of a site policy on dust and the allocation of the site management responsibilities for dust issues.
- The creation of a documented system for managing site practices regarding dust control.
- The development of a method by which the functionality of the dust minimisation plan can be consistently monitored and assessed; and
- The requirement of effective procedures to handle any complaints.

These procedures will be strictly monitored and assessed continuously throughout the construction stage. In the occurrence of dust nuisance outside the site boundary, activities likely to raise dust would be restricted and adequate procedures applied to resolve the problem before the recommencement of construction operations.

Traffic

Traffic emissions associated with site have been projected as not significant therefore no detailed mitigation/remediation related to air and climate emissions from traffic have been described.

Climate

Various site-specific mitigation methods can be applied throughout the construction stage of the Proposed Development to support emissions reduction. The restriction of on-site or delivery vehicles from leaving engines idling, even over brief periods. Reducing waste of materials due to inadequate timing or over stocking of materials on site will assist to minimise the carbon footprint of the site.

Operational

Odour

The following odour abatement measures have been integrated into the design of the plant:

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- The reception hall has been constructed to accommodate multiple trucks to unload at any one time. This will significantly reduce the number of trucks waiting outside of the building and therefore minimising fugitive odour emissions on-site.
- The proposed reception hall will be sealed to prevent fugitive emissions from this building.
- All waste activities at the facility will be carried out within a ventilated building which will be extracted to an odour abatement system using ammonia scrubbing, UV treatment and active carbon filtration to remove odorous compounds. The building will operate under negative pressure with a minimum of 2 air changes per hour. Ventilation pipe work installed in the headspace of the building will be connected to a high-volume medium-pressure blower that will draw off the warm, buoyant building air that will be generated by a combination of emissions from the feedstock materials in the intake area and from fugitive emissions from the movement of the material to the pre-treatment and digesters.
- The main entrances to the reception building will be fitted with rapid response roller shutter doors. A closed-door management strategy will be enforced.
- Treated emissions from the odour control plant in the reception building will be discharged via a 11.0m stack to enhance dispersion. The proposed location of the odour abatement system emission point within the site footprint was also designed to ensure that the distance between the emission point and the nearest sensitive receptors was maximised, thereby aiding dispersion.

The following additional mitigation measures will be adopted for the management of the Proposed Development:

- Vehicles exiting the reception building will be subjected to cleaning procedures in accordance with the DAFM Conditions Document in a designated cleaning area located outside of this door.
- Where there is a potential for odours from deliveries of feedstock, these will be delivered in covered or sealed containers.
- Feedstock delivery times will be controlled in order to minimise truck weighting times outside of the reception building and therefore minimising fugitive odour emissions on-site.
- Biobased fertiliser will be stabilised before storage and removal from the site in order to minimise odour generation.
- An odour management plan will be prepared for the operational phase of the site to ensure that all odour control methods applied are sufficient and assessed at regular intervals. The plan will also outline a procedure for addressing any odour complaints.

As described previously, the proposed development will be licenced by the EPA under the Industrial Emissions Directive and will therefore need to comply to all associated processes as directed by the IE licence to avoid significant impacts to local odour, climate and air quality.

Process Emissions

The proposed stack height for the CHPs has been designed in an adaptive manner to guarantee that an acceptable height has been incorporated into site layout to support effective dispersion of emissions and comply with applicable EU ambient air quality standards at all offsite locations.

As a result of the air dispersion modelling evaluation, mitigation measures designed into site and planned supervision of the proposed AD facility, no supplementary abatement measures are planned for the CHPs, flare and biomethane boiler stack during the operational stage of the development.

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9.4 Cumulative Effects

Construction Phase

There is potential for cumulative dust effects at adjacent site receptors should the construction stage of the planned development overlap with the construction of any other authorised development within 250m of the site. Dust alleviation measures described in **Section 9.6.1** shall be employed during the construction stage of the planned development preventing significant cumulative effects on air quality. Due to suitable mitigation measures in position, any cumulative impacts on air quality and climate linked with the construction stage of the planned development are considered ***short-term and not significant.***

Operational Phase

There is a pig farm in the immediate vicinity of the site, however cumulative impacts are unlikely, in terms of odour or air quality. Feedstock from the piggery will be transported directly to the proposed development. Any existing sources of emissions to air have been included by way of background air quality data during the air dispersion modelling phase.

Indirect Impacts

Ammonia emissions to air occurs from slurry and chicken manure spreading with the use of nitrogen fertilisers. Ammonia can create particulate matter in the atmosphere which can have adverse effects on human health.

Ammonia is one of the key air pollutants monitored and reported under National Emissions Ceiling Directive (2016/2284/EU) which was ratified to give effect to the landmark UNECE Gothenburg Protocol under the Convention on Long Range Transboundary Air Pollution in 1999. Under this directive Ireland's ceiling for ammonia is 116 Kt per annum, with an obligation to decrease ammonia emissions to 107.5 Kt by 2030 or by *ca.* 10%. In 2017 Ireland infringed its ammonia ceiling emitting 11 8.4 KT of ammonia.

Using manure and slurries as a feedstock for the AD process instead of land spreading will reduce ammonia emissions to air. Also, the use of digestate as a biobased fertiliser instead of inorganic nitrogen fertiliser will further reduce ammonia emissions.

The digestate produced will meet prescribed standards for digestive quality respiration activity, metals, pathogenic organisms, impurities, organic matter and maturity. Digestate storage tanks will be covered to prevent rainwater ingress and as they will contain spent digestate there will be a lower odour potential from the digested storage tanks. The digestate will be spent by the time it is sent to the digestate storage tanks because of the digestion process; by which time all biomethane will have been extracted. The digestate will also have undergone pasteurisation during the process. Therefore, the potential for odour will have reduced at this stage.

Therefore, the Proposed Development will have a ***long-term slight positive*** indirect effect on air quality.

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9.5 Residual Impacts

According to Environmental Protection Agency guidelines, Residual Impact 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 which can be taken to reduce or offset the scale, significance and duration of the impacts on the surrounding odour, air quality or climate.

The purpose of this assessment is to specify mitigation measures where appropriate to minimise the 'risk factor' to all aspects of air quality such as to minimize the potential for odours to be generated, air quality limits to be exceeded etc. This 'risk factor' is reduced or offset by recommending the implementation of a mitigation strategy in each area of the study. On the implementation of this mitigation strategy, the potential for impact will be lessened.

A site-specific Construction Environmental Management Plan (CEMP) will be devised and implemented throughout the duration of the construction phase. This document will contain all the necessary procedures required to prevent and minimise any environmental risks posed by the project on the surrounding environment.

Construction Phase

A summary of the predicted impacts associated with the construction phase in terms of quality, significance, and duration, along with the proposed mitigation measures and resulting residual impacts are summarised in **Table 9.29** (**Chapter 9 – EIAR Main Report**)

The overall impact anticipated by the construction phase of the project following the implementation of suitable mitigation measures is considered to be ***negative, imperceptible to moderate, and temporary.***

Operational Phase

A summary of the predicted impacts associated with the operational phase in terms of quality, significance, and duration, along with the proposed mitigation measures and resulting residual impacts are summarised in **Table 9.30** (**Chapter 9 – EIAR Main Report**).

The overall impact anticipated by the operational phase of the project following the implementation of suitable mitigation measures is considered to be ***neutral to negative, imperceptible to slight, and temporary to long term.***

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10 Noise and Vibration

Enfonic Ltd. have been commissioned by ORS Consulting Engineers to conduct a noise impact assessment in relation to the proposed Anaerobic Digester Facility at Cappanihane, Bruree, Co. Limerick (the Proposed Development).

The methodology adopted for this noise impact assessment is summarised as follows:

- Review of appropriate guidance to identify appropriate noise and vibration criteria for the construction, operational and decommissioning phases;
- Quantify the receiving environment through baseline noise surveys at representative Noise Sensitive Locations (NSLs) surrounding the Proposed Development;
- Undertake predictive calculations to assess the potential effects associated with the construction phase of the Proposed Development;
- Undertake predictive calculations to assess the potential effects associated with the operational phase of the Proposed Development;
- Evaluate the potential noise and vibration effects;
- Specify mitigation measures to reduce, where necessary, the identified potential outward effects relating to noise and vibration from the Proposed Development; and
- Describe the significance of the residual noise and vibration effects associated with the Proposed Development.

In addition, the following guidelines were considered and consulted for the purposes of this chapter:

  - EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022); and
  - EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (2003).

10.1 Receiving Environment

Noise Sensitive Locations

A Noise Sensitive Location (NSL) is defied in EPA NG4 as

“any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.”

The study area is defined as any NSL that may be affected by noise from the Proposed Development. A representative sample of the closest NSLs is used in this assessment. Noise levels diminish over distance therefore these locations represent a worse-case evaluation.

A representative sample of the closest NSLs to the Proposed Development is used in this assessment. Noise levels diminish over distance therefore these locations represent a worse-case evaluation. The locations assessed are given in **Figure NTS 10.1** below:

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Figure NTS 10.2: Study Area and Noise Sensitive Locations (NSL)

Background Noise Survey

A noise survey has been conducted at the site in order to quantify the baseline noise levels within the study area. The survey was conducted in general accordance with ISO 1996: 2017: Acoustics - Description, Measurement and Assessment of Environmental Noise and followed the methodology contained in EPA NG4. Specific details are set out below.

Noise Monitoring Locations

Unattended noise monitoring was conducted at NML over several days to establish both daytime and night-time noise levels.

Noise measurements were taken using class 1 Bruel & Kjaer Type 2250 Sound Level Meters (SLMs). Each meter was calibrated prior to measurements and the sensitivity checked afterwards for any significant drift; none was found. Weather conditions were generally calm and dry throughout the survey period.

Monitoring was conducted between 22-11-2024 and 29-11-2024. However, data from 23rd November and 24th November was excluded due to adverse weather conditions, including storms and snowfall.

The Noise Monitoring location shown in **Figure NTS 10.2** below:

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Figure NTS 10.2: Map of noise monitoring locations (NMLs) and site boundary

Survey Results

Daytime and nighttime noise levels were determined using data collected from the unattended noise monitor.

- **Daytime Noise Levels:**

The typical daytime background noise level (LA90) was measured at 38dB (rounded).

- **Night-time Noise Levels:**

The typical nighttime background noise level (LA90) was measured at 29dB (rounded).

A time-history plot of the average noise levels is presented in **Appendix C** (**Chapter 10 – EIAR Main Report**)

10.2 Assessment of Impacts

In general, noise impact is a result of the noise levels of the sources, the distance from the source to a receiver, the intervening topography and built environment, the time of day and the existing background noise levels.

The impact assessment considers the construction and operational phases separately.

Do-Nothing Scenario

If the development is not progressed the existing noise environment (as measured in the baseline assessment) in the vicinity of the Proposed Development will remain largely unchanged. Traffic flows on the road network in the area are expected to grow over time with an associated increase in noise level.

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Construction Phase

The appropriate methodology for the impact assessment of the construction phase is set out in *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 Noise*. The standard sets out sound power levels and L_{Aeq} noise levels of plant items normally encountered on construction sites, which in turn enables the prediction of noise levels at selected locations.

An outline CEMP has been submitted in relation to the Proposed Development and will be updated when a definitive construction plan is formalised, to include mitigation outlined in this chapter. As a working initial hypothesis, the impact of assumed typical construction phases of work has been assessed.

Following a review of the baseline noise survey results (Table 10.3 – EIAR main report), the appropriate BS5228 construction noise category is A i.e. 65dB L_{Aeq}.

The impact assessment considered the impact of the following potential noise sources from construction phase works at the development:

- Construction Noise
- Construction Traffic
- Construction Vibration
- Extension of the Gas Network Pipeline

Description of Effects

With respect to the EPA's criteria for description of effects, the potential worst-case effects at the nearest NSLs associated with the above aspects of the construction phase are described **Table NTS 10.1** below:

Table NTS 10.1: Summary of Description of Effects (Construction Phase).

Aspect	Quality	Significance	Duration
Construction Phase	Negative	Not Significant	Temporary
Construction Traffic	Negative	Not Significant	Temporary

Operational Phase

Anaerobic digestion is a continuous process and therefore the digestion and gas upgrade and injection processes will operate continuously.

Feedstock deliveries and the removal of digestate will only occur from 08:00 to 18:30 hrs Monday to Friday and from 09:00 to 13:00 hrs on Saturday.

The most stringent noise impact assessment is for the Night-time period due to the lower measured Background (LA90) noise levels compared with the Daytime period.

Each of the potential operational noise sources were identified and reference sound power data assigned. The data has been sourced from manufacturers datasheets and noise source databases.

Noise sources that are contained within buildings are estimated to have negligible significance due to the attenuation of the building fabric. The Flare Stack and associated Biogas Blower operate only in an emergency or for testing purposes. Their operation is expected to be no more than 2% annually as a worst-case scenario and it is therefore appropriate not to include these sources in the noise impact assessment.

The associated noise sources with the Proposed Development are described in **Table 10.8**

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(EIAR Chapter 10 – main report).

A computer-based noise propagation model has been prepared to predict the noise levels. This section discusses the methodology behind the noise modelling process and presents the results. **Section 10.6.13** (EIAR Chapter 10 – main report) discusses the methodology behind the noise modelling process and presents the results.

The assessment criteria can be summarised as follows:

BS4142 (Daytime)

There are no Significant adverse noise impacts during the daytime period at any of the NSLs. There is a Slight-Moderate impact at NSL01 which is primarily due to the associated traffic.

NSL01 is immediately adjacent to the R518 road and no change in character of the noise environment is expected.

BS4142 (Night-time)

There are no Significant adverse noise impacts during the daytime period at any of the NSLs. There is a Slight-Moderate impact at NSL01 to the south and NSL10, NSL11 and NSL12 to the east.

The increase above the existing night-time background noise level is between 3-4dB which likely to be imperceptible. There is no risk to sleep disturbance at the range of noise levels in question.

EPA IE License

The measured existing background noise levels do not satisfy the Low Background Noise criteria as outlined in Section 10.4.3.1. Standard operational noise emissions levels will therefore apply and the site is expected to operate below the likely EPA license conditions.

Description of Effects

With respect to the EPA's criteria for description of effects, the potential worst-case effects at the nearest NSLs associated with the proposed development are described in **Table NTS 10.2** below:

Table NTS 10.2: Summary of Description of Effects (Operational Phase)

Aspect	Quality	Significance	Duration
Daytime Period	Negative	Imperceptible to Moderate	Long-term
Night-time Period	Negative	Imperceptible to Moderate	Long-term

10.3 Mitigation Measures

Construction Phase

The Construction Environmental Management Plan (CEMP) will deal specifically with management processes and strategic mitigation measures to remove or reduce significant noise and vibration impacts, and cumulative noise and vibration impacts from the construction works. The Plan will also define noise and vibration monitoring and reporting. The CEMP will also include method statements for each phase of the works, the associated specific measures to minimise noise and vibration in so far as is reasonably practicable for the specific works covered by each plan and a detailed appraisal of the resultant construction noise and vibration generated.

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The contract documents shall specify that the Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures when deemed necessary to comply with the recommendations of BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction on open sites – Noise. The following list of measures will be implemented, where necessary, to ensure compliance with the relevant construction noise criteria:

- No plant used on site will be permitted to cause an on-going public nuisance due to noise.
- The best means practicable, including proper maintenance of plant, 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.
- Any plant, such as generators or pumps, which is required to operate before 07:00hrs or after 19:00hrs will be surrounded by an acoustic enclosure or portable screen.
- During the construction programme, supervision of the works will be include ensuring compliance with the limits detailed in Section 6.2.1 using methods outlined in BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.
- The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 07:00hrs and 19:00hrs weekdays and between 08:00hrs and 16:00hrs on Saturdays. However, any necessary or emergency out of hours working will be agreed in advance with the local Planning Authority.

Operational Phase

The impact assessment herein assumes a worst-case with all noise sources associated with the site operating simultaneously and continuously. In reality, the site will not operate in this way and the noise levels and the impact will therefore be less.

Noise emissions associated with deliveries will be subject to operational restrictions including timings to minimise any adverse impacts.

There are no further mitigation measures required to minimise the impact of the operational phase with the exception of regular maintenance of the plant and suitable assessment of any replacement plant that may be required in the future.

Decommissioning Phase

It is anticipated that the decommissioning phase will adopt a similar approach to the construction phase of this assessment including the same noise criteria. To minimise the potential impact on noise sensitive locations, mitigation measures in line with those proposed for the construction phase are proposed.

Monitoring

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Noise and vibration emissions may be monitored by the planning and/or licensing authority as required to ensure compliance with conditions and in the event of complaint.

10.4 Residual Impacts

The assessment identified that there is potential for elevated noise levels during the construction phase and mitigation measures are prescribed as applicable. However, given the nature of the construction works there may be occasions where residual effects exist. It is therefore considered that the residual impact will be slight and for a brief period.

During the operational phase, the Night-time predicted noise levels may be marginally above the existing baseline noise levels at the limited number of the Noise Sensitive Locations closest to the facility. Despite a new noise source being introduced into the environment, its impact on the vast majority of NSLs will be insignificant.

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11 Landscape and Visual

The landscape and visual impact assessment (LVIA), concerns itself with landscape, landscape values, aesthetic and visual amenity and landscape as a resource which provides society with cultural, economic, and environmental benefits. Landscape has come to be defined according to the European Landscape Convention as ‘an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors’.

The assessment is informed by EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2022 and the methodology prescribed in the Guidelines for Landscape and Visual Impact Assessment, 3rd edition, 2013 (GLVIA) published by the UK Landscape Institute and the Institute for Environmental Management and Assessment.

Although interlinked, the Landscape Impact and the Visual Impacts are assessed separately and with their own sets of criteria.

Landscape

The effects on landscape are studied with Landscape Character Assessment (LCA) as the guiding principle. This is concerned with the identification of and assessment of the importance of landscape characteristics, landscape quality and the condition of the landscape.

The impact of the development itself is studied as the impact of the proposals and development on the landscape, whilst ‘effect’ describes the changes brought about by these impacts e.g., a change to landscape character.

Visual

Visual assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area’s visual amenity.

Methodology for Landscape Assessment

The baseline descriptions are required to consider the context of the landscape and views in terms of the proposed location, magnitude and spatial extent of landscape affected as well as current trends in that landscape/view.

The methodology for conducting a Landscape and Visual Impact Assessment (LVIA) is a structured approach designed to evaluate the potential effects of a proposed development on the landscape and visual environment. This comprehensive process involves several key stages, which are outlined below:

- Baseline Information
- Thresholds of Magnitude of Change
- Landscape Quality
- Value
- Landscape Sensitivity
- Geographical Extent
- Loss/No Loss of Landscape Elements
- Magnitude of Landscape Change
- Probability of Effects

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- Significance of Effects
- Duration of Effects
- Environmental Protection Agency Guidelines
- Methodology for Visual Effects Assessment:
    - Susceptibility of the Visual Receptor to Change
    - Value attached to the view
    - Categories of Viewpoint Sensitivity
- Magnitude of Change to the View
- Significance of Visual Effects
- Mitigation Measures

11.1 Baseline Conditions

The following headings in relation to Landscape and Visual baseline conditions were assessed:

- Ordnance Survey Ireland Historical Maps
- Landscape Associations
- Limerick City and County Development Plan LCA
- Landscape Character Assessment Policy Objectives
- General Landscape Policies and Objectives LCDP
- Landscape Value
- Geological Heritage
- Landscape Character Type
- Recreation and Tourism

The following baseline conditions are deemed to be of notable value to the assessment:

- The landscape has not generally changed significantly. The field system, the drainage pattern, and the shape and structure of the field system in conjunction with planting on the eastern Glenbrook estate define the historical landscape pattern in and around the site of the proposed development.
- The typological classification (Limerick City and County Council - Landscape Character Assessment) describes the landscape around the site of the Proposed Development as Agricultural Lowlands.
- The landscape sensitivity at the site of the Proposed Development is low. The hedgerow system is the most valued element in its ability to define landscape spatial patterns.
- The following policies and objectives of the LCDP are relevant for the Proposed Development: **Landscape Policy & Objectives EH 04,05,07,08,010,012,014,031 EH048** (see Section **11.3.5** EIAR Chapter 11, Main Report for full details)
- There are no scenic routes or protected views affected by the Proposed Development.
- There are no sites of geological importance relating to the site of the Proposed Development.
- The increased planting proposed will ensure that there is a greater potential at the site to absorb carbon and maximise the potential as the plant material matures, to increase habitat connectivity and local landscape ecological gain.
- The wider landscape ecology is well considered and there will be a gain in connectivity and biodiversity in the overall landscape.
- There are no listed views in the proximity of or focused on the proposed development site.
- There are no (SPA, SAC, NHA or pNHA) within the boundaries or close to the Proposed Development.

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- There are no Natura designated areas affected by the Proposed Development.
- The archaeological influence is minimal with Ringfort being the closest to the site of the Proposed Development.
- The topography ensures there is good capacity for the area to enclosure and absorb the potential development. The generous stands of hedgerows and hedgerow trees in the area means there is good capacity to screen development and allow it to be absorbed into the wider landscape.
- In addition, the LCDP has recognised the agricultural lowlands have the capacity to be a preferred area for wind energy projects which have a wider ranging impact on the landscape than the proposed development.

Landscape Effects

Considering the nature of the proposed development, the intrinsic and inherent values attributed to the landscape character area and assessing the landscape at and near the site of the proposed development the rating '**low'** is appropriate for landscape sensitivity.

The example of agricultural/renewable energy development represented by the Proposed Development, is likely to be widely conceived as appropriate unless siting and design are poor. Good efforts to design a rurally appropriate facility and integrate it into its landscape context have been made in the landscape proposals with a good response to the topographical levels of the overall facility in the iterative design process.

Although the ranking is low for this landscape's sensitivity, it is partially only fully described according to the definition below and merits as much protection as can be afforded.

Low Areas: Where the landscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognized in policy and the principal management objective may be to facilitate change through development, repair, restoration or enhancement.

View Effects

Considering highly scenic viewing points, scenic views, and scenic routes it can be seen there will be no effect on any due to the Proposed Development.

11.2 Predicted Impacts

Landscape Construction Phase

The changes to the landscape will occur during the construction stage. The proposals will require an entrance which will puncture the existing hedgerow line and facilitate sight lines. A central drain with hedgerow planting on both sides of the drain will be removed and there will be no other loss of landscape elements that would alter the landscape character at a local level. However, there will be a new scale introduced into the landscape. The landscape exhibits a reasonable capacity for change when accompanied with tree planting. Woodland and trees are an addition to the existing landscape which add to the overall landscape pattern and will effectively blend with the eastern woodland and field mosaic of the area.

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Landscape Sensitivity: **Low**

The overall Magnitude of Change will be '**medium**'.

Setting a **low** landscape sensitivity against a **medium** magnitude of change gives a '**slight**' rating for significance of effects at the construction phase of the Proposed Development.

Landscape Operational Phase

There will be no change to the landscape form or structures placed therein from the construction phase as the facility becomes operational. As part of the landscape proposals, it is recommended that there will be a significant mixed screen planting wrapped around the proposed facility. This will largely include native and naturalised trees and plant material. Hedgerows are to be managed as tall hedges to 2.4m high, where sight lines allow. This will effectively screen the proposed development from the public roads.

It will also screen the scale and form of the structures and add additional deciduous trees and Scots Pine to the overall landscape which blends with the landscape character area. Trees will add another favourable element to the landscape in the long run. During the operational phase of the development, maturing trees present an opportunity to make a positive contribution to the overall landscape.

Landscape Sensitivity: **Low**

Magnitude of Change: **Low to Medium**

Setting a **medium to low** landscape sensitivity against a **low** magnitude of change gives a **'slight'** rating for medium landscape sensitivity and a **'not significant'** rating for significance of effects at the operational phase of the proposed facility

Significance of effects: **Slight**

In the absence of mitigation, the effect will be adverse and long term.

11.3 Visual Assessment

In conducting the visual assessment for the Proposed Development, issues relating to views and viewpoints were considered including the amount of time over which a view would be experienced, the angle of the view and whether views would be full, partial or glimpsed. The distance from the Proposed Development was considered and the extent of the area over which the proposed works would be visible. Again, as for the landscape effect, the duration of the visual impact was considered. The duration of the visual effects is considered as appropriate. As per EPA guidelines, duration of effects is categorised as follows:

Short-term Effects: Effects lasting one to seven years

Medium-term Effects: Effects lasting seven to fifteen years

Long-term Effects: Effects lasting fifteen to sixty years

Permanent Effects: Effects lasting over sixty years

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Visual Impact – Construction Phase

The area around Cappanihane was visited on 22 November 2024 and again on the 31 January 2025. The viewpoints selected were also photographed on February 17, 2025, for verified photomontage production. The visual impact assessment is to be read with the 3Dimensional, verified photomontage booklet which accompanies this report (Chapter 11 - EIAR Main Report). The site location and its hinterland were examined.

There are specific considerations at each viewpoint which are addressed in **Section 11.7.4** (Chapter 11 - EIAR Main Report)

The selected viewpoints were assessed, and this is summarised as outlined in **Table NTS 11.1** below:

Viewpoint No.	**Location**	**Sensitivity**	**Magnitude of Change**	**Significance of Effects**	**Nature of effects**
VP1	Cappanihane	High	High	Very Significant	Adverse
VP2	Cappanihane	High	High	Very Significant	Adverse
VP3	Cappanihane	High	Medium	Significant	Adverse
VP4	Coolrus	High	Medium	Significant	Adverse
VP5	Coolrus	High	Low	Moderate to Slight	Adverse
VP6	Cappanihane	High	Low	Moderate to Slight	Adverse

Visual Impact – Operational Phase

The operational phase of the project will not have any additional large impacts on visual receptors. There will be no change to structures in the views from the construction phase. There will be more vehicular movement into and out of the facility. There are specific considerations at each viewpoint which are addressed here below.

There are specific considerations at each viewpoint which are addressed in **Section 11.7.5** (Chapter 11 - EIAR Main Report)

Viewpoint No.	**Location**	**Sensitivity**	**Magnitude of Change**	**Significance of Effects**	**Nature of effects**
VP1	Cappanihane	High	Low	Moderate	Adverse
VP2	Cappanihane	High	Medium		Adverse

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				Moderate to Significant	
VP3	Cappanihane	High	Low	Moderate	Adverse
VP4	Coolrus	High	Low	Moderate	Adverse
VP5	Coolrus	High	Negligible	Not Significant	Adverse
VP6	Cappanihane	High	Negligible	Not Significant	Adverse

'Do Nothing' Scenario

There will be no difference to the views or the landscape for a 'Do Nothing' scenario. It is likely the site will remain as pastoral grassland. It is unlikely senescent trees will be replaced without a requirement due to development.

11.4 Cumulative Impact

There are no other known proposals of a similar nature planned for this area. The significance of effects will therefore be no greater on the landscape or visual receptors than as assessed above.

11.5 Mitigation Measures

The following landscape protection and landscape impact mitigation measures should be put in place to avoid, eliminate or minimise any potential landscape and visual impact associated with the construction of the Proposed Development.

- Any area of site subject to soil disturbance is to be repaired, the soil reworked into the site, recontoured and modelled. Matching sod/seed sown to blend the topography back into the rural landscape.
- All construction materials, fill, gravel, etc to be removed from the site and surrounding fields once the works are complete.
- Earthworks and hedgerow banks to facilitate appropriate drainage for the soil type and this to be detailed at the design detail stage.
- An irrigation plan to be put in place to allow for establishment of plantings with the irrigation water source to be identified prior to the spring of the first year of planting. A plan to irrigate in hot weather and as required to be put in place especially for the first two years after planting. Recovered process water which has been cooled may be used.
- Hedgerows are to be maintained as thick tall hedgerows with an A shaped profile, min. 2-2.4 m high everywhere sight lines allow.

Avoidance Prevention Reduction and Offsetting

Mitigation is discussed below as a measure of avoidance, prevention, reduction and offsetting of impacts and effects. The positioning of the digestion tanks into the topography along with specified screen planting reduces impact of the structures against the skyline. Other measures include;

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Disease

- The avoidance of *Fraxinus excelsior*, ash, in any infill planting in the hedgerow system will not only protect existing landscape trees from the biologically infectious chalara disease, but it will also protect the local habitats that ash supports for as long as possible, by avoiding this biosecurity risk.

- Any plant materials brought on site to bulk out the plantings during the operational phase of the project to be disease free, to at a minimum hold all relevant plant passports and preferably be sourced field grown and inspected at source prior to planting. This is to avoid spreading potential infections to local populations. All trees and shrubs will conform to the specification for nursery stock as set out in British Standard 3936 Parts 1 (1992) and 4 (1984). Advanced Nursery stock trees if used in tree planting shall conform to BS 5236.

Topsoil

- Avoid bringing any additional topsoil on site. Use local soil to make localised repairs. Where additional topsoil is required use from a matching source as local as possible to the Proposed Development. Do not mix topsoil and sub soil during construction. Identify storage area where soils are to be stored separately until they are reworked into the soil.

Invasive Species

- Avoid spreading or bringing invasive plant species onsite in soil or plant materials. Soil and plant material hygiene to be observed and plant, boots, tools and equipment to be clean before being brought on site. All involved at the construction stage to be made aware of this prior to coming on site.

  Invasive Alien Plant Species include;

- Japanese knotweed Fallopia japonica
- Giant knotweed Fallopia sachalinensis
- Bohemian knotweed Fallopia x bohemica
- Himalayan knotweed Persicaria wallichii
- Old man's beard Clematis vitalba
- Winter heliotrope Petasites fragrans
- Garden Yellow Archangel Lamiastrum galeobdolon ssp argentatum

Of these, knotweed is most likely to be problematic if introduced onsite.

- All hedgerows and hedgerow trees which are being retained are to be protected during the construction process with a root protection zone established, prior to the commencement of construction. No root systems to be trenched severed or cut and there is to be no piling of building materials, soil, plant, containers, or any loading material on the protected root zone during construction. All parties involved in the construction process to be made aware of this avoidance measure. No unnecessary damage is to occur to the existing tree and hedgerow complex during construction or afterwards during operations. At the detailed design stage tunnelling is to be preferred over trenching where pipework interacts with existing hedgerow systems in selected areas. This to minimise the impact of pipe works on adjacent hedgerow structures. The root protection zone is to at a minimum be positioned

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outside the drip line of the hedgerow system.
- Palisade fencing is to be screened with hedging and trees.
- Planting specifications to be overseen by a qualified landscape architect during the construction and operational period as required.

Reinforcing landscape

Any damage to field boundaries received during construction to be repaired in the traditional manner. Low banks for planting trees and hedgerows are to be reinforced where possible. The screening planting and new tree planting will reinforce much of the landscape pattern.

Following correct landscape construction and planting, all plant material is to be properly and satisfactorily, irrigate, pruned and given correct amounts of appropriate fertiliser to ensure plant health and vigour.

Landscape Maintenance and Management Plan

- A landscape management plan is to be produced and ready post construction so that all new and existing planting, hedgerows, and trees will be immediately cared for and promptly maintained. This plan along with any necessary method statements to be produced during the operational phase of the planting by a qualified landscape architect.

- Landscape maintenance and management plans ought to remain in place until all plantings are fully established and during the life of the Anaerobic Digestion Facility. The aim of the plan is to continue to ensure landscape character is maintained as well as biodiversity and habitat protection.

- A landscape maintenance and management plan will include a small woodland/hedgerow management plan and will address appropriate hedgerow cutting, timing of operations, protection of hedgerow habitats, address irrigation of newly planted trees or infill plants, accessing water, pruning, weeding, fertilising, trimming, management of dead and diseased wood, and general maintenance. Plant establishment to be provided for appropriately. All amelioration as required for good plant establishment to be tailored to the plants, trees, and hedgerows to satisfy their continued growing needs.

- The mitigation measures as outlined are conducted throughout the life of the operation.

- Periodically the landscape maintenance and management plans to be reviewed to ensure growth, screen establishment and general appearance of the site is fulfilling its original intent. Stake belts are to be loosened as required and stakes cut down and or removed as appropriate.

- Hedgerow maintenance and laying are to occur outside of the nesting season and where hedgerows are weak and require significant work to rejuvenate the hedgerows, this to be completed on each side, on alternate years.

- Appropriate native infill materials to be used in the rejuvenation of the hedgerows e.g. *Crataegus monogyna*, *Ilex aquifolium* etc,

- Flowering hedgerow plants and other pollinators are to be factored into the hedgerow cutting regime with respect to timing of operations and infill planting opportunities.

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11.6 Interactions and Cumulative Impact

Other environmental impacts which will interact with landscape and visual impacts in the case of this Proposed Development are Biodiversity and Archaeology under the following headings (see **Section 11.9**, **Chapter 11**, EIAR Main Report for details):

- Biodiversity and Carbon Absorption
- Interaction of the LVIA with Archaeology

11.7 Residual Impacts

Once all mitigation measures have been implemented and there is ongoing care provided to the landscape tree planting and hedgerows over the life of the project, the Proposed Development will not be hidden but it will be effectively screened, and a plantation of trees will be an addition to the landscape.

Viewpoints 1,2, 3 and 4 will experience a view of the proposals diminishing consistently in the medium to long term.

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12 Traffic & Transport

ORS conducted an assessment of the likely impact of the proposed development on the traffic flows and transport infrastructure within the site of the Proposed Development and the wider area.

The Proposed Development site is located in the townland of Cappanihane, Bruree, Co. Limerick,

The objectives of this chapter (Chapter 12 – Traffic & Transport) are to assess:

- The prevailing traffic conditions on the public road network in the vicinity of the Proposed Development that may influence conditions;
- The potential effect on the surrounding road network due to the anticipated traffic generated by the Proposed Development;
- The proposed access arrangements for the Proposed Development;
- Review of committed developments adjacent to the Proposed Development site;
- The pedestrian, cyclist and public transport connectivity in the vicinity of the site; and
- The parking requirements for the site.

12.1 Receiving Environment

Traffic and transport-related infrastructure considered in relation to the Proposed Development are listed below:

- Site Access
- Car Parking
- Cycle Storage
- Existing Road Network
- Proposed Road Network Improvements
- Existing Traffic Flows
- Committed Developments Traffic Generation
- Future Year Traffic Growth

Site Access

Vehicular access to the site is through a new proposed priority T-junction off the L8658 Local Road to the west of the site. 12No. car parking bays are provided to the west of the office area, while the central circulation area (concrete apron) to the south of the digestate treatment building will be used for articulated lorry turning and reversing.

The proposed access was designed to accommodate the expected HGV traffic and was designed in accordance with the Transport Infrastructure Ireland (TII) publication DN-GEO-03060.

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Car Parking

The site will have ca. 3-5No. staff members on site at the same time. The number of parking spaces provided for staff and visitors of the development is 12No. spaces, located adjacent to the office building, with 1No. being an accessible parking space and 2No. being dedicated EV charging points. The parking spaces provided can be considered sufficient for the expected levels of traffic associated with the site

Cycle Storage

Due to the nature of the development and the reduced number of staff accessing the site, trips by bicycle are not anticipated. There are currently no bicycle lanes on the R518 and no dedicated means of accessing the site by bicycle.

Despite this, the Proposed Development includes provision for 10No. bicycle parking spaces, aligning with the guidelines established in the Limerick City and County Development Plan.

Existing Road Network

The Proposed Development plans include providing vehicular access from the L8658 to the west of the site. Arrivals and departures will be via the Regional Road R518, located south of the site, and all traffic will utilise the L8658/L8595/R518 priority crossroads junction to/from the proposed site.

The R518 is a two-way flow single carriageway approximately 6 metres wide with no hard shoulders available on either side of the carriageway. The R518 has a posted speed limit of 80 km/h. The R518 connects to the N20 and O'Rourke's Cross to the east, approximately 4.2 km from the assessed junction, and to the R520 and Lees Cross to the northwest, ca. 4.7 km from the junction.

The L8658 is a single-lane carriageway, approximately 5-6 metres wide, that accommodates two-way traffic and provides access to the regional road R518 to the south, with an increasing width towards the priority junction formed by the L8658 and the R518. At this junction, the road lacks road markings, which are essential for guiding vehicle drivers effectively, while a 'STOP' sign is in place.

There are no footpaths or cycle lanes provided along the R518 and the L8658, in the vicinity of the site access. With a width of 6 metres, the R518 road does not provide sufficient space for pedestrian or cyclist access to the site without the provision of substantial development of active travel infrastructure in the surrounding area.

Proposed Road Network Improvements

At present, Limerick City and County Council have no improvement schemes on the R518 or the L8658 that would affect the Proposed Development.

Existing Traffic Flows

Automatic Junction Turning Counts (JTC) have been undertaken at the junction on Tuesday 10th December 2024 by a third-party company called IDASO. The traffic counts were carried out during a 12-hour period from 07:00 AM to 07:00 PM. The traffic counts have been used to obtain accurate data on the prevailing traffic conditions along the road network in the vicinity of the site and to predict future traffic conditions. The traffic counts encompassed all movements

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of traffic: pedal cycles, cars, buses, LGVs and HGVs.

During the morning peak period, a total of 288 PCUs were recorded, with 156 heading eastbound, towards the N20, and 118 towards the west, while only 11 headed northbound onto the L8658. In the PM peak, the majority of traffic moved westbound along the R518, totalling 148 PCUs, with 16 vehicles travelling northbound towards the L8658. Overall, the observed traffic along the assessed junction in the vicinity of the site, during the PM peak, was 292 PCUs.

Results are summarised in **Table NTS 12.1** below.

Table NTS 12.1: December 2024 Traffic Counts

Junction	AM Peak (PCU)	PM Peak (PCU)
1 – Crossroad Junction L8658/L8595/R5118	288	292

Committed Developments Traffic Generation

As part of this Traffic Assessment, to assess the existing and expected traffic along the road network in the vicinity of the Proposed Development, the Limerick City and County Council planning website was consulted to include all committed developments in the area. As per the records available on the website, there are no applications identified that can potentially utilise the road network, in the vicinity of the Proposed Development.

Future Year Traffic Growth

The Proposed Development is aimed to be fully constructed and operational in 2027. The assessment of future year traffic growth is based upon central growth forecasts extracted from the TII Publication PE-PAG-02017 Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections, published in October 2021. **Table NTS 12.2** displays predicted traffic flows along the site access for the year of the development conclusion, 5-year and 15-year after the development conclusion.

Table NTS 12.2: Traffic Flows in Future Design Years (PCUs)

Design Year		R518 Towards O'Rourke's Cross	L8595	R518 Towards Lees Cross	L8658	Total Movements
2027	AM	171	3	133	28	335
	PM	143	3	165	30	341
2032	AM	186	3	144	29	362
	PM	154	3	178	31	366
2042	AM	201	3	156	30	390
	PM	167	3	193	33	396

12.2 Assessment of Impacts

Construction Phase

Construction traffic associated with the Proposed Development will include:

- Construction personnel accessing the site by private vehicles and vans

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- Delivery of materials (here include what type of materials) by vans and HGVs
- Earthworks machinery (excavators, rollers and dumper trucks) transported by HGVs
- HGVs for the export surplus excavated material.

It is expected a maximum of 20No. to 30No. construction personnel to be at the site at the same time (typically 1.2 workers per car) that will arrive and depart outside the peak network times. Deliveries are expected to arrive at a steady rate throughout the day. It is anticipated that the generation of HGV traffic during the construction period will be evenly distributed throughout the day, ensuring minimal impact during peak traffic periods. Table **NTS 12.3** below shows the expected generated traffic during construction phase

Table NTS 12.3: Expected Traffic During Construction Phase

Time Range	Arrivals	Departures	Total
08:00-09:00	25	0	**25**
17:00-18:00	0	25	**25**

Operational Phase

The operation of a Renewable Biogas Facility involves producing renewable biogas through the decomposition of organic feedstock. The site will be functional 24 hours a day for 7 days a week with staff onsite during normal working hours from 07:00 and 19:00 Monday to Friday, and 07:00 to 16:00 on Saturday. Outside of these hours, the process is monitored remotely. There are no shifts, and it is expected that ca. 3-5 staff members will be present at the premises during normal working hours. The Development will receive an intake of approximately 90,000 tonnes of feedstock per annum for anaerobic digestion. The process will produce a methane-rich biogas, which is converted into renewable energy or upgraded to biomethane which is injected to the natural gas grid, and a nutrient-rich fertiliser known as ‘biobased fertiliser’.

Feedstock will be transported to the Proposed Development using heavy goods vehicles (HGVs), enclosed trailers, and sealed vacuum tankers. The average tonnes per load are assumed to be 28-30 tonnes. It is expected that traffic will be spread out throughout the day in order to minimise traffic issues in the road network. However, in the event of deliveries arriving at the same time, the site will be able to cater for the traffic flows, as the access road and internal road layout of the site can accommodate the expected traffic without generating congestion on the main road

Table NTS 12.4 illustrates the expected AM and PM traffic flows associated with the Proposed Development.

Table NTS 12.4: Expected AM and PM Traffic Flows

	Arrivals	Departures	Total
AM	18	13	31
PM	13	18	31
Average movements			**62**

The trip rate profile for the Proposed Development has been interpreted from first principles and has been sufficiently loaded to reflect a ‘worst-case scenario’. The trip rates are relevant given the type of development and the type of use. The trips found indicate that the level of traffic activity associated with this type of development is small and will correspond to approximately 3% of the AADT observed along the R518 in the vicinity of the site. The figures derived from the first principles analysis are very robust, as a ‘worst case scenario’, the total

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daily trips expected from the development are 62.

Regarding the HGV numbers generated from the site, of the 62No. trips associated with the site, 52No. will be composed of heavy vehicles. Traffic counts reveal that during the morning peak, 6% of the traffic on the R518 consisted of HGVs, with only one heavy vehicle turning onto the L8658. In contrast, during the PM peak, 20% of the traffic turning from the R518 onto L8658 composed HGVs, while no HGVs exited the L8658 onto the R518.

Consequently, the traffic generated by the Proposed Development meets the criteria for producing a full Traffic and Transport Assessment, with a 10% increase in traffic, driven primarily by the area's very low existing traffic volumes. Given that the majority of site-related traffic will consist of HGVs, junction modelling has been conducted to assess the impact of the Proposed Development on the existing junction, in order to reinforce the point that the traffic from the Proposed Development will not adversely affect the functionality of the neighbouring junction.

The full Traffic and Transport assessment is outlined in **Section 12.5.2** (Chapter 12 -EIAR Main report)

12.3 Mitigation Measures

Construction Phase

A summary of all mitigation measures for the construction phase to ensure minimum impact on traffic and transport infrastructure is listed below:

- A detailed Traffic Management Plan (TMP), produced in accordance with Chapter 8 of the Traffic Signs Manual, will be finalised and agreed upon with the Local Authority prior to construction works commencement. The following mitigation measures are proposed during the construction phase of the development:
- Appointment of a Construction Project Manager to be responsible for the day-to-day implementation of measures outlined in the TMP;
- Identify routes to be used in the delivery and export of materials to the site and routes that shall be avoided by HGVs;
- Monitor the condition of the roads throughout the construction period and a truck-mounted vacuum mechanical sweeper will be assigned to roads along the haul route as required; and
- Access to the site to be monitored at all times by a banksman who will direct traffic safely into the construction site and facilitate the safe navigation of larger construction vehicles.

Operational Phase

The operational phase of the development will generate a maximum of 62No. vehicle movements day, where 52No. are HGVs and 10No. are private vehicles and vans. The additional vehicles will represent a maximum of 10% increase in traffic but will not generate increased queues and delays along the road network in the vicinity of the site, therefore, no mitigation measure is proposed for the operational phase of the development.

12.4 Residual Impacts

The proposed construction and operational phase of the development will generate a minimal

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impact on the road network in the vicinity of the site. The proposed mitigation measures proposed in Section 12.6 (Chapter 12 - EIAR Main Report) will also help reduce or eliminate any potential impact associated with the proposal. The proposal, located off the R518 Regional Road, is located in an 80km/h speed limit zone* and the narrow road width will not give rise to potential hazards, on the other hand, will reduce traffic speeds and increase road safety benefits.

Queuing of vehicles is not anticipated on the L8658 due to the low number of vehicles predicted to enter the site on a daily basis. The proposal will have no negative impact on the overall road network associated with the proposed construction and operational phase of the site.

Overall, it is assessed that the development will have a ***neutral***, ***slight*** and ***long-term*** effect.

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13 Archaeology & Cultural Heritage

Site Overview and Archaeological Context

The Proposed Development site is located in the townland of Cappanihane approximately 13km west of Kilmallock, Co. Limerick, 20km east of Newcastle West, Co. Limerick and 25km southwest of Limerick City. The site comprises undulating agricultural land, the boundaries of which are demarcated by mature trees and hedgerows. The total area of the site measures *ca.* 5.29 ha. There are no National Monuments within the site boundary. There are two recorded monuments in the vicinity of the Proposed Development. There is a ringfort immediately to the east of the subject site and another ringfort roughly 140m to the west (LI038-130----, and LI038-129----, respectively). There are no other features of Cultural Heritage significance in the immediate vicinity.

Cultural Heritage Assessment

The assessment aimed to identify potential impacts on archaeological and cultural heritage resources through a desktop study and field survey, following guidelines from the Department of Housing, Local Government and Heritage, the National Monuments Acts (1930-2005), and the Limerick City & County Development Plan 2022 – 2028. Archaeological testing conducted on December 9th, 2024, revealed no significant findings.

No significant archaeological or cultural heritage features were found within the proposed development site, and appropriate measures have been taken to ensure minimal impact on the surrounding environment.

13.1 Existing Environment

Archaeological Baseline Data

A comprehensive assessment was conducted to identify potential impacts on archaeological and cultural heritage resources. This included a desktop study, field survey, and archaeological testing, following guidelines from relevant authorities. Archaeological testing on December 9th, 2024, revealed no significant findings.

No significant archaeological or cultural heritage features were found within the proposed development site. Appropriate measures were taken to ensure minimal impact on the surrounding environment, complying with relevant guidelines and regulations.

Site Inspection

A field inspection was conducted on December 9th, 2024, to assess Proposed Development site and its immediate environs, noting and recording the terrain type and land usage, the presence of features of archaeological or historical significance, and visually investigating any suspect anomalies observed to determine their nature and provenance where possible. Any anomalies observed were investigated to determine their nature and origin. The inspection revealed no features of archaeological significance.

Results of Archaeological Testing

There are no monuments recorded by the National Monuments Service within the site boundary. There is a ringfort immediately to the east of the subject site and another ringfort roughly 140m to the west (LI038-130----, and LI038-129----, respectively). There are no other features of Cultural Heritage significance in the immediate vicinity.

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13.2 Potential Effects

Potential Direct Effects

Recorded Archaeological Monuments

The Proposed Development will have no direct physical effect on known archaeological sites and monuments.

Unrecorded Archaeological Monuments or Features

There is a low to moderate potential for unrecorded sub-surface deposits surviving below ground within the project area and the proposed pipeline route.

Architectural Sites

The Proposed Development will have no direct physical effect on known architectural sites.

'Do Nothing Scenario'

If the Proposed Development were not to proceed, there would be no effect upon the archaeological, architectural, or cultural heritage resource.

Potential Effects on the Setting/Operational Effects

Impacts on Setting can be reduced with sensitive site development and screening.

13.3 Mitigation Measures and Residual Effects

Given the proximity of LI038-130----, the adjacent Ringfort - rath it is recommended that a programme of archaeological testing be carried out well in advance of construction.

A suitably qualified archaeologist should be appointed to advise the design team on archaeological matters, liaise with the relevant authorities, prepare an archaeological licence application and method statement, and complete the archaeological testing work .

The mitigation strategies recommend archaeological testing prior to construction, with a qualified archaeologist overseeing the process, to assess and manage any discovered archaeological materials. All findings will be reported to the relevant authorities, and appropriate preservation or excavation measures will be implemented as needed, subject to approval by the National Monuments Service.

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14 Material Assets

ORS conducted an assessment of the likely impact of the proposed development on the material assets within the site of the Proposed Development and the wider area.

The Proposed Development site is located in the townlands of Cappanihane, Clonee, Co. Limerick approximately 13km west of Kilmallock, Co. Limerick, 20km east of Newcastle West, Co. Limerick and 25km southwest of Limerick City.

The objectives of this chapter (Chapter 14 – Material Assets) are:

- To provide a baseline assessment of the receiving built services in the vicinity of the Proposed Development.
- To identify any potential negative effects posed by the construction and operational phases of the Proposed Development.
- To propose suitable mitigation measures to prevent or reduce the significance of the negative effects identified.
- To consider any significant residual effects of cumulative effects posed by the Proposed Development.

14.1 Receiving Environment

Material Assets considered in relation to the Proposed Development are listed below:

- Roads Infrastructure
- Foul Water Network
- Surface Water Network
- Public Water Network
- Gas Infrastructure
- Electricity Network
- Telecommunications Network
- Municipal Waste

The following paragraphs provide an overview of the existing receiving environment in relation to Material Assets under the aforementioned headings.

Roads Infrastructure

The Proposed Development plans include providing vehicular access from the L8658 to the west of the site. Arrivals and departures will be via the Regional Road R518, located south of the site, and all traffic will utilise the L8658/L8595/R518 priority crossroads junction when entering and leaving the proposed site. The site entrance is ca. 130m north of the R518 and the R518/ L8658/ L8595 junction. The Proposed Development will be accessed via the L8658 Local Road and a new internal access road leading east.

At present, Limerick City and County Council have no improvement schemes on the R518 or the L8658 that would affect the Proposed Development.

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Foul Water Network

In its present state, there exists no established connection to the surrounding foul water network. As such it will be necessary to provide foul sewerage treatment within the boundary of the site.

The proposed development will have a maximum design population of 1. no persons for Hydraulic and 3 for organic loading as per EPA Wastewater Treatment Manuals for Small Communities, Business, Leisure Centres and Hotels. With a total daily demand of 1 Hydraulic loading and 3 for organic loading we recommend a PE 6 proprietary treatment system is proposed with discharge to a Ter3 packaged tertiary unit with a minimum 100m2 attenuation layer. Distribution layer to be placed on 144m2 of imported soil 300m depth with suitable percolation values. Imported soil to be tested for suitable percolation values as per EPA COP 2021.

The wastewater from the toilet and canteen will be treated using a proprietary system as recommended in the Site Suitability Assessment. A domestic scale wastewater treatment plant is proposed.

Based on the information provided within the Site Characterisation Assessment for the site and the requirements of the 2021 EPA Code of Practice, the most suitable system for sewage treatment and percolation onsite is the 6PE EuroTank BAF2 Wastewater Treatment System followed by the 6PE EuroTank TER3 Percolation Unit.

Surface Water Network

At present, the site does not feature dedicated surface water infrastructure. The existing ground level slopes gently downwards from northeast corner to the southwest of the site. Ground conditions at the site are known to be relatively poor with low sub-soil permeability.

The proposed site will require the collection, attenuation and disposal of surface water accumulated during rainfall events. Surface water runoff generated from the site will be contained within the attenuation structures proposed and discharged at greenfield runoff rates to the adjacent stream.

Public Water Network

The Proposed Development will not be connected to the public water network. The Proposed Development has been designed to maximise the reuse of rainwater that falls on site. Rainwater runoff from the roof of the Feedstock Reception Building and Silage Clamp will be harvested in a Rainwater Storage Tank for use within the site, such as wash water.

Harvested rainwater will provide water supply for the Office, with reverse osmosis treatment and UV treatment to provide potable water to the Office and Welfare Facilities.

Gas Network

Biomethane will be compressed onsite and transported offsite to a grid connection point and supplied to the existing gas network via the Grid Injection Unit (GIU). The GIU will be owned and operated by Gas Networks Ireland.

GNI has confirmed that the existing grid capacity is adequate to accommodate the production output of the Proposed Development.

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Electricity Network

The Proposed Development will be powered by the onsite CHP unit and Solar PV during normal operation, with power supply from the grid provided only as a backup.

Telecommunications Infrastructure

The Proposed Development will feature an office and canteen facility which will require connections to telephone lines and Wi-Fi.

Municipal Waste

Assuming a volume of 50l of waste per employee per week, it is estimated that weekly waste arisings will equate to approximately 250l per week. The associated mitigation measures to limit their impact are discussed in more detail in the outline Construction Environmental Management Plan (CEMP) that accompanies this application

14.2 Assessment of Impacts

Construction Phase

The construction phase is likely to yield the most disturbance to existing material assets in the vicinity of the site. Potential construction phase impacts are considered in detail in Section 14.5.1 of the EIAR – Main Report and summarised in **Table NTS 14.1** below:

Table NTS 14.1: Construction Phase Effects (Unmitigated)

Asset	Potential Environmental Effects	Quality	Significance	Duration
Roads Infrastructure	Increased flow of construction-related traffic. Establishing the entrance to the site will require the implementation of temporary traffic management measures along the L8658 road.	**Negative**	**Slight-Moderate**	**Temporary**
Foul Water Network	During the construction phase, welfare facilities for staff will be supplied via portable toilets and waste collected and tankered offsite. A domestic scale wastewater treatment plant is proposed for installation during construction stage. It has been concluded that the soils at the Proposed Development have sufficient absorption capacity for the installation of a percolation area.	**Negative**	**Slight**	**Temporary**
Surface Water Network	Contaminated runoff reaching surface water receptors. Spillage of contaminants such as fuels, oils, chemicals, and cement material and subsequent migration into surface water receptors.	**Negative**	**Slight**	**Temporary**

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Public Water Network	Disruption to existing network while establishing connection.	**Neutral**	**Slight**	**Brief**
Gas Infrastructure	There will be no disruption to the local gas supply during the construction or operational phase of the facility.	**Positive**	**Slight**	**Temporary**
Electricity Network	Power supply for plant and machinery during the construction phase will be predominantly supplied by generators onsite. There may be partial disruption to the existing electricity network as connection to the grid via the substation is established.	**Negative**	**Slight**	**Temporary**
Telecommunications	Disruption to existing network while establishing connection. A utility pole will have to be relocated on the south side of the site to allow sightlines to be achieved at the entrance to the site.	**Negative**	**Slight**	**Brief**
Municipal Waste	The Proposed Development will generate a range of non-hazardous and hazardous waste materials during site excavation and construction. Waste materials will be required to be temporarily stored on-site pending collection by a waste contractor. If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues.	**Negative**	**Slight**	**Temporary**

Operational Phase

The operational phase effects anticipated and considered throughout the lifetime of the operation of the facility are considered in detail in Section 14.5.2 of the EIAR – Main Report and summarised in **Table NTS 14.2** below:

Table NTS 14.2: Operational Phase Effects (Unmitigated)

Asset	Potential Environmental Effects	Quality	Significance	Duration
Roads Infrastructure	A new access road will be constructed and connected to the pre-existing road network.	**Neutral to Negative**	**Slight**	**Long-Term**
Foul Water Network	Wastewater from welfare facilities and canteen will be treated using a proprietary system as recommended in Site Suitability Assessment.	**Negative**	**Slight**	**Long-Term**
Surface Water Network	Establishment of clearly defined work areas which can be monitored and isolated if required, for example, the bunded area.	**Negative**	**Slight**	**Long-term**

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	Run-off from the buildings and yards collected in a sealed pipe network which will discharge to the stream. Rain falling on the bunded area will be collected in a separate sealed drainage network and discharged to a sump, from which it will be pumped to the surface water drainage system for the remaining areas of the Proposed Development. Leakage / spillage of biobased fertiliser or feedstocks via vehicle movements.			
Public Water Network	Potential contamination to the local aquifer Potential risk to human health	**Negligible**	**Slight**	**Long-term**
Gas Infrastructure	Biomethane will be compressed onsite and tankered offsite to a Grid Injection Unit (GIU). The GIU comprises equipment which will ensure that the biomethane is compliant with all necessary standards and regulations before it enters the gas network. It is projected that the Proposed Development will produce 510-580 Nm^3 of biomethane per hour, to be supplied to the existing gas network.	**Positive**	**Significant**	**Long-Term**
Electricity Network	An ESB substation will be constructed and will provide connection to the national grid, although this source of power will serve only as a backup.	**Neutral**	**Slight**	**Long-Term**
Telecommunications	Increased demand on existing network.	**Negative**	**Slight**	**Long-Term**
Municipal Waste	Increased waste production of ca. 250l per week. Increased demand on waste collection services.	**Negative**	**Slight**	**Long-Term**

14.3 Mitigation Measures

Construction Phase

A summary of all mitigation measures for the construction phase to ensure maximum protection of material assets is listed below:

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Roads Infrastructure

- A detailed Traffic Management Plan (TMP), produced in accordance with Chapter 8 of the Traffic Signs Manual, will be finalised and agreed upon with the Local Authority prior to construction works commencement.
- Appointment of a Construction Project Manager to be responsible for the day-to-day implementation of measures outlined in the TMP
- Identify routes to be used in the delivery and export of materials to the site and routes that shall be avoided by HGVs
- Monitor the condition of the roads throughout the construction period and a truck-mounted vacuum mechanical sweeper will be assigned to roads along the haul route as required
- Access to the site to be monitored at all times by a banksman who will direct traffic safely into the construction site and facilitate the safe navigation of larger construction vehicles.
- Traffic management measures will be implemented on a temporary basis while connections underground services (telecommunications, water) are established.

Foul Water Network

- Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and the aquifer.
- All foul water infrastructure to be installed in accordance with the relevant industry standards.

Surface Water Network

- 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.
- Stockpile areas for sands and gravel should be kept to minimum size, well away from storm water drains and gullies leading off-site.
- Covers are to be provided over soil stockpiles when high wind and inclement weather are encountered, if required.
- Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and the aquifer.
- Landscaping to take place as soon as possible to reduce weathering.
- Harmful materials such as fuels, oils, greases, paints and hydraulic fluids must be stored in bunded compounds well away from storm water drains and gullies. Refuelling of machinery should be carried out using drip trays.

Public Water Network

- Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and the aquifer.

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Gas Infrastructure

- No mitigation measures are required. There will be no impact to the existing gas network during the construction phase as there are no gas pipeline connections to be established to the existing gas grid network.

Electricity Network

- Consultation with ESB and Dial-Before-You-Dig platforms prior to works on the existing electricity network.
- Implement best practice measures when working on electricity lines.
- Inform the public of when works are to be carried out to ensure they are aware of any temporary interruptions in power supply that may occur.

Telecommunications Network

- Consultation with ESB and Dial-Before-You-Dig platforms prior to works on the existing electricity network.
- Implement best practice measures when working on electricity lines.
- Consultation with Eir and Dial-Before-You-Dig platforms prior to works on the existing telecommunications network.
- Implement best practice measures when working on telecommunications lines.
- Inform the public of when works are to be carried out to ensure they are aware of any temporary interruptions in power temporary telecommunications outages that may occur.

Municipal Waste

- Inform staff through toolbox talks/training etc on the relevance and importance of correct waste segregation and management.
- Ensure waste receptacles available for the different identified waste streams to ensure proper and efficient segregation of waste onsite.
- Install signage to promote and encourage proper waste segregation, recycling etc.
- Ensure bins/skips are not allowed to overflow to prevent litter build-up onsite.
- Ensure all bins have lids and skips are covered when be removed offsite to prevent littering elsewhere.
- Ensure waste is collected by a registered vendor and disposed of at a facility licenced to take said waste.
- Maintain good waste records onsite to ensure all is accounted for.
- Concrete Washout Skip: Chutes of concrete trucks are only to be washed out into an impermeable lined (polythene) skip. The washout water is to be treated prior to discharge.
- The concrete washout skip is to be located to the east of the site, where the overburden is greater.
- Excavations lined with an impermeable liner are not permitted as concrete washout bays.

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- 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.

Operational Phase

A summary of all mitigation measures for the operational phase to ensure maximum protection of material assets is listed below:

Roads Infrastructure

- The operational phase of the development will generate a maximum of 62No. vehicle movements day, where 52No. are HGVs and 10No. are private vehicles and vans. The additional vehicles will represent a maximum of 10% increase in traffic but will not generate increased queues and delays along the road network in the vicinity of the site, therefore, no mitigation measure is proposed for the operational phase of the development.

Foul Water Network

- A regular schedule of foul infrastructure inspection and maintenance will be carried out over the lifetime of the Proposed Development.
- The onsite WWTP will be subject to regular desludging and maintenance, subject to manufacturer recommendations.

Surface Water Network

- Dedicated hard standing for off-loading areas will be established, 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.
- All bunds and pipelines (foul & process) will be subject to integrity assessments every 3 years by a suitably qualified engineer.
- Surface water drainage features onsite will undergo routine inspection and maintenance to ensure absence of blockages or leaks.
- The site will be subject to annual inspections from the EPA which will assess compliance with conditions outlined in the IEL. Surface water outflows from the site will be assessed as part of these inspections to ensure emissions from the site are compliant with the license.

Public Water Network

- Waste water, such as wash water, will be supplied from rainwater harvesting or from treated process water. This water will undergo UV treatment prior to use and storage.

Gas Infrastructure

- No mitigation measures are required. There will be no impact to the existing gas network during the construction phase as there are no gas pipeline connections to be established to the existing gas grid network.

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Electricity Network

- Utilisation of power from the public grid will serve only as a backup. Power usage for the Proposed Development under normal operating conditions will be supplied by CHP and solar PV array onsite.

Telecommunications Network

- No mitigation measures are proposed for the operational phase of the Proposed Development. The onsite office/canteen/staff welfare facility will require a constant telecommunications connection meaning a slight negative impact to the existing network is unavoidable.

Municipal Waste

- Inform staff through toolbox talks/training etc on the relevance and importance of correct waste segregation and management.
- Ensure waste receptacles available for the different identified waste streams to ensure proper and efficient segregation of waste onsite.
- Install signage to promote and encourage proper waste segregation, recycling etc.
- Ensure bins/skips are not allowed to overflow to prevent litter build-up onsite.
- Ensure all bins have lids and skips are covered when be removed offsite to prevent littering elsewhere.
- Ensure waste is collected by a registered vendor and disposed of at a facility licenced to take said waste.
- Maintain good waste records onsite to ensure all waste is accounted for.

14.4 Residual Impacts

Construction Phase

A summary of the predicted impacts associated with the construction phase in terms of quality, significance, and duration, along with the proposed mitigation measures and resulting residual impacts are summarised in **Table 14.3 (Chapter 14 of the EIAR – Main Report)**.

The overall impact anticipated by the construction phase of the project following the implementation of suitable mitigation measures is considered to be ***negligible to neutral, imperceptible to slight,*** and ***brief to temporary***.

Operational Phase

A summary of the predicted impacts associated with the operational phase in terms of quality, significance, and duration, along with the proposed mitigation measures and resulting residual impacts are summarised in **Table 14.4** (**Chapter 8 of the EIAR – Main Report).**

The overall impact anticipated by the operational phase of the project following the implementation of suitable mitigation measures is considered to be ***negligible to positive***, ***slight to significant***, *and* ***long term***.

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15 Interaction Between Effects on Different Factors

15.1 Introduction

In an Environmental Impact Assessment Report (EIAR), the interactions between chapters are crucial for providing a comprehensive understanding of how different environmental factors influence each other.

Each environmental topic chapter of this EIAR includes a dedicated section on interactions with other relevant factors. This approach is considered to meet with the requirements of applicable EU and Irish law. The likely interactions between one topic and another have been discussed under each topic chapter by the relevant specialist consultant. ORS ensured collaboration among specialist consultants to address the likely interactions between effects predicted from the proposed development. This ensured that appropriate mitigation measures were incorporated into the design process.

This section on interactions identifies the potential of unplanned but potential interactions that could occur during construction and operation of the proposed development. **Table 15.1** below identifies where it is predicated, that interactions could occur.

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Table 15.1: Matrix summarising potential interactions noted between factors

Interaction	Biodiversity	Pop. & Human Health	Lands, Soils, Geology	Hydrology & Hydrogeology	Air, Odour, Climate	Noise & Vibration	Landscape & Visual	Traffic & Transport	Archaeology & Cultural Heritage	Material Assets
Biodiversity	*N/A*	✓	✓	✓	✓	✓	✓	✗	✗	✗
Population & Human Health	✓	*N/A*	✓	✓	✓	✓	✓	✓	✗	✓
Lands, Soils & Geology	✓	✓	*N/A*	✓	✗	✗	✗	✗	✗	✗
Hydrology & Hydrogeology	✓	✓	✓	*N/A*	✗	✗	✗	✗	✗	✓
Air, Odour & Climate	✓	✓	✗	✗	*N/A*	✗	✗	✓	✗	✗
Noise & Vibration	✓	✓	✗	✗	✗	*N/A*	✗	✓	✗	✗
Landscape & Visual	✓	✓	✗	✗	✗	✗	*N/A*	✗	✗	✗
Traffic & Transport	✗	✓	✗	✗	✓	✓	✗	*N/A*	✗	✓
Archaeology & Cultural Heritage	✗	✗	✗	✗	✗	✗	✗	✗	*N/A*	✗
Material Assets	✗	✓	✓	✗	✗	✗	✗	✓	✗	*N/A*

✓ Interaction ✗ No interaction

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16 Schedule of Mitigation

16.1 Introduction

This EIAR has assessed the impacts and resulting effects likely to occur as a result of the Proposed Development on the aspects of the receiving environment, grouped under the following headings:

- Population & Human Health
- Biodiversity
- Lands, Soils & Geology
- Hydrology & Hydrogeology
- Air, Odour & Climate
- Noise & Vibration
- Landscape & Visual
- Traffic & Transportation
- Archaeology & Cultural Heritage
- Material Assets

Annex IV(7) of the EIA Directive, as amended, requires that the EIAR should include '*a description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases"*.

The Proposed Development will be constructed and operated in a manner that will ensure that the potential impacts on the receiving environment are avoided where possible. Where impacts or potential impacts have been identified, mitigation measures have been proposed to reduce the significance.

This Chapter of the EIAR collates and summarises the mitigation and monitoring measures detailed in **Chapter 5.0** to **Chapter 14.0.**

Mitigation and monitoring measures proposed during the construction phase are outlined in **Chapter 16** and the **Construction Environmental Management Plan (CEMP)** which accompanies this planning application**.** The main contractor appointed to construct the development will be obliged to carry out the programme of works in strict accordance with the CEMP, thus minimising the effects of the construction phase on the local environmental receptors. The local authority will be responsible for enforcing the conditions of the CEMP.

Mitigation and monitoring measures proposed during the operational phase are outlined in **Chapter 16**. The site will be operated under an Industrial Emissions Licence and will be regulated by the Environmental Protection Agency (EPA), Department of Agriculture, Food and the Marine (DAFM) and the Local Authority (Limerick City and County Council).

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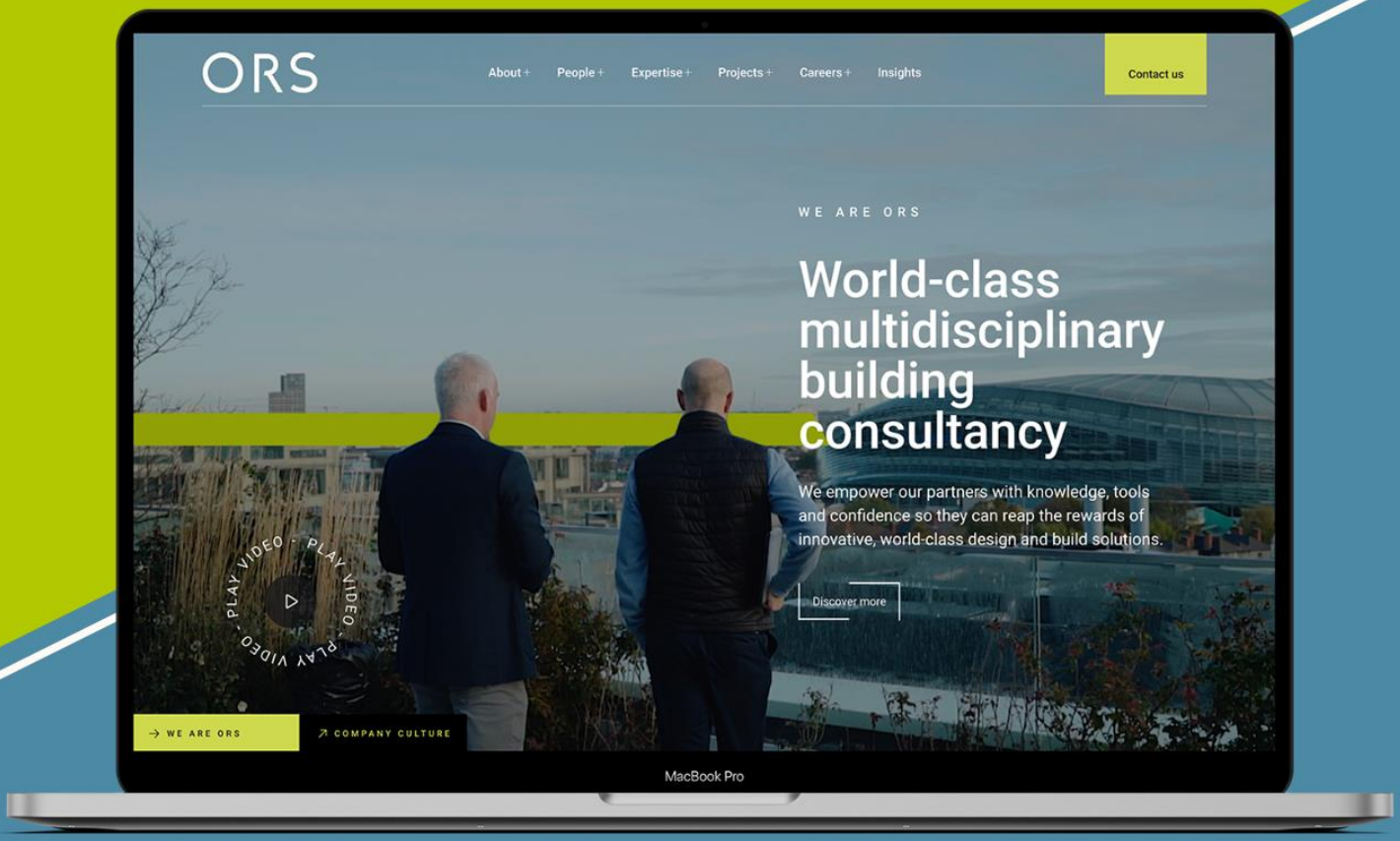

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