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JSA Planning & Development Consultants

Environmental Impact Assessment Report (EIAR)

Anaerobic Digestion Facility

CLIENT

Nephin Renewable Gas

Corracunna Ltd.

Nephin Renewable Gas

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1 Introduction

1.1 Introduction

Nephin Renewable Gas - Corracunna Limited (the Applicant) are pleased to submit this EIAR in support of a planning application for the construction and operation of an Anaerobic Digestion Facility at a site in the townlands Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork.

Occupying an area of circa 5.61 hectares, the development will accept and treat 90,000 tonnes per annum of locally sourced agricultural manures, slurries, food processing residues and crop-based feedstocks to produce grid quality biomethane (renewable natural gas) suitable for direct injection into the Gas Network Ireland (GNI) distribution network. The renewable natural gas (RNG) produced at the facility will be used as a direct replacement for conventional natural gas and in doing so contribute towards the Government's Climate Action Plan to develop 5.7TWh of indigenous biomethane production by 2030. In addition to RNG, the facility will produce a nutrient rich biobased fertiliser which can be used as a direct replacement for fossil fuel derived fertiliser. The facility will also be specified to allow the recovery of biogenic carbon dioxide (CO_2).

The development will consist of the following:

- Demolition of existing single storey disused agricultural buildings, silos, and tank within the western portion of the site (total demolition gross floor area (GFA) of c. 1,781 sq.m). One single storey agricultural building (with a GFA of 87.8 sq.m) will be stabilised and retained as a biodiversity building.

- Construction of 3 no. digesters (c. 15.5m in height), 2 no. digestate storage structures (c. 15.5m and 11m in height), 2 no. liquid storage tanks (c. 12.2m in height), and a liquid feed tank (c. 8m in height) located in the southeast portion of the site.

- 3 no. pasteurisation tanks (each c. 6m in height), a post pasteurisation cooling tank (c. 12.2m in height) and pre fertiliser manufacturing tank (c. 12.2m in height) located in the centre of the site.

- A part single-storey and part two-storey reception hall (with a GFA of c. 2,112.6 sq.m and an overall height of c. 15.5m) to accommodate a laboratory, panel room, tool store, workshop, and storage areas, with a liquid feed intake adjacent to the reception hall, located in the central portion of the site, to the north of the digesters.

- A single-storey solid digestate storage and nutrient recovery building (with a GFA of c. 879.9 sq.m and an overall height of c. 12.4m in height) located to the west of the reception hall, in the central portion of the site.

- Odour abatement plant (c. 6m in height) and equipment, a digestate offtake area, and a fuel tank (c. 1.6m in height) will be provided to the north of the solid digestate storage and nutrient recovery building.

- Construction of an ESB substation (c. 3.4m in height), 2 no. CO_2 tanks (c. 14.5m in height), along with associated plant structures including a CO_2 loading pump, CO_2 auxiliaries, CO_2 liqueufactor, a CO_2 compressor (c. 6.7m in height), and a CO_2 pre-treatment skid, located in the southwest portion of the site.

- Construction of a biogas treatment skid, a biogas compression system, a biogas upgrading module (with an overall height of c. 5.1m) and a grid injection unit within a fenced compound (c. 2.8m in height), located within the southwestern portion of the site.

- Construction of an emergency biogas flare (c. 11.3m in height) and 2 no. propane tanks (c. 1.3m in height) located further to the west of the site.

- Construction of an O_2 generation unit (c. 2.6m in height), a biomethane boiler (c. 5.6m to top of flue stack) a combined heat and power (CHP) unit and panel room (with a maximum height of c. 6m to top of flue), 2 no. pump houses (c. 2.6m in height, each with a GFA of c. 29 sq.m) located in the southwestern portion of the site.

- Construction of a two-storey ancillary office and administration building (with an overall height of c. 8.6m and a GFA of c. 271.5 sq.m) located within the western portion of the site, adjacent to the main site entrance.

- A discharge pipe route extending to the northwest of the main anaerobic digestion facility site, crossing the L90831 and through agricultural lands to the River Funshion.

- Alterations to the adjacent local road (L90831), to allow for improved access and safety, including provision of a passing bay and setting back of boundaries alongside the site entrance.

- Provision of landscaping and tree planting, including the provision of an extensive treeline alongside the N73 to the southeast of the main site area, along with additional landscaping and planting on lands to the west of the L90831.

- Associated and ancillary works including parking (16 no., including 3 no. EV and 1 no. accessible parking spaces), and bike storage (10 no. spaces), access arrangements (including new access points to the site from the L90831 to the west), internal roads, bunds, a weighbridge, wastewater treatment equipment, attenuation pond, boundary treatments, lighting, services, lightning protection masts, drainage, and all associated and ancillary works.

The application is accompanied by an Environmental Impact Assessment Report (EIAR) and an Appropriate Assessment (AA) Screening Report.

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

1.2 The Applicant

Nephin Renewable Gas is a renewable energy company, located in Tipperary Town, Co. Tipperary. Nephin Renewable Gas is part of Nephin Energy, Ireland's largest domestic gas production company. Nephin Energy produces indigenous natural gas through its 43% share in the Corrib gas field and currently provides approximately 25% of the daily gas demand in Ireland. Nephin Renewable Gas is committed to making a meaningful contribution to the decarbonisation of Ireland's gas supply by developing *ca*. 1.2TWh of indigenous Irish biomethane around Ireland, and in doing so contributing towards the Climate Action Plan to develop 5.7TWh of indigenous biomethane.

Nephin Renewable Gas aims to become one of Ireland's largest producers of indigenous biomethane, building on the Group's existing position as Ireland's largest producer of domestic natural gas.

1.3 The Proposed Development Site

The Proposed Development site (herein referred to as 'the site') is located in the townlands of Corracunna, Coolnanave and Garrane approximately 2km northeast of the town of Mitchelstown, Co. Cork and approximately 43km northeast of Cork City, Co. Cork. The approximate grid reference location for the centre of the site is R 82966 14199, ITM: 582918, 614234.

The site location is depicted in **Figure 1.1**.

Figure 1.1: Proposed Development Site Location

The total site area measures *ca*. 5.61ha. The site is partially brownfield and contains a former piggery and disused agricultural buildings. The site is currently used as agricultural pastureland in part and bounded to the north, south, east, and west by further agricultural pastureland. An operational piggery is located ca. 300m to the north.

The site is adjacent to the N73 national road directly to the south. The L90813 local road is located directly west of the site.

Further site-specific details and existing environmental conditions relevant to each assessment topic are outlined in detail within **Chapters 5.0** to **14.0** of this EIAR.

1.4 Environmental Impact Assessment

The European Union (EU) Directive 2011/92/EU, amended by EU Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive'), requires Member States to ensure that a competent authority carries out an assessment of the likely significant effects of certain types of projects, as listed in Directive prior to development consent being given for the project.

EIA is a process for anticipating and predicting the effects on the environment caused by a

project. It is defined in Article 1(2)(g) 4 of the amended Directive as a process consisting of:

1. The preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);
2. The carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;
3. The examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;
4. The reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and
5. The integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a.

The 'EIA Directive' 2014/52/EU, as amended, was transposed into Irish planning legislation by the Planning and Development Acts 2000 to 2019 and the Planning and Development Regulations 2001 to 2019.

In accordance with the relevant legislation, the EIA of the Proposed Development will be undertaken by Cork County Council as the Competent Authority.

1.5 Environmental Impact Assessment Screening

Screening is the term used to describe the process of determining whether a Proposed Development requires an EIA, by reference to mandatory legislative threshold requirements or by reference to the type and scale of the Proposed Development and the significance or the environmental sensitivity of the receiving baseline environment.

Annex I to 'EIA Directive' 2014/52/EU, as amended, requires as mandatory the preparation of an EIA for all developments listed therein. Projects listed in Annex II to the Directive are not automatically subjected to EIA, however Member States can decide to subject such developments to an assessment on a case-by-case basis or according to thresholds and/or criteria, for example size, location and potential impact.

In Ireland, Schedule 5 (Part 1 and Part 2) of the Planning and Development Regulations 2001-2019, as amended, transposes Annex I and Annex II to the 'EIA Directive' 2014/52/EU, as amended.

In the context of the Proposed Development, the most relevant project type in Schedule 5 of the Planning and Development Regulations 2001-2019, as amended, is identified in Part 2, Class 11 (b) Other Projects:

(b) Installations for the disposal of waste with an annual intake greater than 25,000 tonnes not included in Part 1 of this Schedule.

It is therefore concluded that there is a mandatory requirement to undertake an EIA of the Proposed Development. Accordingly, an EIA of the Proposed Development is required to be conducted by the Competent Authority, Cork County Council, prior to deciding on development consent.

1.6 Environmental Impact Assessment Scoping

The purpose of EIAR Scoping is to identify the information to be contained in an EIAR and the

methodology to be used in gathering and assessing that information. It should provide focus for the EIAR, enabling the EIA to be appropriately tailored to the likely significant impacts on the environmental factors set out in Article 3(1) of amended Directive.

Article 3(1) prescribes a range of environmental factors which must be addressed. The EIAR shall identify, describe, and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

a) Population and human health;
b) Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
c) Land, soil, water, air and climate;
d) Material assets, cultural heritage and the landscape;
e) The interaction between the factors referred to in points (a) to (d).

An EIAR scoping exercise based on the nature of the Proposed Development has been conducted to identify the key issues that may be considered likely to have a significant effect on the environment. The scoping exercise was based upon the available baseline information on the site and the feedback received during the pre-application consultation meetings held with Cork County Council. The recommendations of consultees have further informed the scope of the assessments undertaken and the contents of the EIAR.

The following environmental topics have been identified for assessment in the context of the Proposed Development:

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

1.7 Environmental Impact Assessment Report Methodology

This EIAR has been prepared in line with the Planning and Development Act, 2000 S.I. No. 30/2000, as amended, and associated Regulations having regard to the following guidelines.

- European Commission (EC) (2017) *Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report* (Directive 2011/92/EU as amended by 2014/52/EU)
- EPA (2022) *Guidelines on the Information to be contained in Environmental Impact Assessment Reports*;
- EPA (2015) *Advice Notes on Current Practice (in the preparation on Environmental Impact Statements)*; and
- Department of Housing, Planning and Local Government (2018) *Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment*.

Further specific reference documents are cited within the environmental topic chapters of this

EIAR, as appropriate.

1.7.1 Baseline Assessment

Annex IV(3) of the 'EIA Directive', as amended, requires 'a description of the relevant aspects of the current state of the environment, referred to as the baseline scenario, and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge'.

The Baseline Assessment is an assessment of the current state of the environment and how this is likely to evolve without the proposed project but having regard to existing and approved projects and likely significant cumulative effects – in other words the 'do nothing' scenario.

Within each technical chapter, the standard recognised methodology used in establishing the baseline scenario is documented in detail to enable replicable monitoring in the future, so that the future assessment results can be appropriately compared.

1.7.2 Identification of Potential Receptors

A receptor is defined in the EPA Guidelines 2022 as "any element in the environment which is subject to impacts". The environmental impact will depend on the relationship between the source, the available pathway and the sensitivity of the receptor identified. Topic specific receptors have been identified in each technical chapter.

1.7.3 Identification of Likely Significant Impacts

Where appropriate, the evaluation of effects on the environment has been evaluated according to the criteria outlined in **Table 1.1** as referenced in the 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2022).

Each effect is considered in terms of its quality, significance, extent, duration and frequency, and where possible type. The use of standardised terminology for the classification of effects ensures that the EIAR employs a systematic approach to impact assessment, which is replicated across all environmental topics covered within the EIAR.

Table 1.1: Description of Effects (EPA, 2022)

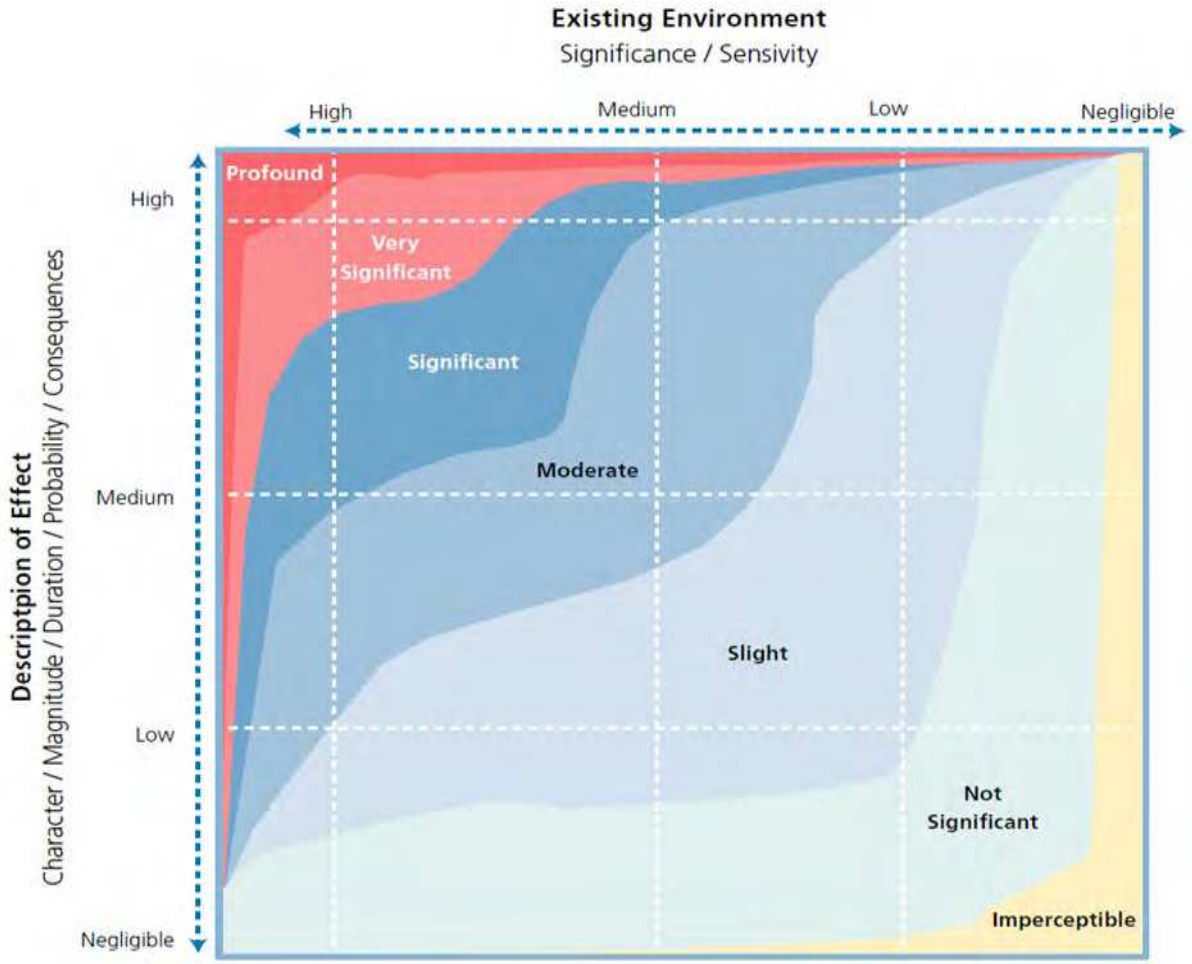
Quality of Effects	**Positive Effects** A change which improves the quality of the environment (for example, by increasing species diversity, or improving the reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
	Neutral Effects No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative/Adverse Effects A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem, or damaging health or property or by causing nuisance).
Describing the Significance of Effects	**Imperceptible** An effect capable of measurement but without significant consequences.
	Not Significant An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight Effects

	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate Effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant Effects An effect which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the environment.
	Very Significant An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.
	Profound Effects An effect which obliterates sensitive characteristics.
Describing the Extent and Context of Effects	**Extent** Describe the size of the area, the number of sites and the proportion of a population affected by an effect.
	Context Describe whether the extent, duration or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the Probability of Effects	**Likely Effects** The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely Effects The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Describing the Duration and Frequency of Effects	**Momentary Effects** Effects lasting from seconds to minutes.
	Brief Effects Effects lasting less than a day.
	Temporary Effects Effects lasting less than a year.
	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.
	Reversible Effects Effects that can be undone, for example through remediation or restoration.
	Frequency of Effects Describe how often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).
Describing the Types of Effects	**Indirect Effects (a.k.a. Secondary or Off-site Effects)** Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative Effects The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.
	'Do-nothing Effects' The environment as it would be in the future should the subject project not be carried out.
	'Worst-case' Effects The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable Effects When the full consequences of a change in the environment

	cannot be described.
	Irreversible Effects When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
	Residual Effects The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic Effects Where the resultant effect is of greater significance than the sum of its constituents (e.g., combination of SOx and NOx to produce smog).

Figure 1.2 illustrates how comparing the character of the predicted effect to the sensitivity of the receiving environment can determine the significance of the effect.

Figure 1.2: Determining Significance (Source: EPA, 2022)



1.7.4 Mitigation and Monitoring

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.

Mitigation by Avoidance has been incorporated into the design of the Proposed Development, as described in **Chapter 3 – Consideration of Alternatives.** Additional mitigation by prevention and reduction, with planned monitoring measures that have been proposed for each environmental topic are set out in each technical chapter within this EIAR.

A summary schedule of all proposed mitigation and monitoring measures is included in **Chapter 16 – Schedule of Mitigation**.

1.7.5 Residual Impacts

The residual impacts are the final predicted or intended effects which occur after the proposed mitigation measures have been implemented. Residual impacts that remain once additional mitigation has been implemented are discussed in each technical chapter within this EIAR.

1.7.6 Cumulative Effects

Cumulative effects take account of the addition of many minor or significant effects to create larger, more significant effects. As outlined in the EPA Guidelines 2022, while a single activity may itself result in a minor effect, it may, when combined with other impacts (minor or significant), result in a cumulative impact that is collectively significant. A single effect which may, on its own, have a significant effect, may also have a reduced and insignificant impact when combined with other effects. Cumulative effects are assessed and discussed within each technical chapter in this EIAR.

1.7.7 Interactions between Environmental Factors

Interactions between effects may arise from the reaction between effects of the Proposed Development on different aspects of the environment which may exacerbate the magnitude of those effects. Such interactions are assessed and are presented in **Chapter 15 - Interactions** of this EIAR.

1.8 EIAR Structure

The information to be provided by the applicant within the EIAR must, at least, address the matters detailed in Article 5(1)(a) to (f) of the 'EIA Directive', as amended, outlined below:

a) A description of the project comprising information on the site, design, size and any other relevant features of the project;
b) A description of the likely significant effects of the project on the environment;
c) A description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
d) A description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;
e) A non-technical summary of the information referred to in points (a) to (d)
f) Any additional information specified in Annex IV of the Directive/Schedule 6 to the 2001 Regulations, as amended, relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.

The EIAR has been prepared to address the matters outlined above and structured in accordance with the following best practice guidelines:

- European Commission (EC) (2017) *Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report* (Directive 2011/92/EU as amended by 2014/52/EU)
- EPA (2022) *Guidelines on the Information to be contained in Environmental Impact Assessment Reports*;
- EPA (2015) *Advice Notes on Current Practice (in the preparation on Environmental Impact Statements)*; and
- Department of Housing, Planning and Local Government (2018) *Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment*.

This EIAR is presented in four volumes as follows:

- Volume I: Non-Technical Summary
- Volume II: Environmental Impact Assessment Report
- Volume III: Appendices to the Environmental Impact Assessment Report
- Volume IV: Drawings

Volume II: Environmental Impact Assessment Report is presented as 16 chapters, as outlined in **Table 1.2** below.

Table 1.2: Chapter Structure

Chapter	Title	Author	Organisation
1.0	**Introduction & Methodology** Sets out the background to, and location of, the Proposed Development, as well as providing details on the EIA process.	Jack Wilton / Oisín Doherty	**ORS** Block A | Marlinstown Office Park | Mullingar | Co. Westmeath | N91 W5NN
2.0	**Project Description** Describes the context of the Proposed Development, the design, and physical nature of the development and its use, including operational processes.	Oisín Doherty	**ORS**
3.0	**Consideration of Alternatives** Describes the alternatives considered including site selection, design iterations and alternative technologies.	Oisín Doherty	**ORS**
4.0	**Planning & Policy Context** Summarises 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.	Luke Wymer Mark Fitzgibbon	**John Spain Associates** 39 Fitzwilliam Place | Dublin 2 | D02 ND61
5.0	**Biodiversity** Addresses the requirement to assess potentially significant effects on biodiversity, having particular attention to species and habitats protected under the EU Habitats Directive and the Birds Directive.	Noreen McLoughlin	**Whitehill Environmental**
6.0	**Population & Human Health**	Luke Wymer	**John Spain Associates**

	Addresses the requirement to assess potentially significant effects on population and human health.	Mark Fitzgibbon	
7.0	**Land, Soils and Geology** Addresses the requirement to assess the type of land, soil, and geology in the area of the Proposed Development and identifies any potentially significant effects.	Jack Wilton Cathal Tighe	**ORS**
8.0	**Hydrology & Hydrogeology** Addresses the requirement to assess potentially significant effects to surface and ground water quality.	Bianca Severgnini Anna Quaid	**ORS**
9.0	**Air, Odour & Climate** Addresses the requirement to assess potentially significant effects to air quality in the surrounding environment.	Neil Kelly Christopher Irwin	**ORS** **Irwin Carr Consulting** 7 Osborne Promenade | Warrenpoint | Newry BT34 3NQ
10.0	**Noise & Vibration** Addresses the requirement to assess potentially significant effects from noise and vibration emissions.	Gary Duffy David Courtney	**Enfonic** Century Business Park | Unit 2A | Dublin | D11 T0HV
11.0	**Landscape & Visual** Addresses the requirement to assess potentially significant effects on landscape and visual characteristics.	Anthony Ryan Geraldine Hayes	**Hayes Ryan Landscape Architects**
12.0	**Traffic & Transport** Addresses the requirement to assess potentially significant effects on traffic and transport infrastructure.	Angeliki Kalatha Adam Price	**ORS**
13.0	**Archaeology & Cultural Heritage** Addresses the requirement to assess potentially significant effects on archaeological and cultural heritage.	Declan Moore	**Moore Group** 3 Gort na Rí | Athenry | Co. Galway
14.0	**Material Assets** Addresses the requirement to assess potentially significant effects on material assets i.e., existing utilities and infrastructure.	Killian Smith	**ORS**
15.0	**Interactions** Provides an assessment of the interaction between all of the environmental aspects referred to in this EIAR.	ORS	**ORS**
16.0	**Summary of Mitigation** Describes mitigation and monitoring measures in order to avoid, prevent, reduce, or if possible, offset any identified significant adverse effects on the environment.	ORS	**ORS**

Each technical assessment chapter, i.e., **Chapters 5.0** to **14.0** adopts the following structure:

- Introduction
- Consultation
- Assessment Methodology & Significance Criteria

- Description of the Receiving Environment
- Likely Significant Effects
- Mitigation Measures
- Cumulative Effects
- Residual Effects
- Monitoring
- Summary of Significant Effects
- Statement of Significance

A schedule of drawings included in **Volume IV: Drawings** is presented below.

Table 1.3: Schedule of Drawings

Name	Scale	Drawing number
SITE LOCATION MAP	1:2500	231925-ORS-ZZ-00-DR-AR-100
EXISTING SITE SURVEY SHEET 1 OF 3	1:500	231925-ORS-ZZ-00-DR-AR-102
EXISTING SITE SURVEY SHEET 2 OF 3	1:500	231925-ORS-ZZ-00-DR-AR-103
EXISTING SITE SURVEY SHEET 3 OF 3	1:500	231925-ORS-ZZ-00-DR-AR-104
EXISTING STRUCTURES PLANS & ELEVATIONS 01, 02, 03, 04, 05 & 06	1:200	231925-ORS-ZZ-ZZ-DR-AR-105
EXISTING STRUCTURES PLANS & ELEVATIONS 07, 08, 09 & 10	1:200	231925-ORS-ZZ-ZZ-DR-AR-106
PROPOSED SITE LAYOUT SHEET 1 OF 3	1:500	231925-ORS-ZZ-00-DR-AR-200
PROPOSED SITE LAYOUT SHEET 2 OF 3	1:500	231925-ORS-ZZ-00-DR-AR-201
PROPOSED SITE LAYOUT SHEET 2 OF 3	1:500	231925-ORS-ZZ-00-DR-AR-202
PROPOSED STRUCTURES 01, 03, 05, 07, 50, TYPICAL PUMP & HEAT EXCHANGER	1:100	231925-ORS-ZZ-ZZ-DR-AR-210
PROPOSED STRUCTURES 51, 53, 54 & 55	1:200	231925-ORS-ZZ-ZZ-DR-AR-211
PROPOSED STRUCTURES 52, 56, 57, 58, 59, 61 & 62	1:100 & 1:200	231925-ORS-ZZ-ZZ-DR-AR-212
PROPOSED STRUCTURES 63, 64, 65, 67 & 68	1:100 & 1:200	231925-ORS-ZZ-ZZ-DR-AR-213
PROPOSED STRUCTURES 76, 77, 101, 102, 103, 104, 105, 106 & 109	1:100	231925-ORS-ZZ-ZZ-DR-AR-214
PROPOSED STRUCTURES 108, 110, 111, 112, 114 & 115	1:100	231925-ORS-ZZ-ZZ-DR-AR-215
PROPOSED STRUCTURES 00, 116, 118, 119 AND LIGHTNING FINIALS	1:100	231925-ORS-ZZ-ZZ-DR-AR-216
PROPOSED CONTINGUOUS ELEVATIONS	1:200	231925-ORS-ZZ-ZZ-DR-AR-217
GENERAL LAYOUT SURFACE WATER DRAINAGE / SUDS REGIME WASTEWATER / WATER SUPPLY	1:500	24055-DR-0501_issue PL01
SITE SECTIONS	1:500	24055-DR-0502_issue PL01
LONGITUDINAL SECTIONS THROUGH SURFACE WATER DRAINS	1:500	24055-DR-0503_issue PL01
SWEPT PATH FOR ARTICULATED VEHICLE THROUGH FACILITY	1:500	24055-DR-0504_issue PL01

1.9 Statement of Competency

Article 5(3)(a) of the EIA Directive, as amended, requires that "the developer/applicant shall ensure that the environmental impact assessment report is prepared by competent experts".

This EIAR has been prepared and managed by ORS on behalf of the applicant. The range of expertise required within the EIAR project team has been identified during the scoping exercise, considering the significance, complexity, and range of effects to be assessed.

The EIAR project team outlined below possesses an appropriate combination of experience, expertise, and knowledge to ensure that the information provided by the applicant for the purpose of its examination by the competent authority is complete and of a high standard.

1.9.1 ORS

Oisin Doherty - Senior Environmental Consultant

Oisín Doherty holds a BSc. (Hons.) in Geography with Environmental Science from Ulster University, 2009, and a MSc. in Environmental Management from Queens University, 2011. Oisin has 15 years' experience in Anaerobic Digestion, Environmental Impact Assessment, Environmental Monitoring and Assessment, Environmental Licence Compliance and Waste Management.

Prior to joining ORS, Oisin spent 4 years as Environmental Manager and Plant Manager of two large-scale Biogas facilities operating under EPA and DAFM license conditions, gaining in-depth knowledge of Anaerobic Digestion, Biomethane and Biogenic CO_2 production, Organic Waste Management, Environmental Licence Compliance and ISO14001 Environmental Management Systems.

Oisin is a Full Member of the Institute of Environmental Sciences (MIEnvSc) and a Charted Environmentalist (CEnv).

Luke Martin – Associate Director - Environmental Team Lead

Luke Martin holds a B.A. (Hons) in Natural Science from Trinity College Dublin, 2012, and a MSc. in Sustainable Energy and Green Technology from University College Dublin, 2015.

Luke has 12 years' experience across all aspects of environmental assessment including contaminated land, flood risk assessment, noise and air monitoring, and licence compliance / applications for a wide range of projects. Luke specialises in the field of Environmental Due Diligence, Industrial Emissions Licence Compliance, Environmental Planning and EIAR co-ordination.

Luke is a Full Member of the Ireland Brownfield Network (IBN), The Institution of Environmental Science (IES) and achieved Chartered Environmentalist (CEnv) status in 2022.

Cathal Tighe (ORS) – Senior Environmental Consultant

Cathal Tighe holds a B.Agr.Sc (Hons) in Agricultural-Environmental Science from University College Dublin in 2017 and has a background in Horticulture from Dublin City University and Teagasc.

Cathal has 4 years' experience working within the agri-environmental research and development sector within Ireland. Cathal has developed novel aerobic composting processes

for the stabilisation of end-of-life substrates, and recycling processes to recover, rehydrate and reuse spent horticultural peat in the protected cropping industry.

Jack Wilton – Environmental Consultant

Jack Wilton holds a B.Sc (Hons) in Microbiology, 2016 and an M.Sc in Environmental Sustainability, 2023 from UCD. Jack has a strong foundation in environmental science and sustainability. Jack specialises in environmental assessments, and technical writing related to both environmental and agricultural sectors. Jack possesses experience in analysis and interpretation with a focus on environmental impact.

Neil Kelly - Senior Environmental Consultant

Neil Kelly holds a B.A. (Hons) in Environmental Science and Health from Dublin City University (DCU), 2015.

Neil has 10 years' experience in the assessment of air quality a for a wide range of projects. Neil is an MCERTS Air and Emission certified Team Leader. Neil specialises in the fields of air dispersion modelling, stack emissions, air quality monitoring and Industrial Emissions Licence requirements.

Anna Quaid - Environmental Consultant

Anna Quaid holds a B.Sc. (Hons) in Environmental Science from Munster Technological University, 2021, and a MSc. in Applied Environmental Science from University College Dublin, 2022.

Anna has 4 years' experience in the assessment of hydrogeology for a wide range of projects. Anna has completed training in site suitability assessments for domestic on-site wastewater treatment (QQI). Anna specialises in the fields of hydrogeological analysis, pollutant fate modelling and contaminated land.

Killian Smith - Environmental Consultant

Killian Smith holds a B.Agr.Sc in Agri-Environmental Science from UCD, 2017.

With a strong foundation in environmental science, Killian specialises in environmental assessments, auditing and compliance related to both environmental and agricultural sectors. Killian possesses experience in data analysis and interpretation with a focus on environmental impact.

Angeliki Kalatha – Infrastructure Engineer

Angeliki holds an MSc in Civil Engineering from Aristotle University of Thessaloniki (A.U.Th.), 2014, and an MSc in Engineering Project Management from A.U.Th., 2016. She is a member of Engineers Ireland and the Technical Chamber of Greece.

Angeliki is a Senior Transportation Engineer with ORS, bringing eight years of professional experience in transportation and infrastructure development. She has contributed to various transportation projects, including traffic analysis, Traffic and Transport Assessments, and initiatives promoting active travel and sustainable mobility. She is skilled in using TRL Junctions 10 and TRANSYT software for modelling and analysing roundabouts, priority junctions and signalised junctions.

Adam Price – Infrastructure Lead

Adam Price holds a BEng (Hons) in Civil Engineering from DIT, 2012 and BEng Construction and Civils Works (2009) and is a qualified TII Road Safety Auditor (2015) (Auditor No AP275695).

Adam is a Chartered Engineer with over 12 years' post graduate experience in consulting engineering. Adam's experience also includes carrying out Road Safety Audits and Traffic and Transport Assessments on various schemes on the national road network in Ireland, including the design review and assessment of a wide range of proposed developments including housing schemes, industrial business parks, hospitals, and schools.

1.9.2 Enfonic

Gary Duffy - Principal Consultant

Gary Duffy, BEng, MIOA is the managing director of Enfonic with over 25 years' experience as an acoustic engineer and consultant. He has extensive knowledge in the field of noise measurement, prediction, and impact assessment. He co-wrote the EPA's original guidance note on noise and represented the Institute of Acoustics (IOA) on the technical advisory committee of the Department of the Environment's revision of Part E (Sound Insulation) of the Building Regulations. He is a founder member of the Irish branch of the Institute of Acoustics and a sitting member of the current committee.

David Courtney - Consultant & Technical Manager

David Courtney, BEng, MIOA (Consultant & Technical Manager) studied Mechatronic Engineering in DCU and qualified with IOA Diploma in Acoustics and Noise Control (2019) & Certificate in Environmental Noise Measurements (2017). He undertakes all types of noise and vibration surveys in relation to wind turbines planning and compliance, IPPC & IE compliance, BS4142, BS5228 and BS8233 assessments, traffic noise, construction, building acoustics and occupational assessments.

1.9.3 Hayes Ryan Landscape Architects

Assessment for this LVIA is being conducted by Geraldine Hayes and Anthony Ryan of Hayes Ryan Landscape Architects. Hayes Ryan are experienced landscape architects and landscape consultants with a wide array of experience in landscape design, management and landscape and visual impact assessment on public and private projects in both urban and rural environments. The partners competency ranges from standalone nationwide landscape architect, led projects to collaboration as part of multidisciplinary teams over a period of 25 years.

Geraldine Hayes - Partner - Landscape Architect

Geraldine Hayes holds a B.Agr.Sc. (Honours) in Landscape and Horticulture, and a MSc. in Landscape Architecture. Geraldine has 25 years' experience in Landscape Architecture, Horticulture, Irish cultural landscapes, LVIA studies, Community Development, Historic Landscapes, Landscape Design, Landscape Ecology and Planning.

Anthony Ryan Partner - Landscape Architect

Anthony Ryan also holds a B.Agr.Sc. (Honours) in Landscape and Horticulture, and a MSc. in Landscape Architecture. Anthony has 25 years' experience in Landscape Architecture,

Horticulture, Detailed Site Design, Large Scale Residential Developments, Theme Park Design, Healthcare and Hospitality Projects.

1.9.4 Moore Group

Declan Moore - Managing Director

Declan Moore studied Archaeology and English at University College Galway, graduating in 1991. He obtained a Certificate in Management Studies in 1994 and became a Licence eligible archaeologist in 1999. Since graduating he has gained over 30 years' experience as a field archaeologist and consultant. Declan is a Member of the Institute of Archaeologists of Ireland and the European Association of Archaeologists. As Managing Director of Moore Group Declan has managed large-scale excavations as well as the cultural heritage elements of numerous urban and rural housing and industrial developments. He has project managed the cultural heritage sections of EIAR's for over 300km of powerlines throughout Ireland, including the 400kV North South Interconnector, the Grid West scheme, the North Kerry Transmission Line Project the Eirgrid North Connacht project, the Cloon – Lanesboro scheme and the Great Island to Kilkenny upgrade scheme.

Most recently he has overseen the cultural heritage assessments of data centres as well as housing developments in Galway, Dublin and Mayo and water schemes and gas pipeline schemes nationwide. He has also recently completed project management of the N52 Grange to Clontail Scheme Route Assessment report and is currently overseeing archaeological work on the N5 Westport to Turlough road as well as consultation for the proposed Kings Island Flood Relief Scheme in Limerick City.

1.9.5 Whitehill Environmental

Noreen McLoughlin – Managing Director

Noreen McLoughlin, M.Sc., MCIEEM. has a degree in Natural Science (Trinity College, Dublin) and an MSc. in Freshwater Ecology (Trinity College, Dublin). She has over 15 years' experience in the ecological fields of conservation, impact assessment and water quality.

As a full member of the Chartered Institute of Ecology and Environmental Management CIEEM, Noreen is bound by this Institute's professional code of practice. A minimum of 30 hours of Continuous Professional Development is required per year for this organisation.

1.9.6 Irwin Carr Consulting

Shane Carr - Director

Shane has over 25 years' experience working in both the Public and Private sectors, with particular expertise in the areas of environmental noise, modelling as well as staff and project management. Shane has been working as a consultant since 2007, joining Marshall Day in 2010 and subsequently becoming a Director in Irwin Carr in 2016. In this time he has carried out noise modelling projects throughout Ireland and the UK and is currently the SoundPLAN distributor for Irwin Carr in Ireland.

Shane has a broad range of experience in all aspects of noise including environmental noise assessment and control. He has presented expert evidence on a number of occasions for a range of planning issues and environmental noise assessments.

Christopher Carr – Consultant

Christopher graduated from the University of Ulster at Jordanstown with a BSc (Hons) degree in Environmental Health and has recently completed a post graduate Diploma in Acoustics and Noise Control at Trinity College Dublin.

Christopher has carried out an extensive number of noise impact assessments for renewable energy developments. This process has involved the setting up of monitoring equipment for background noise surveys, liaising with local authorities, acoustic modelling using the SoundPLAN software package, as well as assessment in line with both ETSU-R-97 and the Institute of Acoustics Good Practice Guidance.

1.10 Appropriate Assessment Screening

Cork County Council (as the Competent Authority) are required to assess in view of best scientific knowledge, if the Proposed Development, individually or in combination with another plan or project is likely to have a significant effect on the European (or Natura 2000) site. To facilitate this requirement, an AA Screening Report (Document Ref: **231925-ORS-XX-XX-RP-EN-13d-005**) has been submitted to the Council for assessment.

1.11 Consultation and Engagement

In accordance with best practice guidelines this EIAR included stakeholder consultation throughout the project design, EIA screening and EIAR scoping stages. A summary of consultation and engagement with relevant local stakeholders, organisations and statutory bodies on the Proposed Development is presented in **Table 1.4** below.

Table 1.4: Consultation and Engagement

Date	Consultation Group	Topic	Consultation Team
June 2023 and ongoing	All residential dwellings in proximity to the Proposed Development	Met average of 2-3 family members per residence to discuss Proposed Development	Nephin Renewable Gas Team
June 2023 and ongoing	Local Agricultural Operators	Consultation and discussion around Feedstock supply	Nephin Renewable Gas Team
June 2023 and ongoing	Regional Industries	Consultation and discussion around Feedstock supply	Nephin Renewable Gas Team
15/09/2023	Environmental Protection Agency (EPA)	Consultation meeting on licensing	Nephin Renewable Gas Team
07/11/2023	Cork County Council	Economic Development Engagement	Nephin Renewable Gas Team
16/11/2023	Cork County Council	Pre-planning meeting	Nephin Renewable Gas Team, ORS, John Spain Associates
17/11/2023	Cork County Council	Submission on Draft Climate Action Plan	Nephin Renewable Gas Team
10/12/2023	Dept of Agriculture, Food and the Marine (DAFM)	Consultation meeting on Stage 1 application	Nephin Renewable Gas Team

09/01/2024	Dept of Agriculture, Food and the Marine (DAFM)	Clarification meeting on Stage 1 application	Nephin Renewable Gas Team
12/01/2024	Environmental Protection Agency (EPA)	Consultation meeting on Industrial Emissions licensing	Nephin Renewable Gas Compliance Officer
22/01/2024	Environmental Protection Agency (EPA)	Follow-up consultation meeting on Industrial Emissions licensing	Nephin Renewable Gas Compliance Officer
08/02/2024	Gas Networks Ireland (GNI)	Consultation on Gas Grid Connection Strategy	Nephin Renewable Gas Team
15/02/2024	Bord Bia/Food Safety Authority	Consultation on the Sustainable Dairy Assurance Scheme	Nephin Renewable Gas Team

1.12 Limitations encountered during preparation of EIAR.

There were no limitations encountered in compiling the information within the EIAR.

1.13 Viewing of EIAR

The EIAR will be available to view online via the Department of Planning, Housing and Local Government's EIA Portal, which will provide a link to the planning authority's website on which the application details are contained.

The EIAR and all associated planning documentation will also be available for viewing at the offices of Cork County Council. The EIAR may be inspected or purchased at a fee not exceeding the reasonable cost of making a copy during normal office hours at the following address:

- Cork County Council, Planning Department, Ground Floor, County Hall, Carrigrohane Road, Cork.
- Cork County Council Planning Department Opening Hours: Monday to Friday 9.00am - 4.00pm

2 Project Description

2.1 Introduction

The Applicant, Nephin Renewable Gas - Corracunna Limited, proposes to develop an Anaerobic Digestion Facility (herein referred to as the Proposed Development) on a site located in the townlands Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork.

This chapter will provide a detailed description of the Proposed Development and the key processes therein.

2.1.1 Description of the Proposed Development

The development will consist of the following:

- Demolition of existing single storey disused agricultural buildings, silos, and tank within the western portion of the site (total demolition gross floor area (GFA) of c. 1,781 sq.m). One single storey agricultural building (with a GFA of 87.8 sq.m) will be stabilised and retained as a biodiversity building.
- Construction of 3 no. digesters (c. 15.5m in height), 2 no. digestate storage structures (c. 15.5m and 11m in height), 2 no. liquid storage tanks (c. 12.2m in height), and a liquid feed tank (c. 8m in height) located in the southeast portion of the site.
- 3 no. pasteurisation tanks (each c. 6m in height), a post pasteurisation cooling tank (c. 12.2m in height) and pre fertiliser manufacturing tank (c. 12.2m in height) located in the centre of the site.
- A part single-storey and part two-storey reception hall (with a GFA of c. 2,112.6 sq.m and an overall height of c. 15.5m) to accommodate a laboratory, panel room, tool store, workshop, and storage areas, with a liquid feed intake adjacent to the reception hall, located in the central portion of the site, to the north of the digesters.
- A single-storey solid digestate storage and nutrient recovery building (with a GFA of c. 879.9 sq.m and an overall height of c. 12.4m in height) located to the west of the reception hall, in the central portion of the site.
- Odour abatement plant (c. 6m in height) and equipment, a digestate offtake area, and a fuel tank (c. 1.6m in height) will be provided to the north of the solid digestate storage and nutrient recovery building.
- Construction of an ESB substation (c. 3.4m in height), 2 no. CO_2 tanks (c. 14.5m in height), along with associated plant structures including a CO_2 loading pump, CO_2 auxiliaries, CO_2 liqueufactor, a CO_2 compressor (c. 6.7m in height), and a CO_2 pre-treatment skid, located in the southwest portion of the site.
- Construction of a biogas treatment skid, a biogas compression system, a biogas upgrading module (with an overall height of c. 5.1m) and a grid injection unit within a fenced compound (c. 2.8m in height), located within the southwestern portion of the site.
- Construction of an emergency biogas flare (c. 11.3m in height) and 2 no. propane tanks (c. 1.3m in height) located further to the west of the site.
- Construction of an O_2 generation unit (c. 2.6m in height), a biomethane boiler (c. 5.6m to top of flue stack) a combined heat and power (CHP) unit and panel room (with a maximum

height of c. 6m to top of flue), 2 no. pump houses (c. 2.6m in height, each with a GFA of c. 29 sq.m) located in the southwestern portion of the site.

- Construction of a two-storey ancillary office and administration building (with an overall height of c. 8.6m and a GFA of c. 271.5 sq.m) located within the western portion of the site, adjacent to the main site entrance.
- A discharge pipe route extending to the northwest of the main anaerobic digestion facility site, crossing the L90831 and through agricultural lands to the River Funshion.
- Alterations to the adjacent local road (L90831), to allow for improved access and safety, including provision of a passing bay and setting back of boundaries alongside the site entrance.
- Provision of landscaping and tree planting, including the provision of an extensive treeline alongside the N73 to the southeast of the main site area, along with additional landscaping and planting on lands to the west of the L90831.
- Associated and ancillary works including parking (16 no., including 3 no. EV and 1 no. accessible parking spaces), and bike storage (10 no. spaces), access arrangements (including new access points to the site from the L90831 to the west), internal roads, bunds, a weighbridge, wastewater treatment equipment, attenuation pond, boundary treatments, lighting, services, lightning protection masts, drainage, and all associated and ancillary works.

2.1.2 Site Location

General

The Proposed Development site is located in the townlands of Corracunna, Coolnanave and Garrane approximately 2km northeast of the town of Mitchelstown and 43km north of Cork City, Co. Cork. The approximate grid reference location for the centre of the site is R 82966 14199, ITM: 582918, 614234.

An overview of the site location is provided in **Figure 2.1**.

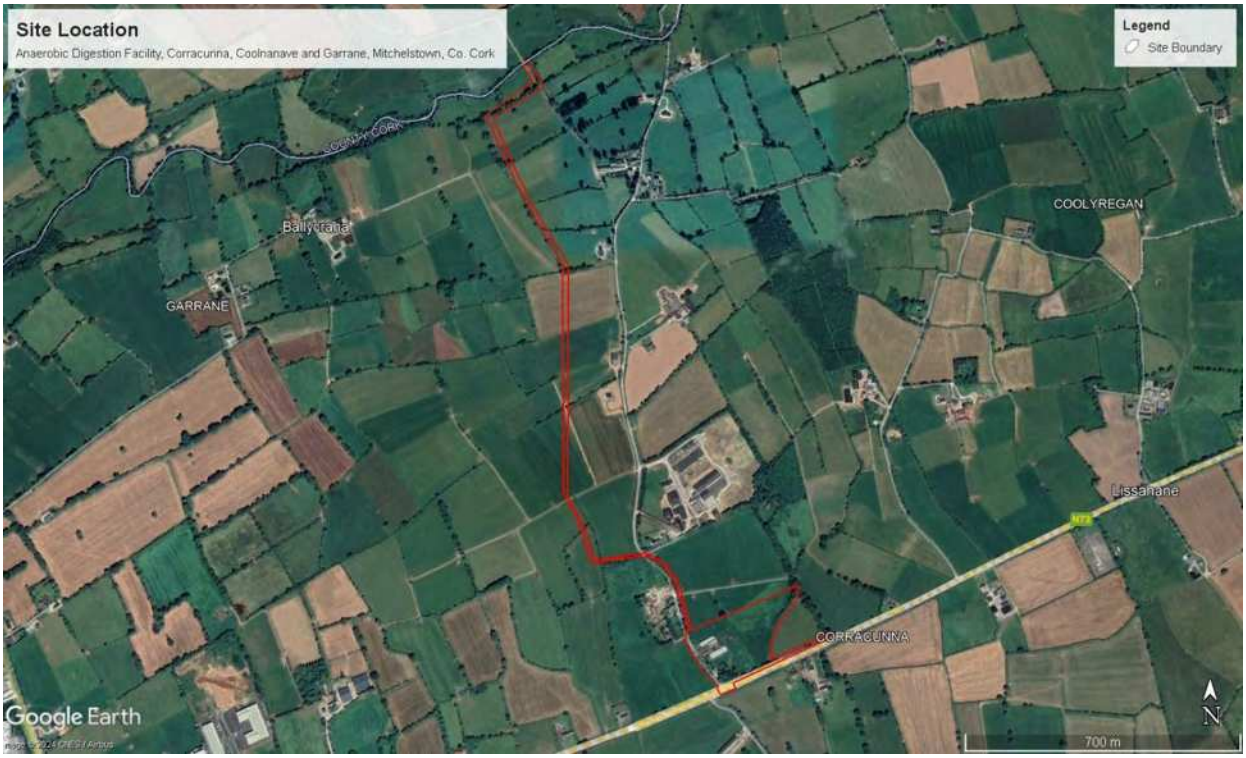


Figure 2.1: Site Location

The total site area measures ca. 5.61ha. The site is partially brownfield and contains a former piggery and disused agricultural buildings. The site is currently used as agricultural pastureland in part and bounded to the north, south, east, and west by further agricultural pastureland. An operational piggery is located ca. 300m to the north.

The site is adjacent to the N73 national road located directly to the south. The L90813 local road is located immediately to the west and provides access to the site.

Topography

The site is characterised as being flat to gently undulating. A peak in the site topography, 107.5m OD, is situated along the northwest boundary of the site with a gradual gradient to the southeast. to a low of 96.5m OD slightly north of the southern boundary of the site before rising to 98m OD along the southern boundary. The landscape in the immediate area surrounding the site has a gently undulating character, with slight variations in topography which is in keeping with the landscape character assessment of the site. To the northwest of the peak the land rises in a relatively steep gradient towards the northwest, with an elevation of 131m OD just south of the Funshion River.

The proposed approach road will be the existing local road off the L90813 local road to the west of the site boundary. The existing L90813 local road has a ground level of 98.5m OD at the junction of the N73 Dublin – Mallow Road and moderately slopes northwards along the site boundary to a level of 107.5m OD as it approaches the northwest corner of the Proposed Development.

Proximity to Designated Sites

The Proposed Development site is not within or immediately adjacent to any site that has been

designated as a Special Area of Conservation (SAC) or a Special Protection Area (SPA) under the EU Habitats or EU Birds Directive.

There are six European Designated sites within 15km of the Proposed Development, five of which are designated as Special Areas of Conservation (SACs), one of which are designated as a Special Protected Area (SPA) (Refer to **Chapter 5: Biodiversity**). These sites are illustrated in **Figure 2.1**.

An appraisal of the potential effects of the Proposed Development on the constitutive characteristics of European sites identified within 15km of the Proposed Development is set out in the Natura Impact Statement which accompanies the planning application.

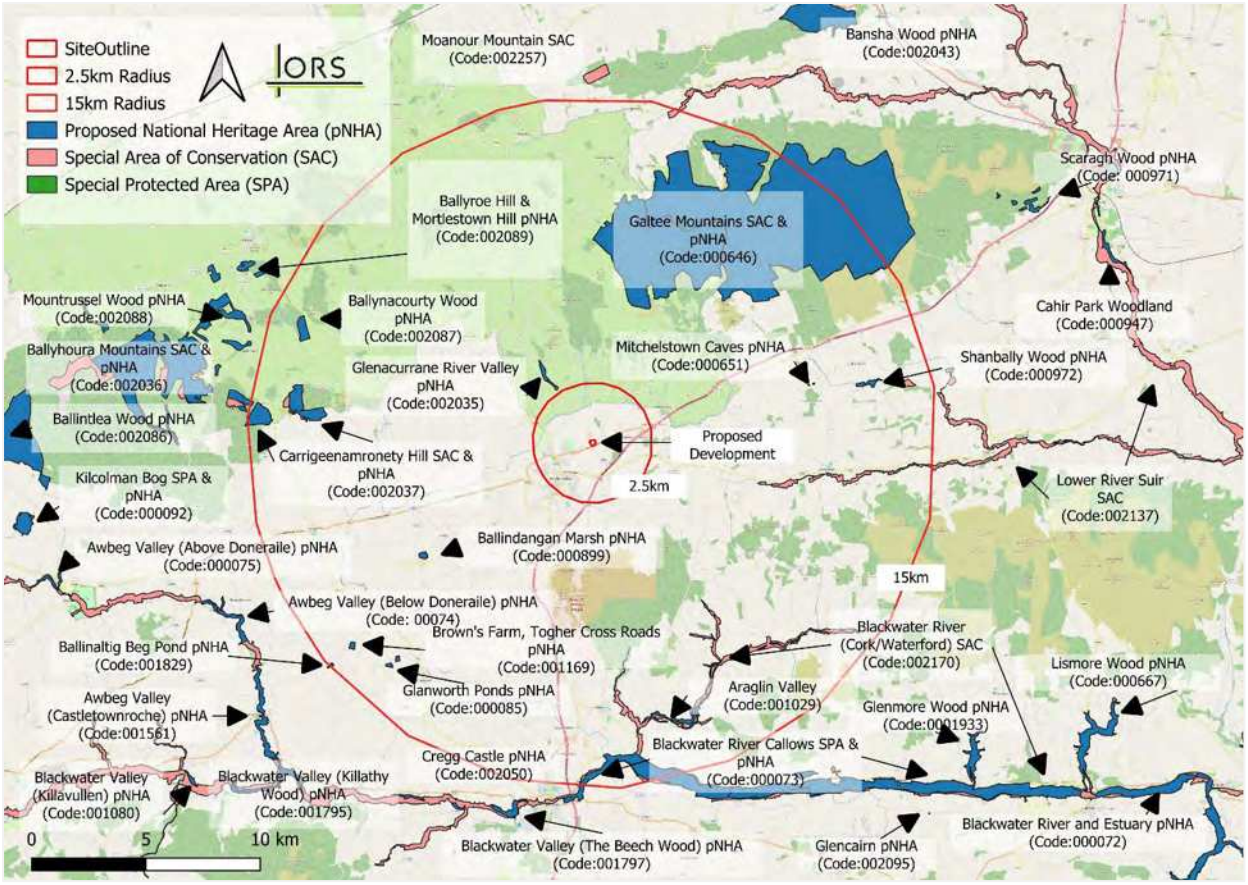


Figure 2.2: Map of Natura 2000 Sites within 15km of the Proposed Site

Habitat

No part of the site lies within nor is it immediately adjacent to any area that has been designated for nature conservation purposes. All proposed works within the site will take place in areas of low biodiversity value on a local level.

Within the former pig farm, the habitat is dominated by Buildings and Artificial Surfaces (BL3), i.e., the former pig houses, yards, tanks etc. Small pockets of scrub and ruderal weeds have encroached into areas surrounding the old buildings and the former concrete surfaces are heavily covered in moss growth.

To the immediate south of the buildings there is an area of unmanaged / rough grassland that

is akin to the Fossit habitat Dry Meadows and Grassy Verges (GS1). This extends to the immediate south and west of the piggery as far as a soil bund that was constructed originally along with the piggery to reduce visual effects of the farm from the road and surrounding area. The vegetation in this area is dominated by grasses that are rank and unmanaged, and species such as cocksfoot grass *Dactylis glomerata* and couch grass *Elymus repens* were common. Pockets of bramble *Rubus fruticosus agg* scrub occur throughout this area. Broadleaved species in this area included ragwort *Jacobaea vulgaris*, thistle *Cirsium vulgare*, broadleaved dock *Rumex obtusifolius*, nettle *Urtica diocia* and creeping buttercup *Ranunculus repens*. The soil bund on the edge of this area is now also heavily vegetated with a dense growth of brambles whilst nettles and broadleaved dock were also noted on this bund.

The remaining area of the site consists of one large field that consists of an Improved Agricultural Grassland habitat that is well drained and dominated by rye grasses *Lolium sp.* and meadow grasses *Poa sp*.

The southern boundary of the site is adjacent to the N73 corridor. There is a treeline present along this boundary that screens the site from the main road. Species noted in this treeline included Leylandii and sycamore *Acer pseudoplantatus*. There is an open drain / watercourse present along this treeline.

The northern portion of the western site boundary (along a local access road to another farm), consists of a treeline, consisting of Leylandii, mature beech Fagus sylvatica, honeysuckle Lonicera periclymenum, ivy Hedera helix, plum blossom, hawthorn Crataegus monogyna and holly Ilex aquifolium. Further south along that boundary and in front of the old piggery buildings, there is a group of mature Leylandii, along with some scattered ash, sycamore and elder.

The habitats along the route of the proposed discharge pipeline were also surveyed in September 2024. The length of the route is approximately 1.8km and it will traverse the following habitats – Improved Agricultural Grasslands (GA1), Hedgerows (WL1) and Treeline (WL2), riparian habitats along the Funshion river and Drains (FW4).

Surface Water

The primary hydrological feature near the proposed development site is the River Funshion (EPA designation: FUNSHION_020). This river drains an area of 56.84 km² and is located approximately 1.5 km north of the site.

Adjacent to the eastern boundary of the site lies an unnamed and unmapped watercourse, functioning as a drainage ditch for the surrounding area.

Proximity to Existing Gas Network

An existing medium pressure distribution pipeline is located at Coolnanave, Co. Cork *ca*. 1.0km west of the site. The existing medium pressure distribution gas pipeline and the proposed route for the pipeline linking the site to the existing local gas network is shown in **Figure 2.2**.

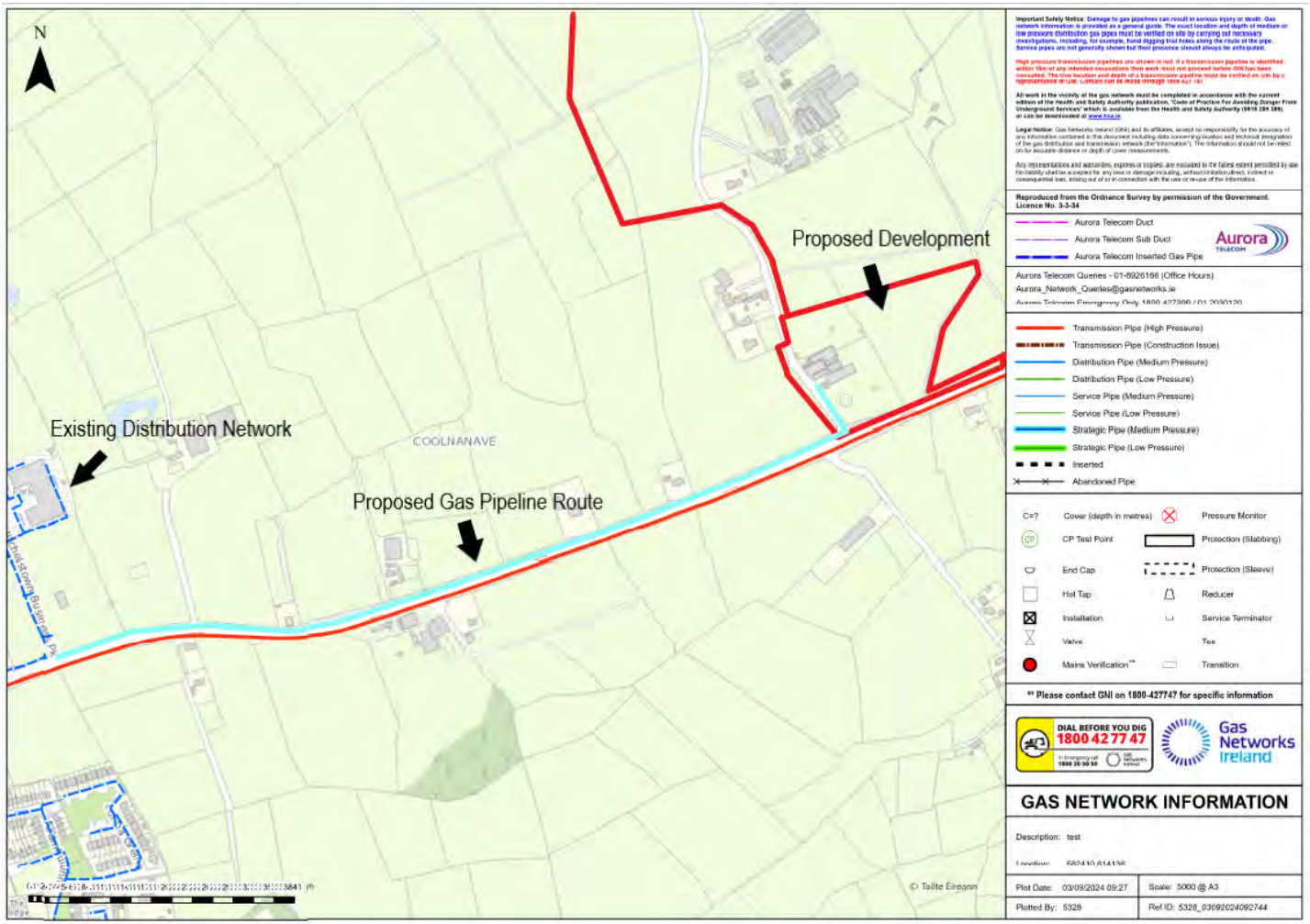


Figure 2.2: Local Existing Gas Network (Source: Gas Networks Ireland)

2.1.3 Site Layout

The site layout is displayed in **Figure 2.3.** Detailed site layout and structural drawings are included in **Volume IV: Drawings**.

Figure 2.3: Proposed Site Layout Plan

2.1.4 3D Image of the Site Layout

A 3D model image of the site layout is included in **Figure 2.4**.

Figure 2.4: 3D Image of Site Layout

2.2 Process and Design Description

The key processes and design details illustrated in **Figures 2.3** and **2.4** above are described in detail in the following sections.

2.2.1 Summary Process Flow Diagram

A summary process flow diagram is presented in **Figure 2.5**.

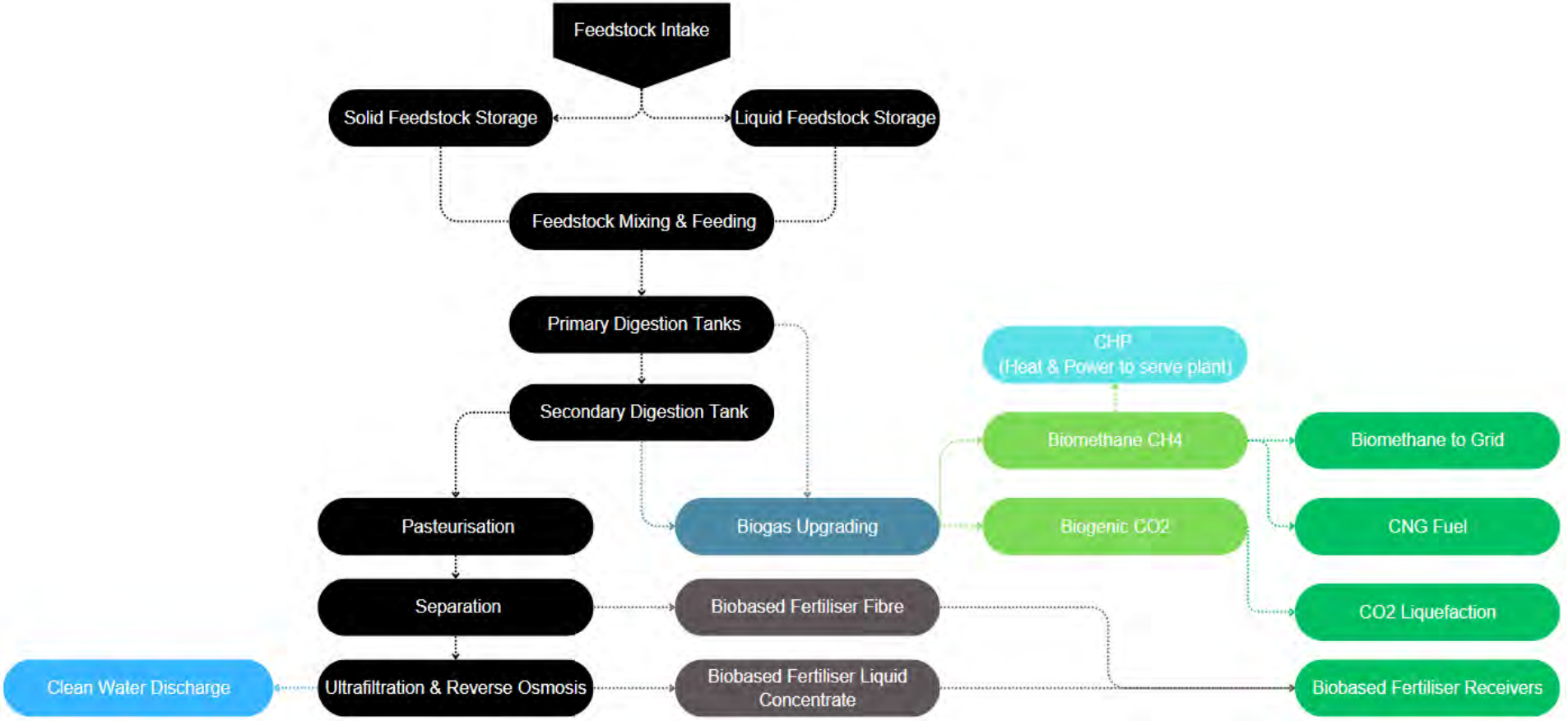


Figure 2.5: Process Flow

2.2.2 Plant Components

The plant components are listed in **Table 2.3** below. Detailed drawings showing design, layout and dimensions of components referenced are presented in the Planning Drawings that accompany this EIAR.

Table 2.3: Key Plant Components and Process

Drawing Ref.	Item	Details
01	Entrance Gate	Site entrance with 1.8 metre high security gate.
02	Car Park	Staff and visitor parking, providing 11no. vehicle parking spaces. Including 3no. EV charging points parking spaces, 1no. disabled access parking space and bicycle storage.
03	Weighbridge and Office	Weighbridge facility to record incoming feedstock delivery tonnages and outgoing biobased fertiliser tonnages. Site Office including Entrance Area, Canteen, Accessible Shower Room, WC, Welfare Facilities and Control Room on the Ground Floor. Office and Meeting Room on the First Floor.
04	Concrete Apron	Concrete apron to the front of Reception Hall providing vehicle access route and turning areas.
05	ESB Substation	Substation to allow for import of back-up electricity when required. Including transformers used to transform incoming electricity from high to low voltage.
06	Canteen and Toilet Wastewater Treatment	Wastewater treatment and percolation for wastewater from canteen and toilet facilities.
07	Perimeter Fencing	1.8 metre high palisade fencing surrounding the site.
08	Bund Floor and Ramps	The bund will be impermeable and provide the required storage volume i.e., a minimum of 110% of the largest single tank volume.
09	Bund Walls	
10	Landscaping	Native flora and tree planting.
11	Attenuation Pond	Attenuation pond providing attenuation of stormwater only.
12	Asphalt Access Road	Access road providing access to the Energy Hub.
50	Odour Treatment	An Odour Treatment System to collect and treat odours arising from potentially odorous activities occurring on site.
51	Reception Hall	Reception Hall accommodating solid waste reception, storage area and quarantine area. Maintained under negative pressure with adjoining Odour Treatment System.
52	Liquid Feed Tank 1	Liquid feedstock intake and storage, prior to feeding.
53	Digesters	Digesters are constructed using pour in-situ concrete, featuring walls measuring 9m in height and 32m in diameter. Each primary digester has a
54	Digesters	

55	Digesters	volume capacity of 6,430 m^3. Each Digester is equipped with a double membrane gas collection dome with a biogas storage capacity of 2,057 Nm^3.
56	Digestate Storage Tank	Storage tank providing a storage capacity of 6,530m^3 for treated Liquid Digestate Concentrate. The site possesses a total storage capacity of 7,130m^3 (2no. Digestate Storage Tanks of 6,530m^3 and 600m^3 volume capacity) – Items 56 and 63.
57	Pasteurisation Tank	Insulated pasteurisation tanks will provide treatment of the digestate material to ABP standard.
58	Pasteurisation Tank	
59	Pasteurisation Tank	
61	Post Pasteurisation Cooling	Post pasteurisation storage to allow recovery of heat from pasteurised digestate prior to further treatment.
62	Pre-Biobased Fertiliser Manufacturing Tank	Liquid digestate buffer tank used to ensure constant digestate supply to the nutrient recovery unit.
63	Digestate Storage	Storage tank providing a storage capacity of 600m^3 for treated Liquid Digestate Concentrate.
64	Nutrient Recovery	Nutrient recovery unit will remove and clean the water from the digestate. It will concentrate the nutrients into a reduced volume of digestate concentrate.
65	Solid Digestate Storage	The Solid Digestate Storage will provide enclosed storage of pasteurised and treated solid digestate fibre, recovered during digestate treatment.
66	Digestate Offtake	Tanker connection for liquid digestate offtake.
67	Pump House	Accommodation for pumping equipment and pipework for the transfer of liquid feedstock and digestate materials.
70	Pump House	
71	Workshop	Dedicated area for undertaking mechanical repairs.
72	Tool Store	Storage of maintenance equipment and parts.
73	Panel Room	Electrical panel room.
74	Laboratory	On site laboratory providing a space for process monitoring and analysis.
75	Liquid Feed Intake	Delivery point for liquid feedstock intake
76	Liquid Feed Tank 1	Liquid feedstock intake and storage, prior to feeding.
77	Liquid Feed Tank 2	Liquid feedstock intake and storage, prior to feeding.
101	CO_2 Tanks	Insulated storage tanks for the temporary storage of liquefied CO_2.
102	CO_2 Loading Pump	Pump for the loading of liquefied CO_2 to specialist tanker for export.

103	CO_2 Auxiliaries	Auxiliary equipment to CO_2 liquefaction process.
104	CO_2 Liquefaction	CO_2 liquefaction system to recover CO_2 from the biogas upgrading process.
105	CO_2 Compressor	
106	CO_2 Pre-Treatment Skid	
107	H_2S Washing Tower	H_2S scrubber system providing removal of H_2S from biogas prior to treatment.
108	Biogas Treatment Skid	Containerised biogas upgrading system to upgrade biogas to biomethane.
109	CHP + Panel Room	1.2MWe capacity containerised CHP unit and panel room.
110	Biogas Compression System	Biogas upgrading removes trace impurities in the biogas stream. The primary goal is to separate carbon dioxide (CO_2) from methane (CH_4) to produce renewable biomethane and CO2.
111	Biogas Upgrading Module	
112	Biogas Flare	1 no. enclosed gas flare serving as additional safety measure. Flare will only operate under distinct scenarios to ensure safety and compliance.
114	Grid Injection Unit	The Grid Injection Unit (GIU) comprises equipment which will ensure that the biomethane is compliant with all necessary standards and regulations before it enters the local gas network.
115	Propane Tanks	Supply of propane to enhance CV of biomethane when necessary.
116	Fuel Tank	1,000 litre capacity self-bunded fuel storage for refuelling of site plant and machinery.
117	CNG Compression Unit	Compressed Natural Gas compression unit
118	Biomethane Boiler	1No. 500kW containerised biomethane boiler, which will provide emergency backup heat utilising biomethane generated on site to produce heat for the digestion process.
119	O_2 Generation Unit	Unit to generate low-level oxygen injection to each of the digesters to reduce hydrogen sulphide (H_2S) formation.

2.2.3 Anaerobic Digestion Process

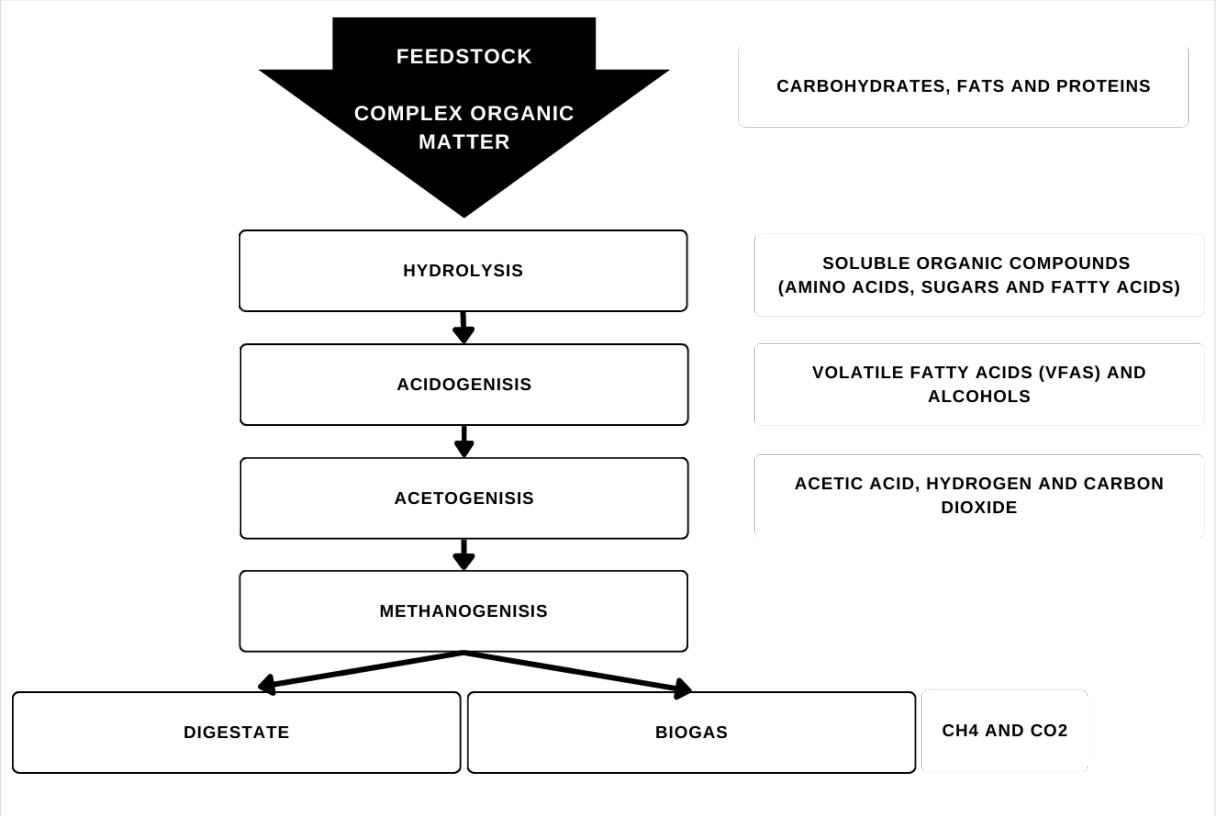
Anaerobic Digestion (AD) is a natural biological decomposition process which takes place in an oxygen-free environment, where micro-organisms (bacteria and archaea) break down organic matter. There are four main stages to this process:

- Hydrolysis - large, complex polymers like carbohydrates, cellulose, proteins, and fats are broken down by hydrolytic enzymes into soluble monomers i.e., amino acids from proteins, long chain fatty acids from lipids, and simple sugars from complex carbohydrates.
- Acidogenesis – these soluble monomers are further broken down into short chain volatile fatty acids (VFAs), alcohols, carbon dioxide and hydrogen.
- Acetogenesis - the products of acidogenesis are broken down into acetate, releasing hydrogen and carbon dioxide.

- Methanogenesis – In this final stage of AD, various groups of methanogenic bacteria consume acetate, hydrogen and carbon dioxide and convert these intermediate products into CH4.

The biological decomposition stages are illustrated in **Figure 2.6**.

Figure 2.6: Biological decomposition process in AD



2.2.4 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.

Biogas can be 'upgraded' to pure methane, often called biomethane, by removing CO_2, H_2S, moisture and other trace gases. The biogas upgrading process produces a purified stream of biomethane, which can then be injected into the main gas grid. The upgrading process also produces a CO_2 rich gas stream which can be recovered for treatment within a CO_2 liquefaction system to produce renewable liquefied CO_2.

Based on the feedstock composition and design operating capacity, it is projected that the facility will be capable of producing 810-960 Nm^3 of biomethane per hour.

2.2.5 Feedstock

The Proposed Development has been designed to accept and treat up to 90,000 tonnes per annum of predominantly locally sourced agricultural manures, slurries, food processing residues and crop-based feedstocks. The estimated feedstock composition and annual tonnages accepted are outlined in **Table 2.4** below. These tonnages are indicative and subject to change based on market and season conditions and availability and quality of feedstocks. The annual feedstock quantity will not exceed 90,000 tonnes per annum.

Table 2.4: Estimated Annual Feedstock Composition and Intake

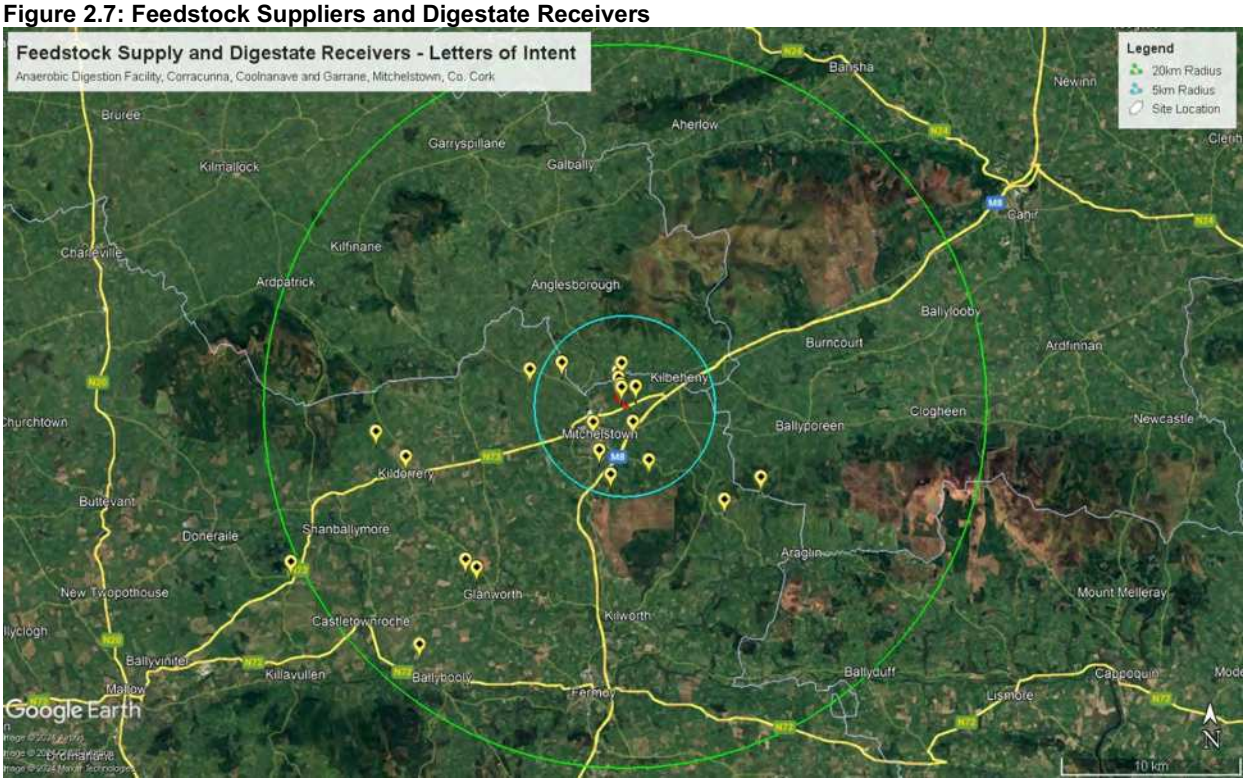
Feedstock	Tonnes/Annum
Cattle Slurry	7,580
Cattle Manure	1,197
Pig Slurry	11,570
Poultry Litter	16,225
Food Production Residues	6,782
Drinks Production Residues	14,762
Dairy Production Residues	9,309
Grass Silage	3,823
Whole Crop Silage	18,752
Total	**90,000**

The agricultural manures, slurries and crop-based feedstocks will be sourced from agricultural operators in the vicinity of the site. Pig Slurry will be supplied to the plant by tanker from the neighbouring Piggery (IPPC Licence Ref: P0494) located 300m to the north of the site.

To date the applicant has engaged with a large number of local farmers, of which 23 have confirmed their agreement to supply feedstock to the Proposed Development and receive biobased fertiliser in return. Letters of intent from these feedstock suppliers and biobased fertiliser receivers have been compiled and submitted alongside the Planning Statement accompanying the application.

The geographical distribution of these feedstock suppliers and biobased fertiliser receivers is represented in **Figure 2.7**. 100% (23) of these sources are located within a 20km radius of the site.

Figure 2.7: Feedstock Suppliers and Digestate Receivers



2.2.6 Feedstock Acceptance and Storage Procedure

Feedstock will be transported to the Proposed Development using heavy goods vehicles (HGVs), enclosed trailers, and sealed vacuum tankers.

Only feedstocks meeting strict feedstock acceptance procedures and complying with Environmental Protection Agency (EPA) and Department of Agriculture, Food & Marine (DAFM) license conditions will be accepted. All suppliers must complete a Feedstock Acceptance Agreement (FAA). Suppliers are also required to notify the weighbridge operator 24 hours in advance of delivery.

Upon arrival at the site, incoming feedstock deliveries will be weighed and logged at the weighbridge located at the site entrance and office, in accordance with regulatory requirements set by the EPA and DAFM. All hauler drivers will proceed to the office for review and submission of commercial documentation related to feedstock transport. Visual inspection of feedstocks will ensure conformity with the FAA.

Once delivery and documentation are confirmed, delivery vehicles will be directed to the Reception Hall for further processing.

2.2.7 Weighbridge

All vehicles entering the facility to deliver feedstock or export digestate will enter and depart via a weighbridge located at the site entrance and adjacent to the site office. Weighbridge information will be recorded automatically by a weighbridge data management system. The weighbridge will be of steel construction, mounted on load cells within a reinforced concrete pit chamber.

The weighbridge is shown as **item 03** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200**.

2.2.8 Reception Hall

The Reception Hall will be constructed utilising a steel frame, composite PVC coated cladding, concrete flooring, and retaining walls equipped with rapid closing doors. The building will feature ventilation and odour abatement system, designed to maintain negative air pressure within the building, thereby minimising the release of fugitive odours. This integrated system of high-speed roller shutter doors, building ventilation, and odour abatement will effectively prevent fugitive emissions. Pedestrian doors are included for safe ingress and egress of personnel. All liquids and washings will be contained within the Reception Hall building and returned to process.

Upon arrival at the Reception Hall, drivers will reverse their vehicles into the building. Prior to entry, high-speed roller shutter doors will open to allow access, and upon entering, the doors will promptly close prior to the discharge of the material.

Liquid feedstock will be discharged into either the reception pit with a capacity of 70m^3 or directly transferred via pump to the liquid feedstock tank, which has a capacity of 196m^3. The reception pit will be constructed using concrete, while the liquid feedstock tank will also be made of concrete and located within a bunded area.

Solid materials will be unloaded into designated feedstock bays, with a total storage capacity of 745 tonnes of solid feedstock material, the equivalent of 5 days storage.

All vehicles will undergo external cleaning via a power hose prior to exiting the building. Rapid closing doors will open to facilitate the vehicle's departure, after which it will return to the office and weighbridge for re-weighing before exiting the site.

The Reception Hall is shown as **item 51** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200**.

2.2.9 Liquid Feed Tank

The Liquid Feed Tank will provide intake storage of liquid feedstocks prior to processing.

Liquid Feed Tanks are shown as **items 52** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200.**

2.2.10 Odour Treatment System

An Odour Treatment System will recover and treat odours arising from potentially odorous activities occurring on site. All major odour sources, inclusive of the Reception Hall, Digestate Storage Tanks, Liquid Feed Tank and Pasteurisation Tasks are all connected to the Odour Treatment System. The odour treatment system is a proprietary system designed and supplied by a specialist contractor with extensive experience of treating odour from biogas and other organic waste facilities. In the event of a grant of licence by the EPA to carry out activities that require such licence, it is expected that odour emission rates will be agreed as part of such licence.

The Reception Hall has a volume of ca. 19,000m^3 and Digestate Storage Building discussed below has a volume of ca 8,000 m^3. The ventilation and odour abatement system will be designed to achieve a minimum of two (2) air changes per hour which corresponds to a flowrate of 54,000 m^3/hour, providing adequate air changes in accordance with BAT. The odour abatement system will be designed to treat 60,500 m^3/hour providing an overcapacity of 12% and an odour destruction efficiency of 95-99.5%.

Following a comprehensive review of BAT and odour abatement technologies on the market, the applicant has adopted multi-stage treatment technology. This technology uses a combination of Ammonia (NH_3) Scrubbing, High Intensity Ultraviolet (UV), Photo Chemical Oxidation, and Activated Carbon Filtration to achieve high levels of odour removal.

Ammonia (NH_3) Scrubbing

An NH_3 Scrubber is used for efficient NH_3 removal consisting of a reaction vessel with packing and liquid distributor and spray system. The exit route from the packed column includes a demister for removing entrained liquid droplets. Water conditioned with weak sulphuric acid is used as the scrubbing liquid, reacting with the ammonia to form ammonium sulphate. Once treated by the NH_3 Scrubber the treated air is combined with the larger low concentration air flow for polishing treatment via ColdOx.

DEO 500

Sources such as the Liquid Feed Tanks and Pasteurisation Tanks will be treated via DEO™ technology. DEO™ is designed to eliminate reduced sulphur compounds, aromatics, and other VOCs. DEO™ allows for VOC and odour reduction of > 95% (typical values are in between 98-99,5%). Once treated by the DEO system the treated air is combined with the larger low concentration air flow for polishing treatment in the Coldox® System.

ColdOx

ColdOx® oxidises volatile organic compounds (VOCs) and eliminates odour through the use of high intensity ultraviolet (UV), excess ozone, and photo chemical oxidation supported by special purpose catalysts. The UV reactor achieves odour reduction efficiency of up to 90% on its own.

Activated Carbon Filtration

Activated Carbon Filters act as a polishing step in the odour treatment process prior to discharge to the atmosphere via the stack.

The Odour Treatment System process flow is depicted in **Figure 2.8**.

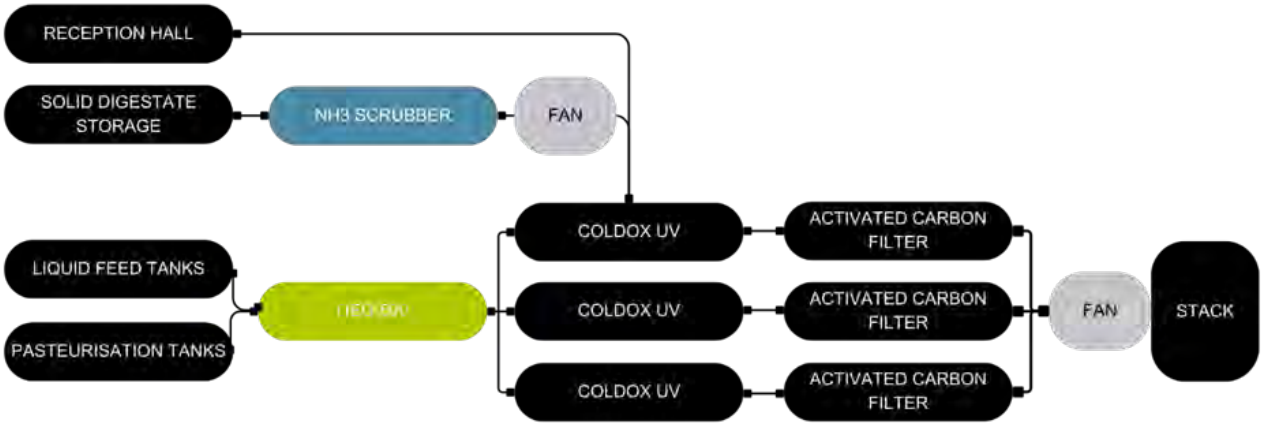


Figure 2.8: Odour Treatment Process Flow

The Odour Treatment System is shown as **item 50** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200**

2.2.11 Primary and Secondary Digester

In two-stage AD, the digestion process takes place in a series of primary and secondary anaerobic digesters. The primary and secondary digestion process will take place within 3no. Continuously Stirred Tank Reactor (CSTR) tanks:

- 2no. Primary Digestion Tanks
- 1no. Secondary Digestion Tank

Primary Digestion Tanks

The Primary Digestion Tanks are constructed using pour in-situ concrete. The walls of the digestion tanks will be constructed from pour-in-situ reinforced concrete and constructed on a reinforced concrete base sloping to a central point to facilitate optimum mixing. Each primary digestion tank has a volume capacity of 6,430 m^3.

The tanks will be designed and constructed in accordance with Eurocode 2 Part 2 Liquid retaining structures and a Construction Quality Assurance (CQA) plan will validate their proper design and construction.

The Primary Digestion Tanks are each equipped with a double membrane gas collection system. The flexible, sealed twin membrane gasholder will act as low-pressure gas capture and temporary storage which will accommodate any fluctuation in gas generation from the process. The inner membrane temporarily stores the biogas while the outer membrane contains low-pressure air which is maintained at a slightly higher pressure to ensure biogas within the inner membrane flows to its destination i.e., Biogas Upgrade Unit. The double membrane gas collection systems of the primary digestion tanks each have a biogas storage capacity of 2,057 Nm^3.

Primary Digestion Tanks are shown as **items 53 and 54** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200.**

Secondary Digestion Tank

The Secondary Digestion Tank is constructed using pour in-situ reinforced concrete and constructed on a reinforced concrete base sloping to a central point to facilitate optimal mixing. The Secondary Digestion Tank is also equipped with a double membrane gas collection system with a biogas storage capacity of 2,057 Nm^3. The Secondary Digestion Tank has a volume capacity of 6,430 m^3.

The Secondary Digestion Tank is shown as **item 55** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200.**

Digestion Mixing

The Digestion Tanks are equipped with mechanical mixers featuring a series of paddles with externally mounted drive units. This configuration is designed to facilitate thorough mixing and homogenisation of the tank contents. The sizing of these mixers is determined based on the characteristics of the substrate, specifically considering factors such as dry matter content and viscosity. This ensures optimal mixing efficiency tailored to the specific requirements of the digestion process.

Digestion Temperature

The temperature in both primary and secondary digestion tanks is maintained within the temperature range of 37-42ºC. Each digester tank is heated using integrated water heating pipework in the walls of the digester. The Supervisory Control and Data Acquisition (SCADA) system ensures the digesters operate in the mesophilic range at 37-42ºC.

2.2.12 Pasteurisation System

The Pasteurisation System is designed to minimise the risks from microbiological hazards. The EU pasteurisation standard uses indicator organisms to;

- verify that pasteurisation achieves the required reductive effect on pathogens and,
- verify that no cross contamination between untreated ABP feedstock and digestate product occurs.

The EU pasteurisation standard requires that all the digestate material is simultaneously held at 70°C or above for a minimum of 60 continuous minutes. The use of this pasteurisation standard reduces pathogens to levels at which they do not pose a risk, ensuring that all digestate end products (Digestate Liquid and Fibre) are safe to handle and use.

In accordance with Animal By-product (ABP) Regulations all organic material must also be mechanically treated to ensure all particles are less than 12mm in size. This will be achieved through a screening and maceration pump prior to pasteurisation.

The Pasteurisation System will comprise the following items:

- 3 no. enclosed pasteurisation tanks
- Heat exchanger (with heat provided by the CHP/Biomethane Boiler)
- 1 no. maceration and screening pump (12mm)
- Post-Pasteurisation Cooling Tank

Digestate from the Secondary Digestion Tank will be fed using enclosed pipework via the macerator and pump system to the 3 no. pasteurisation tanks. Pasteurisation will take place independent of the digestion system, in a batch process. By utilising 3 no. pasteurisation tanks in parallel it is possible to operate the pasteurisation system on a sequential batch basis with one tank filling, one processing and one emptying.

The digestate will be circulated by a pump system through a heat exchanger which will raise the temperature to greater than 70°C. The heating process will cease once the desired process temperature is achieved but material will continue to be maintained at temperature and agitated within the pasteurisation tank for a minimum of 60 minutes.

The pasteurisation tanks will each be equipped with 3no. temperature probes and ultrasonic level indicators to provide evidence to regulatory authorities that all material is kept above the minimum temperature (70°C) for the required minimum period of 60 minutes, therefore meeting the legal time and temperature standards.

The Pasteurisation System will be equipped with a datalogging system that will allow real-time thermographs to be produced via a SCADA system. The datalogging system and thermographs produced will be tamperproof.

The Pasteurisation Tanks (**items 57, 58, 59)** and Post-Pasteurisation Cooling Tank (**item 61**) are shown on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200**.

2.2.13 Digestate Treatment

Following pasteurisation, the digestate passes to the Nutrient Recovery System which through a combination of separation, ultrafiltration and reverse osmosis generates three outputs namely solid digestate, concentrated liquid digestate and clean water of suitable quality for discharge to receiving waters.

The Nutrient Recovery System has a design capacity to treat a minimum of 78,000 tonnes of whole digestate per annum. Following treatment of the whole digestate, *ca*. 8,000 tonnes of digestate fibre, and *ca*. 17,000 tonnes of liquid digestate concentrate will be produced. The treatment process will recover *ca*. 53,000 tonnes of clean water which will be reused on site for cleaning, with the remaining volume discharged under licence to receiving water.

The nutrient recovery process involves the following stages:

- Screwpress Separation
- Ultrafiltration
- Reverse Osmosis

Screwpress Separation

The screwpress, comprising a rotating screw and mechanical screen, separates the digestate into a solid and liquid fraction. The solid fraction (solid digestate) is passed through the separator and is collected in the enclosed storage bay below. The liquid fraction (permeate) is pumped to the nutrient recovery unit for further treatment by ultrafiltration and reverse osmosis.

Ultrafiltration

The liquid fraction of the digestate is then concentrated to reduce the water content and increase the nutrient concentration in the remaining concentrated digestate. The liquid digestate is first passed through a vibrating screen ultra filtration module to further remove suspended solids from the liquid. The concentrate material obtained from the ultra filtration module is stored in one of the digestate storage tanks.

The thin fraction permeate which passes through the ultra filtration module contains dissolved solids with the suspended solids being removed during the ultrafiltration process.

Reverse Osmosis

In order to remove dissolved solids Reverse Osmosis is required. Spiral wound reverse osmosis membranes are installed on a 3-stage treatment system; this ensures that there can be no breakthrough of nutrients, bacteria or ions as the material undergoes reverse osmosis. The membranes within the reverse osmosis module are 0.2 micron ensuring any dissolved solid material containing nutrients is recovered from the liquid.

Due to the small pore size only water molecules can pass through. The water permeate produced from the reverse osmosis unit is pure water free from bacteria, salts, and nutrients. The filtrate collected during the process contains high concentrations of nutrients. The nutrient rich digestate concentrate is pumped to the digestate storage tank and mixed with the concentrate obtained from the ultrafiltration unit. This mixing of concentrate ensures a pumpable, homogenous, nutrient rich, high quality biobased fertiliser is produced.

Discharge of Clean Water

The Reverse Osmosis (RO) system will maintain a steady maximum outflow volume of $10m^3$ per hour. Following the RO stage, the purified water generated by the process will be stored in a balance tank before being reused onsite for cleaning activities. The remaining volume of excess water will be diverted through an overflow pipe to undergo continuous water quality monitoring. Upon confirmation that the discharge emissions limit values (ELV) are met, the purified water will be released under a discharge license to surface water. However, should the ELV not be met, an automated shut-off valve will be activated to prevent discharge, diverting the water back into the processing system. Please refer to **Figure 2.9** for the discharge monitoring process.

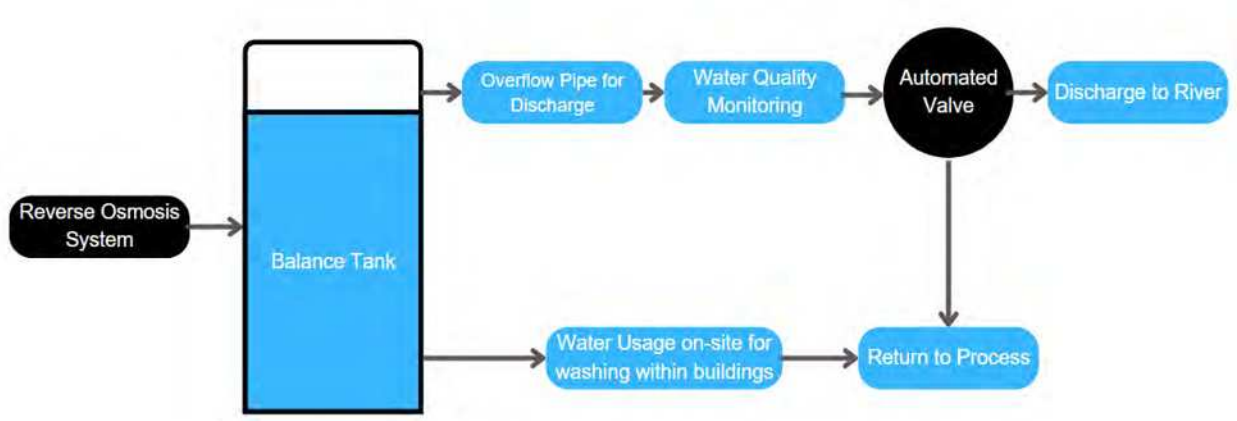


Figure 2.9: Discharge Monitoring Process

The Digestate Treatment process includes **items 62, 63, 64** as shown on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200.**

2.2.14 Digestate Storage

Digestate Liquid Concentrate Storage

The site possesses a total storage capacity of 7,130m^3 (2no. Digestate Storage Tanks of 6,530m^3 and 600m^3 volume capacity) for digestate liquid concentrate. It is projected that *ca*. 17,000m^3 of digestate liquid concentrate will be produced annually after complete digestate separation and treatment.

With onsite storage capacity amounting to 7,130m^3, there is sufficient storage to accommodate volume for up to 21 weeks, surpassing the maximum requirement of 16 weeks set down by the Department of Agriculture, Food & Marine (DAFM).

Digestate Fibre Storage

Solid digestate fibre will be housed in the dedicated Digestate Storage Building. The building is vented to the Odour Treatment System which will recover and treat all odours arising from within. With no land spreading permitted during the closed period, the storage building possesses adequate capacity to store solid digestate for over 20 weeks.

The Digestate Storage is shown as **item 63** and **65** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200**.

2.2.15 Digestate Quality and Volume

Digestate produced will meet the quality and end-of-waste requirements of an agreed quality standard, such as Article 28 End of Waste, PAS110 or standard agreed with the regulator and will comply with DAFM transformation parameters and testing requirements as per the CN 11: Approval and Operation of Biogas Plants Transforming Animal By-Products and Derived Products in Ireland (DAFM, 2014).

Digestate Liquid and Digestate Fibre will be classified as a bio-based fertiliser for use on

agricultural lands as a direct replacement for chemical/mineral fertilisers. Digestate liquid and fibre will, on the whole, be returned to lands associated with feedstock supplies of crop and/or slurry, thereby promoting a local circular bioeconomy. Digestate receivers will manage the storage and application of bio-based fertiliser on their lands and will be subject to controls set out in S.I. No. 113 of 2022 European Union (Good Agricultural Practice for Protection of Waters) Regulations 2022.

The treatment process recovers 70% of the liquid digestate concentrate volume as clean water with the remaining concentrate being stored in the Digestate Storage tank.

With an annual processing capacity of 90,000 tonnes of feedstock, approximately 78,000 tonnes of whole digestate are expected to be generated following the anaerobic breakdown. Approximately 17,000 tonnes of liquid digestate concentrate (biobased fertiliser) is projected to be produced annually after separation and treatment.

At full capacity the process is projected to produce a total of *ca*. 78,000 tonnes per annum of pasteurised whole digestate of *ca*. 10-12% Dry Matter (DM) content. Following the screw press separation process *ca*. 8,000 tonnes of solid Digestate Fibre of typically 29% DM content will be recovered. The remaining liquid digestate will be treated within the Digestate Treatment Unit, producing 53,000 tonnes of recovered clean water and 17,000 tonnes of nutrient rich liquid digestate concentrate to be stored in the Digestate Storage Tank prior to offtake and delivery to DAFM registered end users.

At full capacity the total digestate (fibre and liquid) tonnages for transportation off-site as biobased fertiliser to local receivers are summarised below:

- Digestate Fibre - 8,000 tonnes
- Digestate Liquid Concentrate - 17,000 tonnes

Post-pasteurisation the digestate will achieve End of Waste requirements, such as Article 28, PAS110 or relevant standard. The operator will complete the application process for End of Waste status upon grant of permission.

2.2.16 Biomethane Boiler

The proposal includes 1No. 500kW containerised biomethane boiler, which will provide emergency backup heat when the CHP is unavailable. The boiler will utilise biomethane generated on site to produce heat for the digestion process.

The 1No. Biomethane Boiler is shown as **item 118** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200.**

2.2.17 Fuel Storage

1 no. 1,000 litre above ground fuel tank will be located within a bunded area on site and used for refueling on site plant and equipment.

This Fuel Storage is shown as **item 116** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200**.

2.2.18 CHP Unit

The Proposed Development includes a containerised CHP unit. Biomethane or imported natural gas will be utilised to generate electricity to power the site parasitic load, and to supply heat for the primary and secondary digester tanks, pasteurisation, biogas upgrading and CO_2 liquefaction processes.

The CHP unit is shown as **item 109** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200**.

2.2.19 Biogas Upgrading

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

Initially, biogas is directed through a biological desulphurisation unit where specialised bacteria work to reduce the concentration of hydrogen sulphide present within the biogas. Following this step, the biogas is filtered through a series of activated carbon filters. This filtration process aims to eliminate any remaining hydrogen sulphide or trace volatile organic compounds (VOCs) generated during the breakdown of organic material in the anaerobic digestion process. Subsequently, the biogas proceeds through a biogas upgrading module, featuring a selective permeable membrane. Here, carbon dioxide passes through the membrane while methane gas is retained, resulting in an upgraded biogas known as biomethane. Notably, biomethane attains a molecular composition equivalent to natural gas.

The Biogas Upgrading process includes H_2S Washing Tower (**item 107**) Biogas Treatment Skid (**item 108)** Biogas Compression Module **(item 110)** and Biogas Upgrading Module **(item 111)** as shown on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200**.

Post treatment, the biomethane is injected into the local natural gas grid via the onsite Grid Injection Unit (GIU).

2.2.20 Grid Injection Unit (GIU)

Biomethane will be supplied to the existing gas network via the Grid Injection Unit (GIU) and a pipeline connecting the site to the existing medium pressure distribution gas pipeline located to the west of the Proposed Development, at Coolnanave, Co. Cork. The GIU will be owned and operated by Gas Networks Ireland.

The GIU comprises equipment which will ensure that the biomethane is compliant with all necessary standards and regulations before it enters the local gas network. The unit performs the following key tasks:

- Gas pressure reduction and control: so that the gas pressure is always correct to match the medium pressure gas network.
- Gas analysis for compliance monitoring: the gas is tested for contaminants
- Metering: the volume of gas needs to be measured and recorded

- Flow Weighted Average Calorific Value: the energy content of the gas being injected into the grid needs to be measured and recorded. The calorific value must match the value stipulated by the local gas distributor.
- Propanation: Where there are any shortfalls in the calorific value of biomethane, propane can be added from the on-site propane storage to match the calorific value required.

The Grid Injection Unit (GIU) is shown as **item 114** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200**.

2.2.21 CO_2 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.

The CO_2 which passes through the membranes in the biogas upgrading unit is further treated using activated carbon filters. Residual compounds which may have passed through the membrane of the biogas upgrading unit are removed. The clean carbon dioxide is then cooled, compressed, and dried into liquid form. The liquid is then stored in the carbon dioxide storage tanks prior to being transported offsite.

By utilising this process, the biogenic CO_2 from biomethane production which would have been emitted to the atmosphere is now captured, purified, and reused, thereby creating a circular economy.

The CO_2 Liquefaction process incorporates CO_2 Tanks (**item 101**), CO_2 Loading Pumps (**item 102**), CO_2 Auxiliary equipment (**item 103**), Discovery & CO_2 Liquefaction (**item 104**), CO_2 Compressor (**item 105**) and CO_2 Pre-Treatment Skid (**item 106**) and are shown on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200.**

2.2.22 Biogas Flare

An enclosed biogas flare is proposed for installation on the site, serving as an additional safety measure. The flare will only operate under distinct scenarios to ensure safety and compliance.

The biogas flare serves as a safety device in case the biomethane upgrading unit requires unscheduled maintenance. This flare is activated only in the unlikely event of when there is no outlet (i.e. the biogas upgrading unit and CHP) available for the produced biogas.

The flare is controlled and operated by the Supervisory Control and Data Acquisition (SCADA) system. An enclosed flare, characterised by the concealed flame and quiet operation below 65dB, ensure discreet and efficient operation during use.

The Biogas Flare is shown as **item 112** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200.**

2.2.23 Supervisory Control and Data Acquisition system

A supervisory control and data acquisition (SCADA) system will be installed for ease of operation and monitoring of plant processes. This system comprises hardware and software components to monitor and control industrial processes within the site. SCADA will be used to monitor and control the anaerobic digestion process, biogas upgrade, grid injection and

associated plant and emissions control devices.

2.2.24 Office

The Site includes a two-storey Office Building incorporating an office area, meeting room welfare facilities, storeroom, first aid facility, communications, and control room.

The Office is shown as **item 3** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200**.

2.2.25 Water Supply

The water requirements for the Proposed Development will be met as follows:

Fire-water: Fire-fighting water will be stored in an underground tank. The tank will be fed by run-off from roofs.

Potable Water: Potable water will be taken from a connection to an existing watermain in the public road. The potable water demand is estimated to be 700 litres/day (IW Code of Practice for Wastewater Infrastructure).

Any other water, for example wash water, will be supplied from rainwater harvesting or from treated process water. This water will go through UV treatment before storage and use.

2.2.26 Surface Water Management

The Proposed Development will comprise three separate drainage networks:

- Run-off from the buildings and yards in the facility will be collected in a sealed pipe network which will discharge to the watercourse;

- Rain falling on the bunded area will be collected in a sperate 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 facility.

A model for the surface water drainage system was designed using AutoDesk Infodrainage. Details of this model are provided in **Technical Note Ref: 24055-TN-SUDS - Appendix B**. The results of design calculations for the critical 1% AEP rainfall events are provided in **Technical Note Ref: 24055-TN-SUDS - Appendix C**.

SUDs Regime - Quantity

Discharge Rate

Subsoils are unsuited to infiltration of all surface water run-off and so it will be necessary to discharge surface water run-off to an outfall.

The rate of discharge to the stream will be restricted to a maximum permissible rate of 12.8 lit/sec. 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.

Storage of Attenuated Surface Water

The restriction on discharge will attenuate surface water run-off within the Site when the run-off from the Proposed Development exceeds the discharge rate.

This attenuated water will be stored temporarily in an Attenuation Pond located in a grassed landscaped area close to the receiving watercourse. Details of this Attenuation Pond are provided on the reference drawings.

The Attenuation Ponds are shown as **item 11** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200.**

The Surface Water Management strategy and civil design measures are detailed in the **Technical Note Ref: 24055-TN-SUDS** and Drawings which accompany the application.

2.2.27 Foul Water Management

The Proposed Development will have 5 workers on site each day with normal loadings of 30l/day and BOD of 20g/day. The wastewater from the toilet and canteen will be treated using a proprietary system as recommended in the Site Suitability Assessment.

Testing and assessment have been carried in accordance with the requirements of EPA Code of Practice Wastewater Treatment Manuals Treatment Systems for Single Houses (p.e.< 10).

Please refer to **Technical Note Ref: 24055-TN-SUDS - Appendix D** for a site-specific assessment report, testing results, and specifications. The location shown on Drawing Ref: **24055-DR-0501** is indicative and may be subject to change upon detailed design of the system.

2.2.28 Bunding

The bund is designed in accordance with IPC Guidance on Storage and Transfer of Materials for Scheduled Activities (EPA, 2004). The digestion tank area will be bunded in its entirety to provide sufficient containment volume in the unlikely event of a leak at the facility.

The bund will be impermeable and provide the required storage volume i.e., a minimum of 110% of the largest single tank volume (110% of 6,514 m3 = 7,166m3). The bund has been designed to accommodate >7,166m3 in the unlikely event of a failure of the storage tanks.

Maintenance vehicle access to the bund will be provided via 2no. ramps.

The Bunding is shown as **item 08** and **09** on Drawing Ref. **231925-ORS-Z1-ZZ-DR-B-200**.

2.2.29 Access Road

Vehicles travelling between the proposed site and the N73 corridor can use the L90813 third class road.

The Proposed Development includes improvements to the L90813 local road, inclusive of 1no. passing bay to provide safe and efficient passing of vehicles.

Road improvement works are depicted in Drawings Ref. **24055-DR-0504_issue PL01.**

2.2.30 Boundary Treatment

The site boundary will be enclosed by a mesh panel perimeter fencing system *ca*. 1.8m high with secured mesh panel entrance and exit. The landscape strategy offers short to long term buffering, sustainability and biodiversity at its core and is specifically adapted to assist in integrating the Proposed Development into its surrounds. The buffer planting aims to increase value for wildlife and is pollinator friendly. The primary objective being to buffer visual receptors of the Proposed Development.

The Perimeter Fencing as **item 07** on Drawing **Ref. 231925-ORS-Z1-ZZ-DR-B-200**.

Please refer to Landscape Plan (**Ref: 24/NRG/ORS/Mt/M/001**) which accompanies the application.

2.2.31 Electricity Substation

The Proposed Development will include an ESB Networks substation. The substation will be designed and constructed in accordance with published ESB standard details and subject to ESB certification. A transformer is incorporated in the substation area to convert imported high voltage electricity to low voltage for use on site.

Under normal operation the Proposed Development will be powered by the on-site CHP unit and Solar PV, with power supply from the grid provided only as a backup.

The Electricity Substation is shown as **item 05** on Site Layout Drawing Ref. **231925-ORS-Z0-00-DR-B-200**.

2.2.32 Solar PV

Solar photovoltaic (PV) modules are included upon the roof structures of the Reception Hall and Solid Digestate Storage buildings.

2.2.33 Lightning Protection System

An independent lightning consultant was engaged by the applicant to design a level 2 Lightning Protection System for the site. The Lightning Protection System is designed in accordance with BSEN60079 & BSEN 1127. The system is designed to provide a protective virtual dome over the site. The purpose of the protective dome is to ensure no structures or tanks are within any potential lightning strike path. Lightning finials are strategically positioned around the site to ensure all areas of the site are protected from a potential lightning strike. The finial positioning is determined by detailed 3D site modelling which was undertaken as part of the lightning protection design.

2.2.34 Site Security

Entrance to the site will include a locked gate, controlled entrance barrier and CCTV monitoring system.

2.2.35 Operating Hours

The facility will operate 24 hours per day, 7 days a week, as Anaerobic Digestion is a

continuous biological process. However, feedstock will only be accepted between the hours of 0700 and 1900 Monday to Friday, and 0700 to 1600 on Saturday. There will be no deliveries on Sunday and on Bank Holidays.

2.3 Licensing Requirements

2.3.1 Environmental Protection Agency (EPA)

The EPA were consulted during the design phase of the Proposed Development, to verify authorisation requirements under the Environmental Protection Agency Act 1992 (as amended) or the Waste Management Act 1996 (as amended).

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, outlined in **Table 2.5** below:

Table 2.5: Class 11.4 of First Schedule to the EPA Act 1992 as amended

11.4 (a) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving one or more of the following activities (other than activities to which the Urban Wastewater Treatment Regulations 2001 (S.I. 254 of 2001) apply):

1. *biological treatment;*
2. *physico-chemical treatment;*
3. *pre-treatment of waste for incineration or co-incineration;*
4. *treatment of slags and ashes;*
5. *treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.*

(b) Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, (other than activities to which the Urban Wastewater Treatment Regulations 2001 (S.I. No. 254 of 2001) apply):

1. *biological treatment;*
2. *pre-treatment of waste for incineration or co-incineration;*
3. *treatment of slags and ashes;*
4. *treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.*

(c) Notwithstanding clause (b), when the only waste treatment activity carried out is anaerobic digestion, the capacity threshold for that activity shall be 100 tonnes per day.

In the event of a grant of licence by the EPA to carry out activities that require such licence, it is expected that the following will be regulated under such licence:

- Emission Limit Values for emissions to air and stormwater;
- Monitoring requirements for emissions;
- Resource use and energy efficiency;
- Waste management control documentation;
- Waste acceptance procedures and records;
- Storage and transfer of substances;
- Changes to operations and the physical fabric of the facility;
- Facility management including the requirement for an environmental management system (EMS);
- Accident prevention and emergency response including fire water retention; and,
- Operational controls.

An Environmental Management System (EMS) will be put in place for the facility, as will be required by the IE Licence. The operator shall develop the EMS in accordance with ISO14001:2015, applying for accreditation when operational. This EMS will include but not be limited to the following:

- Measures to comply with the IE licence and other relevant environmental legislation;
- Waste Acceptance Procedures;
- Standard Operating Procedures;
- Measures to comply with the corporate sustainability goals (e.g., reducing water and energy consumption); and
- Accident prevention and emergency response procedures

2.3.2 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 facility will process Category 2 animal by-products, specifically farmyard manures i.e., cattle slurry, pig slurry and poultry manure. Approval will be required from the Department of Agriculture, Food, and the Marine (DAFM) in accordance with Article 24(a) of Regulation (EC) No. 1069/2010, for the acceptance and/or treatment of animal by-products.

DAFM were consulted during the design phase and the Proposed Development has been designed in accordance with DAFM guidance *CN11: Conditions for approval and operation of biogas plants transforming animal by-products and derived products in Ireland*. The application process for approval and operation of the proposed facility by the DAFM occurs in three stages as follows;

1. Application for approval in principle.
2. Application for conditional approval to operate which allows an operating period of three months to test and demonstrate ABP compliance. This stage commences following the construction and handover of the facility.
3. Full approval.

This application process will commence upon receipt of planning consent.

2.3.3 SEVESO III Directive / Control of Major Accident Hazards (COMAH) Regulations

The Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S. L No. 209 of 2015) transposes Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC ("the SEVESO III Directive").

The purpose of the COMAH Regulations is to lay down rules for the prevention of major accidents involving dangerous substances, and to seek to limit as far as possible the consequences for human health and the environment of such accidents when they occur, with the overall objective of providing a high level of protection in a consistent and effective manner.

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The COMAH Regulations place an obligation on operators of establishments that store, handle, or process dangerous substances above certain thresholds to take all necessary measures to prevent major accidents and to limit the consequences for human health and the environment. Under the Regulations, an establishment may qualify as upper tier or lower tier, depending on the inventory of dangerous substances; sites that store, handle or process dangerous substances below a certain threshold do not qualify as establishments under the Regulations.

SEVESO/COMAH Assessment of the Proposed Development

Methane, the combustible component of biogas is classified as a P2 flammable gas in accordance with Regulation (EC) No. 1272/2008 on the classification, labelling and packaging of substances and mixtures.

Under COMAH, P2 Flammable gases are subject to a threshold quantity of 10 tonnes meaning that any biogas facility storing less than 10 tonnes of methane will fall outside of the COMAH Regulations. At full operation, the proposed facility will store less than 3.72 tonnes of flammable gas, and is, therefore not a COMAH regulated site.

3 Consideration of Alternatives

3.1 Introduction

The purpose of this chapter is to present the reasonable alternatives considered by the developer during the design and pre-application phases of the Proposed Development.

3.2 Legislative Context

Annex IV (2) of the EIA Directive 2014/52/EU requires the consideration of reasonable alternatives which are relevant to the project and take into account the effects of the project on the environment. An EIAR must contain:

"…*a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment*."

Schedule 6 of the Planning and Development Regulations, 2001 (as amended) sets out the information which is to be contained in an EIAR and Part 1 (d) of Schedule 6 states that the following shall be included:

"*A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment*."

In accordance with 2022 EPA Guidelines, different types of alternatives may be considered at several key stages during the process. As environmental issues emerge during the preparation of the EIAR, alternative designs may need to be considered early on in the process or alternative mitigation options may need to be considered towards the end of the process.

The EPA Guidelines (EPA, 2022) state:

"*The objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with 'an indication of the main reasons for selecting the chosen option'. It is generally sufficient to provide a broad description of each main alternative, and the key issues associated with each, showing how environmental considerations were taken into account is deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required*."

The consideration and examination of alternatives is set out in the following sections.

3.3 Methodology

The EU Guidance Document (EU, 2017) on the preparation of EIAR outlines the requirements of the EIA Directive and states that, in order to address the assessment of reasonable alternatives, "*the Developer needs to provide:*

- *A description of the reasonable alternatives studied, and;*
- *An indication of the main reasons for selecting the chosen option with regards to their environmental impacts.*

The EU 'Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)' (EU, 2017) states that reasonable

alternatives "*must be relevant to the proposed project and its specific characteristics, and resources should only be spent assessing these alternatives*". The guidance also acknowledges that "*the selection of alternatives is limited in terms of feasibility. On the one hand, an alternative should not be ruled out simply because it would cause inconvenience or cost to the Developer. At the same time, if an alternative is very expensive or technically or legally difficult, it would be unreasonable to consider it to be a feasible alternative*".

The current EPA 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (EPA, 2022) state that "*It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'miniEIA') of each alternative is not required*."

With consideration of the legislative and guidance requirements taken into account, this chapter addresses alternatives under the following headings:

- Do Nothing Scenario;
- Alternative Locations;
- Alternative Designs and Layouts; and
- Alternative Technical Configurations.

3.4 Consideration of Alternatives

3.4.1 Do Nothing Scenario

Article IV, Part 3 of the EIA Directive states that the description of reasonable alternatives studied by the developer should include "*an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge*." This is referred to as the 'Do Nothing' scenario.

EU guidance (EU, 2017) states that the assessment should involve the assessment of "*an outline of what is likely to happen to the environment should the Project not be implemented – the so-called 'do nothing' scenario*."

In implementing this 'Do-Nothing' scenario, an Anaerobic Digestion Facility would not be developed and there would be no changes made to existing land-use practices. The site would likely continue to be used for agricultural grazing.

The Climate Action and Low Carbon Development (Amendment) Act 2021 has committed Ireland on a legally binding path to net-zero emissions by no later than 2050, and to a 51% reduction in emissions by 2030. Indigenously produced biomethane will play a significant role in enabling this transition to a net-zero economy as biomethane can to displace fossil gas in many hard-to-decarbonise sectors, such as high-temperature heat, while also playing a significant role in the decarbonisation of County Cork's agriculture sector. In the 'Do-Nothing' scenario, the opportunity to capture a volume of County Cork's bioenergy resource for the production of biomethane to supply the national grid would be missed.

Agriculture accounts for 39% of County Cork's total carbon emissions, making agriculture the single largest emitter of greenhouse gasses in the county. This equates to 26,689,000 tCO2e per year, resulting in a 25% emissions reduction target of 6,672,325 tCO_2e from agriculture by 2030. This Proposed Development alone can reduce County Cork's CO_2 emissions by ca. 7,776 tCO2e per year. In the 'Do-Nothing' scenario, this contribution to a

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reduction in emissions from agriculture would not be achieved.

The agricultural manures, slurries and crop-based feedstocks will be sourced from agricultural operators in the vicinity of the site. Pig Slurry will be supplied to the plant by tanker from the neighbouring Piggery (IPPC Licence Ref: P0494) located 300m to the north of the site. In the 'Do-Nothing Scenario' these agricultural wastes would not be treated locally through the AD process. Untreated and unpasteurised manures and slurries would continue to be applied directly to the land at current volumes, with the continued addition of chemical fertiliser. Furthermore, the associated CH_4 would not be captured within the AD process. In addition, the current traffic movements associated with the movement of manures and slurries from source to lands for spreading would remain unchanged.

The Proposed Development will provide important construction stage employment. The construction phase will also have secondary and indirect 'spin-off' impacts on ancillary support services in the area of the site, such as retail services, together with wider benefits in the building supply services, professional and technical professions etc. These beneficial impacts on economic activity will be largely temporary but will contribute to the overall future viability of the construction sector and related services and professions over the construction period.

The operational stage will offer direct employment in the Anaerobic Digestion Facility, while also supporting existing employment opportunities on surrounding farms. Further indirect employment will be created as a result of the induced benefits of the development such as surrounding businesses catering for employee subsistence and hauliers, transporting materials to the facility. The Proposed Development will be of considerable benefit to the area in terms of employment provision and economic gain leading to a positive, medium-term impact which is significant in the context of its rural location.

The Proposed Development can deliver between 70-75 jobs to the immediate area (consisting of *ca*. 5 full time jobs in the AD Facility, 13 jobs supported in the applicant operational team, *ca*. 45 contractors, and an estimated *ca*. 10 supporting roles) specifically across rural locations and protect existing farming employment.

Under the 'Do-Nothing' scenario the opportunity to generate direct and indirect local employment would be forgone. It would lead to a missed opportunity for an increase in employment opportunities in the area generally, and a missed opportunity for rural employment objectives of the County Development Plan to be fulfilled. 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 Proposed Development not occurring.

The 'Do-Nothing' scenario is discussed in further detail within each EIAR technical assessment chapter.

3.4.2 Consideration of Alternative Locations

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

- Transport Network and Access
- Availability and proximity to Feedstock Supply
- Availability and proximity to Digestate Receivers
- Existing Land Use
- Landscape Sensitivity
- Ecological Designations

- Archaeological Designations
- Access to Gas Grid
- Access to Electricity Grid
- Proximity to Sensitive Receptors
- Available Land Size
- Land Availability
- Landscape and Visual Amenity
- Proximity to Suitable Water Course or Sewer
- Proximity to Drinking Water Source/Aquifer
- Topography
- Flood Risk

The applicant devised a scoring matrix based on each of the site specific criteria outlined above. Site visits and desk based studies were completed for all candidate sites. Each candidate site was then assessed and an overall score assigned. The site-specific selection criteria and basis for assessment is included in **Table 3.1**.

Table 3.1: : Site-Specific Selection Criteria and Basis for Assessment

Criteria	Scoring	Score	Weighting	Total Score
Transport Network and Access	1. Greater than 5km from Regional Roads, 2. 1 - 5km km from Regional Road 3. Less than 1km from Regional Road. 4. Immediately adjacent to major source of feedstock allowing for transport internally.		3	
Proximity to Feedstock Supply	1. 80% available >10km 2. 80% available within 10km 3. 80% Available within 5 km 4. Immediately adjacent to major source of feedstock.		3	
Proximity to Biobased Fertiliser Receivers	1. 80% available >10km 2. 80% available within 10km 3. 80% Available within 5 km		3	
Existing Land Use	1. Urban or greenfield 2. Rural Brownfield, 3. Zoned Industrial		2	
Landscape Sensitivity	1. Proximate to Sensitive Landscape 2. Greater than 1km 3. Greater than 5km		2	
Ecological Designations Score	1. Adjacent to designated site 2. >1km from designated sites 3. >5km from designated sites		2	
Archaeological Designations Score	1.Adjacent to archaeology sites 2. >1km from archaeology sites 3. >5km from archaeology sites		1	
Access to Gas Grid	1. Greater than 5km, 2. 1-5km, 3. <1km		3	
Access to Electricity Grid	1. Greater than 5km, 2. 1-5km, 3. <1km		1	

Sensitive Receptors	1. Less than 250m. 2. less than 1km. 3. Greater than 1 km		3	
Available Land Size	1. 1- 2ha 2. 2-3ha 3. Greater than 4ha		3	
Land Availability	1. Not for Sale or Lease 2. Available for Sale or Lease but financially unviable 3. Owned or for sale/lease at		3	
Landscape and Visual Amenity	1. Site is elevated or exposed 2. Site has existing cover and partial views 3. Site is hidden and with little or no receptors overlooking the site.		2	
Proximity to Suitable Water Course Or Sewer	1. Greater than 1km 2. Less than 1km. 3. Immediately adjacent or on site		3	
Proximity to Drinking Water Source/Aquifer	1. Less than 250m. 2. less than 1km. 3. Greater than 1km		1	
Existing Topography	1. Undulating or severe level changes 2. Moderate level changes that can be engineered out. 3. Relatively flat and level.		2	
Flood Risk	1. In a Flood Risk Zone 3. Outside Flood Risk Zone		3	
Total Ranked Score				

4 no. alternative site locations within County Cork were assessed under the above criteria, with the site at Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork scoring highest overall. The Site-Specific Selection Criteria and Basis for Assessments for each candidate site are included in **Appendix 3.1**.

The alternative sites considered include;

- Land at Bottlehill Landfill Site, Co. Cork
- Land at Mitchelstown Business Park, Co. Cork
- Land at Killakane, Mitchelstown, Co. Cork
- Land at Ballard, Araglin, Mitchelstown

The rationale used in the identification of the Proposed Development site at Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork is further discussed in the following sections.

3.4.2.1 Transport Network and Access

The Proposed Development is located northeast of the town of Mitchelstown and approximately 2.2km west of the N73/M8 junction. The L90813 local road is located immediately to the west and provides access to the site. As the Proposed Development is located in the vicinity of the N73, it offers connectivity to various locations across the county.

3.4.2.2 Proximity to Feedstock Supply and Biobased Fertiliser Receivers

The Proposed Development has been designed to accept and treat up to 90,000 tonnes per annum of predominantly locally sourced agricultural manures, slurries, food processing residues and crop-based feedstocks. To date the applicant has engaged with a large number of local farmers, of which 23 have confirmed their agreement to supply feedstock to the Proposed Development and receive biobased fertiliser in return. The geographical distribution of these feedstock suppliers and biobased fertiliser receivers is represented in **Figure 3.1**. 100% (23) of these sources are located within a 20km radius of the site. Pig Slurry will be supplied to the Proposed Development by tanker from the neighbouring Piggery located 300m to the north.

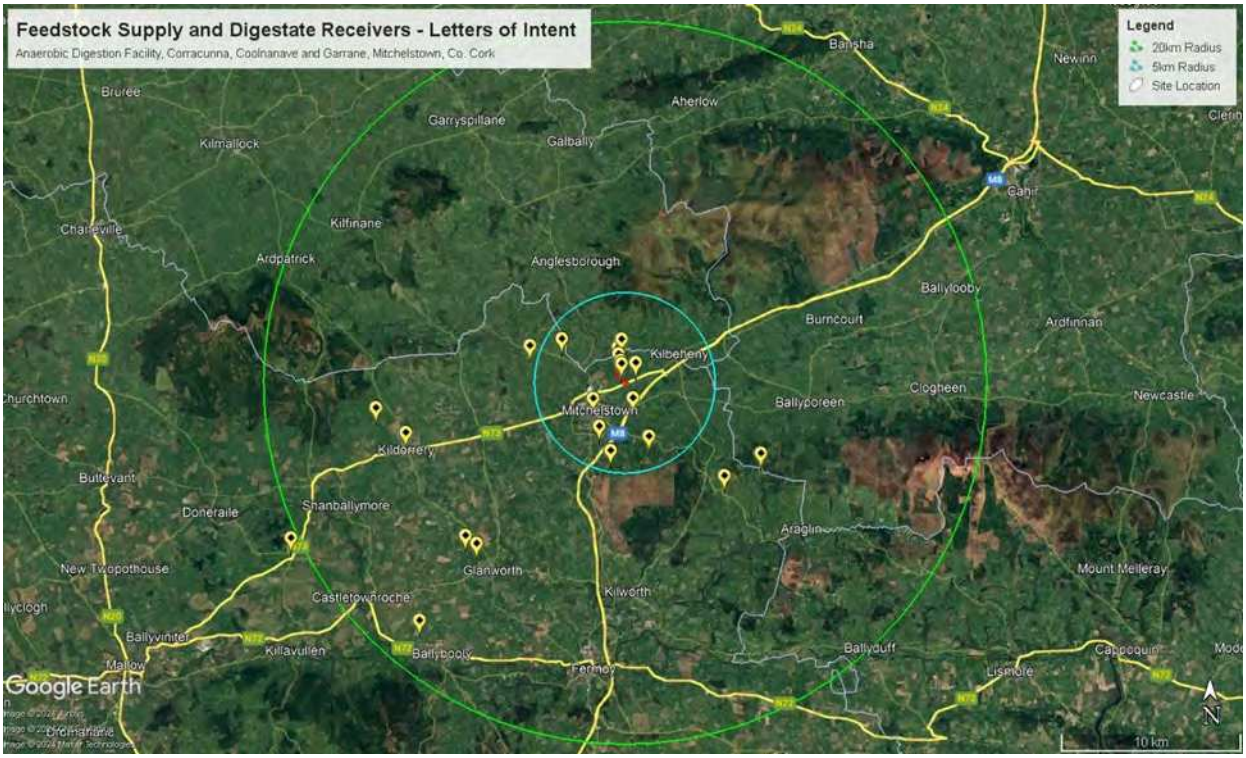

Figure 3.1: Feedstock Suppliers and Digestate Receivers

Alternative sites considered were deemed unsuitable for two primary reasons. Firstly, there was uncertainty regarding the availability of sustainably sourced agricultural feedstocks. Secondly, the distances required to transport these feedstocks from their source locations to the alternative sites would result in significantly more HGV (heavy goods vehicle) movements compared to the current proposal. The increased HGV traffic would lead to higher estimated greenhouse gas emissions, which would conflict with the overall sustainability goals of the Proposed Development.

3.4.2.3 Proximity to the Existing Gas Network

Proximity to the existing gas network was a key consideration when considering alternative locations. In comparison to other locations considered, the site at Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork benefits from existing infrastructure as the existing medium pressure distribution pipeline is located at Coolnanave, Co. Cork ca. 1.0km from the Proposed Development. The existing medium pressure distribution gas pipeline and the proposed route for the pipeline linking the site to the existing local gas network is shown in **Figure 3.2.**

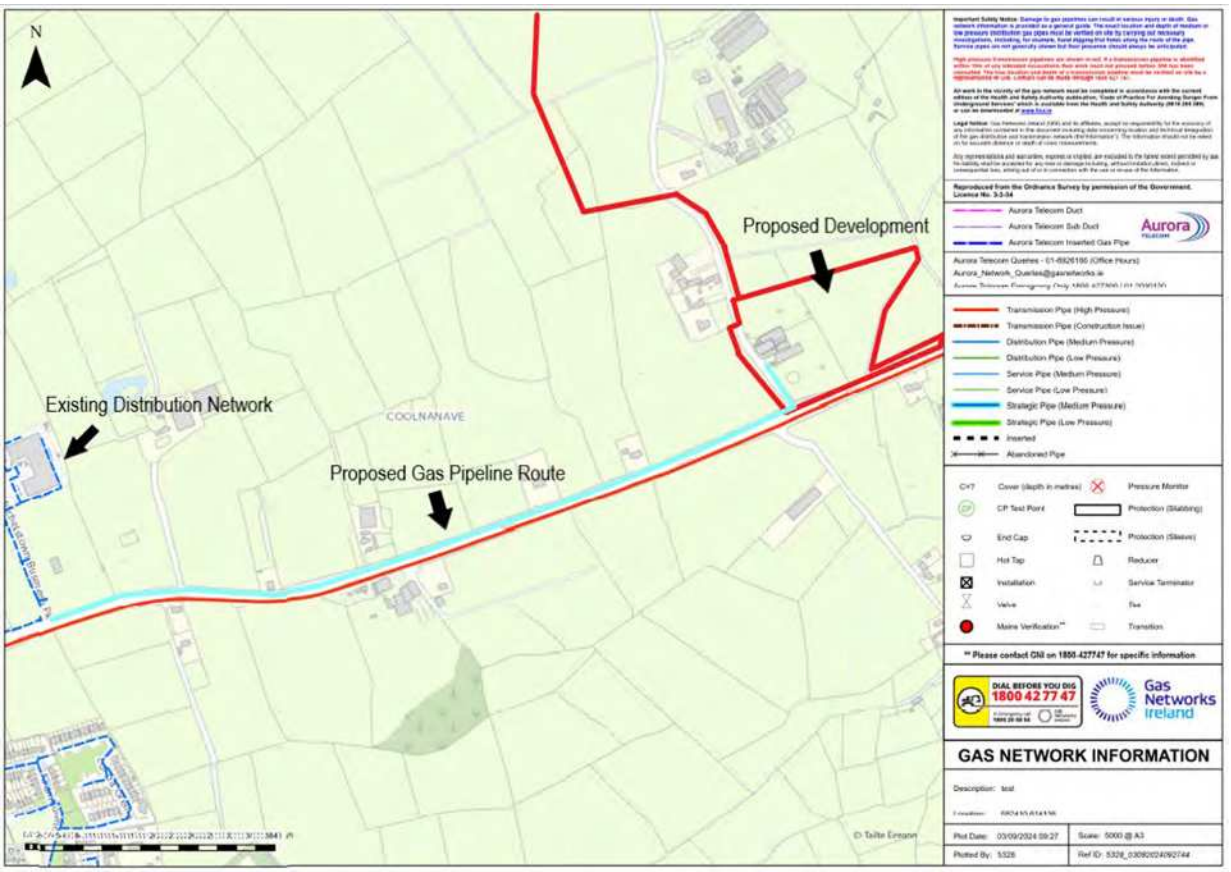

Figure 3.2: Local Existing Gas Network (Source: Gas Networks Ireland)

All other site locations considered are located significant distances from the existing national gas network, meaning a direct connection point via a Grid Injection Unit (GIU) would not be feasible and/or economically viable.

3.4.2.4 Proximity to Sensitive Environmental Receptors and Designated Sites

The Proposed Development is not within or immediately adjacent to any site that has been designated as a Special Area of Conservation (SAC) or a Special Protection Area (SPA) under the EU Habitats or EU Birds Directive. Furthermore, the application site is not within or immediately adjacent to any nationally designated site, such as a Natural Heritage Area or a proposed Natural Heritage Area.

All work within the Proposed Development site will take place in areas considered to be of low biodiversity value on a local level.

3.4.2.5 Landscape and Visual Impact

Alternative site locations were visited for preliminary landscape and visual impact surveys during spring 2024. Each site location and hinterland were examined and a preliminary assessment with respect to viewpoint sensitivity and the likely magnitude of change was made.

Following the preliminary assessments, the Proposed Development location was preferred as the existing topography and natural screening offered benefits in terms of minimising potential

impacts.

Furthermore, the site is brownfield and contains existing disused agricultural buildings. Further agricultural development types are found in the immediate vicinity of the Proposed Development. The operational piggery located ca. 300m north of the Proposed Development comprises a number of existing agricultural units of various types and scales which are currently visible from the surrounding road network.

3.4.2.6 Flood Risk

A preliminary flood risk assessment was undertaken for all candidate sites considered. There have been no recorded historic flooding incidents within the Proposed Development site boundaries and no part of the Proposed Development work is scheduled within an area which has been declared as Flood Zone A or B.

A Site-Specific Flood Risk Assessment accompanies the planning application (Document Ref: **231925-ORS-XX-XX-RP-EN-13d-011**)

3.4.3 Consideration of Alternative Design and Site Layout

The design of the Proposed Development has been an informed and collaborative process from the outset, involving design, engineering, planning, environmental, hydrological, geotechnical, archaeological, landscape and traffic specialists. The design process has also taken account of the comments of the relevant statutory and non-statutory consultees as detailed in **Chapter 1: Introduction**.

Throughout the preparation of the EIAR, the layout of the Proposed Development has been revised and refined to take account of the findings of all site investigations and baseline assessments, which have brought the design from its first concept layout (**Figure 3.3**) to the final site layout.

Figure 3.3: Concept Site Layout

Layout selection was an iterative process, with the objective of identifying a suitable layout that;

- Optimised the existing topography of the site in order to minimise excavation works.
- Optimised the existing topography of the site in order to minimise potential visual impacts on the local landscape.
- Met the design and operational requirements of DAFM guidance document CN11: Conditions for approval and operation of Biogas Plants transforming Animal By-Products and derived products in Ireland.
- Met the design and operational requirements of the EPA Industrial Emissions licencing.

The design of emissions stacks was considered throughout the design and planning process. Air dispersion modelling undertaken as part of the Air and Odour impact Assessment detailed in **Chapter 8: Air, Odour & Climate Change** informed the suitable height of the 1 No. CHP stack, 1 no. Biomethane Boiler stack and 1 No. Odour Treatment stack.

The Concept Site Layout (**Figure 3.3**) was revised in order to provide additional area along the south, east and western boundaries of the Proposed Development to be utilised for landscaping and enhanced natural screening. In addition, the proposed site entrance was relocated to allow for retention of existing mature Oak tree. A landscape plan has been

incorporated and accompanies the application (Document Ref: **24/NRG/ORS/Mt/M/001**).

The Landscape Plan (**Figure 3.4**) offers short to long term buffering and is specifically developed to assist in integrating the Proposed Development into its surrounds. In addition, native planting is proposed adjacent to attenuation pond, in order to provide enhanced biodiversity areas within the Proposed Development. The alternate layout considered initially, which did not include this additional buffering, would have given rise to a higher degree of landscape and visual impact from the Proposed Development, compared to the design and layout ultimately selected.

Figure 3.4: Extract from Landscape Plan (Document Ref: 24/NRG/ORS/Mt/M/001)

3.4.4 Consideration of Alternative Technical Configurations

Alternative Technical Configurations were considered as part of the design process of the Proposed Development.

There are several different process configurations around which AD systems may be designed. Factors considered when making design decisions included whether the process is 'batch' or 'continuous' feed, whether it is a 'dry' or 'wet' system, whether it is a 'single stage' or 'multi-stage' process and whether the anaerobic digester is operated at 'mesophilic' or 'thermophilic' temperatures.

3.4.4.1 Process Configuration

A Batch' Flow system involves the single addition of feedstock to a digester at the start of the process. When the feedstock has been placed in the digester, the unit is sealed for the duration of the process with no more material added. The process was ruled out as it is deemed

unsuitable given the characteristics of the agricultural manures, slurries, food processing residues and crop-based feedstocks available locally.

In contrast, Continuously Stirred Tank Reactor (CSTR) systems have feedstock added consistently or in stages with substrate displaced as new material is added. A multi-stage CSTR anaerobic digestion system is chosen for the Proposed Development, providing primary and secondary digestion within suitably sized Digestion Tanks. In comparison to single stage systems, multi-stage CSTR anaerobic digestion systems provide greater process stability, increased energy efficacy and better control over crucial parameters such as temperature, mixing, and substrate concentration. CSTR systems are fed consistently resulting in a steady-state and a consistent biogas production rate.

3.4.4.2 Operating Temperature

It is proposed to operate the AD process at mesophilic temperature range (30^{o}C – 40^{o}C). Mesophilic digestion systems are generally more stable than thermophilic systems (50^{o}C-60^{o}C) because a wider diversity of bacteria grow at mesophilic temperatures and these bacteria are generally more robust and adaptable to changing environmental conditions.

Thermophilic digestion offers the advantages of faster reaction rates compared to mesophilic digestion, leading to shorter retention times. However, thermophilic systems require significant additional energy to maintain the higher operating temperatures which is considered contradictory to the sustainability goals of the proposed project. The additional heat demand would increase the volume of biomethane required to be used on site as a fuel for the CHP engine and boiler, thereby reducing the overall volume of biomethane available for export to the national gas network thereby reducing the positive environmental impact of the proposed development with regard to the displacement of fossil fuels.

3.4.4.3 Biogas Uses Considered

Biomethane

A number of options were considered for the utilisation of the biomethane produced from the AD process.

- On-site generation of electricity and heat using a Combined Heat and Power (CHP) plant.
- Injection of biomethane to the existing gas network for industrial, commercial, or residential use.

The Proposed Development is conceived to adopt both options above, as both electricity and heat are required to support the process and enable the production of biomethane. On-site generation of electricity and heat using a CHP plant is incorporated to ensure the Proposed Development can be self-sufficient in terms of electrical and thermal energy demand.

The Irish Government is committed to supporting delivery of up to 5.7TWh of indigenously produced biomethane by 2030. The National Biomethane Strategy published by the Department of Environment, Climate, and Communications and the Department of Agriculture, Food and the Marine on the 28th of May 2024, sets the primary objective to deliver on the ambitious target set by the Government as part of the agreement on the sectoral emission ceilings.

Considering the proximity of the Proposed Development to the existing gas network, injection of biomethane to the existing gas network for industrial, commercial, or residential use was deemed the most suitable option. The Grid Injection Unit (GIU) within the Proposed Development will allow for the direct injection of biomethane into the gas network. A distribution gas connection to the Proposed Development will be delivered separately by GNI under a separate consenting process (with this gas connection considered in this EIAR).

Biomethane supplied to the existing gas network in this manner will be used as a direct substitute for fossil gas in various applications, such as high-temperature heat, electricity generation and transport. The biomethane produced by the Proposed Development will therefore directly contribute to meeting the national target of 5.7TWh of indigenously produced biomethane by 2030. Furthermore, direct entry into the gas network is more efficient in terms of GHG emissions compared to virtual pipeline as no additional fuel is required for the transport of the renewable energy. Traffic is also less with the direct entry method as opposed to a virtual pipeline.

Biogenic CO_2

A CO_2 liquefaction system has been included within the Proposed Development. The biogenic CO_2 that is extracted during the biogas upgrading process can be captured and liquefied. By utilising this process, the biogenic CO_2 will be captured, purified, and reused.

3.4.4.4 Best Available Techniques (BAT)

The processes outlined in **Chapter 2: Project Description** were selected following a thorough review of Best Available Techniques (BAT) detailed below, site conditions, and regulatory requirements.

- Best Available Techniques (BAT) Waste Treatment - Commission Implementing Decisions (CID)
- Best Available Techniques (BAT) Reference Document for the Animal By-products and/or Edible Co-products Industries
- Best Available Techniques (BAT) Reference Document for Energy Efficiency
- Best Available Techniques (BAT) Reference Document Emissions from Storage

The chosen techniques and technologies are industry-standard, support the effective implementation of emission control measures, and are well-established and proven within the industry.

3.5 Conclusion

In conclusion, this chapter has thoroughly examined the practicable alternatives considered during the design and pre-application phases of the Proposed Development, in compliance with the legislative context and guidelines provided by the EIA Directive 2014/52/EU and the EPA. The methodology followed a structured approach, ensuring all reasonable alternatives were assessed with respect to their environmental impacts.

Detailed considerations were given to the 'Do Nothing' scenario, highlighting the significant environmental, economic, and social benefits that would be forfeited if the project were not implemented.

The chapter also detailed the alternative locations considered, using a comprehensive scoring matrix to evaluate site-specific criteria. By presenting a clear rationale for the selected option, this chapter underscores the careful and informed decision-making process that ensured environmental considerations were taken into account in deciding on the selected options.

Appendix 3.1

Site-Specific Selection Criteria and Assessment: Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork

Criteria	Scoring	Score	Weighting	Total Score
Transport Network and Access	1. Greater than 5km from Regional Roads, 2. 1 - 5km km from Regional Road 3. Less than 1km from Regional Road. 4. Immediately adjacent to major source of feedstock allowing for transport internally.	4	3	12
Proximity to Feedstock Supply	1. 80% available >10km 2. 80% available within 10km 3. 80% Available within 5 km 4. Immediately adjacent to major source of feedstock.	4	3	12
Proximity to Biobased Fertiliser Receivers	1. 80% available >10km 2. 80% available within 10km 3. 80% Available within 5 km	3	3	9
Existing Land Use	1. Urban or greenfield 2. Rural Brownfield, 3. Zoned Industrial	2	2	4
Landscape Sensitivity	1. Proximate to Sensitive Landscape 2. Greater than 1km 3. Greater than 5km	3	2	6
Ecological Designations Score	1. Adjacent to designated site 2. >1km from designated sites 3. >5km from designated sites	3	2	6
Archaeological Designations Score	1.Adjacent to archaeology sites 2. >1km from archaeology sites 3. >5km from archaeology sites	3	1	3
Access to Gas Grid	1. Greater than 5km, 2. 1-5km, 3. <1km	3	3	9
Access to Electricity Grid	1. Greater than 5km, 2. 1-5km, 3. <1km	3	1	3
Sensitive Receptors	1. Less than 250m. 2. less than 1km. 3. Greater than 1 km	2	3	6
Available Land Size	1. 1- 2ha 2. 2-3ha 3. Greater than 4ha	3	3	9

Land Availability	1. Not for Sale or Lease 2. Available for Sale or Lease but financially unviable 3. Owned or for sale/lease at	3	3	9
Landscape and Visual Amenity	1. Site is elevated or exposed 2. Site has existing cover and partial views 3. Site is hidden and with little or no receptors overlooking the site.	1	2	2
Proximity to Suitable Water Course Or Sewer	1. Greater than 1km 2. Less than 1km. 3. Immediately adjacent or on site	3	3	9
Proximity to Drinking Water Source/Aquifer	1. Less than 250m. 2. less than 1km. 3. Greater than 1km	3	1	3
Existing Topography	1. Undulating or severe level changes 2. Moderate level changes that can be engineered out. 3. Relatively flat and level.	3	2	6
Flood Risk	1. In a Flood Risk Zone 3. Outside Flood Risk Zone	3	3	9
Total Ranked Score				**117**

Site-Specific Selection Criteria and Assessment: Bottlehill Landfill Site, Co. Cork

Criteria	Scoring	Score	Weighting	Total Score
Transport Network and Access	1. Greater than 5km from Regional Roads, 2. 1 - 5km km from Regional Road 3. Less than 1km from Regional Road. 4. Immediately adjacent to major source of feedstock allowing for transport internally.	3	3	9
Proximity to Feedstock Supply	1. 80% available >10km 2. 80% available within 10km 3. 80% Available within 5 km 4. Immediately adjacent to major source of feedstock.	1	3	3
Proximity to Biobased Fertiliser Receivers	1. 80% available >10km 2. 80% available within 10km 3. 80% Available within 5 km	1	3	3
Existing Land Use	1. Urban or greenfield 2. Rural Brownfield, 3. Zoned Industrial	3	2	6
Landscape Sensitivity	1. Proximate to Sensitive Landscape 2. Greater than 1km 3. Greater than 5km	3	2	6
Ecological Designations Score	1. Adjacent to designated site 2. >1km from designated sites 3. >5km from designated sites	3	2	6
Archaeological Designations Score	1.Adjacent to archaeology sites 2. >1km from archaeology sites 3. >5km from archaeology sites	3	1	3
Access to Gas Grid	1. Greater than 5km, 2. 1-5km, 3. <1km	1	3	3
Access to Electricity Grid	1. Greater than 5km, 2. 1-5km, 3. <1km	3	1	3
Sensitive Receptors	1. Less than 250m. 2. less than 1km. 3. Greater than 1 km	3	3	9
Available Land Size	1. 1- 2ha 2. 2-3ha 3. Greater than 4ha	3	3	9

Land Availability	1. Not for Sale or Lease 2. Available for Sale or Lease but financially unviable 3. Owned or for sale/lease at	1	3	3
Landscape and Visual Amenity	1. Site is elevated or exposed 2. Site has existing cover and partial views 3. Site is hidden and with little or no receptors overlooking the site.	3	2	6
Proximity to Suitable Water Course Or Sewer	1. Greater than 1km 2. Less than 1km. 3. Immediately adjacent or on site	1	3	3
Proximity to Drinking Water Source/Aquifer	1. Less than 250m. 2. less than 1km. 3. Greater than 1km	3	1	3
Existing Topography	1. Undulating or severe level changes 2. Moderate level changes that can be engineered out. 3. Relatively flat and level.	3	2	6
Flood Risk	1. In a Flood Risk Zone 3. Outside Flood Risk Zone	3	3	9
Total Ranked Score				**90**

Site-Specific Selection Criteria and Assessment: Mitchelstown Business Park, Mitchelstown, Co. Cork

Criteria	Scoring	Score	Weighting	Total Score
Transport Network and Access	1. Greater than 5km from Regional Roads, 2. 1 - 5km km from Regional Road 3. Less than 1km from Regional Road. 4. Immediately adjacent to major source of feedstock allowing for transport internally.	3	3	9
Proximity to Feedstock Supply	1. 80% available >10km 2. 80% available within 10km 3. 80% Available within 5 km 4. Immediately adjacent to major source of feedstock.	3	3	6
Proximity to Biobased Fertiliser Receivers	1. 80% available >10km 2. 80% available within 10km 3. 80% Available within 5 km	2	3	6
Existing Land Use	1. Urban or greenfield 2. Rural Brownfield, 3. Zoned Industrial	3	2	6
Landscape Sensitivity	1. Proximate to Sensitive Landscape 2. Greater than 1km 3. Greater than 5km	1	2	2
Ecological Designations Score	1. Adjacent to designated site 2. >1km from designated sites 3. >5km from designated sites	3	2	6
Archaeological Designations Score	1.Adjacent to archaeology sites 2. >1km from archaeology sites 3. >5km from archaeology sites	3	1	3
Access to Gas Grid	1. Greater than 5km, 2. 1-5km, 3. <1km	3	3	9
Access to Electricity Grid	1. Greater than 5km, 2. 1-5km, 3. <1km	3	1	3
Sensitive Receptors	1. Less than 250m. 2. less than 1km. 3. Greater than 1 km	1	3	3
Available Land Size	1. 1- 2ha 2. 2-3ha 3. Greater than 4ha	2	3	6

Land Availability	1. Not for Sale or Lease 2. Available for Sale or Lease but financially unviable 3. Owned or for sale/lease at	2	3	6
Landscape and Visual Amenity	1. Site is elevated or exposed 2. Site has existing cover and partial views 3. Site is hidden and with little or no receptors overlooking the site.	2	2	4
Proximity to Suitable Water Course Or Sewer	1. Greater than 1km 2. Less than 1km. 3. Immediately adjacent or on site	3	3	9
Proximity to Drinking Water Source/Aquifer	1. Less than 250m. 2. less than 1km. 3. Greater than 1km	3	1	3
Existing Topography	1. Undulating or severe level changes 2. Moderate level changes that can be engineered out. 3. Relatively flat and level.	3	2	6
Flood Risk	1. In a Flood Risk Zone 3. Outside Flood Risk Zone	3	3	9
Total Ranked Score				**96**

Site-Specific Selection Criteria and Assessment: Lands at Killakane, Mitchelstown, Co. Cork

Criteria	Scoring	Score	Weighting	Total Score
Transport Network and Access	1. Greater than 5km from Regional Roads, 2. 1 - 5km km from Regional Road 3. Less than 1km from Regional Road. 4. Immediately adjacent to major source of feedstock allowing for transport internally.	3	3	9
Proximity to Feedstock Supply	1. 80% available >10km 2. 80% available within 10km 3. 80% Available within 5 km 4. Immediately adjacent to major source of feedstock.	2	3	6
Proximity to Biobased Fertiliser Receivers	1. 80% available >10km 2. 80% available within 10km 3. 80% Available within 5 km	2	3	6
Existing Land Use	1. Urban or greenfield 2. Rural Brownfield, 3. Zoned Industrial	3	2	6
Landscape Sensitivity	1. Proximate to Sensitive Landscape 2. Greater than 1km 3. Greater than 5km	3	2	6
Ecological Designations Score	1. Adjacent to designated site 2. >1km from designated sites 3. >5km from designated sites	3	2	6
Archaeological Designations Score	1.Adjacent to archaeology sites 2. >1km from archaeology sites 3. >5km from archaeology sites	3	1	3
Access to Gas Grid	1. Greater than 5km, 2. 1-5km, 3. <1km	2	3	6
Access to Electricity Grid	1. Greater than 5km, 2. 1-5km, 3. <1km	3	1	3
Sensitive Receptors	1. Less than 250m. 2. less than 1km. 3. Greater than 1 km	2	3	6
Available Land Size	1. 1- 2ha 2. 2-3ha 3. Greater than 4ha	2	3	6

Land Availability	1. Not for Sale or Lease 2. Available for Sale or Lease but financially unviable 3. Owned or for sale/lease at	2	3	6
Landscape and Visual Amenity	1. Site is elevated or exposed 2. Site has existing cover and partial views 3. Site is hidden and with little or no receptors overlooking the site.	2	2	4
Proximity to Suitable Water Course Or Sewer	1. Greater than 1km 2. Less than 1km. 3. Immediately adjacent or on site	1	3	3
Proximity to Drinking Water Source/Aquifer	1. Less than 250m. 2. less than 1km. 3. Greater than 1km	3	1	3
Existing Topography	1. Undulating or severe level changes 2. Moderate level changes that can be engineered out. 3. Relatively flat and level.	3	2	6
Flood Risk	1. In a Flood Risk Zone 3. Outside Flood Risk Zone	3	3	9
Total Ranked Score				**94**

Site-Specific Selection Criteria and Assessment: Lands at Ballard, Araglin, Mitchelstown, Co. Cork

Criteria	Scoring	Score	Weighting	Total Score
Transport Network and Access	1. Greater than 5km from Regional Roads, 2. 1 - 5km km from Regional Road 3. Less than 1km from Regional Road. 4. Immediately adjacent to major source of feedstock allowing for transport internally.	1	3	3
Proximity to Feedstock Supply	1. 80% available >10km 2. 80% available within 10km 3. 80% Available within 5 km 4. Immediately adjacent to major source of feedstock.	3	3	9
Proximity to Biobased Fertiliser Receivers	1. 80% available >10km 2. 80% available within 10km 3. 80% Available within 5 km	3	3	9
Existing Land Use	1. Urban or greenfield 2. Rural Brownfield, 3. Zoned Industrial	1	2	2
Landscape Sensitivity	1. Proximate to Sensitive Landscape 2. Greater than 1km 3. Greater than 5km	3	2	6
Ecological Designations Score	1. Adjacent to designated site 2. >1km from designated sites 3. >5km from designated sites	3	2	6
Archaeological Designations Score	1.Adjacent to archaeology sites 2. >1km from archaeology sites 3. >5km from archaeology sites	3	1	3
Access to Gas Grid	1. Greater than 5km, 2. 1-5km, 3. <1km	1	3	3
Access to Electricity Grid	1. Greater than 5km, 2. 1-5km, 3. <1km	2	1	2
Sensitive Receptors	1. Less than 250m. 2. less than 1km. 3. Greater than 1 km	1	3	3
Available Land Size	1. 1- 2ha 2. 2-3ha 3. Greater than 4ha	3	3	9

Land Availability	1. Not for Sale or Lease 2. Available for Sale or Lease but financially unviable 3. Owned or for sale/lease at	2	3	6
Landscape and Visual Amenity	1. Site is elevated or exposed 2. Site has existing cover and partial views 3. Site is hidden and with little or no receptors overlooking the site.	2	2	4
Proximity to Suitable Water Course Or Sewer	1. Greater than 1km 2. Less than 1km. 3. Immediately adjacent or on site	1	3	3
Proximity to Drinking Water Source/Aquifer	1. Less than 250m. 2. less than 1km. 3. Greater than 1km	3	1	3
Existing Topography	1. Undulating or severe level changes 2. Moderate level changes that can be engineered out. 3. Relatively flat and level.	3	2	6
Flood Risk	1. In a Flood Risk Zone 3. Outside Flood Risk Zone	3	3	9
Total Ranked Score				86

4 Planning and Policy

4.1 Introduction

This chapter of the Environmental Impact Assessment Report (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 located within the townlands of Corracunna, Coolnavane and Garrane, Mitchelstown, Co. Cork.

The planning history most relevant to the subject site is also summarised below.

4.2 Need for the Proposed Development at Mitchelstown

The Proposed Development represents a location-specific form of development. A key factor determining the appropriateness of locating an anaerobic digestion facility within a given area is the availability of and potential for co-location with significant feedstock sources. Additional key factors include proximity to a potential connection point to the gas grid, the capacity of local transport infrastructure to support the proposed development, the ability of a site to provide for visual screening to reduce visual impact, and the potential for impact on sensitive environmental receptors. The applicants have undertaken an extensive site selection exercise in County Cork, as part of their overall roll-out of strategically important biomethane developments in the State. The site selected for the Proposed Development is an appropriate site for a development of the nature and scale of that which is proposed.

- The location of the Proposed Development allows for direct co-location with a significant source of agricultural feedstock for the proposed facility. This reduces transportation requirements and increases the overall sustainability and efficiency of operations.
- The site of the Proposed Development is partially brownfield in nature, replacing a cluster of derelict agricultural sheds and outbuildings.
- The site benefits from direct proximity to the gas grid, while the surrounding area accommodates ongoing development of biomethane infrastructure (in the form of a GNI grid injection facility, which is now under construction).
- Based on the significant level of feedstock capacity identified by the applicant in the area immediately surrounding the subject site, there is a location specific need for the provision of an anaerobic digestion facility in the area, with the subject site best suited to this use due to its accessibility, partially brownfield nature, proximity to gas connections, and the ability of the site to accommodate landscaping and screening to effectively reduce the visibility and visual impact of the proposed development.
- This bioenergy plant is located close to the relevant energy source (i.e.. feedstock producers, including the adjacent piggery, which will supply a significant portion of the overall feedstock requirements), and to the point of demand (i.e. the gas grid, which will transmit biomethane to users).
- The site benefits from excellent accessibility (it is adjacent to a transport corridor in the form of the N73 national route), and it has been determined that the proposed development will not give rise to any significant traffic and transport impacts.
- Similarly, the accompanying EIAR has determined that the proposed development will not give rise to any significant ecology, landscape, soils, air quality / odour impact, or water impact. The proposed development is appropriately sites, designed, and laid out to avoid any adverse impacts on the amenity of residential properties in the vicinity.
- The applicant and environmental consultants (ORS) have undertaken a robust assessment of alternative locations for the Proposed Development, including an

assessment of lands at Bottlehill as requested by the Planning Authority at pre-application stage, and it has been determined that the selected site is the most appropriate based on a range of environmental considerations. This is set out in detail within Chapter 3 of this EIAR.

- The Proposed Development, based on the reasons set out above, is fully consistent with the provisions of Objective ET1-17 of the County Development Plan (CDP), which relates to Bioenergy developments and their location.
- As noted above, the Proposed Development is located within an area identified as a green belt around the town of Mitchelstown. The Proposed Development has been carefully sited and designed, to ensure that a high degree of visual screening is provided through landscaping and layout to achieve a low level of visibility, maintaining the rural character and appearance of the green belt.
- Nonetheless, the Proposed Development represents a strategic form of development which is most appropriately located in close proximity to a significant feedstock source (in the form of an EPA licenced piggery), and where connection can be made to the gas grid.
- The Proposed Development successfully minimises any impact on the functions and open character of the Mitchelstown green belt as required under Objective RP 5-17 of the County Development Plan.
- The location of the Proposed Development has been tested against the 'Site Suitability Requirements' set out in Section 5.6 of the CDP and the proposed development is in keeping with the principles set out therein.

4.3 Prior Consultations

The Applicant has undertaken extensive consultations with local residents and farmers, and with relevant bodies prior to the lodgement of this application. These consultations are outlined within Table 1.4 of the EIAR. The feedstock required to operate the Proposed Development will be sourced predominantly from farms within close proximity of the subject site.

The application is widely supported by the agricultural community as evidenced by the support letters from local farmers willing to supply feedstock to the Proposed Development (see Appendix 1 to the Planning Report).

The applicants and design team have also undertaken detailed pre-application consultation with the Planning Authority prior to the lodgement of this application. The final development design and the content of the application responds to the matters discussed during the course of pre-application consultations.

The Planning Authority noted their overall support for renewable energy development. However it was noted that a robust assessment of alternatives and justification for the location of the Proposed Development would be required as part of any final application. This detailed assessment and justification has now been prepared and provided as part of this application, within the Planning Report and this EIAR, and was reviewed and discussed further by the Planning Authority prior to lodgement of the application.

In relation to traffic and transport, the assessment submitted with the application has concluded that there will no significant impact (refer to the Traffic and Transport Assessment and Road Safety Audit submitted with this application).

In relation to the site's location within a Greenbelt location along a scenic route, and an

assessment of alternative locations, this application includes an assessment of alternative sites, including the Bottlehill site referred to by the Planning Authority during pre-application consultation. The assessment concluded that the Bottlehill site would not be suitable for the Proposed Development (refer to EIAR Chapter 3: Consideration of Alternatives for further detail), and the assessment supports the strong justification for the subject site as an appropriate location for the development.

The Proposed Development is located in proximity to the source material and point of demand (refer to EIAR Chapter 2: Project Description for further detail). A central gas injection facility is location along the N73, c. 940m east of the subject site (albeit on a different gas network to the one which the Proposed Development will inject into), and there is direct access to the gas grid available for the development via a piped connection to the gas grid, to be delivered by GNI. An existing piggery is located c. 180 m north of the Proposed Development, which feedstock (source material) will be transported directly from, providing a significant portion (over 12%) of the overall feedstock requirements for the facility.

The design of the development has been updated since the initial pre-application meeting, to take in additional areas to provide for visual screening and landscaping. The overall layout and landscaping design has been undertaken via an iterative approach, including the preparation of several updates to layout and landscaping during the design process in response to iterations of visual impact imagery. The final solution provides a high degree of screening and will ensure that the overall visual integrity of the green belt is maintained, while allowing for a strategic and urgently required form of renewable energy development at an appropriate location.

As evident from the proposed Verified View Montages submitted with this application, and the conclusion of the residual visual impacts of EIAR Chapter 11, the proposed planting along the boundary to the N73 will include extensive planting (see Verified View Montage, verified view 2), mitigating any negative views of the site from this road. Once all mitigation measures in relation to the visual impact 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 be substantially hidden from view, and will be effectively screened, with a generous plantation of trees will continue to absorb the Proposed Development at viewpoint 3 and 2 (of the Verified View Montages). Apart from the impacts as outlined in the assessment in EIAR Chapter 11, no further residual impacts, in relation to the visual impact, are expected.

The location of the Proposed Development is considered to be appropriate due to its partially brownfield composition, strategic location, proximity from source material and point of demand, excellent transportation connectivity, and appropriate size with a low environmental impact.

As concluded in the EIAR submitted with this application, the proposal will have no adverse residual impact on the surrounding land, air, water and properties.

In relation to climate, the proposal will result in a slight, positive and long-term impact at a national scale due to the development due to the generation of a renewable alternative to fossil fuels (refer to EIAR Chapter 9 submitted with this application).

The Proposed Development is an agricultural-related development, that will support the sustainability of the agricultural sector, utilising agricultural wastes (from surrounding farms) to produce renewable biomethane and biobased fertiliser, whilst utilising an existing, derelict, brownfield site.

4.4 Site Planning Application History

The following planning history is based on a review of the Proposed Development site and surrounding area using the Planning Authority online planning search tool.

Subject Site

Reg. Ref.: 07/4633 – Cattle Shed

On the 31st of January 2007, permission was sought for the *"construction of loose housing cattle shed and effluent tank, removal of earth bank and reconstruction of existing yard surface and widening of entrance".* However, the application was deemed invalid. There is no other planning history pertaining to the subject site, according to the Cork County Council online planning search system.

Adjacent Lands

Reg. Ref.: 20/5631 – Alteration and Extension to Dwelling – Immediately Southeast of Subject Site

Cork County Council granted permission on the 27th October 2020, subject to 9 no. conditions, for *"permission for alterations and extension to an existing dwelling and permission for retention of an existing extension".*

The 9 no. conditions are summarised below:

- **Condition 3:** Vegetation or any structure shall not exceed 1m in height within the sight distance triangle.
- **Condition 4:** Surface water shall be disposed of within the site by means of soakaways and shall not be allowed to flow onto public road.
- **Condition 5:** Existing roadside drainage arrangements shall be preserved.
- **Condition 6:** Existing inlets or drains taking surface water from the public road into the site shall be preserved and maintained.
- **Condition 7:** Potable water supply shall be from a private well which shall be constructed so as to prevent contamination.
- **Condition 9:** The existing entrance shall be maintained.

Reg. Ref.: 19/6089 and ABP Ref.: 307394 – Central Gas Injection Facility – C. 940m East of Subject Site

Cork County Council issued a decision to grant permission on the 19th of May 2020, subject to 22 no. conditions, for a development comprising:

"The demolition of existing agricultural structures and construction of a Central Gas Injection Facility within a site area of ca. 1.8ha, comprising of; a concrete apron; 16 no. truck bays, a welfare/office facility; Medium Voltage substation; 8 no. pressure reduction skid units; 2 no. boiler units; network entry facility unit; flare unit; odorant injection unit; propane storage; compressed natural gas refuelling area, electrical and instrumentation kiosk; generator kiosk; transformer kiosk; 8 no. compressor container units; 4 no. gas chromatograph units; covered shelter for storage of gas bottles; compressed natural gas dispenser; compressor building; on site drainage; underground pipework; 1 no. new site entrance from the N73 and associated

drainage to serve the proposed facility and adjacent existing Corracunna Above Ground Installation facility and the removal of the existing Corracunna Above Ground Installation entrance and ; all associated site development works. The Major Accident Regulations apply to this development; it is a lower tier development. Permission is sought for a period of 10 years."

A third-party appeal was submitted to An Bord Pleanála by An Taisce (307394-20). However, the appeal was unsuccessful and An Bord Pleanála issued an Order to grant permission for the development on the 21st of December 2020, subject to 12 no. conditions (summarised below):

- During the operational phase of the proposed development, deliveries shall only take place between the hours of 0800 and 2000 Mondays to Sundays inclusive. Deviation from these times will only be permitted in exceptional circumstances where prior written approval has been given by the planning authority.
- Developer shall enter a water connection agreement with Irish Water.
- Site development and building works shall be carried out only between the hours of 0700 to 1900, Mondays to Fridays inclusive, between the hours of 0800 to 1400 on Saturdays and not at all on Sundays or public holidays. Deviation from these times will only be allowed in exceptional circumstances where prior written approval has been received from the planning authority.

The Board's Inspectors Report noted the following in relation to the location of the injection point development within the green belt surrounding the town of Mitchelstown:

"The proposed development would be located within the greenbelt associated with the town of Mitchelstown. I note the provisions of Cork County Development Plan that relate to this location. The specific objective applicable to this location is Objective RCI 5-8. I note that the planning authority has made reference to Objectives RCI 5-6 and RCI 5-7 in its considerations on the proposed development. Reliance on these objective is misplaced as they expressly apply to the Metropolitan Cork Greenbelt only according to the Cork County Development Plan. They do not extend to Mitchelstown or to any other settlement remote from Metropolitan Cork.

The proposed development is, thus, required to be assessed against the provisions of Objective RCI 5-8 to determine how it complies with the requirements applying to the Mitchelstown Greenbelt. There are four provisions relating to this objective generally referring to the prevention of sprawl, reservation for agricultural use, preventing linear road frontage development, and local area plans being required to define the extent of individual greenbelts around towns. My considerations on these are as follows:

- *It is acknowledged that the nature of the proposed development is one that does not introduce development which could be considered sprawl or one that blurs the distinction between the built up area of Mitchelstown and the open countryside surrounding it.*

- *While the site will not be retained for agriculture, open space or recreational uses, it is reasonable to ascertain that the development would comprise infrastructure that facilitates activities occurring as part of farm practices, namely anaerobic digestion, and forms a key outlet for biomethane produced.*

- *The nature and extent of the development would not impact on linear roadside frontage development on the N73 national route leading to Mitchelstown in the widely held understanding of linear development relating to one-off housing.*

- *I note that Mitchelstown is defined as a 'Main Town' in the Fermoy Municipal District Local Area Plan. The role of food-related industry for the town is highlighted. The site for the proposed development lies within the greenbelt for the town and it is clearly beyond the settlement boundary for the town as set out in the LAP. The objectives set out in the LAP for Mitchelstown relating to agriculture, open space and recreation are focused on areas within the settlement boundary.*

Overall, I submit that the nature of the proposed development is one in principle which is distinctly related to agricultural uses and is one best accommodated in a rural location. I do not consider that there is any material conflict with the 'Greenbelt' provisions of Cork County Development Plan. Finally, I must also acknowledge the existence of the established Gas Networks Ireland above ground installation on the lands to the west of the site and the compatibility of the proposed development with this established use."

Reg. Ref.: 19/5319 – Dwelling House – Southeast of Subject Site

Cork County Council granted permission on the 15th of July 2019, subject to 17 no. conditions, for the *"construction of a new dwellinghouse, detached domestic use garage, wastewater treatment system and all other associated site works".*

The application was subsequently subject to a third-party appeal by Transport Infrastructure Ireland. The application was later withdrawn by the applicant.

Reg. Ref.: 19/5853 – Dairy Associated Works – North of Subject Site

Cork County Council granted permission on the 26th of November 2019 for the *"Retention of straw storage shed and permission for demolition of existing dairy and part of collecting yard, conversion of existing milking parlour to dairy, construction of milking parlour, collecting yard, slatted channel, silage pit extension and associated works".*

Permission was granted by the Planning Authority subject to 40 no. conditions.

Reg. Ref.: 17/7193 – Two-Storey Dwelling House – North of Subject Site

Cork County Council granted permission on the 21st of June 2018 for the *"construction of a two-storey dwellinghouse, detached domestic garage and associated site works including roadside entrance, septic tank and percolation area".*

Permission was granted by the Planning Authority subject to 19 no. conditions.

Reg. Ref.: 11/5359 – Dwelling House – North of Subject Site

Cork County Council granted permission on the 4th of September 2012 for the construction of a "*new dwellinghouse, detached domestic garage, septic tank and percolation area, new entrance, including all associated site works."* The application was approved by the Planning Authority subject to 21 no. conditions.

Reg. Ref.: 10/5658 – Domestic Vehicular Entrance Gate – Immediately West of Subject Site

Cork County Council granted permission on the 1st of October 2010 for the provision of a *"new domestic vehicular entrance gate to existing dwelling & adjacent farm access gate from a local*

access road. The development will consist of a landscaped & gravelled driveway to dwelling, rendered walls & piers to gateway, cattlegrid & sundry other minor works."

Reg. Ref.: 08/5998 – Milking Parlour – North of Subject Site

Cork County Council granted permission on the 5th of June 2008 for the *"demolition of milking parlour and construction of milking parlour."*

Reg. Ref.: 07/12944 – Slurry Tank – North of Subject Site

Cork County Council granted permission on the 8th of February 2008 for the *"Construction of overground slurry tank."*

Reg. Ref.: 07/10669 – Demolition of Dwelling, Alterations and Construction of Two-Storey Office – South of Subject Site

Cork County Council granted permission on the 31st of January 2008 for the *"demolition of derelict dwelling and partial change of use of existing shed from warehouse to display area for kitchens and construction of two storey office extension to front, installation of proprietary wastewater treatment facility, realignment of existing entrance and associated site works."*

Reg. Ref.: 06/4926 – Garage Conversion – Immediately South of Subject Site

Cork County Council granted permission on the 19th of May 2006 for a *"garage conversion to living accommodation and alterations to elevations of dwelling and construction of detached domestic garage."*

Reg. Ref.: 06/11753 – Feeding Passage and Milking Parlour – North of Subject Site

Cork County Council granted permission on the 20th of March 2007 for the *"demolition of milking parlour and construction of feeding passage, milking parlour and ancillary works."*

Reg. Ref.: 05/973 – Agricultural Stores – North of Subject Site

Cork County Council granted permission on the 24th of May 2005 for the development of *"5 no. agricultural stores and weighbridge."*

Reg. Ref.: 04/3555 – Dwellinghouse Renovations and Extension – South of Subject Site

Cork County Council granted conditional permission on the 19th of August 2004, for *"renovations and extension to dwellinghouse and detached domestic garage."*

Reg. Ref.: 03/4250 – Dwellinghouse – East of Subject Site

Cork County Council refused permission on the 20th of October 2003 for the construction of a *"dwellinghouse and modification of existing entrance."*

4.5 European Policy and Legislation

4.5.1 Energy and Climate

The need to recognise the impact of anthropogenic climate change and transition our way of

life towards dealing with the effects of climate change is dealt with across European policy and legislation. The key energy and climate policies and legislative documents with relevance to the Proposed Development are set out in this section.

The EU has pledged to achieve climate neutrality by 2050, delivering on commitments under the Paris Agreement (COP21). Reaching this objective will require a transformation of Europe's energy supply, society, and economy. With the 2030 Climate Target Plan[1], the EC proposes to raise the EU's ambition on reducing greenhouse gas (GHG) emissions to at least 55% below 1990 levels by 2030. The plan recognises the significant contribution of the agricultural sector to GHG emissions and while these emissions can never be fully eliminated under existing technology and management options, they can be significantly reduced, whilst ensuring food security is maintained in the EU. Efficient use of fertilisers, adopting precision farming, a healthier herd and the deployment of AD technologies treating organic waste to produce renewable biogas are highlighted within the plan as examples of existing technologies.

The European Green Deal package of policy initiatives was launched by the EC in 2019, which aims to set the EU on the path to a green transition, with the ultimate goal of reaching climate neutrality by 2050. The associated Fit for 55 legislative package aims to translate the ambitions of the Green Deal into law. The policy package itself underlines the need for a cross-sectoral approach in which all relevant policy areas contribute to the ultimate climate-related goal. The package includes initiatives covering the climate, the environment, energy, transport, industry, agriculture, and sustainable finance.

The Green Deal recognises that "*renewable and low-carbon gases, such as biomethane, will play a central role in achieving climate neutrality*"[2]. Biogas and biomethane, renewable and low carbon hydrogen have the potential to gradually replace fossil gases, including natural gas, and can be used as a fuel to reduce emissions in hard-to-abate sectors, particularly in industry and transport.

As part of the Deal, the EU Farm to Fork Strategy[3] was published which includes proposals to transform agriculture and position it as a key sector for climate mitigation and adaptation. The development of an agri-led biomethane industry in Ireland is strongly aligned with a number of the headline Farm to Fork goals, including:

- Ensure food production has a neutral or positive environmental impact.
- Carbon Farming Initiative - implement green business models that sequester carbon.
- Promote a circular bio-based economy.
- Reduce pesticide use and excess nutrients in the environment by 2030.
- Achieve a 50% reduction in nutrient losses without reducing soil fertility leading to a 20% reduction in fertiliser use.
- Increase the proportion of organic farming to 25% by 2030.

4.5.2 EU Common Rules on Renewable Gasses

[1] Communication from The Commission to The European Parliament, The Council, The European Economic and Social Committee and The Committee of the Regions - *Stepping up Europe's 2030 climate ambition Investing in a climate-neutral future for the benefit of our people*. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0562
[2] European Commission, Directorate-General for Communication, (2021) *Delivering the Green Deal: the role of clean gases including hydrogen.* https://data.europa.eu/doi/10.2775/718801
[3] Communication from The Commission to The European Parliament, The Council, The European Economic and Social Committee and The Committee of the Regions - *A Farm to Fork Strategy for a fair, healthy, and environmentally friendly food system.* https://ec.europa.eu/info/sites/default/files/communication-annex-farm-fork-green-deal_en.pdf

The common rules for the internal markets for renewable gas, natural gas and hydrogen (recast) European Parliament legislative resolution was published on the 11th of April 2024.

The common rules outlined that the Commission communication of 8 March 2022 entitled 'REPowerEU: Joint European Action for more affordable, secure and sustainable energy' (REPowerEU), which was adopted after the beginning of Russia's unprovoked and unjustified military aggression against Ukraine, highlighted the importance of diversification of gas supplies to phase out the Union's dependency on Russian energy.

REPowerEU recognised that "*scaling up sustainable biomethane and the roll-out of renewable hydrogen could play a decisive role"* in ensuring secure and more sustainable power supply for the EU.

The common rules recognise that "*Although electrification is a key element of the green transition, household natural gas consumption, including increasing volumes of renewable gas, in particular biomethane, will continue to exist in the future."*

The common rules go on to state the following:

"Member States should take concrete measures to assist the wider use of sustainable biomethane, or other types of gas, that can technically and safely be injected into, and transported through, the natural gas system, the producers of which should be granted non-discriminatory access to that system, provided that such access is compatible with the relevant technical rules and safety standards on an ongoing basis and unless otherwise provided for in this Directive"

The rules also state that Member States should seek to expedite and support the connection of biomethane producers to the natural gas network, and that Member States must ensure that transmission and distribution system operators adhere to reasonable time limits to assess requests for the injection of biomethane.

4.5.3 Renewable Energy Directive

The current Renewable Energy Directive 2018/2001/EU[4] entered into force in December 2018 and has since been amended by Directive EU 2023/2413[5] (RED III). On the 12th September 2023, RED III was adopted by the Parliament. The Directive establishes a basis in policy for the production and promotion of renewable energy, setting a new binding renewable energy target for the EU for 2030 of at least 42.5%, with this target having been revised upward in 2023 from 32%.

This target is a continuation of the 20% target for 2020. In order to help EU member countries to achieve this target, the directive introduces new measures for various sectors of the economy, particularly on heating, cooling, and transport. It also includes new provisions to enable citizens to play an active role in the development of renewables by enabling renewable energy communities and self-consumption of renewable energy. It also establishes

[4] Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources. https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG

[5] Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023L2413&qid=1699364355105

strengthened criteria to ensure bioenergy's sustainability.

The 2023 amending Directive altered the 2018 Directive to align with increased climate ambitions and recognise renewable energy as an “overriding public interest” in the Appropriate Assessment process.

Under this revision the planning, construction and operation of renewable energy plants, their connection to the grid and the related grid itself, and energy storage assets are presumed to be in the overriding public interest and serving public health and safety when balancing legal interests for the purposes of the Birds, Habitats, and Water Framework Directives. The revisions to the Directive present further evolution of the target to accelerate the development of renewable energy developments in EU member states.

Building on the 2009 and 2018 directives, the revised directive introduces stronger measures to ensure that all possibilities for the further development and uptake of renewables are fully utilised. This will be key to achieving the EU's objective of climate neutrality by 2050 and to strengthen Europe's security of energy supply.

In addition to the new headline target to double the existing share of renewable energy sources, a strong policy framework will facilitate electrification in different sectors, with new increased sector-specific targets for renewables in heating and cooling, transport, industry, buildings, and district heating/cooling, but also with a framework promoting electric vehicles and smart recharging.

To support renewables uptake in transport and heating and cooling, the revised directive converts into EU law some of the concepts outlined in the energy system integration and hydrogen strategies, published in 2020. These concepts aim at creating an energy-efficient, circular, and renewable energy system that facilitates renewables-based electrification and promotes the use of renewable fuels, including hydrogen, in sectors like transport or industry where electrification is not yet a feasible option. For these hard-to-electrify sectors, the directive sets new binding targets for renewable fuels of non-biological origin.

As an important bottleneck to the deployment of renewables on the ground, permitting procedures will also be easier and faster both for renewable energy projects (including through shorter approval periods and the creation of 'Renewables acceleration areas') and for the necessary infrastructure projects. Under the amended Directive, member states must identify areas for the acceleration of renewables where projects will undergo a simplified and fast-track procedure.

Member States (including Ireland) must transpose RED III into national law by the 21st May 2025. However, certain provisions – including those aimed at accelerating permit-granting procedures – are required to be transposed into national law by the 1st July 2024.

4.5.4 REPowerEU Energy Plan

The European Commission presented the REPowerEU Energy Plan on the 18th May 2022, which aims to tackle the climate crisis by accelerating Europe’s clean energy transition and adopts a call to end European dependency on Russian fossil fuels. The Plan recognises that the uptake of biomethane involves a continued support to innovative technologies for the production of sustainable biomethane, upgrade of biogas to biomethane and its integration within the gas network.

The proposal contains a Biomethane Action Plan[6] to stimulate the renewable gas value chain within EU member states and achieve production of 35 billion cubic metres (bcm) of biomethane by 2030. This plan also includes a targeted revision of the Fitfor55 energy efficiency and renewable targets, together with the necessary measures to accelerate Renewable Energy Sources (RES) permitting and recommendations to facilitate renewable gas injection.

4.5.5 EU Strategy to reduce Methane Emissions

After CO_2, methane is recognised as the second largest GHG contributor to climate change. Methane emissions from livestock originate from ruminant species, manure management and feed cultivation. The EU Strategy to reduce Methane Emissions[7], published in 2020, acknowledges the agriculture sector as having the highest potential in overall benefits for reducing methane emissions. The Strategy points to the benefits of biogas derived from organic agricultural wastes to reduce methane emissions, generate new revenue streams for farmers and contribute to wider rural development.

The use of digestate is also identified as an organic soil improver and mechanism to displace chemical fertilisers. It is noted that sequential cropping can be used with manure as feedstock for sustainable biogas production, while contributing to sustainable farming practices. The Strategy aims to provide targeted support to accelerate the development of the EU market for biogas from sustainable sources such as livestock manure, organic waste, and residues via policy initiatives.

4.5.6 Waste

The benefits of Anaerobic Digestion (AD) are recognised and promoted in European Union (EU) waste management legislation and policy. The EU Directives and policies discussed below, which set the context for the management of waste in Ireland (and which are transposed and implemented by domestic legislation), encourage the use of AD as an essential element of sustainable waste management and an efficient recycling method for organic wastes.

The Waste Framework Directive (2008/98/EC, as amended by Directive (EU) 2018/851) enshrines a key principle which aims to move waste away from landfill and towards treatment options. The separate collection of organic waste with a view to its biological treatment, through processes such as AD, is encouraged by this Directive.

The objective of landfill diversion is also a requirement of the Landfill Directive (1999/31/EC).

The foundation of EU waste management is the five-step “waste hierarchy”, established in the Waste Framework Directive. It establishes an order of preference for managing and disposing of waste.

[6] Biomethane Action Plan. https://eur-lex.europa.eu/legal content/EN/TXT/?uri=SWD%3A2022%3A230%3AFIN&qid=1653033922121

[7] European Commission (2020) *Communication from the Commission to the European Parliament, The European Council, The Council, The European Economic and Social Committee and the Committee of the Regions* - on an EU strategy to reduce methane emissions

Figure 4.1: The Waste Hierarchy

On the 5th of July 2023, a targeted revision of the Waste Framework Directive[8] was published by the Environment Directorate General of the European Commission. The proposal aims to bring about increased circular and sustainable management of waste and aims to reduce the environmental and climate impacts of food systems associated with food waste generation.

Towards a circular economy: a zero-waste programme for Europe[9] was proposed in 2014 by the EC to establish a common and coherent EU framework to promote the circular economy. In December 2017, a provisional agreement was reached with representatives of the European Parliament on all four legislative proposals of the package with new targets. An obligation on EU member states to separately collect organic waste and associated ban of organic waste landfilling will come into effect as of 2024. The circular economy principles, and particularly the development of a bioeconomy can provide opportunities for agricultural residues such as those from crops, animal manures and dairy by-products, to be used to produce biobased fertiliser and renewable energy through the AD process.

4.6 National Planning, Climate, and Waste Policy and Legislation

4.6.1 National Biomethane Strategy[10]

The National Biomethane Strategy (NBS hereafter) was published by the Department of Environment, Climate, and Communications and the Department of Agriculture, Food and the Marine on the 28th May 2024. The NBS sets out the necessary policy and regulatory measures and provides a roadmap to developing a biomethane industry of scale in Ireland. In all aspects, this application aligns with the aspirations set out in the NBS as described in more detail below.

A wide range of support mechanisms were assessed during the development of the NBS, including Feed in Tariffs (FiT) and Contracts for Difference (CfD). Given the need to swiftly stimulate the industry, the Renewable Heat Obligation in conjunction with Capital Grants were

[8] Proposal for a targeted revision of the Waste Framework Directive. https://environment.ec.europa.eu/publications/proposal-targeted-revision-waste-framework-directive_en

[9] Communication from The Commission to The European Parliament, The Council, The European Economic and Social Committee and The Committee of the Regions - *Towards a circular economy: a zero-waste programme for Europe.* https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52014DC0398

[10] National Biomethane Strategy (2024): https://www.gov.ie/en/publication/d115e-national-biomethane-strategy/

the chosen method to support the delivery of a biomethane sector in Ireland. This offers budget certainty for the support programme while delivering a sector of scale.

Renewable Heat Obligation: The NBS states, *"To support the need to decarbonise the heat sector, the Government has agreed to the introduction of a Renewable Heat Obligation (RHO). The RHO* ***will support an increased use of renewable energy in the heat sector and contribute to a reduction in emissions*** *in line with Ireland's climate ambitions. As Ireland imports most of its fossil fuels, the heating sector is a significant contributor to Ireland's high energy import dependency. The RHO will also help reduce our reliance on imported fossil fuels and strengthen our energy security due to greater diversification of our energy streams. Under current proposals, the RHO would recognise biomethane as an eligible fuel for certification, providing an important policy tool to support the development of an indigenous biomethane sector. CAP 24 commits to the publication of a high-level RHO scheme by Q3 2024".* [**Emphasis added**].

The vision of the NBS states, *"By 2030, Ireland will have developed a sustainable biomethane industry of scale, meeting ambitious targets set by the Government".*

The primary objective of the NBS is to deliver on the ambitious target set by the Government as part of the agreement on the sector emission ceilings. This ambition is to scale up indigenously produced biomethane to 5.7 TWh (Terawatt hour) per annum by 2030, which has been increased substantially from a previous Climate Action Plan 2019 target of 1.6 TWh by 2030.

The NBS states that *"biomethane has the potential to progressively replace fossil gas supplies at a national level as we substantially reduce our use of gas over the next 15 to 20 years."*

The strategy states that Ireland is recognised by the European Commission as having one of the largest potentials for biomethane production in Europe on a per capita basis due to its substantial agriculture sector. The development of a new agri-centric biomethane industry can engender cross sectoral benefits for Ireland. However, the strategy states that currently Ireland has only two operational biomethane facilities injecting biomethane into the gas grid; the volume of biomethane injected into the grid at present is small, equating to c. 75 GWh per annum (0.001% of Ireland's current gas demand).

The benefits that Ireland can realise from the development of a new agri-centric biomethane industry are summarised as follows:

- Without biomethane, Ireland is unlikely to meet its legally binding climate targets.
- Biomethane helps to reduce agriculture sector emissions.
- Diversification option for farmers.
- Opportunity to replace chemical fertiliser with a supply of biobased fertiliser.
- Helps reduce Ireland's energy emissions.
- Improves gas security and diversification of supply.
- Stimulation of the rural economy.

This application proposes to develop an AD facility to produce biomethane for injection into the national grid. This proposal is supported by the National Biomethane Strategy, and it is evident from the strategy, that this development type is crucial in order to achieve climate targets, rural and farm diversification, the replacement of chemical fertiliser with a supply of biobased fertiliser and improve gas security and diversification of supply. The proposal will create c. 75 full time jobs (direct and indirect), stimulating the rural economy.

The Strategy also notes the importance of biomethane production for ensuring security of energy supply in Ireland. It is noted that c. 75% of Ireland's gas supply is currently imported from the UK, with biomethane (along with hydrogen in the future) playing a key role in ensuring a domestic supply of renewable gas to diversify gas supply and displace fossil gas. The Proposed Development directly contributes to this objective.

The Strategy analyses a range of policy options for the roll-out of biomethane production, with a combination of small scale and larger-scale facilities ultimately supported by Government Policy. Therefore, the scale of the plant aligns with the aspirations of the NBS.

The strategy recognises the effectiveness and maturity of carbon dioxide capture technology as part of biomethane production. This technology is an integral part of the Proposed Development, with CO_2 resulting from the biogas upgrading / refining process to be captured at source. In summary, this application fully aligns with the aspirations set out in the NBS as presented above.

4.6.2 National Planning Framework

The National Planning Framework[11] (NPF hereafter) was published in 2018 and forms the top tier of Ireland's planning policy hierarchy, setting the policy context at a national level for Regional Spatial and Economic Strategies, County and City Development Plans, and Local Area Plans.

The Proposed Development aligns with the National Planning Framework, the overarching policy and planning framework for the social, economic, and cultural development of Ireland. This development specifically relates to the NPF in terms of Planning for Diverse Rural Places (Chapter 5) and Realising our Sustainable Future (Chapter 9).

National Policy Objective (NPO hereafter) 21 states the following:

"Enhance the competitiveness of rural areas by supporting innovation in rural economic development and enterprise through the diversification of the rural economy into new sectors and services, including ICT-based industries and those addressing climate change and sustainability."

The role of rural areas in providing a sustainable renewable energy supply is recognised in the NPF, which states:

"In planning Ireland's future energy landscape and in transitioning to a low carbon economy, the ability to diversify and adapt to new energy technologies is essential. Innovative and novel renewable solutions have been delivered in rural areas over the last number of years, particularly from solar, wind and biomass energy sources.

In meeting the challenge of transitioning to a low-carbon economy, the location of future national renewable energy generation will, for the most part, need to be accommodated on large tracts of land that are located in a rural setting, while also continuing to protect the integrity of the environment and respecting the needs of people who live in rural areas."

Furthermore, the competitive advantage of rural activities associated with the bioeconomy is

[11] Government of Ireland (2020) *National Planning Framework*: 39baaa8c-48dc-4f24-83bd-84bbcf8ff328.pdf (www.gov.ie)

highlighted in the NPF, which states:

"The transition to a more circular economy and bioeconomy, where the value of bio-based products, materials and resources is maintained in the economy for as long as possible, and the generation of waste management is minimised, will provide an essential contribution to our national goal of developing a sustainable, low-carbon, resource efficient and competitive economy.

We take special note of the following National Policy Objectives, which aim to:

Reference	Description
NPO 23	*"Facilitate the development of the rural economy through supporting a sustainable and economically efficient agricultural and food sector, together with forestry, fishing and aquaculture**, energy and extractive industries, the bio-economy and diversification into alternative on-farm and off-farm activities**, while at the same time noting the importance of maintaining and protecting the natural landscape and built heritage which are vital to rural tourism."* [**Emphasis added**].
NPO 53	*"Support the circular and bio economy including in particular through greater efficiency in land management, greater use of renewable resources and by reducing the rate of land use change from urban sprawl and new development."*

The NPF identifies the need to reduce emissions while ensuring that Ireland has a reliable and resilient energy supply, as expressed in Section 9.2:

"Ireland's national energy policy is focused on three pillars: (1) sustainability, (2) security of supply and (3) competitiveness. The Government recognise that Ireland must reduce greenhouse gas emissions from the energy sector by at least 80% by 2050, compared to 1990 levels, while at the same time ensuring security of supply of competitive energy sources to our citizens and businesses."

The transition of the energy sector towards low-carbon and renewable sources of energy is recognised as playing a key role in achieving a sustainable and climate-friendly future for Ireland, as expressed by the following National Policy Objectives:

Reference	Description
NPO 54	*"Reduce our carbon footprint by integrating climate action into the planning system in support of national targets for climate policy mitigation and adaptation objectives, as well as targets for greenhouse gas emissions reductions."*
NPO 55	*"Promote renewable energy use and generation **at appropriate locations within the built and natural environment** to meet national objectives towards achieving a low carbon economy by 2050."* [**Emphasis added**].

Finally, the NPF supports circular economy principles that aim to minimise the amount of waste that goes into landfill and maximise the utilisation of waste as a resource, as expressed by the following National Policy Objective:

NPO 56: *"Sustainably manage waste generation, invest in different types of waste treatment and **support circular economy principles**, prioritising prevention, reuse, recycling and recovery, to support a healthy environment, economy and society".* [**Emphasis added**].

It is noted that on the first draft revision to the National Planning Framework was published on the 10th of July 2024. The draft revision to the NPF includes the following statement in relation to biomethane within Chapter 9, which deals with Climate Transition and Environment:

"Biomethane is a carbon-neutral renewable gas made from farm and food waste through a process known as anaerobic digestion. A National Biomethane Strategy has been published which requires the development of policies with the primary objective of delivering the ambitious target of producing 5.7 TWh of indigenous biomethane by 2030.

It is estimated that over 80% of biomethane will be produced from grass silage and cattle slurry. This will require grass from 120,000ha (3% of total agricultural area) to produce the required feedstock.

To meet Ireland's target of 5.7 TWh of biomethane by 2030, a large number of anaerobic digestion facilities will need to be developed, alongside the related infrastructure necessary to support these facilities."

Consistency with the National Planning Framework

The Proposed Development is consistent with the NPF, the principles of which are reflected in the various regional and local policy documents as discussed below.

We note in particular the role that the Proposed Development can play in strengthening the economic and climate resiliency of the county. Furthermore, partnerships with the farming community can contribute to the reduction of emissions in the agricultural sector and the sustainable diversification of agricultural activities in response to climate change.

The energy sector must transition towards low-carbon and renewable sources to achieve the 80% reduction in emissions by 2050, as set out in the NPF. AD facilities can play an important role in this transition. Finally, the Proposed Development provides an opportunity to sustainably utilise agricultural waste as a resource, to produce biobased fertiliser and renewable energy through the AD process, allowing for the decarbonisation of the gas network.

The Proposed Development is strongly supported by, and is fully consistent with, the national policy objectives highlighted above. The development will deliver local employment and significant economic benefits in a rural area, while producing renewable biomethane and helping to improve the sustainability of the agricultural sector in the vicinity.

4.6.3 National Development Plan 2021 – 2030

The National Development Plan[12] (NDP hereafter) sets out the national capital investment priorities to realise the objectives of the NPF, providing a guide for national, regional, and local planning and investment decisions during this decade. The NDP recognises that public capital investment choices over the next 10 years must not only contribute to the objective of a 51% reduction in greenhouse gas emissions by 2030 but also lay the pathway to achieve the national climate objective of net-zero greenhouse gas emissions by 2050. The Plan states that significant Exchequer investment, combined with further household, State-Owned Enterprise (SOE), and crucially private sector investment in renewable energy projects such as the

[12] Government of Ireland (2021) *National Development Plan 2021-2030*: a36dd274-736c-4d04-8879-b158e8b95029.pdf (www.gov.ie)

Proposed Development, are critical to delivering on these climate action objectives.

The NDP sets out 10 National Strategic Outcomes (NSOs) with Strategic Investment Priorities, with a particular emphasis on Climate Action and strengthening and developing rural economies and communities. The NSOs and Strategic Investment Priorities of particular relevance to the Proposed Development are outlined below:

Reference	Description
NSO 3 - Strengthen Rural Economies and Communities	This outcome recognises the importance of rural communities and community engagement in achieving the goals of the NPF and NDP. The NDP highlights the role that rural economies and communities can play in responding to climate change across sectors and supports the sustainable development of Ireland's agri-food sector. For example, the On-Farm Capital Investment Scheme supports farmers looking to increase their environmental efficiency through, inter alia, the investment in and adoption of new technologies.
NSO 8 – Transition to a Climate-neutral and Climate Resilient Society	This outcome responds to the significant commitments by the Government to tackle the effects of climate change, reduce greenhouse gas emissions by 51% by 2030 (as compared to 2018 levels), and work towards achieving net-zero greenhouse gas emissions by 2050 in line with the Climate Action and Low Carbon Development (Amendment) Act 2021 (see below). The NDP recognises the special importance of the energy sector in achieving these targets, and that radical changes may be needed to reduce our reliance on fossil fuels: *"Action in the energy sector will be critical to the achievement of Ireland's climate targets and the transformation to a high-renewable, net-zero emissions future. This will require a fundamental shift in the means by which we supply, store, and use energy."* The NDP also recognises the continued need for the supply and use of gas in Ireland, particular with regards to ensuring security of energy supply. Underpinning this theme is a commitment to a just transition, to ensuring that all people are able to participate in and benefit from the decarbonisation of economy: *"A key focus of this investment is to support the transition of the existing workforces and the creation of new enterprise and employment opportunities so that the region remains vibrant, innovative and makes the most of the opportunities that decarbonisation will bring."*
NSO 9 – Sustainable Management of Water and Other Environmental Resources	This outcome highlights the need for investment in the environmental resources and infrastructure Ireland, with a particular focus on the sustainable management of waste and water. This theme is supported by the whole-of-government Circular Economy Strategy (see below) as recognises that investments in waste management is critical to achieving an environmentally and economically sustainable future: *"While the overall focus of Government waste policy is on prevention and waste minimisation, investment in indigenous waste treatment capacity remains critical to our environmental and economic well-being."* AD facilities, such as the Proposed Development, are highlighted as one investment opportunity to achieve this NSO:

	*"Capacity will continue to be built in waste facilities, **including anaerobic digestion**, hazardous waste treatment, plastics processing, recycling, waste to energy, and landfill and landfill remediation, to meet future waste objectives."* [**Emphasis added**].

Consistency with the National Development Plan

Cross-sectoral investment in agriculture, energy and waste are vital to enable the timely transition to a low-carbon, climate-resilient and environmentally sustainable economy and society by 2050.

The Proposed Development directly aligns with the objectives of the NDP to strengthen rural economies and move towards an economy based on dependable and domestically sourced renewable energy. The Proposed Development is highly integrated with the just transition of the rural and agricultural communities and Circular Economy principles, in terms of the supply of agricultural waste by local farmers to be used as a resource for the sustainable production of bio-methane gas and biobased fertiliser within a state of the art facility.

4.6.4 Climate Action Plan 2024

The Climate Action Plan 2024[13] (CAP24 hereafter) is the third annual update to Ireland's Climate Action Plan, adopted by Government on the 21st May 2024 following public consultation in early 2024. Under section 15 of the Climate Action and Low Carbon Development Act 2015, as amended, the Planning Authority must perform its functions in a manner which is consistent with the current Climate Action Plan, in so far as is practicable.

CAP24 builds upon last year's Plan (CAP23) by refining and updating the measures and actions required to deliver the carbon budgets and sectoral emissions ceilings. The Plan provides a roadmap for taking decisive action to halve Ireland's emissions by 2030 and reach net zero by no later than 2050, as committed to in the Climate Action and Low Carbon Development (Amendment) Act 2021.

The target for biomethane production under CAP 24 is for 1TWh by 2025 and 5.7TWh by 2030.

Section 16 'Agriculture' of the CAP 2024 identifies a required reduction in annual agricultural emissions (on 2018) of 25% (17.25 $MtCO_2eq.$ per annum by 2030).

CAP24 states that the agricultural sector is the largest contributor to Ireland's greenhouse gas emissions.

CAP24 reiterates the need of the "*production of up to 1 TWh of Biomethane by 2025" and the "production of up to 5.7 TWh of Biomethane by 2030".*

Section 14 'Built Environment' consists of a key target of *"up to 0.6 TWh of heating provided by biomethane by 2025, and up to 1.1 TWh by 2030".*

Section 14.4.1 'Measures to Delivery Required Abatement' states that to meet the required level of emissions reduction, in regard to residential, by 2025 we will:

[13] Government of Ireland (2024) *Climate Action Plan 2024:* https://www.gov.ie/en/publication/79659-climate-action-plan-2024/

- *"Develop the appropriate policies and safeguards, as set out in chapter 16, to supply up to 0.4 TWh of biomethane to decarbonise residential heating; and*
- *Supply 0.7 TWh of biomethane to decarbonise residential heating."*

In regard to the Commercial/Public sector, by 2025 we will:

"Develop the appropriate policies and safeguards to supply biomethane for use in commercial and public buildings of up to 0.4 TWh".

Section 15.2.1.3 'Road Haulage Strategy – Decarbonisation Programme' states that *"there is a full relief from the carbon component of Mineral Oil Tax for liquid or gaseous fuels that have been produced from biomass. This means that no carbon tax applies to biofuels, such as Hydrogenated Vegetable Oil or biomethane, used in any road vehicle, private or commercial."*

Section 16.6.1 'Actions for 2024' states that *"there is also increasing potential for the use of bio-fertilisers and digestate coming from a developing biomethane industry to replace chemical nitrogen combined with more efficient use of existing animal slurries through achieving our targets for low-emission slurry spreading."*

Other key measures to deliver climate adaptation in agriculture, indicated in the CAP include the following:

- RE/24/6: Increase investment in research to support agricultural and land use diversification.
- AG/24/22: Establish a Biomethane Coordination Group to oversee delivery of 5.7 TWh target and National Biomethane Strategy implementation activities.
- AG/24/21: Identify and address the research and knowledge gaps around supply of feedstocks, the role of biobased products including digestate and the sequestration potential regarding biomethane production.
- Introduce obligation in the heat sector, incentivising the production of indigenously produced biomethane.

CAP24 states that *"guided by the Food Vision 2030 Strategy, Irish farmers and food producers will be supported to continue to produce world-class food whilst reducing greenhouse gas emissions and achieving high levels of sustainability".* The Government will also take measures to promote diversification into less greenhouse-gas practices, such as biomethane feedstock production.

Consistency with CAP24

The Proposed Development directly contributes to the realisation of the aims and objectives of the Climate Action Plan as outlined above. The swift deployment of biomethane production in the state is a key objective of the CAP24, in order to meet the ambitious targets set for 2025 and 2030.

The Proposed Development will also assist in achieving the steep emissions reductions required if the agricultural sector is to meet its sectoral emissions targets for 2025 and 2030.

The roll-out of biomethane production is rendered all the more urgent having regard to the recently published EPA projections on Ireland's Greenhouse Gas Emissions 2023 to 2050

(published in May 2024), which warn that Ireland is currently likely to miss both its first and second carbon budget targets, in the absence of additional measures. The timely rollout of additional renewable energy generation will assist in achieving current targets, and reduce the risk of steeper emissions reductions being required in later years to achieve 2030 targets.

4.6.5 Sectoral Emissions Ceilings

Following the approval of the Carbon Budgets, Ireland's Sectoral Emissions Ceilings were agreed by Government on the 28th July 2022. Section 6C of the Climate Action and Low Carbon Development Act 2015 (as amended) (the Act) provides for the preparation of Sectoral Emissions Ceilings which set out the maximum amount of greenhouse gas emissions that are permitted in different sectors of the Irish economy.

This carbon budget programme comprises three successive 5-year Carbon Budgets as follows:

- 2021-2025: 295 Mt CO 2 eq. This represents an average reduction in emissions of 4.8% per annum for the first budget period.
- 2026-2030: 200 Mt CO 2 eq. This represents an average reduction in emissions of 8.3% per annum for the second budget period.
- 2031-2035: 151 Mt CO 2 eq. This represents an average reduction in emissions of 3.5% per annum for the third provisional1 budget.

Following the process set out in the Act, the carbon budget programme proposed by the Climate Change Advisory Council was approved by the Government on 21 February 2022, and subsequently adopted by the Oireachtas on the 6th of April 2022.

For the agriculture sector, the sectoral emissions ceilings mandate a reduction in emissions of 10% over the period from 2021-2025, and a reduction of 25% from 2026-2030.

The rollout of AD and Biomethane production helps to contribute to a reduction in agricultural emissions, while also benefiting efforts to reduce carbon emissions in other hard to abate sectors which are currently reliant on natural gas.

4.6.6 Climate Action and Low Carbon Development Acts 2015 and 2021

The first Climate Action and Low Carbon Development Act 2015[14] provided the statutory basis for the national goal of progressively pursuing a low carbon, climate resilient and environmentally sustainable economy by 2050.

In 2021 the Government passed the Climate Action and Low Carbon Development (Amendment) Act 2021[15] enshrining the target to achieve net zero emissions by 2050 and a 51% reduction in emissions by 2030 into law. The roll-out of an agri-led biomethane industry can help to decarbonise both industry and agriculture, contributing to the goals set out in the new Act.

The Climate Action and Low Carbon Development Act 2015 established the National Mitigation Plan (NMP) and National Adaptation Framework (NAF), both of which are designed to address

[14] *Climate Action and Low Carbon Development Acts 2015:* Climate Action and Low Carbon Development Act 2015 (irishstatutebook.ie)
[15] *Climate Action and Low Carbon Development (Amendment) Act 2021:* Climate Action and Low Carbon Development (Amendment) Act 2021 (irishstatutebook.ie)

the causes and consequences of climate change in Ireland.

Published in July 2017, the NMP represented an initial step in transitioning Ireland to a low carbon, climate resilient and environmentally sustainable economy by 2050. This whole-of-government Plan drew on the perspectives and responsibilities of a range of government departments and reflected the central roles of key ministers responsible for electricity generation, the built environment, transport, and agriculture.

The Plan acknowledges the role of the circular economy and particularly the bioeconomy, and opportunities for residues and agriculture residues such as from crops, animal, and dairy by-products to be used to produce biomaterials and biochemicals through biorefining or to produce heat and/or power through combustion or AD.

The NMP identifies the role that anaerobic digestion can play in contributing to the bioeconomy in particular, and the circular economy in general:

"The circular economy, or bioeconomy, provides opportunities for FBB and agriculture residues, such as animal by-products (ABP), to be used to produce heat and/or power through combustion or anaerobic digestion. In addition there is potential to reduce carbon emissions along the full life cycle of the food/processing chain through food waste reduction."

The NAF provides a framework to ensure local authorities, regions, and key sectors can assess the key risks and vulnerabilities of climate change, implement actions to build resilience to climate change, and ensure climate adaptation considerations are mainstreamed into all local, regional, and national policy.

The Climate Action and Low Carbon Development Act 2021 commits the Government to moving to a climate-resilient and climate-neutral economy by the end of 2050. It sets the commitment to achieve net zero emissions by 2050 and a 51% reduction in emissions by 2030. It introduces carbon budgets for the State, and sectoral emissions ceilings.

We note in particular Section 4 of the Climate Action and Low Carbon Development Act 2021 (as amended), which states that:

"4. (8) For the purposes of performing their respective functions under this section, the Minister and the Government shall have regard to the following matters;

- *(h) the fact that the means of achieving a climate neutral economy and other measures to enable the State to pursue the national climate objective may not yet be fully identified and may evolve over time through innovation, evolving scientific consensus and emerging technologies;*

- *(n) the special economic and social role of agriculture, including with regard to the distinct characteristics of biogenic methane."*

Section 15 of the Climate Action and Low Carbon Development Act 2015, as amended, states the following:

"(1) A relevant body shall, in so far as practicable, perform its functions in a manner consistent with—
a) the most recent approved climate action plan,
b) the most recent approved national long term climate action strategy,

c) *the most recent approved national adaptation framework and approved sectoral adaptation plans,*
d) *the furtherance of the national climate objective, and*
e) *the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State."*

This places a responsibility on Planning Authorities to consider the compliance of each Proposed Development with these criteria and to make decisions which are consistent with the listed policies in so far as practicable.

The criteria are addressed in turn below to assist the Planning Authority in considering the current application and in undertaking an Environmental Impact Assessment of the Proposed Development with cognisance of the above requirement of the Act.

Consistency with Climate Action Plan

The objectives of the CAP24 (which is now the current most recent approved climate action plan) which the Proposed Development will support have been set out above.

Consistency with Long Term Climate Action Strategy

The Long-term Climate Action Strategy[16] was published on the 28th April 2023. An update to the Strategy was published in 2024[17]. The Long-term Climate Action Strategy outlines the importance of (i) completing the actions in the Climate Action Plan, (ii) greater demand side management, (iii) better annual forecasting for the electricity and gas systems and (iv) security of gas supply infrastructure, particularly in the context of electricity generation.

The Long-term Climate Action Strategy recognises the role that biogas and biomethane can play in reducing carbon emissions in hard to abate sectors including the industrial sector.

The Strategy states:

"Key measures included in Climate Action Plan 2024 to reduce on-farm emissions include a significant reduction in nitrous oxide emissions by changing farm management practices in relation to nutrient use improved GHG efficiencies from breeding, feed modification and earlier finishing age for cattle, an increase in the proportion of organic farming, and with the waste sector providing feedstocks for the production of ***indigenous sustainably produced biomethane****."*

The Strategy also recognises at Page 47 that the production of zero-emission fuels including biomethane is a key driver of the pathway to industrial decarbonisation. The same page of the Strategy states:

"The 2030 target is a steppingstone towards the ambition of achieving climate neutrality, with a relatively clear trajectory for the sector to 2050. Achieving a fully decarbonised industry sector will require; driving material efficiency in construction to reduce embodied energy in materials;

[16] Long-term Strategy on Greenhouse Gas Emissions Reductions 2023. https://www.gov.ie/en/publication/e4e81-long-term-strategy-on-greenhouse-gas-emissions-reductions/
[17] Long-term Strategy on Greenhouse Gas Emissions Reductions 2024. https://www.gov.ie/en/publication/e4e81-long-term-strategy-on-greenhouse-gas-emissions-reductions/#:~:text=Ireland%E2%80%99s%20Long-term%20Strategy%20on%20Greenhouse%20Gas%20Emissions

*employing heat pumps for low-temperature heat and **zero emissions gas/ bioenergy** for high-temperature heat; fully switching fuel used for cement (e.g., waste, bioenergy) and alumina; and utilising CCS and innovative binders in cement."*

The Proposed Development will support the achievement of the goals and objectives of the Long-term Climate Action Strategy.

Consistency with Approved National Adaptation Framework and Approved Sectoral Adaptation Plans

The National Adaptation Framework (NAF hereafter) (DECC, 2024) has outlined several actions to help ensure a targeted approach to achieving climate resilience into the future

Section 2.2 of the NAF states, that for climate resilience, Ireland must be open to innovative climate change solutions. It must have a reduced reliance on fossil fuel, will need to transition towards sustainable agricultural practices such as agroforestry and organic farming and Irish industries must embrace circular economy principles.

The NAF provides key guiding principles for climate adaptation, grouped into high-level themes including: 'Adaptation governance, engagement and resourcing': *"Mobilise Existing and New Resources: Maximise the efficient use of existing and new resources, including financial, human, and natural resources, to achieve adaptation."*

Section 2.6.4 of the NAF outlines the role of the private sector in enabling climate change adaptation. *"Businesses and industries, being both affected by climate change impacts and contributors to adaptation efforts, are at the forefront of developing and implementing innovative technologies and practices to enhance climate resilience. **This entails investments in renewable energy, sustainable agriculture**, and efficient water management systems, for example. Collaborative partnerships with the government further empower businesses to fulfil their role in climate adaptation by pooling resources and expertise, innovation, fostering green job opportunities, and collectively working towards a more sustainable and resilient future for Ireland."* [**Emphasis added**].

Section 2.9 of the NAF outlines the future research prioritise for climate change adaptation in Ireland including the following:

- ***"Ecosystem Resilience:** Understanding how ecosystems respond to climate change is crucial. Research into the adaptation of natural environments, biodiversity, and the sustainable management of natural resources will be essential."*
- *"**Infrastructure Adaptation:** Investigating how infrastructure, such as buildings, transportation, and energy systems, can be made more resilient to climate impacts, including retrofitting, sustainable design, and disaster preparedness."*
- *"**Agriculture and Food Security:** Given the importance of agriculture in Ireland, research into climate-resilient farming practices, crop and livestock management, and the impact of climate change on food security will be critical."* [**Emphasis added**].

The NAF outlines the potential impacts of the electricity and gas networks sector from climate change:

- Water shortages and drought may affect the availability of cooling at conventional power plants,

- Changes in rainfall distribution could reduce hydro power generation during certain seasons, while increasing the role of hydro station flood alleviation.
- Floods may damage electricity and gas transmission systems, and coastal erosion could impact infrastructure.
- Increased wind variability may require backup generation or storage, and strong winds may lead to turbine shutdown or damage.

Climate proofing of the project was undertaken using the approaches outlined in the *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (EC, 2013) and *IEMA EIA Guide to Climate Change Resilience and Adaptation* (IEMA, 2020). Both documents outline a methodology for undertaking a risk assessment where there is a potentially significant impact on the project receptors due to climate change.

Furtherance of the National Climate Objective

Under the Climate Action and Low Carbon Development Act 2015 (as amended by the 2021 amendment Act). The National Climate Objective is as follows:

"The State shall, so as to reduce the extent of further global warming, pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy."

The Proposed Development will reduce GHG emissions and help to decarbonise Ireland's energy system by generating renewable gas to displace fossil fuels. The digestate produced by the Proposed Development (which will be a bio-based fertiliser) will also displace chemical fertilisers, which are generally produced using fossil fuels. The development will directly further the National Climate Objective.

The Objective of Mitigating Greenhouse Gas Emissions and Adapting to the Effects of Climate Change in the State

The Proposed Development, which comprises a renewable energy development, directly addresses the need to mitigate greenhouse gas emissions by producing renewable energy to displace conventional natural gas in the gas grid.

The development serves to directly mitigate GHG emissions and to improve the resilience of the state to climate change by enhancing security of renewable energy supply.

4.6.7 Support Scheme for Renewable Heat (SSRH)

This support scheme[18] was developed to contribute towards Ireland's 2020 renewable energy and emission reduction targets. It focuses on support mechanism to increase the energy generated from renewable sources in the heat sector, including an on-going operation support for biomass boiler and AD heating systems. This scheme aims to incentivise the development and Biomethane Utilisation and Renewable Gas Certification

The SSRH comprises an installation grant for heat pumps and an operational support (an ongoing payment for up to 15 years) for biomass and anaerobic digestion (biogas) heating systems. The SSRH was developed to incentivise the delivery of an additional 3% of heat use

[18] Department of the Environment, Climate and Communications (2019) *Support Scheme for Renewable Heat (SSRH):* gov - Support Scheme for Renewable Heat (SSRH) (www.gov.ie)

in Ireland to come from renewable sources. The current National Development Plan includes an allocation of €300 million for the rollout of the SSRH for the period up to 2027.

Gas Networks has recognised that there is significant growth in demand from households and businesses looking to source sustainable fuel alternatives that have been produced in Ireland. They state that:

"Gas Networks Ireland registers and issues certificates to Irish producers that inject renewable gas into the gas network. This includes biomethane, which is a renewable gas produced by anaerobic digestion of biodegradable matter that is then upgraded to network entry specifications prior to injection. Each certificate represents our guarantee that the equivalent amount of renewable gas has been injected into the gas network."[19]

AD facilities must be compliant with the requirements of Gas Networks Ireland's Renewable Gas Certification for the export and utilisation of biogas. This certification system is in place to ensure that natural gas produced in Ireland is compliant with relevant legislation, and to assure customers that their gas has been generated in a sustainable manner. This is also relevant to ensure that gas produced aligns with EU policies and guidance, such as the EU Methane Strategy (2020) which estimates that by 2050, the EU's annual consumption of biogas and biomethane will increase to between 54 and 72 Mtoe (up from c.17 Mtoe in 2017).

4.6.8 White Paper: Ireland's Transition to a Low Carbon Energy Future 2015–2030

The White Paper[20] sets out a framework to guide policy and the actions that the Government intends to take in the energy sector from 2015 up to 2030.

We note in particular Section 133 on bioenergy, which sates:

"Bioenergy is a versatile source of energy that can be used for heating, transport, and power generation. The most advantageous economic benefits arise when it is used for heating. Bioenergy encompasses a range of fuels in solid, liquid, and gaseous forms, including forest-based biomass, dry agricultural residues, energy crops, organic materials including wastes, and landfill gas and other biogases. ***Bioenergy can contribute to broader policy objectives such as waste recovery and rural development, as is the case with anaerobic digestion, which not only generates energy, but also gives effect to national waste policy in terms of utilising waste as a resource.*** *It has been highlighted in waste management plans as a technology suitable for development at a local and regional level and at varying scales.* ***Anaerobic digestion also has the potential to improve air quality, for example through mitigation of ammonia emissions and odour by diverting slurry from land spreading.*** *However, expanding the uptake of bioenergy involves several challenges, including the availability of sufficient sustainably-sourced biomass, competition with other land uses such as food production, and the cost of support. Consideration must be given to the most prudent uses for bioenergy."* [**Emphasis added**].

We also note Section 136 on waste policy, which states:

"Waste Management Policy in Ireland recognises the need to develop efficient ways to extract

[19] Gas Networks Ireland, *Renewable Gas Certification:* Renewable gas certification (gasnetworks.ie)
[20] Department of Environment, Climate and Communications (2020) *The White Paper:* Department of Communications, Energy and Natural Resources - Ireland's Transition to a Low Carbon Energy Future - 2015-2030 - e5aa9f25-da81-43eb-804d-57309615681e.pdf (www.gov.ie)

as much value as possible from waste in accordance with the requirements of the waste hierarchy and the opportunity for waste to be used as an indigenous energy resource [34]. In this regard, three new regional waste management plans for the period 2015-2021 support the development of additional thermal recovery and biological treatment capacity within the State. The REFIT schemes, which support the generation of electricity and CHP technologies including waste-to-energy, anaerobic digestion, and landfill gas, continue to support the use of waste as a renewable energy feedstock."

4.6.9 Biomethane Energy Report – Gas Networks Ireland

While not a policy or guidance document, the Biomethane Energy Report was published by GNI, who are the public body responsible for connecting customers to the gas network and for connecting developments such as the Proposed Development to the grid. The Energy Report provides a detailed insight into the potential for biomethane production in Ireland. The Gas Networks Ireland (GNI) Biomethane Report[21] provides a rationale for accelerating biomethane production in Ireland and states the following:

- *"Domestically produced biomethane, dispersed throughout the country, boosts security of supply and can displace fossil gas from Corrib as it declines;*
- *Similar to the early years of the wind industry, the biomethane gate price is currently more expensive than natural gas.;*
- *Biomethane could rapidly reduce climate emissions across hard to abate energy demand sectors and can create negative emissions;*
- *Biomethane production boosts employment in rural areas, promotes circular economy in agriculture, and can improve soil health. Digestate, a byproduct of biomethane production can displace fossil produced fertilizer;*
- *Biomethane can deliver highly valuable energy, which is dispatchable, suitable for intensive heat industries, transport and other hard to abate sectors; and*
- *Biomethane is produced with existing technology and can therefore be rapidly scaled up. It can also be transported, stored, and distributed through existing gas grids."*

The GNI report refers to the Climate Action and Low Carbon Development (Amendment) Bill. In 2021 the Bill was *"signed into law and Ireland is now on a legally binding path to net-Zero emissions no later than 2050, and to a 51% reduction in emissions by the end of this decade".*

Section 6 of the report states that after the Russian invasion of Ukraine, *"Ireland must ensure that security of energy supply is maintained as Ireland transitions to a net-zero emissions future".*

The report concludes by stating that *"Ireland has a real opportunity to develop a biomethane industry at scale, which will offer multiple benefits for our agricultural economy, assist in the decarbonisation of Ireland's economy more generally, enhance our security of energy supply and lead to the development of a key renewable indigenous energy resource in the build-up to 2030".*

[21] Gas Networks Ireland, *Biomethane Energy Report:* The Biomethane Energy Report (gasnetworks.ie)

4.6.10 Energy Security in Ireland to 2030

The Government Strategy for Energy Security in Ireland to 2030 was published in November 2023.

Energy Security in Ireland to 2030 outlines a new strategy to ensure energy security in Ireland for this decade, while ensuring a sustainable transition to a carbon neutral energy system by 2050. This report is being published as part of an Energy Security Package, containing a range of supplementary analyses, consultations, and reviews, which have informed the recommendations and actions related to energy security.

Informed by the Government's energy security policy objectives - to ensure energy is affordable, sustainable, and secure - the review considered the risks to oil, natural gas, and electricity.

The strategy states that "*the National Biomethane Strategy in development sets us on a trajectory to develop a new source of renewable indigenous gas in Ireland*".

The strategy is clear that Biomethane has an important role to play in supporting Ireland's energy transition, while maintaining and safeguarding security of supply through indigenous renewable gas generation.

4.6.11 National Policy Framework on Alternative Fuels Infrastructure for Transport in Ireland

The National Policy Framework on Alternative Fuels Infrastructure for Transport in Ireland: 2017-2030[22] sets an ambitious target that from 2030 all new cars and vans sold in Ireland will be zero emission (or zero emission-capable) and that other technologies, perhaps still unknown, will be fueling larger vehicles, so that by 2050, the nation's car fleet, along with much of our public transport buses and rail lines, will be low/near zero emissions.

The framework highlights the importance of greater diversification of fuels in the freight sector to include a mix of natural gas, biogas/biomethane, electricity and renewable diesel or other biofuels.

4.6.12 Ag Climatise – National Climate & Air Roadmap for the Agriculture Sector

The National Climate & Air Roadmap for the Agriculture Sector[23] sets an ambitious vision for a 'climate neutral agriculture sector by 2050' and includes 29 actions with specific and targets aimed at reducing the environmental footprint and further building on the strong credentials of Irish Agriculture. Of particular relevance to the Proposed Development are the following action and targets:

Reference	Targets
Action 20	Engage with stakeholders to maximise the potential opportunities from Anaerobic Digestion for the agriculture sector.

[22] Department of Environment, Climate and Communications (2017) *National Policy Framework on Alternative Fuels Infrastructure for Transport in Ireland: 6186_NPF_Alternative Fuels_V5.indd - 6ce8a48a99c44e1dbf40a59a073cb06d.pdf (www.gov.ie)*
[23] Department of Agriculture, Food and the Marine (2020) *A Roadmap towards Climate Neutrality: 7c8b812c-d857-4f39-96b9-1e7f134ba896.pdf (www.gov.ie)*

	Work closely with DCCAE and other key stakeholders to set a target for the level of energy to be supplied by indigenous biomethane injection and consider the necessary supports including funding mechanisms. Work with DCCAE and other stakeholders to develop the necessary research, policies, and measures to provide policy certainty around the development of an Anaerobic Digestion industry in Ireland.

The roadmap recognises that the agriculture sector has a key role to play in the provision for bio-energy feedstocks for the production of biogas/biomethane as a key renewable energy resource for the decarbonisation of the transport and heat sectors in particular.

4.6.13 National Energy and Climate Plan (NECP) 2021-2030

Ireland's National Energy & Climate Plan[24] (NECP hereafter) 2021-2030 was submitted to the European Commission in December 2018. The Plan outlines a long-term vision for the agriculture, forest and land use sectors based on an approach to carbon neutrality in these sectors, which does not compromise the capacity for sustainable food production. This effectively means that agricultural emissions are balanced by reducing emissions of methane, nitrous oxide, and carbon dioxide in so far as the best available science allows, increasing carbon-sequestration through forests and land use and displacing fossil fuel and energy intensive materials with renewable sources.

The NECP set an indicative target of 1.6 TWh/yr (Terawatt hour per year) for the level of energy to be supplied by indigenous biomethane injection in 2030, taking account of the domestic supplies of feedstock that meet strict sustainability criteria and agreed a commitment to consider how the supports necessary to reach this target would be funded.

The NECP stated the following:

"In the absence of certainty in relation to the mechanism by which biomethane will be supported, it is proposed to set an indicative target which will be reviewed in 2023 as part of the review process for the National Energy and Climate Plan. This review will take into account the development of supports and market development for biomethane and progress towards the indicative target. The indicative target for indigenous biomethane is therefore set at 1.6 TWh and will be reviewed in 2023."

As noted previously in this EIAR chapter, the CAP24 include the following key actions relevant to the development of a biomethane industry in Ireland, including:

- *"By 2025 – Production of up to 1 TWh of Biomethane by 2025; Construction of up to 20 AD plants of scale; and*
- *By 2030 – Production of up to 5.7 TWh of Biomethane by 2030; Construction of up to 200 AD plants of scale."*

This represents a significant uplift in the targeted level of biomethane production by 2030 vis a vis the National Energy and Climate Plan.

4.6.14 The Planning and Development Act 2000 (as amended)

[24] Department of Environment, Climate and Communications (2020) *National Energy and Climate Plan 2021-2030:* NECP_DRAFT_BRANDED - f3e50986-9fde-4d34-aa35-319af3bfac0c.pdf (www.gov.ie)

The Planning and Development Act 2000[25] (as amended) also sets out provisions for climate change within Section 10 (2) (n). This includes requirements to:

- reduce energy demand in response to the likelihood of increases in energy and other costs due to long-term decline in non-renewable resources,
- reduce anthropogenic greenhouse gas emissions, and
- address the necessity of adaptation to climate change; in particular, having regard to location, layout, and design of new development.

The Planning and Development Act, as amended also transposes the requirements of the EIA Directive and provides the framework within which the Planning Authority, as competent authority, will undertake EIA of the current development proposal.

4.6.15 Whole of Government Circular Economy Strategy 2022 – 2023

The Whole of Government Circular Economy Strategy 2022-2023[26] is Ireland's first national circular economy strategy. It serves as a driver for the Irish government to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and to reach net-zero emissions by no later than 2050, as per commitments in the Programme for Government and the Climate Act 2021. The strategy was a specific commitment in the Waste Action Plan for a Circular Economy (see below).

The Strategy states:

*"In Europe today, just **16% of bio-waste is recycled into something useful.** The EU has set a **target by 2035 of 65% of bio-waste to be reused or recycled.** In Ireland, the agri-food and municipal wastewater treatment sectors together produce over 100,000 tonnes of bio-waste per year. This waste is largely applied to agricultural land or disposed of as waste, thereby missing the opportunity for recycling into energy."*

This strategy also discusses the role of the bioeconomy in transitioning to a carbon-neutral and circular economy. It describes the bioeconomy as:

"… the part of our economy which uses renewable resources such as crops, forestry, and fisheries to produce food, products, as well as energy, while also reducing waste. Increasing the scope of the bioeconomy will mean diminishing our reliance on fossil-based fuels and carbon intensive resources and will boost our use of renewable biological resources."

4.6.16 A Waste Action Plan for a Circular Economy Strategy 2020-2025

This plan[27] provides a roadmap for cross-sectoral waste planning and management in Ireland. It broadly discusses the role of the Circular Economy in achieving the Sustainable Development Goals, including SDG7 'Affordable and Clean Energy'.

Among the measures outlined to achieve the optimum results of the Waste Action Plan is the following, which commits to the development of a government circular economy strategy (see

[25] *Planning and Development Act 2000:* Planning and Development Act, 2000 (irishstatutebook.ie)
[26] Department of Environment, Climate and Communications (2021) *Whole of Government Circular Economy Strategy 2022-2023:* bd90130d-494e-4d32-8757-46d36c77b912.pdf (www.gov.ie)
[27] Government of Ireland (2020) *A Waste Action Plan for a Circular Economy: Ireland's National Waste Policy 2020-2025:* *dcf554a4-0fb7-4d9c-9714-0b1fbe7dbc1a.pdf (www.gov.ie)*

above):

"One of its first tasks will be the development of a high-level all of government circular economy strategy. This will set a course for Ireland to transition across all sectors and at all levels of government toward circularity. Policy coherence across government will be key to ensuring all policy levers are set towards the same objective."

We note in particular the following:

"We want to realise the Anaerobic Digestion (AD) and composting potential of the food waste resource. AD and composting provide opportunities for regional development with benefits for communities through sales of locally generated energy and compost."

4.6.17 National Policy Statement on the Bioeconomy (2018)

This national policy statement[28] elaborates on how the strategic development of the bioeconomy might be advanced through greater policy coherence across all relevant sectors and dealing with fundamental challenges to its commercial success and social development. It outlines Ireland's comparative advantages in developing bioeconomy and provides commitments in the form of a Policy Framework for Developing the Bioeconomy.

4.6.18 Common Agricultural Policy (CAP) Strategic Plan 2023 – 2027

First established in 1962, the CAP23[29] (as revised) consists of a Two Pillar Structure: Pillar 1 Income Support (including Basic Payment Scheme and Greening) and Pillar 2 Infrastructure, Environment and Development Support (including GLAS, EIP-AGRI and TAMS).

4.6.19 European Union (Waste Directive) Regulations 2020[30]

This Statutory instrument sets out regulations for the mode by which waste compost and digestate is recycled into fertiliser products. We note in particular the following replacement of Regulation 38 in the Regulations of 2011 (Bio-waste):

"38 (2): The Minister shall take measures in accordance with sections 21A and 32(1) of the Act of 1996 to: (a) encourage the recycling, including composting and digestion, of bio-waste in a way that fulfils a high level of environment protection and results in output which meets relevant high-quality standards."

4.6.20 Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations, 2013[31] and Waste Facility Permitting

All operators of an AD Facility require consent to operate under one of the following: Waste Management Act, 1996[32] (as amended), the Environmental Protection Agency Act, 1992[33], the

[28] Government of Ireland (2018) *National Policy Statement on the Bioeconomy:* gov - National Policy Statement on the Bioeconomy (www.gov.ie)
[29] Department of Agriculture, Food and the Marine (2020) *The CAP Strategic Plan 2023-2027*: gov - The CAP Strategic Plan 2023 - 2027 (www.gov.ie)
[30] Gov. of Ireland: *European Union (Waste Directive) Regulations 2020:* S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2020 (irishstatutebook.ie)
[31] Gov. Of Ireland (2013) *Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations 2013:* S.I. No. 137/2013 - Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations 2013. (irishstatutebook.ie)
[32] *Waste Management Act, 1996:* Waste Management Act, 1996 (irishstatutebook.ie)
[33] *Environmental Protection Agency Act, 1992:* Environmental Protection Agency Act, 1992 (irishstatutebook.ie)

Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations, 2013[34], S.I. No. 821 of 2007, Waste Management (Facility Permit and Registration) Regulation (as amended 2008), the Industrial Emissions Directive (2010/75/EU) which introduced a class of license that can be granted by the EPA, known as an Industrial Emissions License.

S.I. No. 821 of 2007 Waste Management (Facility Permit and Registration) Regulation (as amended)[35] sets out the procedures for the making of applications for waste facility permits for the purposes of section 39(4) of the Waste Management Act, 1996, and the manner by which a waste authorisation can be granted by the EPA. The Regulations also provide rules pertaining to public consultation, consideration by the local authorities of submissions in relation to permit applications, and the grant, refusal, and review of permits by local authorities. They also prescribe rules for the spreading of organic waste on land from waste facilities and other matters relative to organic waste.

4.6.21 Animal By-Products Regulations

In order to build and operate a biogas plant, an operator must comply with the European Communities (Animal By-Products) Regulations 2014 (S.I. No. 187 of 2014)[36] and in accordance with Regulation (EC) No. 1069/2009 and Regulation (EU) No. 142/2011. If animal by-products are processed within the AD facility, certification may be required and obtained from the Department of Agriculture, Food, and the Marine.

Document 'CN11 – Conditions for Approval and Operation of Biogas Plants Transforming Animal By-Products and Derived Products in Ireland' provides details on the requirements of a biogas plant such as that proposed here. These include general requirements including animal by-product feedstocks, structural and equipment requirements, plant operational requirements, requirements for microbiological testing, Plant HACCP Plans and Plant Pre-requisite Programmes (PRPs), and record keeping requirements.

4.7 Regional Planning Policy

4.7.1 Regional Spatial and Economic Strategy for the Southern Region

The Regional Spatial & Economic Strategy for the Southern Region[37] (RSES hereafter) determines at a regional scale how best to achieve the shared goals set out in the NPF.

The RSES acknowledges that the effects of climate change will be felt in the environment, society, and the economy of the Southern Region. Out of the 11 key goals of the RSES, we highlight the following as being of particular relevance for the Proposed Development:

Reference	Regional Policy Statements
Statement 3 – Strengthened Rural Economies and Communities	Strengthening the role of and improving quality of life in the Region's diverse rural areas and communities and valuing our rural Region as dynamic, resilient and outward looking.

[34] *S.I. No. 137/2013:* S.I. No. 137/2013 - Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations 2013. (irishstatutebook.ie)
[35] Gov. of Ireland: *Waste Management (Facility Permit and Registration) Regulations 2007*: S.I. No. 821/2007 - Waste Management (Facility Permit and Registration) Regulations 2007 (irishstatutebook.ie)
[36] *European Union (Animal By-Products) Regulations 2014:* S.I. No. 187/2014 - European Union (Animal By-Products) Regulations 2014. (irishstatutebook.ie)
[37] Southern Regional Assembly (2020) *RSES*: Southern Regional Assembly (southernassembly.ie)

Statement 8 – Low Carbon, Climate Resilient and Sustainable Society	Safeguarding and enhancing our environment through sustainable development, prioritising action on climate change across the Region, driving the transition to a low carbon and climate resilient society.
Statement 9 – Sustainable, Planned and Infrastructure-led Development	Providing infrastructure and services in a sustainable, planned and infrastructure-led manner to ensure the sustainable management of water waste and other environmental resources.

The RSES identifies the significance of the threat of climate change in Chapter 5, stressing the importance to transition to a low carbon economy. The Regional Assembly, evident from the RSES, is committed to implement regional policy consistent with national Climate Action Plans.

We note the following Regional Policy Objectives (RPOs) as being of particular relevance for the Proposed Development:

RPO 44 – Common Agricultural Policy: *"It is an objective to ensure the delivery of sustainable actions under the Rural Development Programme (RDP) 2014-20 and beyond in priority areas of innovation, bio-diversity restoration, water and soil management, renewable energy and waste management, carbon conservation and sequestration, diversification, job creation and ICT development in our rural areas"*

RPO 50 – Diversification: *"It is an objective to further develop a diverse base of smart economic specialisms across our rural Region, including innovation and diversification in agriculture (agri-Tech, food and beverage), the marine (ports, fisheries and the wider blue economy potential), forestry, peatlands, renewable energy, tourism (leverage the opportunities from the Wild Atlantic Way, Ireland's Ancient East and Ireland's Hidden Heartlands brands), social enterprise, circular economy, knowledge economy, global business services, fin-tech, specialised engineering, heritage, arts and culture, design and craft industries as dynamic divers for our rural economy."*

RPO 56 – Low Carbon Economy:

a) *"The RSES recognises the urgency to transition to a low carbon future and it is therefore an objective to accelerate the transition towards low carbon economy and circular economy."*
b) *"It is an objective to develop enterprises that create and employ green technologies."*
c) *"Local authorities should ensure that the development of green industry and technologies incorporates careful consideration of potential environmental impacts at project level including the capacity of receiving environment and existing infrastructure to serve new industries."*

RPO 58 – Bio-economy and Rural Areas: *"It is an objective to facilitate the development of the rural economy through supporting a sustainable and economically efficient agricultural and food sector, together with the bioeconomy."*

RPO 87 – Low Carbon Energy Future: *"The RSES is committed to the implementation of the Government's policy under Ireland's Transition to a Low Carbon Energy Future 2015-30 and Climate Action Plan 2019. It is an objective to promote change across business, public and residential sectors to achieve reduced GHG emissions in accordance with current and future national targets, improve energy efficiency and increase the use of renewable energy sources across the key sectors of electricity supply, heating, transport and agriculture."*

RPO 89 – Building Resilience to Climate Change: *"It is an objective to support measures to*

build resilience to climate change throughout the Region to address impact reduction, adaptive capacity, awareness raising, providing for nature-based solutions and emergency planning."

RPO 90 – Regional Decarbonisation: *"It is an objective to develop a Regional Decarbonisation Plan to provide a framework for action on decarbonisation across all sectors."*

RPO 94 – Decarbonisation in the Agricultural Sector: *"It is an objective to support initiatives that advance an approach to achieve carbon neutrality for agriculture and land-use that does not compromise sustainable food production."*

RPO 95 – Sustainable Renewable Energy Generation: *"It is an objective to support implementation of the National Renewable Energy Action Plan (NREAP), and the Offshore Renewable Energy Plan and the implementation of mitigation measures outlined in their respective SEA and AA and leverage the Region as a leader and innovator in sustainable renewable energy generation."*

RPO 96 – Integrating Renewable Energy Sources: *"It is an objective to support the sustainable development, maintenance and upgrading of electricity and gas network grid infrastructure to integrate renewable energy sources and ensure our national and regional energy system remains safe, secure and ready to meet increased demand as the regional economy grows."*

RPO 98 – Regional Renewable Energy Strategy: *"It is an objective to support the development of a Regional Renewable Energy Strategy with relevant stakeholders."*

RPO 112 – Water Quality: *"It is an objective to support commitments to achieve and maintain "At Least Good" status, except where more stringent obligations are required, and no deterioration of status for all water bodies under the Marine Strategy Framework Directive and its programme of measures, the Water Framework Directive and the River Basin Management Plan."*

RPO 219 – New Energy Infrastructure: *"It is an objective to support the sustainable reinforcement and provision of new energy infrastructure by infrastructure providers (subject to appropriate environmental assessment and the planning process) to ensure the energy needs of future population and economic expansion within designated growth areas and across the Region can be delivered in a sustainable and timely manner and that capacity is available at local and regional scale to meet future needs."*

RPO 225 – Gas Network: *"Subject to appropriate environmental assessment and the planning process where required, it is an objective to:*

- *Promote renewable gas leading to carbon emission reduction in agriculture, industry, heating and transport as well as sustainable local employment opportunities; and*
- *Support investment in the sustainable development of agricultural biogas sector and regional gas supply projects which strengthen gas networks in the Region and assist integration of renewable gas to the grid network."*

RPO 102 – Energy Resource Funding: *"It is an objective to support initiatives for energy research funding within our Region to accelerate diversification away from fossil fuels to green energy, including the potential of wind, wave, solar, biomass, biofuels, biogas and hydrogen in the Region."*

Section 8.3 'Gas Networks' of the RSES states that *"Gas Networks Ireland are committed to integrating indigenous renewable has production, including biogas derived from waste… . There is significant potential for the Region to lead in the integration of the biogas sector and biogas production as a core element of sustainable agriculture, developing a significant indigenous renewable energy industry".*

Statement of Consistency with the Regional Spatial and Economic Strategy

The RSES highlights the agricultural and energy sectors as key sources of emissions and recognises that there is a capacity in the region to supply the infrastructure required to reduce the carbon impact of these sectors and to generate renewable energy.

AD facilities apply the principles of the bioeconomy and circular economy, by utilising biomass as a resource for the use and long-term security of renewable energy across the region. Such facilities also contribute to the competitiveness of the agricultural sector, by encouraging the use of green technologies and other mitigation / adaptation opportunities. As such, this proposal is compliant with and supported by the RSES for the Southern Region.

4.8 Local Planning Policy

4.8.1 Cork County Development Plan

The Cork County Development Plan 2022-2028[38] (CDP hereafter) recognises the central role of land use planning in promoting a low carbon society, mitigating the impact of climate change, and progressing towards a sustainable energy future for County Cork. The CDP aligns with the NPF, by recognising the role that rural areas play in driving the economy, for example by attracting entrepreneurship and innovation development, particularly where low carbon outputs can be achieved. The Vision for the CDP is:

"The Vision is to provide for the development of County Cork as an attractive, competitive and ***sustainable place to live****, visit and do business, where the quality of its economy,* ***natural*** *and built* ***environment,*** *culture and the strength and* ***viability of its rural*** *and urban* ***communities are to the highest standards.****"* [**Emphasis added**].

The CDP vision and aims for the County are to be underpinned by the core quality of life principles of, *"****sustainability****,* ***climate action****, social inclusion, placemaking, and resilience".* [**Emphasis added**].

4.8.1.1 Zoning and Designation Specific to the Subject Site

According to the CDP, the subject site is located in the 'North Cork – Fermoy' Strategic Planning Area, in Mitchelstown, within the 'Fermoy Municipal District', just beyond the 'Mitchelstown Development Boundary'. Mitchelstown is designated as a main town. The subject site is located within the 'Greenbelt 1' zone surrounding the Mitchelstown settlement. The subject site is otherwise not zoned under the CDP as a result of its location beyond built-up settlement / rural location.

Chapter 5 (Rural) of the Development Plan sets out policies and objectives pertaining to town greenbelts, which are distinct from the metropolitan greenbelt which surrounds Cork City.

[38] Cork County Council (2022) *Cork County Development Plan 2022-2028:* Cork County Development Plan 2022-2028 | Cork County Council (corkcoco.ie)

Objective RP 5-19 of the CDP states the following:

"(a) Retain the identity of towns, to prevent sprawl, and to ensure a distinction in character between built up areas and the open countryside by maintaining a Greenbelt around all individual towns.

(b) Reserve generally for use as agriculture, open space or recreation uses those lands that lie in the immediate surroundings of towns. Where Natura 2000 sites, Natural Heritage Areas, proposed Natural Heritage Areas and other areas of biodiversity value occur within Greenbelts, these shall be reserved for uses compatible with their nature conservation designation and biodiversity value.

(c) Prevent linear roadside frontage development on the roads leading out of towns and villages."

With regard to part (a) of this objective, it is noted that the development of an anaerobic digestion facility does not represent urban sprawl. The development represents an energy-related use which is appropriately located in close proximity to feedstock sources and an offtake point to the gas grid. The development is not of an urban form or character, and has been designed to minimise visual impact and integrate into the surrounding rural area. The application site is partially occupied by derelict buildings at present.

The siting, layout, and design of the development ensure that it will not erode the clear distinction between the town of Mitchelstown and its rural hinterland. The rural character of the greenbelt and its open nature will not be negatively impacted by the introduction of the Proposed Development.

With regard to part (b) of the objective, it is noted that the site is not within or in proximity to any Natura 2000 site or any NHA or pNHA. While the site is within the greenbelt zoned area, it is not 'immediatly surrounding' to the town of Mitchelstown, being over 1km from the outskirts of the town itself. While the objective notes that agricultural, open space, and recreation uses will 'generally' be required on lands immediately surrounding towns, it is submitted that the proposed use is inherently connected to surrounding agricultural uses (by facilitating agricultural practices via the taking in of agricultural feedstocks and providing biobased fertiliser) and strong justification has been provided within the application for the intended use at this location.

Finally, in relation to part (c) of the objective, the proposed development will not give rise to linear or 'ribbon' development on a road leading out of Mitchelstown, with the main site entrance located off a local road and the overall development set well back within the site and screened effectively from the N73 to the south and the local roadway to the west. In any event the reference to linear development is considered to refer more to the proliferation of one-off housing rather than relating to development of the nature proposed.

Objectives RP 520 and 5-21 relate specifically to individual houses within Main Town greenbelts, and therefore are not of relevance to the current proposals.

The Proposed Development of an anaerobic digestion facility to produce biomethane is highly promoted by the CDP, to achieve renewable energy targets. The Proposed Development is located in proximity to the source material and point of demand.

The Proposed Development is an agricultural related development as it will use agricultural wastes from farms in the surrounding area, to produce renewable biomethane and a high quality biobased fertiliser. As evident from the proposed Verified View Montages submitted with this application, and the conclusion of the residual visual impacts of EIAR Chapter 11, the proposed planting along the boundary to the N73 will include extensive tree planting (see Verified View Montage, verified view 2), mitigating negative impact on views of the site from this road. Once all mitigation measures in relation to the visual impact 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 will be effectively screened, and extensive tree planting will continue to absorb the Proposed Development at viewpoint 3 and 2 (of the Verified View Montages).

The location of the Proposed Development is considered to be appropriate due to its strategic nature, strategic location, proximity from source material and point of demand, excellent transportation connectivity, appropriate size with a low environmental impact and location outside of flood any risk zones.
According to Volume 1, Chapter 14 of the CDP, the Proposed Development site is located within the very northeast section of a 'High Value Landscape'. *"Within these High Value Landscapes considerable care will be needed to successfully locate large scale developments without them becoming unduly obtrusive. Therefore, the location, siting and design of large-scale developments within these areas will need careful consideration and any such developments should generally be supported by an assessment including a visual impact assessment which would involve an evaluation of visibility and prominence of the proposed development in its immediate environs and in the wider landscape."*

This section further states: *"The capacity of each landscape character type to absorb new development will largely depend on the sensitivity of the landscape type. Developments which are likely to create a significant environmental and particularly visual impact will best be absorbed in areas where the landscape is robust, i.e. has the capacity to absorb development without significantly changing its character. All developments should be assessed on a site-by-site basis to avoid, minimise or mitigate any potential environmental or visual impact."*

We take note of CDP Objective GI 14-19 (Landscape):

a) *"Protect the visual and scenic amenities of County Cork's built and natural environment.*
b) *Landscape issues will be an important factor in all land-use proposals, ensuring that a pro-active view of development is undertaken while protecting the environment and heritage generally in line with the principle of sustainability.*
c) *Ensure that new development meets high standards of siting and design.*
d) *Protect skylines and ridgelines from development.*
e) *Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments."*

According to the CDP Map Browser, the Proposed Development site is located along a 'Scenic Route' (Mitchelstown - Kilbeheny Road to County Boundary – Reference S1). The following objectives are noted in relation to scenic routes:

- *"GI 14-13: Protect the character of those views and prospects obtainable from scenic routes and in particular stretches of scenic routes that have very special views and prospects identified in this Plan. The scenic routes identified in this Plan are shown on*

the scenic amenity maps in the CDP Map Browser and are listed in Volume 2 Heritage and Amenity Chapter 5 Scenic Routes of this Plan.

- *GI 14-14 (Development on Scenic Routes):*

a) *Require those seeking to carry out development in the environs of a scenic route and/or an area with important views and prospects, to demonstrate that there will be no adverse obstruction or degradation of the views towards and from vulnerable landscape features. In such areas, the appropriateness of the design, site layout, and landscaping of the proposed development must be demonstrated along with mitigation measures to prevent significant alterations to the appearance or character of the area.*
b) *Encourage appropriate landscaping and screen planting of developments along scenic routes (See Chapter 16 Built and Cultural Heritage).”*

We note that Objective GI 14-11 states that *“Whilst advocating the protection of such scenic resources the Plan also recognises the fact that all landscapes are living and changing, and therefore in principle it is not proposed that this should give rise to the prohibition of development along these routes, but development, where permitted, should not hinder or obstruct these views and prospects and should be designed and located to minimise their impact. This principle will encourage appropriate landscaping and screen planting of developments along scenic routes”.*

4.8.1.2 Development Plan Aims

We note the following overall CDP aims as they are of relevance to the Proposed Development:

Aim No.	Overall CDP Aims
(1)	Plan for and support the sustainable long-term development of County Cork as an integrated network of vibrant socially and economically successful urban settlements and rural communities, metropolitan and town greenbelts and open countryside, supporting and contributing to the economic development of the County and of the Southern Region.
(3)	Incorporate sustainable development, climate change mitigation and adaptation, social inclusion, high quality design and resilience as fundamental principles, cross cutting and underpinning the Development Plan.
(10)	Facilitate and encourage innovation in order to drive sustainable development, protecting against potential negative impacts.

4.8.1.3 Core Strategy Policy Objectives

CS 2-8 ‘Climate Change’ (b) is relevant to the Proposed Development, which aims to *“reduce anthropogenic greenhouse gas emissions, and address the necessity for adaptation to climate change, in particular, having regard to location, layout and design of new development”.*

4.8.1.4 Chapter 12: Transport and Mobility

Section 12.19 ‘Road Freight and Logistics’ states that *“a shift to more sustainable means of road freight and logistics transport, including EV and low emission fuels, is necessary to decarbonise transport. In the medium term, freight is likely to be fuelled by a range of fuel types or combinations of such types as* ***biogas****, biofuels, electricity, hydrogen, CNG and LNG. However, the level of contribution from biofuels is expected to have limits over the long term due to various resource constraints, demand/supply and land use issues”.* [**Emphasis added**].

Section 12.19.7 states that there may be a role for plug in hybrid electric heavy goods vehicles

and emerging technologies such as hydrogen vehicles, **biomethane and Anaerobic Digestion** (AD hereafter) substitutes for natural gas.

It is a CDP objective, According to Volume 1, Chapter 2 of the CDP, for the North Cork Strategic Planning Area, to *"Facilitate the development of renewable energy projects in support of national climate change objectives".*

4.8.1.5 Chapter 13: Energy and Telecommunications

Section 13.4 'Cork Energy' states that *"Gas Networks Ireland has plans to develop Ireland's first Central Grid Injection (CGI) facility for delivering renewable gas into the national gas network with the GRAZE project, in Mitchelstown, Co Cork. It is envisaged that the facility will enable the development of on-farm anaerobic digestion (AD) plants, which will supply the CGI plant. It is intended that the Mitchelstown facility will be the first of a number of transmission connected facilities, delivering renewable gas into the natural gas network. It is estimated that GRAZE Gas will deliver 8% of Ireland's residential gas demand, equivalent to the gas demand of 56,000 new homes. The GRAZE project will also provide support for the development of two Compressed Natural Gas (CNG) stations, as part of a network of stations being developed by Gas Networks Ireland. These stations will support vehicles switching from diesel to renewable gas, which offers a 99% reduction in particulate matter emissions when compared to diesel".*

With regard to energy, we take note of Objective ET 13-1 (a):

"Ensure that County Cork fulfils its potential in contributing to the sustainable delivery of a diverse and secure energy supply and to harness the potential of the county to assist in meeting renewable energy targets and managing overall energy demand."

Section 13.5 'Renewable Energy' states that AD can be harnessed to contribute to both heat and electricity, and that biofuels can contribute to the transport sector. This section states that "*achieving 70% renewable electricity by 2030 will involve phasing out coal and peat-fired electricity generation plants, increasing our renewable electricity*".

In regard to renewable energy, we take note of Objective ET 13-2:

a) *"Support Ireland's renewable energy commitments as outlined in Government Energy and Climate Change policies by facilitating the development of renewable energy sources such as wind, solar, geothermal, hydro and bio-energy and energy storage at suitable locations within the county where such development has satisfactorily demonstrated that it will not have adverse impacts on the surrounding environment (including water quality), landscape, biodiversity or amenities.*
b) *Support and facilitate renewable energy proposals that bring about a direct socio-economic benefit to the local community. The Council will engage with local communities and stakeholders in energy and encourage developers to consult with local communities to identify how they can invest in/gain from significant renewable energy development.*
c) *Support the development of new and emerging renewable energy technologies / fuels for the transport sector.*
d) *To promote the potential of micro renewables where it can be demonstrated that that it will not have adverse impacts on the surrounding environment (including water quality), landscape, biodiversity or amenities."*

The CDP recognises its role in progressing towards a sustainable energy future for County Cork, by promoting a low carbon society and mitigating impacts of climate change. It highlights

the need to address the causes of climate change in line with the NDP, by reducing greenhouse gas emissions in the agricultural and energy sectors. Biofuels are highlighted as a potential and feasible renewable energy option for the County. We take note of Section 13.10 'Bioenergy' which states that *"the bioenergy sector, as a means of generating electricity, heat and transport fuel, will play a key role in the delivery of renewable heat and renewable transport targets".*

In regard to Bioenergy, this section contains objective ET 1-17:

a) *"Encourage the development of commercial bioenergy plants on brownfield sites which are adjacent to industrial areas or on lands which are reserved for industrial uses or on brownfield sites in rural areas. The Council may consider other lands for bioenergy production where the applicant has suitably demonstrated a location specific need for the type and scale of facility proposed and there is no adverse environmental or ecological impact on surrounding land, air, water and properties.*
b) *Commercial bioenergy plants should be located close to the energy source and the point of demand, where they can be served by public roads with sufficient capacity to absorb increased traffic flows and adjacent to transport corridors.*
c) *In rural areas, consideration will be given to proposals for bioenergy developments located close to the source material and where the road network in the area has capacity to absorb increased traffic flows. Such plants should, where possible, be located in proximity to existing agricultural buildings.*
d) *In all cases, visual, noise, odour, and amenity impact on adjacent properties, uses and amenity areas and wider cumulative impacts will be key considerations when assessing any such proposals".*

The Proposed Development is located on a partially brownfield and primarily greenfield site, within a rural location surrounded by agricultural lands, in close proximity to a significant source of feedstock material (in the form of an EPA licenced piggery), and other agricultural feedstock providers in the immediate locality of the site. According to the EIAR submitted within this application, there will be no adverse residual impact on the surrounding land, air, water, or properties.

The Proposed Development is additionally located in close proximity to the point of demand (i.e. the gas network, which the proposed development will supply), served directly by the N73 National Road (and the M8 Motorway, c. 2.5km east), which have sufficient capacity to absorb the traffic flows associated with the development.

This EIAR includes an assessment and mitigation measures regarding visual, noise, odour and amenity impact on adjacent properties, uses and amenity areas and wider cumulative impacts.

In regard to the 'Gas Networks' Section 13.16.7 Objective ET 13-24 is to *"facilitate the sustainable delivery, improvement, and expansions of natural gas infrastructure throughout the County and have regard to the location of existing gas infrastructure in the assessment of planning applications".*

According to the CDP, Table 13.1, the gas distribution network runs through Mitchelstown.

4.8.1.6 Chapter 15: Biodiversity and Environment

Section 15.12 'Waste' states that the County's waste policies and objectives aim to minimise waste using the Circular Economy Concept with the objective to *"mitigate where possible and*

adapt to the impacts of climate change; protect and improve ground and surface waters; and provide a clean natural environment".

Section 15.12.16 states that *"food waste is potentially the largest un-tapped recyclable component of the municipal waste stream and there are mature and available recovery techniques in place to deal with it, such as composting and anaerobic digestion. The Council will work with the Southern Waste Region to consider the delivery of such waste infrastructure where appropriate through the Development Management process, subject to environmental assessment".*

4.8.1.7 Volume 3: North Cork – Fermoy Municipal District

Mitchelstown – Key Planning Considerations and Objectives:

According to this plan, the general objectives for Mitchelstown of note are listed below:

Reference	General Objectives for Mitchelstown
MH-GO-02	In order to secure the sustainable population growth and supporting development proposed in MHGO-01, appropriate and sustainable water and wastewater infrastructure that will secure the objectives of the relevant River Basin Management Plan and the Blackwater River Special Area of Conservation, must be provided and be operational in advance of the commencement of any discharges from the development. Wastewater infrastructure must be capable of treating discharges to ensure that water quality in the receiving waterbody does not fall below legally required levels.
MH-GO-10	In accordance with Objectives in Chapter 11 of Volume One of this Plan, all new development will need to make provision for Sustainable Urban Drainage Systems (SuDs) and provide adequate storm water infrastructure. Surface water management and disposal should be planned in an integrated way in consideration with land use, water quality, amenity, and habitat enhancements as appropriate.

Statement of Consistency with the Cork County Development Plan

The Proposed Development is consistent with the best practice and planning principles in the CDP, including the prevention of negative impacts on the surrounding environment, landscape, biodiversity or local amenities.

The CDP aims to minimise waste using the Circular Economy concept. The Proposed Development will use organic material to produce renewable biomethane and sustainable biobased fertiliser.

The proposal seeks to utilise the waste agricultural resources of the local area in an environmentally acceptable manner, consistent with Cork County Council's support for the development of the circular economy and bioeconomy.

AD is recognised as a potential and feasible option for the production of renewable energy in County Cork, and as a means for the agricultural and energy sectors to move towards environmentally and economically sustainable models. Innovative developments such as this also recognise the importance of social sustainability, with community buy-in and local partnerships supported at the County level as a means by which communities are empowered to take control of the production and consumption of energy.

Furthermore, the CDP aims to facilitate the expansion of natural gas infrastructure, having regard to the location of the existing natural gas infrastructure. The Proposed Development is

consistent with the aims of the CDP.

4.8.2 Cork County Council Climate Change Adaptation Strategy 2019 – 2024

Section 17.6 of the CDP refers to the Cork County Council Climate Change Adaptation Strategy[39] (Cork CAS hereafter) and it is an objective (CA 17-1) of the CDP to support strategies objectives. We take note of Goal 3 within the Climate Change Adaptation Strategy, relating to 'Landuse and Development', which is *"to integrate climate action considerations into landuse planning".*

4.8.3 Cork Climate Change Action Plan 2024-2029

The Cork County Council Climate Action Plan 2024-2029[40] (Cork CAP hereafter) came into effect on the 12th February 2024. The vision for the County under this plan is to "*become a climate resilient and low carbon organisation that inspires, leads and supports ambitious and just climate action across the county*".

The following policies and objectives of the Climate Action Plan are of relevance:

Reference	General Objectives for Mitchelstown
Goal 4.3.1	Achieve sectoral targets in relations to greenhouse gases reduction from direct energy use and Energy Efficiency
Objective 4.3.1.1	51% reduction in greenhouse gases from the 2016/2018 baseline resulting from the council's electricity usage
Objective 4.3.1.3	51% reduction in greenhouse from the 2016/2018 baseline resulting from the council's transport use
Objective 4.3.1.4	50% increase in energy efficiency from the 2009 baseline
Goal 4.5.5	Future Proofing LULUCF for climate change
Objective 4.5.5.1	Support climate change adaptation measures in land use, changing land-use, and forestry to sequester carbon and mitigate climate change.
Goal 4.8.1	Support the energy transition to a sustainable energy system.
Objective 4.8.1.1	Support the development of renewable energy infrastructure
Goal 4.9.1	Reduce solid waste disposal and resulting emissions
Objective 4.9.1.1	Promote and support the Circular economy

4.8.4 Cork Energy Champion – Energy Master Plan (2019)

Energy Champion (Energy Cork) is a registered member of the Sustainable Energy Authority of Ireland's (SEAI) Sustainbale Energy Communities (SEC) Network, and in 2019, according to the Energy Master Plan[41] (EMP hereafter), they entered into a three-year partnership agreement with SEAI. The objectives of the SEC program are to:

- Increase energy efficiency.
- Use renewable energy.
- Develop decentralised energy supplies.

The EMP suggested an action of *"20% renewable gas on gas grid by 2030"*

We take note of the following actions from the EMP:

[39] Cork County Council (2019) *Cork Climate Adaptation Strategy 2019-2024*: cork-county-council-climate-adaptation-strategy-2019-2024-pdf.pdf (corkcoco.ie)
[40] Cork County Council (2024) *Cork CAP*: cork-county-council-climate-action-plan-2024-2029.pdf (corkcoco.ie)
[41] (2019) *Energy Master Plan*: CORK ENERGY CHAMPION - energy master plan (energycork.ie)

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- (Large-Scale Actions) GNI commitment towards 20% renewable gas by 2030 (impacts on residential and non-domestic sectors only).
- (Transport) Renewable Energy Contribution Action 2: 20% renewable gas on the natural gas grid by 2030 (GNI commitment). This measure could potentially provide 502.03GWh renewable heat and electricity towards energy demand in the study area by 2030. The feasibility of this action very much depends on the availability of suitable feedstocks such as energy crops/grass silage, food wastes, animal slurries, etc. For the purposes of this study, this measure is considered to be cost-neutral.

Statement of Consistency with the Climate Change Adaptation Strategy, Energy Master Plan and Sustainable Energy and Climate Action Plan

It is submitted that, with regard to the expressed objectives of these plans, the Proposed Development is consistent with these objectives and will provide an important contribution to the reduction of GHG emissions in the County, by the production of renewable energy, avoiding fugitive emissions from agricultural waste, creating sustainable biobased fertiliser and energy produced from waste resources. In addition, the Proposed Development supports the facilitation of biomethane injection into the natural gas grid to assist in the decarbonisation of this crucial energy infrastructure.

4.10 Summary Statement

This chapter has examined and summarised the relevant planning, climate, and waste management policy, and the legislative context at European, and national levels with relevance to the Proposed Development located within the townlands of Corracunna, Coolnavane and Garane, Mitchelstown, Co. Cork.

The Proposed Development aims to lessen the dependence on imported fossil fuels, provide greater security in energy supply, and increase the provision of renewable energy in line with government and planning policy at the national, regional, and local level.

It is considered that the Proposed Development is supported by the Cork County Development Plan 2022-2028 and the local, regional and national policy discussed within this chapter.

The Proposed Development has been carefully designed so it will integrate into the local landscape, will not be prejudicial to public health, and would be acceptable in terms of traffic safety. The Proposed Development would therefore be in accordance with the proper planning and sustainable development of the area and will deliver local renewable energy generation and employment to support the economic development and prosperity of the area.

This EIAR is accompanied by a detailed Planning Report, produced by John Spain Associates.

The Planning Report is intended to supplement this chapter of the EIAR with a more extensive and detailed assessment of the consistency of the Proposed Development with the relevant national, regional, and local planning policy context. We refer the Planning Authority to the accompanying Planning Report prepared by John Spain Associates for further details.

5 Biodiversity

5.1 Introduction

This chapter provides an Ecological Impact Assessment (EcIA) which addresses the potential ecological impacts that may occur in the future on the terrestrial, avian and aquatic ecology of a Proposed Development at Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork and its surrounding environs.

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

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

The main objectives of this ecological assessment were:

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

5.1.1 Legislative and Policy Context

The Irish Wildlife Act 1976 (and its amendment of 2000) provides protection to most wild birds and animals. Interference with such species can only occur under licence. Under the Act it is an offence to “wilfully interfere with or destroy the breeding place or resting place of any protected wild animal”. The basic designation for wildlife is the Natural Heritage Area (NHA). This is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. Under the Wildlife Amendment Act (2000) NHAs are legally protected from damage. NHAs are not part of the Natura 2000 network and so the Appropriate Assessment process does not apply to them.

The Flora Protection Order 1999 provides statutory protection in Ireland to a number of rare plant species from being wilfully cut, picked, uprooted or damaged. It is also illegal under this order to alter, damage or interfere with their habitats.

The Birds Directive (Council Directive2009/147/EC) recognises that certain species of birds should be subject to special conservation measures concerning their habitats. The Directive requires that Member States take measures to classify the most suitable areas as Special Protection Areas (SPAs) for the conversation of bird species listed in Annex 1 of the Directive. SPAs are selected for bird species (listed in Annex I of the Birds Directive), that are regularly occurring populations of migratory bird species and the SPA areas are of international importance for these migratory birds.

The EU Habitats Directive (92/43/EEC) requires that Member States designate and ensure that particular protection is given to sites (Special Areas of Conservation) which are made up of or support particular habitats and species listed in annexes to this Directive.

The Water Framework Directive (WFD) (2000/60/EC), which came into force in December 2000, establishes a framework for community action in the field of water policy. The overall aim of the WFD is the eventual achievement of good status in all waterbodies. The WFD was transposed into Irish law by the European Communities (Water Policy) Regulations 2003 (S.I. 722 of 2003). The WFD rationalises and updates existing legislation and provides for water management on the basis of River Basin Districts (RBDs). RBDs are essentially administrative areas for coordinated water management and are comprised of multiple river basins (or catchments), with cross-border basins (i.e. those covering the territory of more than one Member State) assigned to an international RBD. Ireland is now within the 3rd cycle of the WFD (2022 – 2027).

5.1.2 Planning Policies

National

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

Regional

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

Local

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

Policy No:	Biodiversity Policy Objectives
BE15 - 1	a) Support and comply with the objectives of the National Biodiversity Plan 2017-2021 (and any future National Biodiversity Plan which may be adopted during the period of this Plan) as appropriate, b) Implement the current County Biodiversity Action Plan and any future updated Plan; c) Support and comply with biodiversity policy set out in other national and regional policy documents as appropriate.
BE 15-2	a) Protect all natural heritage sites which are designated or proposed for designation under European legislation, National legislation and International Agreements. Maintain and where possible enhance appropriate ecological linkages between these. This includes Special Areas of

	Conservation, Special Protection Areas, Marine Protected Areas, Natural Heritage Areas, proposed Natural Heritage Areas, Statutory Nature Reserves, Refuges for Fauna and Ramsar Sites. These sites are listed in Volume 2 of the Plan. b) Provide protection to species listed in the Flora Protection Order 2015, to Annexes of the Habitats and Birds Directives, and to animal species protected under the Wildlife Acts in accordance with relevant legal requirements. These species are listed in Volume 2 of the Plan. c) Protect and where possible enhance areas of local biodiversity value, ecological corridors and habitats that are features of the County's ecological network. This includes rivers, lakes, streams and ponds, peatland and other wetland habitats, woodlands, hedgerows, tree lines, veteran trees, natural and semi-natural grasslands as well as coastal and marine habitats. It particularly includes habitats of special conservation significance in Cork as listed in Volume 2 of the Plan. d) Recognise the value of protecting geological heritage sites of local and national interest, as they become notified to the local authority, and protect them from inappropriate development e) Encourage, pursuant to Article 10 of the Habitats Directive, the protection and enhancement of features of the landscape, such as traditional field boundaries, important for the ecological coherence of the Natura 2000 network and essential for the migration, dispersal and genetic exchange of wild species.
BE15-3	a) Ensure that biodiversity issues are considered at the earliest possible stages of plan making; b) Ensure that plans and strategies comply with nature conservation legislation and policy as required (fulfil Strategic Environmental Assessment and Appropriate Assessment requirements); and c) Carry out ecological impact assessment of plans and strategies as appropriate.
BE 15-4	a) Ensure that biodiversity protection is considered at design stage for works and development planned and progressed by Cork County Council and that all such projects comply with nature conservation legislation and policy as required; b) Fulfil Appropriate Assessment and Environmental Impact Assessment requirements and carry out Ecological Impact Assessment in relation to Local Authority plans and projects as appropriate.
BE 15-5	a) Protect biodiversity and support the principle of biodiversity net gain on land and property owned and managed by Cork County Council. b) Support the implementation of positive conservation management on lands and property which are owned or managed by Cork County Council; c) Support and implement best practice in the management of roadside boundaries including tree lines and hedgerows managed by Council; d) Support national policy to create new woodlands on public land and participate in the Creation of Woodlands on Public Lands Scheme and any successor schemes; e) Where possible, develop and implement Pollinator Plans and/or Biodiversity Action Plans for lands managed by Cork County Council in accordance with the National Biodiversity Action Plan (and any future National Biodiversity Plan which may be adopted during the lifetime of this Plan) and the All-Ireland Pollinator Plan; f) Support the use of natural approaches to flood management and control on lands owned or managed by or on behalf of Cork County Council. g) The Council will incorporate primarily native planting into new landscaping schemes within its own developments
BE 15-6	Provide for the protection and enhancement of biodiversity in the development management process and when licensing or permitting other activities by: a) Providing ongoing support and guidance to developers on incorporating biodiversity considerations into new development through preplanning communications and the Council's guidance document 'Biodiversity and the Planning Process – guidance for developments on the management of biodiversity issues during the planning process' and any updated versions of this advice; b) Encouraging the retention and integration of existing trees, hedgerows and other features of high natural value within new developments; c) Requiring the incorporation of primarily native tree and other plant species, particularly pollinator friendly species in the landscaping of new developments; d) Fulfilling Appropriate Assessment and Environmental Impact Assessment obligations and carrying out Ecological Impact Assessment in relation to development and activities, as appropriate; e) Ensuring that an appropriate level of assessment is completed in relation to wetland habitats subject to proposals which would involve drainage or reclamation. This includes lakes and ponds, watercourses, springs and swamps, marshes, heath, peatlands, some woodlands as well as some coastal and marine habitats; f) Ensuring that the implementation of appropriate mitigation (including habitat enhancement, new

	planting or other habitat creation initiatives) is incorporated into new development, where the implementation of such development would result in unavoidable impacts on biodiversity – supporting the principle of biodiversity net gain.
BE 15-7	Implement best practice to minimise the risk of spread of invasive alien species, on Council owned or managed land, and require the development and implementation of Invasive Alien Species Management Plans for new developments where required.
BE 15-8	a) Protect trees the subject of Tree Preservation Orders. b) Make use of Tree Preservation Orders to protect important trees or groups of trees which may be at risk or any tree(s) that warrants an order given its important amenity or historic value. c) Encourage the provision of trees for urban shading and cooling in developments in urban environments and as an integral part of the public realm. d Preserve and enhance the general level of tree cover in both town and country. Ensure that development proposals do not compromise important trees and include an appropriate level of new tree planting. e) Where appropriate, to protect mature trees/groups of mature trees and mature hedgerows that are not formally protected under Tree Preservation Orders

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

5.1.2.1 Heritage Plans

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

Previous Cork County Heritage and Biodiversity Plans identified a number of objectives and policies in order to protect the natural heritage and biodiversity of County Cork.

5.2 Methodology

5.2.1 Statement of Competence

The initial site surveys and this EcIA report were carried out by Noreen McLoughlin. Noreen is the owner and main ecologist at Whitehill Environmental. Noreen holds a BA (Hons) in Natural Science (Mod) Zoology and an MSc in Freshwater Ecology (TCD, Dublin). She has been a full member of the CIEEM (Chartered Institute of Ecology and Environmental Management) for over 18 years. Noreen has over 20 years' experience as a professional ecologist in Ireland and in that time has carried out a large number of Ecological Impact Assessments and Appropriate Assessments for a wide range of projects.

Additional surveys of ground mammals, bats, birds and aquatic invertebrates were carried out by qualified ecologists from ORS and Dixon Brosnan.

5.2.2 Study Area

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

5.2.3 Desk Based Studies

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

The following websites were used to access information and data:

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

5.2.4 Field Based Studies

Initial visits to the Proposed Development site at Corracunna were conducted on February 16th, 2024, when relevant field notes, species lists and photographs were taken. The habitats within the Proposed Development site were identified and classified according to 'A Guide to Habitats

in Ireland' (Fossitt, 2000). Plant species present in each habitat type were recorded. Habitats were assessed for their potential to be protected habitats under Annex I of the EU Habitats Directive (92/43/EEC) and for their capacity to support rare, threatened, and endangered species. The methodology used in this report to assess the impact on habitats is based on NRA guidelines (2009).

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

An arborist survey was completed in February 2024 and a report is included with the submission. Please refer to Drawing Reference **TS_TCP_7_2_24**.

5.2.4.1 Terrestrial Mammals, Birds and Bats

Any signs and sightings of terrestrial mammals were noted in the site walkover in February 2024. All bird activity seen or heard was noted.

In March 2024, a preliminary Bat Roost Assessment was carried out on a number of derelict buildings in the site by ecologists from Dixon Brosnan, whilst a mammal assessment of the site was also carried out at this time. This mammal survey focused on a number of holes that were observed in spoil heaps in the site.

In August 2024, follow up bat activity surveys were conducted by Dixon Brosnan. The aims of this survey were to:

- Identify any bat roosts located within the existing site structures and/or trees and
- Identify areas and buildings within the proposed development site that are being used by bats (including flight paths/commuting routes and foraging areas).

In September 2024, additional habitat, mammal and bird surveys were also carried out by ecologists from ORS on the proposed route of the discharge pipe, which will carry process water from the facility to the Funshion River.

5.2.4.2 Aquatic Surveys

Aquatic ecology surveys, including biological assessment (Q-values) of the Funshion River, were carried out in August 2024 by ecologists from ORS.

5.2.4.3 Seasonal Constraints

Having regards to the limited and largely improved habitats within the main area of the Proposed Development site, it was considered that there were no seasonal constraints associated with the habitat assessment element of the field work for this EcIA.

All additional surveys were carried out during the optimal periods.

5.2.5 Assessment Methodology

5.2.5.1 Evaluation of Ecological Features

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

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

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

- International
- National (Ireland)
- Regional (South)
- County (Cork)
- District (Mitchelstown)
- Local/Townland (Corracunna)

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

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

5.2.5.2 Assessment of Impacts

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

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

Impacts are defined as being positive, negative, or neutral. A significant impact is defined as an impact upon the integrity of a defined ecosystem and/or the conservation status of a habitat or

species within a given area. Where a potential negative impact has been identified, mitigation measures have been formulated using best practices techniques and guidance to prevent, reduce or offset the impact.

5.3 Characteristics of the Proposed Development

5.3.1 Description of the Proposed Project

The Applicant, Nephin Renewable Gas - Corracunna Limited , proposes to develop an Anaerobic Digestion Facility (herein referred to as the Proposed Development) on a site located in the townlands Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork.

Occupying an area of circa 5.61 hectares, the development will accept and treat 90,000 tonnes per annum of locally sourced agricultural manures, slurries, food processing residues and crop-based feedstocks to produce grid quality biomethane, also known as renewable natural gas (RNG) suitable for direct injection into Gas Network Ireland's (GNI) transmission and distribution network. The RNG produced at the Anaerobic Digestion Facility will be used as a direct replacement for conventional natural gas and in doing so contribute towards the Government's aspiration to develop 5.7TWh of indigenous biomethane production. In addition to RNG, the facility will produce a nutrient rich bio fertiliser which can be used as a direct replacement for fossil fuel derived fertiliser. The Anaerobic Digestion Facility will also include the recovery of biogenic carbon dioxide (CO_2) from the biogas upgrading process.

The development will consist of the following:

- Demolition of existing single storey disused agricultural buildings, silos, and tank within the western portion of the site (total demolition gross floor area (GFA) of c. 1,781 sq.m). One single storey agricultural building (with a GFA of 87.8 sq.m) will be stabilised and retained as a biodiversity building.
- Construction of 3 no. digesters (c. 15.5m in height), 2 no. digestate storage structures (c. 15.5m and 11m in height), 2 no. liquid storage tanks (c. 12.2m in height), and a liquid feed tank (c. 8m in height) located in the southeast portion of the site.
- 3 no. pasteurisation tanks (each c. 6m in height), a post pasteurisation cooling tank (c. 12.2m in height) and pre fertiliser manufacturing tank (c. 12.2m in height) located in the centre of the site.
- A part single-storey and part two-storey reception hall (with a GFA of c. 2,112.6 sq.m and an overall height of c. 15.5m) to accommodate a laboratory, panel room, tool store, workshop, and storage areas, with a liquid feed intake adjacent to the reception hall, located in the central portion of the site, to the north of the digesters.
- A single-storey solid digestate storage and nutrient recovery building (with a GFA of c. 879.9 sq.m and an overall height of c. 12.4m in height) located to the west of the reception hall, in the central portion of the site.
- Odour abatement plant (c. 6m in height) and equipment, a digestate offtake area, and a fuel tank (c. 1.6m in height) will be provided to the north of the solid digestate storage and nutrient recovery building.
- Construction of an ESB substation (c. 3.4m in height), 2 no. CO_2 tanks (c. 14.5m in height), along with associated plant structures including a CO_2 loading pump, CO_2 auxiliaries, CO_2 liqueufactor, a CO_2 compressor (c. 6.7m in height), and a CO_2 pre-treatment skid, located in the southwest portion of the site.
- Construction of a biogas treatment skid, a biogas compression system, a biogas upgrading module (with an overall height of c. 5.1m) and a grid injection unit within a fenced compound (c. 2.8m in height), located within the southwestern portion of the site.

- Construction of an emergency biogas flare (c. 11.3m in height) and 2 no. propane tanks (c. 1.3m in height) located further to the west of the site.
- Construction of an O_2 generation unit (c. 2.6m in height), a biomethane boiler (c. 5.6m to top of flue stack) a combined heat and power (CHP) unit and panel room (with a maximum height of c. 6m to top of flue), 2 no. pump houses (c. 2.6m in height, each with a GFA of c. 29 sq.m) located in the southwestern portion of the site.
- Construction of a two-storey ancillary office and administration building (with an overall height of c. 8.6m and a GFA of c. 271.5 sq.m) located within the western portion of the site, adjacent to the main site entrance.
- A discharge pipe route extending to the northwest of the main anaerobic digestion facility site, crossing the L90831 and through agricultural lands to the River Funshion.
- Alterations to the adjacent local road (L90831), to allow for improved access and safety, including provision of a passing bay and setting back of boundaries alongside the site entrance.
- Provision of landscaping and tree planting, including the provision of an extensive treeline alongside the N73 to the southeast of the main site area, along with additional landscaping and planting on lands to the west of the L90831.
- Associated and ancillary works including parking (16 no., including 3 no. EV and 1 no. accessible parking spaces), and bike storage (10 no. spaces), access arrangements (including new access points to the site from the L90831 to the west), internal roads, bunds, a weighbridge, wastewater treatment equipment, attenuation pond, boundary treatments, lighting, services, lightning protection masts, drainage, and all associated and ancillary works.

Extracts from the planning drawings as submitted can be seen in **Figure 5.1**. A detailed description of the processes involved at this Proposed Development are included in **Chapter 2: Project Description** of this EIAR.

Figure 5.1: Extract from Planning Drawings (as prepared by ORS)

5.4 Receiving Environment

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

5.4.1 Site Location & General Description

The site in question is approximately 5.61 hectares in area and is located in a rural area in the townlands of Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork, approximately 2.0km north-east of Mitchelstown. The site will be accessed via the creation of a new entrance off the L90813 local, third-class road. The site is bounded to the west by the L90813, to the south by the N73 and to the north and east by agricultural land. Site location maps can be seen in **Figures 5.2** and **5.3.**

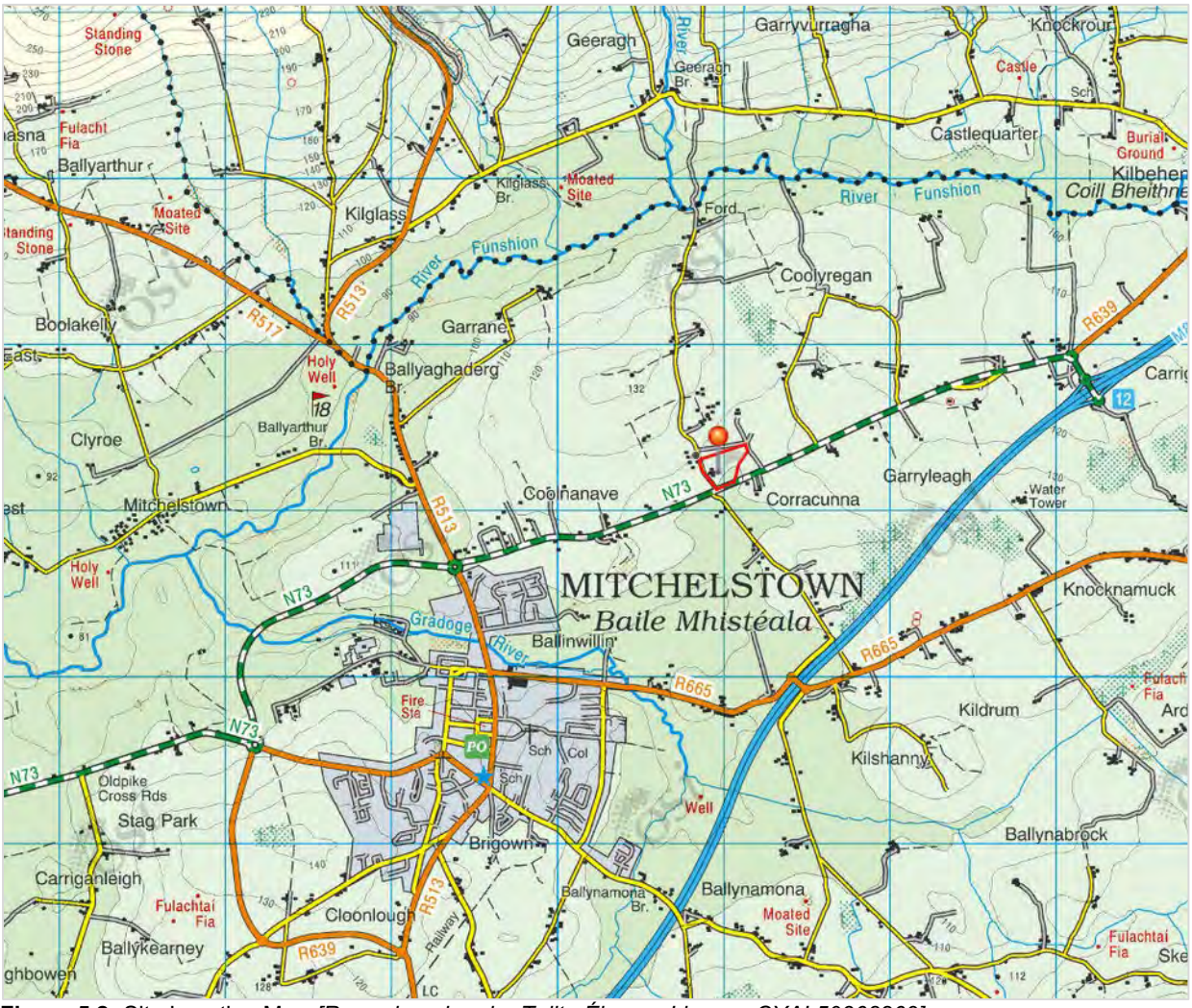

Figure 5.2: Site Location Map *[Reproduced under Tailte Éireann License CYAL50368269]*

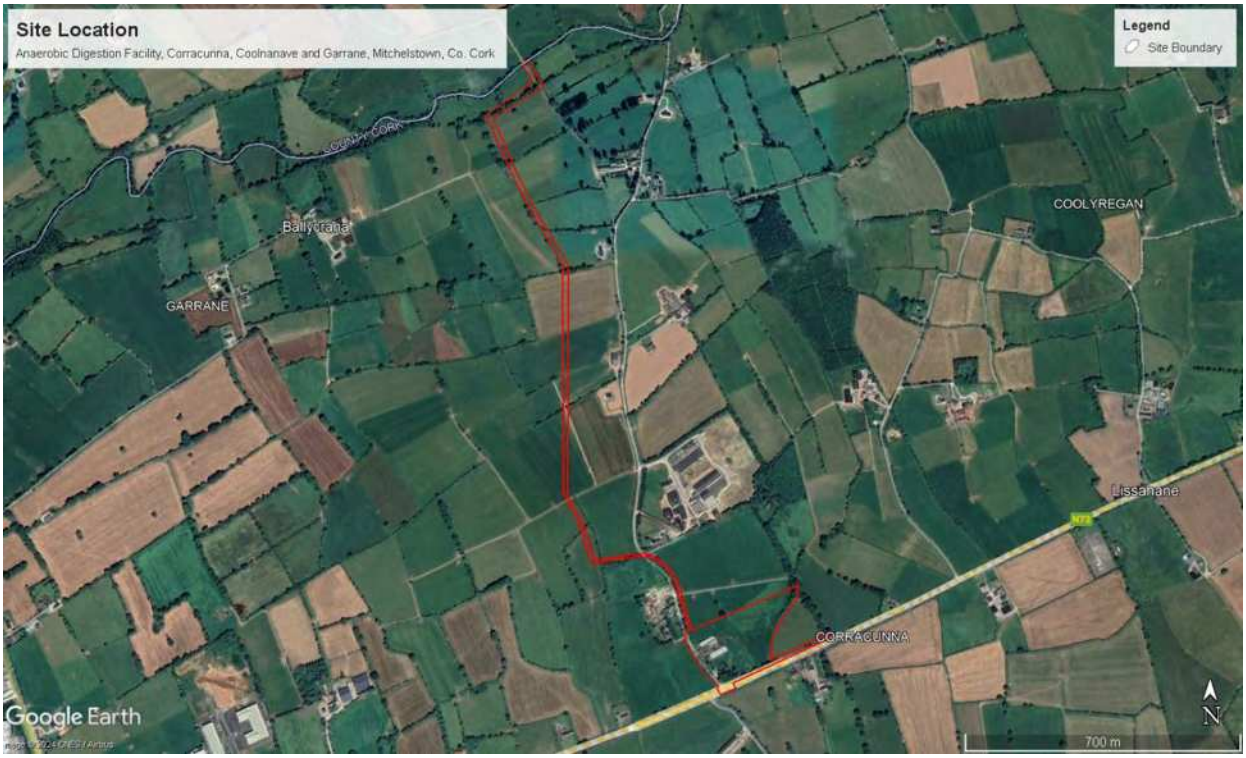

Figure 5.3: Site Location Map.

5.4.1.1 Land Use and Habitats Surrounding the Proposed Development

Using up to date aerial photographs, an overview of the land-use and habitats surrounding the site was assessed and noted. The site is in a rural area where the predominant land use is intensive agriculture and the dominant habitat associated with this use is improved agricultural grassland (Fossit Code: GA1). Other habitats represented in the wider area include semi-improved grasslands, arable crops (BC1) and tilled land (BC3), hedgerows (WL1), treelines (WL2), and areas of coniferous forestry (WD4) and scrub (WS1). There are also a number of watercourses close to the site. The area is also characterised by a moderate level of one-off dwelling houses and farm yards and the dominant habitats associated with these areas include buildings and artificial surfaces (BL3) and amenity grasslands (GA2) and gardens.

An overview of the local habitats surrounding the Proposed Development site can be seen in the aerial photograph in **Figure 5.4**.

Figure 5.4 – Aerial photograph showing habitats surrounding the study area. Proposed Development site is outlined in red and proposed Gas Pipeline route in blue.

5.5 Designated Sites

5.5.1 Natura 2000 Sites

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

There are six Natura 2000 sites within the Zone of Influence of this Proposed Development site. These sites are summarised in **Table 5.2**. The location of the site in relation to these designated areas are shown in **Figures 5.5** and a full synopsis of these sites can be read online on the website of the National Parks and Wildlife Service (www.npws.ie).

Table 5.2 – Natura 2000 Sites within 15km of the Proposed Development

Site Name & Code	Distance from Site	Qualifying Interests
Galtee Mountains SAC 000646	6.2km north	• Northern Atlantic wet heaths with *Erica tetralix* • European dry heaths • Alpine and Boreal heaths • Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) • Blanket bogs (* if active bog) • Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) • Calcareous rocky slopes with chasmophytic vegetation • Siliceous rocky slopes with chasmophytic vegetation
Lower River Suir SAC 002137	7.4km east	• Atlantic salt meadows (Glauco-Puccinellietalia maritimae) • Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation • Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) • *Taxus baccata* woods of the British Isles • *Margaritifera margaritifera* (Freshwater Pearl Mussel) • *Austropotamobius pallipes* (White-clawed Crayfish) • *Petromyzon marinus* (Sea Lamprey) • *Lampetra planeri* (Brook Lamprey) • *Lampetra fluviatilis* (River Lamprey) • *Alosa fallax fallax* (Twaite Shad)

		• *Salmo salar* (Salmon) • *Lutra lutra* (Otter)
Blackwater River (Cork/Waterford) SAC 002170	8.3km south 39km downstream of the proposed discharge point	• Estuaries • Mudflats and sandflats not covered by seawater at low tide • Perennial vegetation of stony banks • Salicornia and other annuals colonising mud and sand • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) • Mediterranean salt meadows (*Juncetalia maritimi*) • Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) • *Margaritifera margaritifera* (Freshwater Pearl Mussel) • *Austropotamobius pallipes* (White-clawed Crayfish) • *Petromyzon marinus* (Sea Lamprey) • *Lampetra planeri* (Brook Lamprey) • *Lampetra fluviatilis* (River Lamprey) • *Alosa fallax fallax* (Twaite Shad) • *Salmo salar* (Salmon) • *Lutra lutra* (Otter) • *Trichomanes speciosum* (Killarney Fern)
Ballyhoura Mountains SAC 002036	14km west	• Northern Atlantic wet heaths with Erica tetralix • European dry heaths • Blanket bogs (* if active bog
Blackwater Callows SPA 004094	13.6km south 39km downstream of the proposed discharge point	• Whooper Swan *(Cygnus cygnus)* • Wigeon *(Anas penelope)* • Teal *(Anas crecca)* • Black-tailed Godwit *(Limosa limosa)* • Wetland and Waterbirds
Carrigeenamronety Hill SAC 002037	11.7km west	• European dry heaths • Killarney Fern *Trichomanes speciosum*

The generic conservation objectives of the SACs are:

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

The generic conservation objectives of the SPAs are:

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

The favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

The population dynamics data on the species concerned indicate that it is maintaining itself on a long -term basis as a viable component of its natural habitats.

- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future.
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

As required under Article 6(3) of the Habitat's Directive, this proposed development was also screened for Appropriate Assessment. As part of this process, significant effects upon all Natura 2000 sites were ruled out.

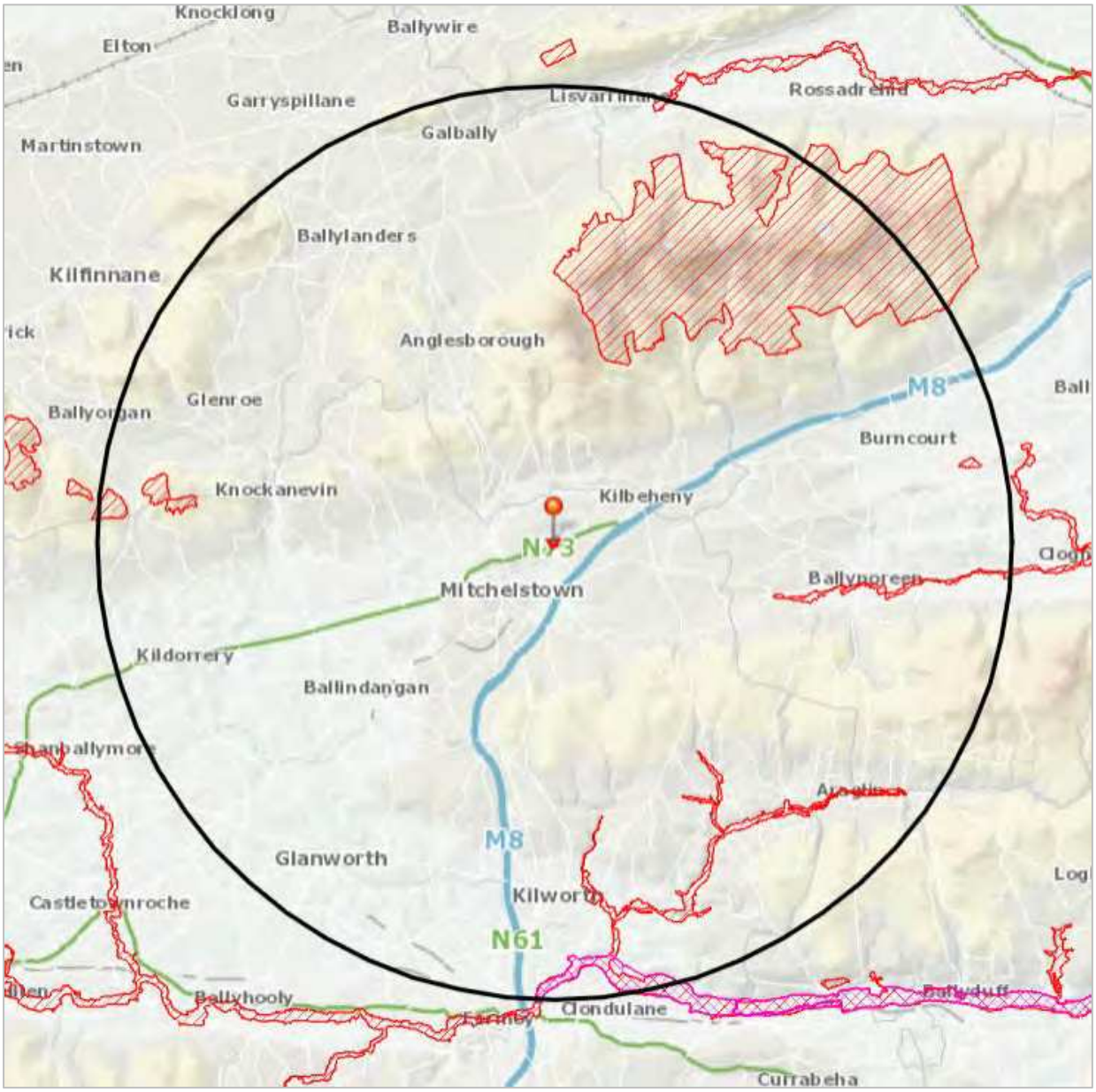

Figure 5.5 – Designated Sites within the Zone of Influence of the Proposed Development (Pinned). SACs – Red Hatching, SPAs – Pink Hatching.

5.5.2 Nationally Important Sites

The Proposed Development is not within or immediately adjacent to any nationally designated site, such as a Natural Heritage Area or a proposed Natural Heritage Area. It is within the Zone of Influence of twelve sites that have been designated as proposed Natural Heritage Areas. These sites are summarised in **Table 5.3** and a map showing their locations relative to the site is shown in **Figure 5.7**.

Table 5.3 – Nationally Important Sites within 15km of the Proposed Development	
Site Name & Code	**Distance from Site**
Glenacurrane River Valley pNHA 002035	2.6km north
Galtee Mountain pNHA 000646	6km north
Ballindangan Marsh pNHA 000899	8.6km south-west
Mitchelstown Caves pNHA 000651	9.6km north-east
Araglin Valley pNHA 001029	10.6km south
Shanbally Wood pNHA 000972	11.6km north-east
Carrigeenamronety Hill pNHA 002037	11.6km west
Glanworth Ponds pNHA 000085	12.4km south-west
Brown's Farm, Togher Cross Roads pNHA 001169	13.4km south-west
Ballyhoura Mountains SAC 002036	13.9km west
Ballinaltig Beg Pond pNHA 001829	14.7km south-west
Blackwater River Callows pNHA 000073	13.4km south and 39km downstream

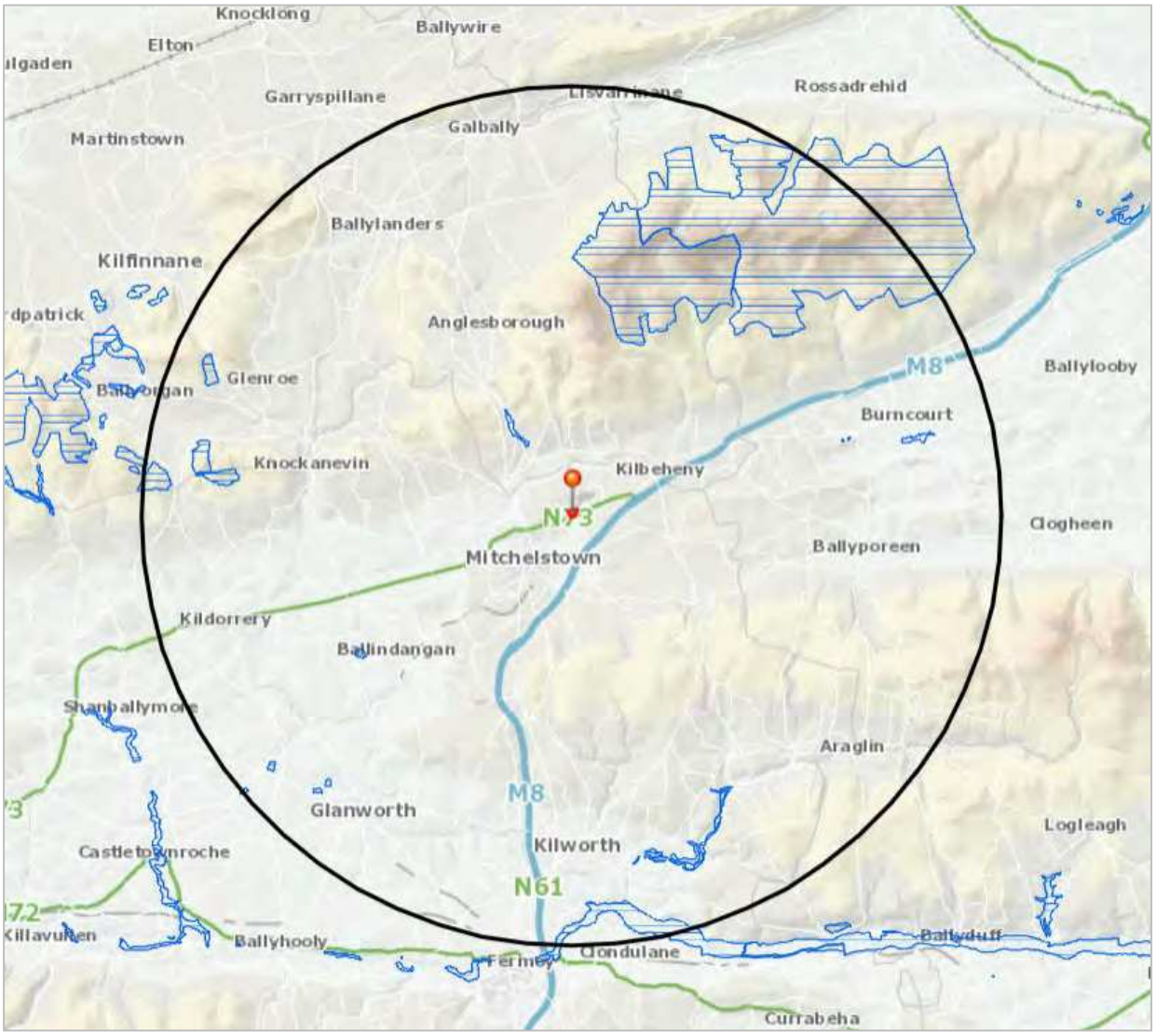

Figure 5.7 – Proposed Development in relation to proposed Natural Heritage Areas within 15km (Blue Cross Hatching).

5.6 Flora

5.6.1 Habitats within the Study Area

No part of the Proposed Development site lies within, nor is it immediately adjacent to any area that has been designated for nature conservation purposes. All Proposed Development works within the Proposed Development site will take place on areas of low – high biodiversity value on a local level. These habitats are described in greater detail below, whilst a habitat map depicting the main habitats in the Proposed Development site is presented in **Figure 5.8**.

The site encompasses a now derelict pig farm, along with an area of agricultural land that lies to the north and east of the former pig farm site.

Figure 5.8 – Habitat Map of the Proposed Study Area (Excluding Discharge Pipe Route)

Within the former pig farm, the habitat is dominated by Buildings and Artificial Surfaces (BL3), i.e., the former pig houses, yards, tanks etc. Small pockets of scrub and ruderal weeds have encroached into areas surrounding the old buildings and the former concrete surfaces are heavily covered in moss growth.

To the immediate south of the buildings there is an area of unmanaged / rough grassland that is akin to the Fossit habitat Dry Meadows and Grassy Verges (GS1). This extends to the immediate south and west of the piggery as far as a soil bund that was constructed originally along with the piggery to reduce visual effects of the farm from the road and surrounding area. The vegetation in this area is dominated by grasses that are rank and unmanaged, and species such as cocksfoot grass *Dactylis glomerata* and couch grass *Elymus repens* were common. Pockets of bramble *Rubus fruticosus agg* scrub occur throughout this area. Broadleaved species in this area included ragwort *Jacobaea vulgaris*, thistle *Cirsium vulgare*, broadleaved dock *Rumex obtusifolius*, nettle *Urtica diocia* and creeping buttercup *Ranunculus repens*. The

soil bund on the edge of this area is now also heavily vegetated with a dense growth of brambles whilst nettles and broadleaved dock were also noted on this bund.

The remaining area of the site consists of one large field that consists of an Improved Agricultural Grassland habitat that is well drained and dominated by rye grasses *Lolium* sp. and meadow grasses *Poa* sp.

The boundaries of the site were also noted. The southern boundary of the site is adjacent to the N73 corridor. There is a treeline present along this boundary that screens the site from the main road. Species noted in this treeline included Leylandii and sycamore *Acer pseudoplantatus*. There is an open drain / watercourse present along this treeline.

The northern portion of the western site boundary (along a local access road to another farm), consists of a treeline, consisting of Leylandii, mature beech *Fagus sylvatica*, honeysuckle *Lonicera periclymenum*, ivy *Hedera helix*, plum blossom, hawthorn *Crataegus monogyna* and holly *Ilex aquifolium*. Further south along that boundary and in front of the old piggery buildings, there is a group of mature Leylandii, along with some scattered ash, sycamore and elder.

The northern boundary is defined by a fence. There is a Mature pedunculate oak at this location which is to be retained.

The eastern boundary is largely undefined, however there is a portion of the site boundary to the south-east which follows an open watercourse with grassy banks.

The habitats along the route of the proposed discharge pipeline were also surveyed in September 2024. The length of the route is approximately 1.8km and it will traverse the following habitats – Improved Agricultural Grasslands (GA1), Hedgerows (WL1) and Treelines (WL2), riparian habitats along the Funshion river and Drains (FW4).

5.6.1.1 Overall Evaluation of Habitats within the Proposed Development Site

Overall, the biodiversity and ecology of this Proposed Development site varies from low-high local value. The dominant habitats within the site are artificial and highly modified improved grassland. These habitats are of low biodiversity value. However, the hedgerows and treelines within the site and along the route of the proposed pipeline are of higher biodiversity value and they provide suitable nesting sites for birds, as well as important commuting corridors for small ground mammals and bats, whilst being an integral part of the ecological networks that surround the site. The drain/watercourse that flows along the eastern perimeter of the site as well as the riparian habitats along the Funshion River are also of high local ecological value.

5.6.1.2 Rare and Protected Plant Species

An examination of the website of the National Parks and Wildlife, the National Biodiversity Data Centre and the Online Atlas of Vascular Plants for Ireland revealed that there are no records for any plant species protected under the Flora Protection Order from within the 10km square (R81) of the Proposed Development site. The majority of the habitats within the site are all highly modified and no protected plant species were noted within the Proposed Development site.

5.6.1.3 Invasive Species

No non-native invasive species that are regulated for control under the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477) were recorded from within the

application site itself. However, invasive species were recorded along the proposed pipeline route and these species included Japanese knotweed (*Fallopia japonica*), Himalayan balsam (*Impatiens glandulifera*), and snowberry (*Symphoricarpos albus*). Japanese knotweed and Himalayan balsam are regulated species under SI 477. Snowberry does not fall under this legislation.

5.7 Fauna

5.7.1 Protected Mammals

Records from the National Biodiversity Data Centre reveal the presence of the following protected mammals from within the 10km square (M26) of this Proposed Development site:

- Brown Long-eared Bat (*Plecotus auritus)*
- Common Pipistrelle (*Pipistrellus pipistrellus sensu stricto*)
- Daubenton's Bat (*Myotis daubentonii*)
- Eurasian Badger (*Meles meles*)
- Eurasian Pygmy Shrew (*Sorex minutus*)
- Eurasian Red Squirrel (*Sciurus vulgaris*)
- European Otter (*Lutra lutra*)
- Fallow Deer (*Dama dama*)
- Irish Hare (*Lepus timidus subsp. hibernicus*)
- Irish Stoat (*Mustela erminea subsp. hibernica*)
- Lesser Noctule (*Nyctalus leisleri*)
- Pine Marten (*Martes martes*)
- Soprano Pipistrelle (*Pipistrellus pygmaeus*)
- West European Hedgehog (*Erinaceus europaeus*)

A custom polygon generated for the Proposed Development site revealed that none of these records were obtained from within the planning site itself.

All these species are protected under the Irish Wildlife Acts. In addition, the otter (*Lutra lutra)* is protected under Annex II of the European Habitats Directive. The initial field survey of the site in February 2024 noted some ground holes in the spoil heap and therefore it was recommended that further surveys of the site for badgers be carried out.

Badger surveys of the site were undertaken in spring 2024. It was determined that the entrance holes in the spoil heap were formed and used by rabbits, and there was no evidence of the use of the application site itself by badgers.

The riparian zone of the stream that flows along the eastern perimeter of the site was walked to determine the presence of any otter signs such as slips, couches or spraints. None of the above signs were noted, however this does not exclude the possibility that otters use this stream.

Separate ground mammal surveys were also undertaken along the route of the proposed discharge pipeline in September 2024. The following species were recorded:

- Rabbits (*Oryctolagus cuniculus*): Abundant evidence of rabbits was found, including numerous burrows, droppings, and sightings, particularly at coordinates 52.280275, -8.249984 and 52.288600, -8.256377.

- Badgers (*Meles meles*): A badger sett was recorded at 52.288600, -8.256377, with additional signs of badger activity such as scat at 52.291191, -8.255180. Camera traps set in front of the badger sett did not capture footage during the survey period, but the presence of fresh droppings confirms active use of the site.
- Otters (*Lutra lutra*): While direct evidence of otters was not confirmed, the dense and overgrown riparian habitat along the Funshion River shows high potential for otter runs. Camera traps set at potential otter run locations did not capture otter activity, but the habitat remains suitable.

5.7.2 Bats

5.7.2.1 Bat Suitability Index

The National Biodiversity Data Centre (NBDC) has produced a landscape suitability index for bat species in Ireland, and this is based on work by *Lundy et al (2011).* The results are provided as maps, where the area of concern is coloured to indicate the overall suitability of the landscape for bats. The index ranges from 0 to 100 with 0 being least favourable and 100 most favourable for bats. The overall assessment of bat habitats for the current study area is given as 39.11, which is moderately high. **Table 5.4** gives the suitability of the study area for the bat species found in the study area (based on NBDC).

Table 5.4 – Bat Suitability Index for the Proposed Development (NBDC)

Bat Species	Suitability Index
All Species	23.44
Brown Long-Eared Bat *Plecotus Auritus*	31
Soprano Pipistrelle *Pipistrellus Pygmaeus*	38
Natterer's *Bat Myotis Nattereri*	23
Nathusius' Pipistrelle *Pipistrellus Nathusii*	3
Daubenton's Bat *Myotis Daubentoniid*	22
Whiskered Bat *Myotis Mystacinus*	12
Leisler's Bat *Nyctalus Leisleri*	39
Lesser Horseshoe Bat *Rhinolophus Hipposideros**	3
Common Pipistrelle *Pipistrellus Pipistrellus*	40

** Annex II Species*

5.7.2.2 Preliminary Bat Survey

Within the existing old pig farm on the site there are a number of old derelict buildings. In March 2024, a detailed building inspection was carried out to look for potential bat access points and potential roosting features, along with other signs that bats use the buildings, such as rub marks, staining or droppings. A ground level tree assessment on all trees within the proposed development site was also undertaken.

No trees of potential value as bat roosts will be removed by the proposed development. One Oak tree, which has moderate potential roost value, will be retained and mitigation measures have been outlined for pruning works to this tree to ensure there is no potential for direct impacts on roosting bats.

No evidence of bat usage was recorded in any of the building surveys. Overall, it has been concluded that the buildings within the site are not utilised as bat roosts. However, given that the Building 1 (the old farm dwelling) has been classified as low potential for roosting bats,

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

It is noted that Building 1 is to be retained and maintained as a biodiversity enhancement feature and potential future roosting structure for bats.

5.7.2.3 Bat Activity Survey (Summer 2024)

The night-time emergence / activity surveys carried out in August 2024 determined that In general levels of bat activity were low to moderate. Sporadic overflying Leisler's were recorded early in the survey period with sporadic activity during the survey. Signals were generally brief and indicative of a small number of bats commuting or foraging through the wider landscape. One Common Pipistrelle was observed commuting over the existing site very early in the emergence period. Although there was no prolonged foraging within the existing complex of structures. Common Pipistrelle (estimated 2-3 individuals) and Soprano Pipistrelle (estimated 1 individual) were recorded foraging along the treelined, local road along the western boundary. Common Pipistrelle was recorded in the south-western area of the site which is dominated by conifer treeline/scrub also noted. One brief signal for Brown Long-eared bat was recorded, which was probably an individual briefly foraging or commuting along the minor road which adjoins the site.

There was continuous foraging by Common Pipistrelle around a large mature oak on the periphery of the site (T57874-A3). Although a thermal imaging camera was utilised during the survey, this tree is characterised by dense foliage and very dense mature ivy making it difficult to identify emergence. No bats were observed emerging from this tree however the presence of a small number of roosting Common Pipistrelle cannot be altogether precluded. This tree is quite isolated in the context of the wider landscape but does provide a foraging resource. Overall there is no evidence of bats roosting within the proposed development site with moderate levels of foraging/commuting by Leisler's, Common and Soprano Pipistrelle. Brown Long Eared bat was recorded outside the site boundary. The minor road which adjoins the site and a mature oak which will be retained provide foraging resources for bat species which are relatively common in the wider landscape. Sporadic foraging was also recorded in the lower section of the site which supports conifer trees and scrub.

5.7.2.4 Discharge Pipe Route

An assessment of the potential bat habitats along the route of the proposed discharge pipe was also undertaken in September 2024. The entirety of the proposed discharge pipeline route is of high suitability for feeding and foraging bats. The hedgerows offer bat feeding highways and navigational aids. The trees in the entire area are largely mature and veteran trees with high bat roost potential, ranging from Ash to Oak and Chestnut. The river provides potential foraging habitat for Daubenton's bats (*Myotis daubentoniid*) and other species.

5.7.3 Birds

No birds of conservation concern were noted within the Proposed Development site during the site survey in February 2024. The following bird species were heard singing within the Proposed Development site or flying overhead. Overall bird activity in the main field of the Proposed Development site was limited, probably due to the presence of the site located

adjacent to a very busy road. The current conservation status of the birds is also given, where green status is of low conservation concern, amber is of medium concern and red is of high concern (*Gilbert et al., 2021*).

- Blackbird (*Turdus merula) – Green Status*
- Wren (*Troglodytes troglodytes) – Green Status*
- Robin (*Erithacus rubecula*) – *Green Status*
- Chaffinch (*Fringilla coelebs) – Green Status*
- Starling (*Sturnus vulgaris) – Amber Status*
- Pigeon (*Columba livia f. domestica)* – Green Status

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

Separate bird surveys of the proposed pipeline route were undertaken in September 2024. A total of 17 bird species were recorded as follows:

- **Breeding Birds:** Wren (*Troglodytes troglodytes*), blackbird (*Turdus merula*), song thrush (*Turdus philomelos*), robin (*Erithacus rubecula*), and dunnock (*Prunella modularis*).
- **Raptors:** A pair of buzzards (*Buteo buteo*) was observed nesting at 52.291479, -8.259112.
- **Corvids:** Magpie (*Pica pica*), jackdaw (*Corvus monedula*), hooded crow (*Corvus cornix*), raven (*Corvus corax*), and rook (*Corvus frugilegus*) were common throughout the survey area.
- **Gulls and Martins:** Herring gull (*Larus argentatus*), sand martin (*Riparia riparia*), and house martin (*Delichon urbicum*) were noted, utilising both riparian and open habitats.

A map showing the locations of the ecological features recorded along the proposed route line is included below in **Figure 5.9**.

Figure 5.9: Ecological Features Recorded along the Proposed Discharge Pipeline Route

5.7.4 Amphibians, Reptiles and Invertebrates

February is frog spawn season; however, no frog spawn was noted in any of the watercourses surrounding the site. The flow in these watercourses is likely to be too fast for the deposition of spawn. There are no ponds within the site that would provide suitable breeding habitat for the smooth newt. In summer months, the viviparous lizard (*Zootoca vivipara*) may bask on rocks within the site.

The old lagoon within the application site is eutrophic and would not provide a suitable habitat for amphibians or reptiles.

The improved agricultural grassland habitats within the site provide limited value to pollinating insects, however any unmanaged verges along the site perimeters and the hedgerows would provide suitable foraging habitats for pollinating insects in the late spring and summer.

5.8 Aquatic Environment

5.8.1 Water Features and Quality

5.8.1.1 Surface Waters – Water Framework Directive Status

The site is within the Blackwater (Munster) Hydrometric Area (18) and Catchment (18), the Funshion Sub-Catchment (010) and the Gradoge (010) Sub-Basin. There is a small, unnamed watercourse present along the eastern boundary of the site. Water in this watercourse flows south initially and then west along the boundary of the N73. Flow is likely to continue west until it meets the Gradoge Stream which is a tributary of the Funshion River. The Funshion River lies to the north-west of Mitchelstown. This river flows in a westerly, then southernly direction until its confluence with the Munster Blackwater to the east of Fermoy.

Treated water from the process will also be discharged under licence to the Funshion River, at a point ca. 1.8km north of the Proposed Development.

The EPA have classed the ecological status of the Funshion River and its tributaries at points close to the application site as varying between poor and good status. Under the requirements of the Water Framework Directive, good status must be achieved in all these watercourses by the end of the 3rd WFD cycle (2027). An overview of the ecological status of the watercourse in the area and surrounding catchments is presented in **Figure 5.10**.

Figure 5.10 – The site (Outlined in red) and local WFD Status [Green – Good Status; Yellow – Moderate Status; Red – Poor Status]. Proposed Discharge Point Included (Red Dot)

5.8.1.2 Surface Waters – Biological Quality Assessment

The results of the biological water quality assessment (2024) from the Funshion River at points upstream and downstream of the proposed discharge point are presented below in **Table 5.5**. The full Q-value report is presented separately in **Appendix 2.**

Table 5.5 –Q Values Results of the Funshion River (2021)

Station ID	Q-Value	Ecological Status
Upstream of Discharge Point	Q5	High Status
Downstream of Discharge Point	Q4-5	High Status

5.8.1.3 Ground Water

The Proposed Development site is within the Mitchelstown Groundwater Body and the current status of this waterbody is noted as good. This groundwater body is currently considered to be At Risk. Within the Proposed Development site itself, groundwater vulnerability is noted to be moderate.

5.9 Ecological Evaluation

5.9.1 Summary of the Value of the Site

The Proposed Development site is within the Zone of Influence of six sites designated under the Natura 2000 network (SACs / SPAs). The closest of these is the Galtee Mountains SAC and this is 6.2km north of the application site. There are no source-pathway-receptor linkages between the application site and the Galtee Mountains SAC. There is a source-pathway-receptor linkage between the application site and the Blackwater River SAC and the Blackwater Callows SPA. The separation distance is 8.3km, however the actual hydrological distance from the site to this SAC / SPA is 39km.

The Proposed Development site is also within 15km of twelve sites designated as Natural Heritage Areas (NHAs and pNHAs). The closest of these is the Glenacurrange River Valley pNHA, which is 2.6km north of the site.

Within the Proposed Development site itself and the route of the discharge pipe, the dominant habitats include Buildings and Artificial Surfaces, Dry Meadows and Grassy Verge type habitats, Improved Agricultural Grasslands, Treelines and Watercourses. The watercourse, treelines and hedgerows that occur along the perimeters of the site are important ecological features - these areas provide important nesting areas and safe commuting corridors for local populations of birds and small mammals, including potentially bats.

The NRA guidelines on the Assessment of Ecological Impacts on National Road schemes (NRA, 2009) provides a rationale for the evaluation of ecological receptors within a site. **Table 5.6** lists the habitats that have been described within the Proposed Development site and their associated ecological value, based on the NRA guidelines.

Table 5.6 – Ecological Features and their Evaluation

Habitat	Rating	Criteria
Buildings and Artificial Surfaces -BL3 Improved Agricultural Grasslands – GA1 Dry Meadows and Grassy Verges – GS2	No Value - Local Importance (Lower Value)	Limited biodiversity value although may provide some habitat opportunities for invertebrates and birds
Well Structured Hedgerow – WL1 Well Structured Treelines – WL2 Watercourses (Funshion River and its Tributaries) – FW2	Local Importance (Higher Value)	Semi-Natural Habitat that is higher in biodiversity value in a local context. Provides value for local populations of bats and birds.
River Blackwater SAC and SPA (39km Downstream of Discharge)	International Importance	'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.

5.10 Impact Assessment

5.10.1 Introduction

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

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

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

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

5.11 Impacts upon Designated Sites

5.11.1 Natura 2000 Sites

The site at Corracunna, Coolnanave and Garrane, Co. Cork is 39km upstream of the Blackwater River (Cork / Waterford) SAC and the Blackwater Callows SPA. Having regards to this extensive downstream distance then it is considered that even in the absence of mitigation, that significant effects upon this SAC / SPA and their QIs will not arise. There will be no deterioration in water quality in the Funshion River and its tributaries that could give rise to subsequent deteriorations in water quality in the River Blackwater. There will be no negative effects upon the attributes and targets that have been set for the maintenance or restoration of the favourable conservation condition of the QIs of this SAC or SPA.

5.11.2 Natural Heritage Area NIS

The Proposed Development will not lead to the loss or fragmentation of the protected habitats within any pNHA or NHA. The closest pNHA to the application site is the Glenacurrane River Valley pNHA and this is 2.6km north of the application site. There is no hydrological connectivity between the application site and this pNHA, therefore significant effects upon this pNHA will not arise. The site is 39km upstream off the Blackwater River Callows pNHA. Having regards to this extensive downstream distance, then it is considered that significant effects upon this pNHA will not arise due to constructional or operational impacts.

5.12 Impacts within the Site

5.12.1 Construction Phase

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

Habitat Loss and Fragmentation

The dominant habitats within the Proposed Development site include Buildings and Artificial Surfaces, Dry Meadows and Grassy Verges, Scrub and Improved Agricultural Grassland. These habitats have limited ecological value and therefore their loss constitutes a negligible ecological impact.

Plans indicate that all mature vegetation along the boundaries will be retained and this will mitigate against any impacts due to the direct loss of these ecological features. However, damage to these existing hedgerows and mature trees and a subsequent reduction in their lifespan may arise if any root compaction occurs due to works or storage of heavy vehicles or spoil in the root protection zone (RPA) of these features. Any loss or damage to these features would have a moderate negative impact upon the local biodiversity value

Negative impacts to habitats along the route of the proposed discharge pipeline have also been considered. In the absence of mitigation, then the loss or fragmentation of the hedgerows, treelines and riparian habitats along the route could also arise. This constitutes a moderate and long-term negative effect.

Impacts on Local Wildlife

Birds

In the absence of mitigation, any removal of vegetation within the field or along the route of the gas / water discharge pipeline during the bird nesting season could result in direct mortality of birds. In addition, during site preparation and construction, local populations of birds may be disturbed by the increase in noise, traffic and human activity. This would constitute a moderate negative impact.

Mammals

During site preparation and construction, local populations of mammals may be disturbed by the increase in noise, traffic and human activity.

Negative effects upon the otter could also arise due to any reductions in water quality in the Funshion River and its tributaries that might occur during site construction and the laying of the discharge pipe. The installation of the headwall along the banks of the Funshion could also result in fragmentation of the riparian habitats of the otter.

There will be no loss or fragmentation of any habitats used by roosting or hibernating bats during construction within the site itself. However, any tree removal along the route of the proposed discharge pipe could result in the loss of bat roosting and hibernating sites, along with fragmentation of bat commuting corridors.

The biomethane produced will be delivered to the grid via a new pipeline (which will be designed in detail, consented, and delivered by GNI) along the N73. This may result in the loss of hedgerows and grassy verges along the roadside.

Amphibians, Reptiles, Insects

No significant effects anticipated.

Pollution to Surface and Ground Water

The construction of the new structures and associated works will involve the excavation of soil and the pouring of concrete for foundations and other surfaces. These works will take place on a site that is adjacent a tributary of the Funshion River. In addition, the laying of the 1.8km discharge pipe and outfall into the Funshion River could also result in the pollution of the water in this river with sediments or hydrocarbons.

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

5.12.2 Operational Phase

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

Impacts on Local Wildlife

Birds

Significant effects not anticipated during the operation of the site.

Mammals

Negative effects upon the otter could arise due to any reductions in water quality in the Funsion River that might occur from the discharge of the water into the river.

Any increase in the baseline level of nighttime lighting in the area could give rise to negative effects upon local bats that might forage in the area.

Amphibians, Reptiles, Insects

No significant effects anticipated.

Pollution to Surface and Ground Water

Run-off from impermeable areas within the Proposed Development site such as roads and car parking areas may contain potentially polluting substances such as hydrocarbons etc. This run-off could be mobilised to the tributary of the Funshion River within the site.

Pollution of groundwater could occur during loading or unloading of the digestate material. In addition, any structural weaknesses in the effluent or soiled water holding tanks on site could lead to impacts upon groundwater. Groundwater quality can impact upon surface water quality as these two resources mix at the hyporheic zone, which is the region just under a river or stream bed where there is a mixing of shallow ground water and surface water. Any pollution of groundwater locally could lead to significant effects upon designated water dependant ecosystems that are in the same catchment.

The process will also result in a discharge to the Funshion River under license. As part of the application for the discharge license that will be sought from Cork County Council, Assimilative Capacity calculations were undertaken by the applicant. These calculations concluded that at the maximum ELV (Emission Limit Values) permitted, that the discharge would be fully assimilated by the Funshion River without causing any deterioration in ecological status of the river. However, in the absence of mitigation, any breach in the ELVs of the discharge could lead to pollution of the Funshion River locally. This river current achieves a Q5 upstream of the discharge point and a Q4-5 downstream of the discharge point. These Q values are indicative of high ecological status and under the requirements of the Water Framework Directive, this status must be maintained.

Land-Spreading

The biobased fertiliser (biobased fertiliser) produced will be a rich source of nutrients that will be used by customer farmers for the fertilisation of their land. In the worst case scenario and in absence of mitigation, any inappropriate land-spreading of the biobased fertiliser could lead to impacts upon the receiving waters in local catchments and it can result in eutrophication, algal blooms, fish kills and loss of biodiversity. Designated habitats and species can be impacted upon. There is a greater risk when groundwater vulnerability at the lands for spreading is high, or when land-spreading is undertaken close to drains or streams. In these situations, the Pollution Impact Potential for both phosphates and / or nitrates is high.

The farms of the customer farmers have been identified; however, these will be subject to local change on an annual basis. All farmers will use the biobased fertiliser on lands that have an agronomic requirement for fertiliser. Spreading will be done in accordance with the specific Nutrient Management Plan for the farm and in accordance with S.I. 113 of 2022. Records for the movement of all biobased fertiliser will be kept.

The positive benefits of using the biobased fertiliser produced must also be considered, as this provides an alternative to the land-spreading of liquid slurry. Using biobased fertiliser presents several scientific advantages over the continued use of untreated manures, slurries, or chemical fertilisers, particularly concerning plant nutrient availability and the mitigation of nutrient leaching into watercourses. The benefits are outlined below.

Balanced Nutrient Availability

Biobased fertiliser typically contains a balanced mix of essential nutrients, including nitrogen (N), phosphorus (P), potassium (K), and micronutrients crucial for plant growth. This balanced nutrient profile contrasts with chemical fertilisers, which often supply only specific nutrients. Studies have shown that the diverse nutrient composition of biobased fertiliser supports comprehensive plant nutrition, contributing to improved crop yields and overall plant health (Möller and Müller, 2012)[1].

Slow-Release Nutrients

Biobased fertiliser releases nutrients gradually over time as it decomposes in the soil. This gradual release mechanism ensures a sustained supply of nutrients to plants, contrasting with untreated manures, slurries and chemical fertilisers, which can be prone to leaching or volatilisation. The slow-release nature of biobased fertiliser reduces the risk of nutrient loss and enhances nutrient uptake efficiency by plants (Yao et al., 2011)[2]. Analysis has shown that approximately 80% of the total nitrogen in biobased fertiliser is present as readily available nitrogen. Digestion of livestock slurry has also been shown to increase the plant availability of nitrogen in slurry by *ca*. 10%.
Compared to untreated manures and slurries, biobased fertiliser poses a lower risk of nutrient leaching into watercourses. The balanced nutrient composition and slow-release nature of biobased fertiliser minimise the likelihood of excess nutrients washing away into streams or groundwater. This reduction in nutrient leaching coupled with land spreading best practice helps mitigate water pollution and eutrophication, safeguarding aquatic ecosystems and maintaining water quality (Möller and Müller, 2012).

Enhanced Soil Health

Rich in organic matter, biobased fertiliser improves soil structure, promotes water retention, and stimulates microbial activity. These soil health benefits contribute to improved nutrient

[1] Möller, K., & Müller, T. (2012). Effects of anaerobic digestion on biobased fertiliser nutrient availability and crop growth: a review. Engineering in Life Sciences, 12(3), 242-257.

[2] Yao, R., Li, G., Xie, H., Zhao, B., & Liu, H. (2011). *Release characteristics of nutrients from aerobic composted swine manure in soil. Journal of Soils and Sediments*, 11(1), 103-111.

cycling, root development, and overall soil fertility (De Vries et al., 2015).[3]

Pathogen and Weed Reduction

Manure and slurry may contain a range of bacterial, viral, and parasitic pathogens and land application of these organic fertilisers typically occurs without prior treatment. In contrast, Anaerobic Digestion, and subsequent pasteurisation of biobased fertiliser significantly reduces the presence of pathogens and weed seeds, making it safer for agricultural use compared to untreated manures and slurries (Vinnerås et al., 2006).[4]

Biobased Fertiliser Usage

At full capacity the total tonnages for transportation off-site as biobased fertiliser to local agricultural operators are summarised below:

- Biobased fertiliser Fibre - 8,000 tonnes
- Biobased fertiliser Liquid Concentrate - 17,000 tonnes

Of the maximum 90,000 tonnes of annual feedstock intake, circa 36,572 tonnes of untreated manures and slurries would normally be land spread locally. Following the AD, pasteurisation and biobased fertiliser treatment there will be 8,000 tonnes of solid and 17,000 tonnes of liquid biobased fertiliser. This represents a significant reduction in the hydraulic loading of land spreading locally of circa 11,572 tonnes per annum.

Post-pasteurisation the biobased fertiliser will meet the standard of an EU fertilising product under Regulation (EC) No 2019/1009 under the criteria outlined for Product Function Category (PFC) 3 B: Inorganic Soil Improver. The operator will apply for End of Waste status upon grant of permission.

All biobased fertilisers will be used in accordance with S.I. 113 of 2022 European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2022). The spreading of the biobased fertiliser on the customer farms will be done on accordance with the specific Nutrient Management Plan for that farm.

In summary, utilising biobased fertiliser as a biobased fertiliser as an alternative to slurries and manures offers several scientific benefits, including balanced nutrient availability, slow-release nutrients, improved soil health, reduction of pathogens and weeds, and reduced risk of nutrient leaching into watercourses. These advantages support sustainable agricultural practices, enhance crop productivity, and contribute to environmental conservation efforts.

5.12.3 Cumulative Impacts with other Proposed/Existing Developments

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

[3] De Vries, J. W., Groenestein, C. M., & Kool, P. L. (2015). *Effects of anaerobic digestion and composting on reducing the environmental impact of pig manure*. Journal of Environmental Management, 162, 230-237.

[4] Vinnerås, B., Nordin, A., & Niwagaba, C. (2006). *Anaerobic treatment of faecal matter at low temperatures and intermittent loading*. Water Research, 40(18), 3389-3395.

of two or more effects (*Bowers-Marriott, 1997*).

In the larger context of the Mitchelstown area, there are a number of other ongoing and Proposed Developments, some of which are proposed for previously undeveloped, green field sites. These developments combined will reduce the open spaces and habitat availability of the Mitchelstown area as a whole, thereby cumulatively impacting on local bird and mammal populations.

However, the creation of new areas of biodiversity within the Proposed Development site and the retention and protection of the existing watercourses, hedgerows and treelines, will provide local ecological corridors and networks that will reduce the overall cumulative impact of this development in the Mitchelstown area.

5.13 Mitigation Measures

5.13.1 Introduction

In order to avoid any reductions in water quality in the area surrounding the Proposed Development site in Corracunna, a number of mitigation measures must be implemented and followed. These measures will protect the surface and ground water quality locally. Measures have also been suggested that will help to protect or enhance the local biodiversity of the surrounding area and to ensure the protection of local wildlife.

It is recommended that the measures contained herein, along with all other measures outlined in this EIAR are contained in a Construction and Environmental Management Plan and that all works are overseen by an onsite Environmental or Ecological Clerk of Works (ECoW).

5.13.2 Pre-Construction and General Requirements

- Site preparation and construction must be confined to the Proposed Development site only and it must adhere to all the mitigation measures outlined in this Biodiversity Chapter. Work areas should be kept to the minimum area required to carry out the proposed works and this area should be clearly marked out in advance of the proposed works.

- Prior to the commencement of developments on site, the site engineer and the contractors must be made aware of the ecological sensitivity of the Proposed Development site. They must be made familiar with the mitigation measures outlined in this Chapter and a signed statement saying that they have taken on board the mitigation measures contained herein should be presented to the local authority along with the Notice of Commencement. The applicant will be responsible for alerting the engineers and contractors to the sensitivity of the habitats and water receptors surrounding the Proposed Development site. This will be done prior to the commencement of any site works.

5.13.3 Protection of Terrestrial Habitats and Features

- In accordance with the policies and objectives of the Regional and County Development Plans, the existing green infrastructure (GI) of the Proposed Development site, i.e., the treelines and hedgerows, must be incorporated into the development. In order to prevent damage to treelines / hedgerows in the Proposed Development site that are to be retained, then protective barrier fencing should be erected at a minimum 2m out from these boundaries to protect these features prior to the commencement of site clearance works. There must be no dumping or storage of construction waste or machinery in this zone during construction.

- Any small tree or shrubs that require removal should be removed outside of the bird nesting season (March – August). This includes removal of vegetation along the proposed discharge pipeline route.

5.13.4 Mitigation Measures during Construction

5.13.4.1 Protection of Water Quality and Management of Pollutants

- Efficient construction practices and sequences should be employed on site, and this will minimise soil erosion and potential pollution of local watercourses with soil and sediment.

Unnecessary clearance of vegetation should be avoided and only areas necessary for building works should be cleared. All existing grassland habitats within 10m of the watercourse within the site should be retained. The retention of these areas will also help retain storm water run-off from the site during construction and operation.

- It is vital that there is no deterioration in water quality in the Funshion River and its tributary within the site. Therefore, strict controls of erosion, sediment generation and other pollutants associated with the construction process should be implemented, including the provision of attenuation measures, silt traps or geotextile curtains to reduce and intercept sediment release into any local watercourses. Guidelines in the following best practice documents should be adhered to:

  - Construction Industry Research and Information Association (CIRIA) (2005) Environmental Good Practice on Site (C692).

  - Construction Industry Research and Information Association (2001) Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532).

  - Construction Industry Research and Information Association (2000) Environmental Handbook for Building and Civil Engineering Projects (C512).

  - Environmental Protection Agency (2015) List of Waste and Determining if Waste is Hazardous or Non-Hazardous.

  - Environment Agency et al. (2015) Guidance on the Classification and Assessment of Waste, Technical Guidance WM3.

- Works should be avoided during periods of heavy rainfall.

- There must be no uncontrolled discharges of contaminated waters to ground or surface waters from this development, either during the construction or operation of the development. The control and management of hydrocarbons on site will be vital to prevent deteriorations in surface and groundwater quality locally. The following measures should be employed on site:

  - During construction re-fuelling of equipment and machinery must be done off site. If this is not possible, then a dedicated re-fuelling location must be established on site in the compound area away from ground clearance or rock-breaking activities.

  - Spill kits stations must be provided at the fuelling location for the duration of the works.

  - Staff must be provided with training on spill control and the use of spill kits.

  - All fuel storage containers must be appropriately bunded, roofed and protected from vehicle movements. These bunds will provide added protection in the event of a flood event on site.

  - All chemicals must be stored as per manufacturer's instructions. A dedicated chemical store within a building must be provided on site if chemicals are to be stored on site.

  - Procedures and contingency plans must be established on site to address cleaning up small spillages as well as dealing with an emergency incident. A stock of absorbent

materials such as sand, spill granules, absorbent pads and booms should be kept on site, on plant working near the water and at the refuelling area.

- Daily plant inspections will be completed by all plant operators on site to ensure that all plant is maintained in good working order. Where leaks are noted on these inspection sheets, the applicant must remove the plant from operations for repairs.

- All personnel shall observe standard precautions for handling of materials as outlined in the Safety Data Sheets (SDS) for each material, including the use of PPE. Where conditions warrant, emergency spill containment supplies should be available for immediate use.

- Best practice concrete / aggregate management measures must also be employed on site during construction.

  - It is important that run-off from the construction works does not enter the watercourse that is within the site. Therefore, it is recommended that silt fences are installed along the buffer zones of this watercourse. The silt fences should be sturdy and constructed of a suitable geotextile membrane (Hy-Tex Terrastop Premium silt fence, or similar) to ensure that water can pass through, but that silt will be retained. The silt fences must be capable of preventing particles of 425mm from passing though. The footing of the fencing to be buried into the ground and the visible fencing to be *ca.* 0.5m high.

  - An interceptor trench will be required in front of this silt fence.

  - The silt fences should be monitored daily to ensure that they remain functional throughout the construction of the Proposed Development. Maintenance of the fences should be carried out regularly. Fences should be inspected thoroughly after periods of heavy rainfall.

  - 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 removed off-site for treatment.

  - The concrete washout skip is to be located to the east of the site, where the underlying overburden is greater.

  - Excavations lined with an impermeable liner are not permitted as concrete washout bays on the site.

  - Large excess loads of concrete are to be returned to the supplier or poured into concrete block modules (Betonblock or similar design), in order to minimise waste and reduce the risk of concrete being dumped throughout site.

  - Best practice in bulk-liquid concrete management should be employed on site, addressing pouring and handling, secure shuttering, adequate curing times etc.

  - Stockpile areas for sands and gravel must be kept to a minimum size, well away from drains on site.

  - Where concrete shuttering is used, measures should 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 should be controlled by dampening down the areas.

- Raw and uncured waste concrete should be disposed of by removal from the site.

5.13.4.2 Construction of the Pipe to the River

- During the laying of the pipeline though the identified lands, then works must not take place within 6m of hedgerows and treelines. Where the pipeline must cross over a hedgerow or treeline, then the removal of mature trees must be avoided. Any vegetation removal must be done outside of the bird nesting season. Vegetation removal must be overseen by an ECoW.

- All guidelines within the document Inland Fisheries Ireland Requirements for the Protection of Fisheries Habitats during Construction and Development Works and River Sites (www.fisheriesireland.ie) and the updated guidelines entitled Guidelines on Protection of Fisheries During Construction Works in And Adjacent to Waters (2016) should be adhered to during the construction of the headwall and they include:

  - Consultation with Inland Fisheries Ireland (IFI) to ensure that the development proceeds with due regard to the provisions of the Fisheries Acts and Habitats Regulations;

  - Consultation with IFI in order to determine the correct timing of works on the site;

  - There should be no in stream works carried out within the streams without prior approval from IFI.

- In order to construct the pipe to allow discharge into the Funshion River, approximately 1-2m of bankside vegetation will have to be cleared. The works should be carried out under the supervision of the ECoW. Works to remove the vegetation should be done by hand and heavy machinery on the banks should be avoided as this could destabilise the riverbank. Prior to the works along the bankside, the proposed outfall location along the riverbank should be inspected by the ECoW to ensure that the works will not disturb any otter holts or bird nests. It is recommended that the inspection is done instream with waders. The inspection should focus on the discharge point plus 5m either side of it.

- Works on the installation of the pipe from the buffer tank to the Funshion River will utilise the “Mole Plough” installation method. This will limit trenching requirements and reduce the risk of sediment laden run-off. Some trenching will also be required. The trenches must be infilled and stabilised immediately and vegetation along the route restored.

- The timing of installation of the discharge pipe into the Funshion River must be scheduled to ensure no instream works are carried out during the closed season for instream works. (October 1st to June 30th). IFI must be notified prior to works taking place. The timing of works shall be in accordance with to IFI (2016) Guidelines on the Protection of Fisheries during Construction Works in and Adjacent to Water. Works associated with the construction should be supervised by an Ecological Clerk of Works (ECoW). Full details on the construction and installation of the head wall must be detailed in the CEMP.

- Biosecurity measures must be strictly adhered to throughout the proposed works. Measures must be in accordance with IFI (2010) Biosecurity Protocol for Field Survey Work. Where

staff are working instream, staff footwear and PPE should be inspected on daily completion of the works and vegetation or debris removed.

- Footwear should be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkron Aquatic or another proprietary disinfection product) and thoroughly dried afterwards. Sand bags placed instream should not be re-used in other watercourses.

5.13.4.3 Construction of the Gas Pipeline

The proposed gas pipeline connecting to the existing Gas Networks Ireland pipeline along the N73 will be installed alongside the existing N73. This is an indicative routing of the pipeline to the site and is subject to change pending detailed network modelling and design. The final pipeline will be designed, consented and delivered by Gas Networks Ireland in accordance with the following standard: *I.S. 328 2021 Gas transmission — Pipelines and pipeline installations.*

5.13.4.4 Management of Construction Waste and Soil

- All construction waste must be removed from site by a registered contractor to a registered site. Evidence of the movement and safe disposal of the construction waste must be retained and presented to the Local Authority upon request. Removal of the construction waste should occur as soon as possible after construction works. There must be no disposal of construction waste or topsoil in any designated site or site of biodiversity value.

- All topsoil generated from site works should be stored within the Proposed Development site until it is required for landscaping. It must not be stored outside the Proposed Development site boundaries and it must not be used for the infilling of any area outside of the Proposed Development site. If there is more topsoil than is needed for landscaping, it must be removed from site by a registered contractor for appropriate use elsewhere. The end location of the topsoil must be identified and records presented to the local authority if requested.

5.13.4.5 Prevention of the Spread of Invasive Species

Both Japanese knotweed and Himalayan balsam were recorded along the proposed discharge pipeline route. Himalayan balsam generally spreads by seed, which are propelled large distances from ripened seed heads, whilst knotweed spreads vegetatively through extensive networks of underground rhizomes and vegetative fragments.

It is important that prior to construction works, that a full survey of these species along the route is undertaken by an indemnified and qualified invasive species specialist. Balsam can be controlled by hand removal and herbicides. However, knotweed requires specialist assessment for best methods of control. Exclusion zones around the existing knotweed stands might have to be included to ensure that construction works do not disturb the existing root system as this may result in further spread of this species. Machinery hygiene may be also required to ensure that small vegetative particles of knotweed are not transported elsewhere.

5.13.4.6 Protection of Badger Setts

An active badger sett was recorded close to the proposed route of the discharge pipe at 52.288600, -8.256377. It is vital that this sett is fully protected from all site works. A 30m buffer around the badger sett must be clearly marked out prior to commencement of works. This buffer zone must be inspected and signed off on by an Ecological Clerk of Works prior to commencement of works.

5.13.4.7 Protection of Bats

The following measures are recommended for the protection of bats within the site.

Lighting

During the construction and operation of the proposed development, general mitigation measures for bats will follow the National Road Authority's 'Guidelines for the Treatment of Bats during the Construction of National Road Schemes' NRA (2005) and the 'Bat Mitigation Guidelines for Ireland: Irish Wildlife Manuals, No. 25' (Kelleher, C. & Marnell, F. (2006)). These documents outline the requirements that should be met in the pre-construction and construction phases of developments to minimise negative impacts on roosting bats or prevent avoidable impacts resulting from significant alterations to the immediate landscape. Lighting near the mature oak tree retained (as well as other retained vegetation) within the site should be avoided.

Lighting during construction

Construction works will primarily take place during hours of daylight to minimise disturbance to any nocturnal mammal species. Where lighting is required, lighting mitigation measures will follow *Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers* (Bat Conservation Ireland, 2010). The following measures will be applied in relation to construction works lighting:

- Lighting will be provided with the minimum luminosity necessary for safety and security purposes. Where possible, lighting will be restricted to the working area and using the cowl and angling noted above, will minimise overspill and shadows on sensitive habitats outside the construction area.
- During construction, lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the potential impact on retained vegetation within and adjoining the site.
- Site lighting will typically be provided by tower mounted temporary portable construction floodlights. The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. The following measures will be applied in relation to site lighting.
- Where possible, construction lights will be switched off when not in use.

Lighting during operation

In keeping with best practice, the proposed design should satisfy the requirements listed in relation to the mitigation of impacts on bats. This includes:

- Lighting with suitably chosen lantern heads and optics to prevent / limit indirect lighting.
- Luminaires design to be mounted on the horizontal with zero degrees vertical tilt, reducing spill light.
- The proposed lighting design should be designed using warm white spectrum (2700k) lanterns.
- Lanterns to be flat glass type to limit upward light spill to the surrounding area.
- LEDs have lower intensity, good colour rendition and dimming capability.
- The developer will take all reasonable steps to ensure works do not harm individuals by altering working methods or timing to avoid bats. External lighting should be kept to a

minimum at locations where it is likely to disturb bats, and where possible will follow the Bat Conservation Ireland Lighting Guidelines.

Demolition/Tree Removal

Although no signs of roosting bats were recorded, Building 1 has low potential to support roosting bats. Therefore, Building 1 is to be retained and maintained as a biodiversity enhancement feature and potential roosting structure for bats.

- Care must be taken when renovating roofs or walls, to ensure that bats are not present. Structures will be examined immediately prior to the commencement of any such works using an endoscope where necessary by the supervising ecologist to ensure there are no signs of bat activity.
- If bats are recorded during site works, the NPWS will be informed immediately and no works will proceed without a relevant derogation licence from the NPWS.

With the exception of one mature Oak tree (which has moderate potential roost value), the trees onsite are of low to negligible potential for roosting bats. However, as a precaution, the following mitigation measures will be implemented during tree removal. The contractor will take all required measures to ensure works do not harm individuals by altering working methods or timing to avoid bats, if necessary:

- Crown reduction on trees will be minimised and that trees earmarked for retention are adequately protected.
- Felled trees will not be mulched immediately. Such trees shall be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. If bats are seen or heard in a tree that has been felled, work shall cease and the local NPWS Conservation Ranger shall be contacted.
- Trees will be retained where possible and no ‘tidying up’ of dead wood and spilt limbs on tree specimens shall be undertaken unless necessary for health and safety. Bat Report, Corracunna 37 DixonBrosnan 2024.
- Trees/treelines outside the proposed development area but adjacent to it and thus at risk, shall be clearly marked by a bat specialist to avoid any inadvertent damage.
- It is noted that the Oak Tree (T57874-A3) will be retained and pruned. Where pruning is required, this will be undertaken in the period September to late October/early November. During this period bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken.
- If bats are seen or heard in a tree that has been felled, work shall cease and the suitability qualified ecologist will specify protection methods and will contact the National Parks & Wildlife Service. If bats are found, no works will proceed without a relevant derogation licence from the National Parks and Wildlife Service.

Enhancement Measures

Six bat boxes, suitable for breeding will be located on retained trees along the boundary of the site located along the periphery of the site. Bat boxes will be erected under ecological supervision to provide alternative roosting habitat prior to the commencement of works on the building. It is proposed that five bat boxes will be located on mature trees within the overall site.

5.13.5 Mitigation Measures during Operation

5.13.5.1 Environmental Management System (EMS)

An Environmental Management System (EMS) accredited to ISO14001:2015 will be prepared and implemented by the operating company during the operational phase. This is a practical document which will include detailed procedures to address the main potential effects on surface water and groundwater.

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

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

Other conditions of relevance to uncontrolled releases will include:

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

5.13.5.2 Discharge Monitoring

The monitoring of the discharge into the Funshion River will be vital to ensure that ELVs are not elevated. The discharge will be monitored and should there be any increase in ELVs above prescribed limits an alarm will sound and an automated shut off valve will be used to ensure there is no further discharge into the river.

Monitoring frequency and emission limit values will be in line with BAT Waste treatment CID and proposed EPA licence conditions.

Discharge monitoring shall include the following:

- TOC to be continuously monitored.
- Total N, Total P and Suspended Solids to be tested daily as outlined in BAT 7.

5.13.5.3 Landscaping and Lighting

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

- The treelines and hedgerows around the site are important ecological corridors. These features should be enhanced and maintained for the benefit of wildlife.

- The existing hedges should be enhanced with some more native shrubs if possible, such as hawthorn, gorse, and blackthorn. Trees such as willow provide early sources of pollen for bees, as would fruit blossoms such as crab apple and wild cherry. Planting should focus on providing year-long interest for pollinators. Planting should be delivered in accordance with the Landscape Plan (Document Ref: **24/NRG/ORS/Mt/M/001**) which accompanies the application.

- The natural verges along the hedgerows could also provide excellent opportunity for the benefit of wildlife. These should be managed as old hay meadows, cutting only in late summer. This will be of significant benefit to local pollinators.

- It is recommended that further actions that are outlined as part of the National Pollinator Plan should be implemented. There is a specific guide for farms (Farmland: Actions to help pollinators - //pollinators.ie/farmland).

- Nesting areas for solitary bees could be included by providing south or east-facing banks or areas of bare earth. Bee boxes for cavity-nesting bees could be created by drilling holes in untreated wooden blocks and attaching them to an outdoor structure. The holes should be 10cm in depth and 4-8mm in diameter at a height of at least 1.5-2m. It is important to have holes of different sizes for the different species.

- Bat boxes could be installed around the Proposed Development site, on walls, tree trunks and posts. They should be located as high as possible (at least 4m off the ground) in a sunny but sheltered location. If erecting on a mature tree, choose one that has clean bark (no ivy) with no branches for 1m radius around the location of the box. If erecting on a building, erect as close as possible to the eaves.

- When erecting bat boxes externally (i.e. on a tree or external wall of a building), put up a minimum of three boxes facing in different directions to provide a range of temperature conditions. For example, boxes facing from south-east to south-west allow the sun to fall on each box for part of the day. During very hot days a south-facing box may overheat, but the other boxes should have some shade. Three boxes can be arranged around the trunk of large, mature and clean trunk trees. When erecting bat boxes, erecting three different types of bat boxes will increase the chance of catering for the different species likely to be found

foraging on the Proposed Development site. Guidelines for the construction of bat boxes can be obtained on the website of Bat Conservation Ireland.

- The use of herbicides within the Proposed Development site should be minimised. The clearance of vegetation around fences should be done by hand if possible. Where spraying is necessary, it should be done with a knapsack sprayed to minimise spray and target required areas only.

- All rodenticides use on the Proposed Development site should be in accordance with the Campaign for Responsible Rodenticide use.

- Lighting should be kept to a minimum around the remaining trees on the Proposed Development site. Guidelines from Bat Conservation Ireland will be provided for considering how to avoid light pollution of the hedgerows to allow for feeding, commuting, and roosting.

- There should be no lighting directed from the Proposed Development site towards mature vegetation or the watercourse within the site.

- Lighting shall be controlled to avoid light pollution of green areas and shall be targeted to areas of human activity and for priority security areas. Motion-activated sensor lighting is preferable to reduce light pollution. None of the remaining mature trees or trees proposed for planting shall be illuminated.

    - Dark corridor for movement of bats along the grounds of the Proposed Development site. Lighting shall be directed downwards away from the treetops and shall not illuminate the watercourses, hedgerows and treelines around the site.
    - All luminaires shall lack UV elements when manufactured and shall be LED.
    - A warm white spectrum (ideally <2700 Kelvin) to reduce blue light component.
    - Luminaires shall feature peak wavelengths higher than 550nm.
    - Tree crowns shall remain unilluminated.
    - Planting shall provide areas of darkness suitable for bats to feed and commute.

5.13.6 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 (Good Agricultural Practice for Protection of Waters) Regulations, 2022).

- The spreading of the biobased fertiliser on the customer farms must be done in accordance with the specific Nutrient Management Plan for that farm. Records will be kept by the farmer and routinely provided to the Applicant for verification.

5.14 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 to be taken to reduce or offset the scale, significance, and duration of the effects on the surrounding ecological receptors.

5.14.1 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**.

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

5.14.2 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.**

The overall impact anticipated for 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***.

5.14.3 Conclusion

With the recommended mitigation measures, it can be concluded that the Proposed Development site at Corracunna, Coolnanave and Garrane, Mitchelstown will have a neutral impact upon local ecological receptors. The proposed landscaping plan and the creation of new habitats on the Proposed Development site will be a positive benefit to local ecology and with proper management of the Proposed Development site and its green areas, local areas of biodiversity will be allowed to develop.

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Habitat Loss and Fragmentation	**Improved Agricultural Grasslands** **Dry Meadows and Grassy Verges** **Buildings and Artificial Surfaces**	All these habitats have limited ecological value and therefore their loss constitutes a negligible ecological impact.	Negative	Negligible	Temporary	• Timing of works outside Bird Nesting Season • The landscaping of the site offers the potential for biodiversity enhancements within the site. • Any existing gappy hedges should be enhanced with native shrubs if possible, such as hawthorn, gorse, and blackthorn. • Planting should focus on providing year-long interest for pollinators. • Selected areas around the site to be seeded with species rich grassland to promote biodiversity.	**Positive, Slight, Long Term**
	Vegetation (ca. 1m) along the banks of the Funshion River	The proposed discharge into the Funshion River may require the installation of a pipe from the site to the river. This may result in vegetation clearance (ca. 1m) along the banks of the stream.	Negative	Slight	Temporary	• Consultation with IFI • Timing of instream works • Unnecessary clearance of vegetation should be avoided and only areas necessary for the laying of the pipe should be cleared. • These works should be overseen by an ecological Clerk of Works.	**Neutral, Slight, Temporary**
	Treelines and Hedgerows along Discharge Pipe Route	The installation of the 1.8km discharge pipeline may result in the loss of sections of hedgerows and treelines as it traverses through field boundaries.	Negative	Slight	Temporary	• 6m buffer to hedgerows and treelines along discharge route. • Timing of works outside Bird Nesting Season • Minimal removal of mature vegetation where pipe traverses field boundary.	**Neutral, Slight, Temporary**

Disturbance to Local Wildlife	**Impacts Upon Birds**	Any removal of vegetation during the bird nesting season could result in disturbance of birds. In addition, during site preparation and construction, local populations of birds and mammals may be disturbed by the increase in noise, traffic, and human activity.	Negative	Moderate	Long-term	• In accordance with the policies and objectives of the Regional and County Development Plans, the existing green infrastructure (GI) of the site, i.e., the riparian habitats, treelines and hedgerows, must be incorporated into the development. • In order to prevent damage to treelines / hedgerows in the site that are to be retained, then protective barrier fencing should be erected at a minimum 2m out from these boundaries to protect these features prior to the commencement of site clearance works. There must be no dumping or storage of construction waste or machinery in this zone during construction. • Any small tree or shrubs that require removal should be removed outside of the bird nesting season (March – August).	**Neutral, Slight, Temporary**
	Impacts Upon Bats	Loss of Roosting, Feeding and Commuting Habitats	Negative	Moderate	Long-term	• Bat surveys of Trees along the Pipeline Route Prior to Removal	**Neutral, Slight, Temporary**
	Impacts Upon Badgers	Damage to Sett, disturbance	Negative	Moderate	Long-term	• Exclusion Zone of 30m around existing sett. • Further monitoring of existing sett.	**Neutral, Slight, Temporary**
	Impacts Upon Otters	Loss of Habitat, Disturbance	Negative	Moderate	Long-term	• Survey of Funshion River prior to construction of discharge pipe	**Neutral, Slight, Temporary**

Spread of Invasive Species	**Japanese Knotweed** **Himalayan Balsam**	Spread of these listed species due to works in laying of the discharge pipeline route	Negative	Moderate	Long-term	• It is important that prior to construction works, that a full survey of these species along the route is undertaken by an indemnified and qualified invasive species specialist. Balsam can be controlled by hand removal and herbicides. However, knotweed requires specialist assessment for best methods of control. Exclusion zones around the existing knotweed stands might have to be included to ensure that construction works do not disturb the existing root system as this may result in further spread of this species. Machinery hygiene may be also required to ensure that small vegetative particles of knotweed are not transported elsewhere.	**Neutral, Slight, Temporary**

Pollution to Surface and Ground Water	**Surface Water** Funshion River and its Unnamed Tributary within the Site	The clearing of the site and the construction of an anaerobic digestor and associated works along with the laying of the discharge pipe to the Funshion River will generate sediment and without due care this sediment could be mobilised into the Funshion River. These works could also result in the pollution of the water with cement or other hydrocarbons.	Negative	Moderate	Temporary	• Efficient construction practices and sequences should be employed on site, and this will minimise soil erosion and potential pollution of local watercourses with soil and sediment. Unnecessary clearance of vegetation should be avoided and only areas necessary for building works should be cleared. All existing grassland habitats within 10m of the watercourse within the site should be retained. The retention of these areas will also help retain storm water run-off from the site during construction and operation. • It is vital that there is no deterioration in water quality in the Funshion River and its tributary within the site. Therefore, strict controls of erosion, sediment generation and other pollutants associated with the construction process should be implemented, including the provision of attenuation measures, silt traps or geotextile curtains to reduce and intercept sediment release into any local watercourses. Guidelines in the following best practice documents should be adhered to: o Construction Industry Research and Information Association (CIRIA) (2005) Environmental Good Practice on Site (C692). o Construction Industry Research and Information Association (2001) Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532). o Construction Industry Research and Information Association (2000) Environmental Handbook for Building and Civil Engineering Projects (C512). o Environmental Protection Agency (2015) List of Waste and Determining if Waste is Hazardous or Non-Hazardous. o Environment Agency et al. (2015) Guidance on the Classification and Assessment of Waste, Technical Guidance WM3.	**Neutral, Slight, Temporary**

						• Works should be avoided during periods of heavy rainfall. • There must be no uncontrolled discharges of contaminated waters to ground or surface waters from this development, either during the construction or operation of the development. The control and management of hydrocarbons on site will be vital to prevent deteriorations in surface and groundwater quality locally. The following measures should be employed on site: o During construction re-fuelling of equipment and machinery must be done off site. If this is not possible, then a dedicated re-fuelling location must be established on site in the compound area away from ground clearance or rock-breaking activities. o Spill kits stations must be provided at the fuelling location for the duration of the works. o Staff must be provided with training on spill control and the use of spill kits. o All fuel storage containers must be appropriately bunded, roofed and protected from vehicle movements. These bunds will provide added protection in the event of a flood event on site. o All chemicals must be stored as per manufacturer's instructions. A dedicated chemical store within a building must be provided on site if chemicals are to be stored on site. o Procedures and contingency plans must be established on site to address cleaning up small spillages as well as dealing with an emergency incident. A stock of absorbent materials such as sand, spill granules, absorbent pads and booms should be kept on site, on plant working near the water and at the refuelling area. o Daily plant inspections will be completed by all plant operators on site to ensure that all	

						plant is maintained in good working order. Where leaks are noted on these inspection sheets, the applicant must remove the plant from operations for repairs. o All personnel shall observe standard precautions for handling of materials as outlined in the Safety Data Sheets (SDS) for each material, including the use of PPE. Where conditions warrant, emergency spill containment supplies should be available for immediate use. • Best practice concrete / aggregate management measures must also be employed on site during construction. o It is important that run-off from the construction works does not enter the watercourse that is within the site. Therefore, it is recommended that silt fences are installed along the buffer zones of this watercourse. The silt fences should be sturdy and constructed of a suitable geotextile membrane (Hy-Tex Terrastop Premium silt fence, or similar) to ensure that water can pass through, but that silt will be retained. The silt fences must be capable of preventing particles of 425mm from passing though. The footing of the fencing to be buried into the ground and the visible fencing to be *ca.* 0.5m high. o An interceptor trench will be required in front of this silt fence. o The silt fences should be monitored daily to ensure that they remain functional throughout the construction of the Proposed Development. Maintenance of the fences should be carried out regularly. Fences should be inspected thoroughly after periods of heavy rainfall. o 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 removed off-site for treatment. o The concrete washout skip is to be located to the east of the site, where the underlying overburden is greater. o Excavations lined with an impermeable liner are not permitted as concrete washout bays on the site. o 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. o Best practice in bulk-liquid concrete management should be employed on site, addressing pouring and handling, secure shuttering, adequate curing times etc. o Stockpile areas for sands and gravel must be kept to a minimum size, well away from drains on site. o Where concrete shuttering is used, measures should be put in place to prevent against shutter failure and control storage, handling and disposal of shutter oils. o Activities which result in the creation of cement dust should be controlled by dampening down the areas. o Raw and uncured waste concrete should be disposed of by removal from the site. • During the laying of the discharge pipe to the Funshion River, it is important that efficient construction practices and sequences are employed, and this will minimise soil erosion and potential pollution of the Funshion River with soil and sediment. • Unnecessary clearance of vegetation should be avoided and only areas necessary for the laying	

						of the pipe should be cleared. • These works should be overseen by an ecological Clerk of Works. • All guidelines within the document Inland Fisheries Ireland Requirements for the Protection of Fisheries Habitats during Construction and Development Works and River Sites (www.fisheriesireland.ie) and the updated guidelines entitled Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016) should be adhered to during the construction of the headwall and they include: o Consultation with Inland Fisheries Ireland (IFI) to ensure that the development proceeds with due regard to the provisions of the Fisheries Acts and Habitats Regulations; o Consultation with IFI in order to determine the correct timing of works on the site; o There should be no in stream works carried out within the streams without prior approval from IFI. • In order to construction the pipe to allow discharge, approximately 1m of bankside vegetation will have to be cleared. The works should be carried out under the supervision of the ECoW. • Prior to the works along the bankside, the proposed outfall location along the riverbank should be inspected by the ECoW to ensure that the works will not disturb any otter holts or bird nests. It is recommended that the inspection is done by waders or boat. The inspection should focus on the discharge point plus 5m either side of it. • The timing of any instream works must not coincide with the Fisheries closed season (October 1st to June 30th).	

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

						for repairs. • All personnel shall observe standard precautions for handling of materials as outlined in the Safety Data Sheets (SDS) for each material, including the use of PPE. Where conditions warrant, emergency spill containment supplies should be available for immediate use. • Best practice concrete / aggregate management measures must also be employed on site during construction.	

Table 5.7: Summary of predicted construction phase effects, mitigation measures and residual impact

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Disturbance to Local Wildlife		The operation of the site will be associated with an overall increase in human activity, noise and lighting on the site. However, having regards to the overall low value of the site to mammals, this impact is not considered significant. However, mitigation measures will be included to ensure that all lighting used within the site is of a low level to ensure minimum disruption to bats and other nocturnal mammals.	**Negative**	**Slight**	**Long term**	• The natural verges along the stonewalls hedgerows could also provide excellent opportunity for the benefit of wildlife. These should be managed as old hay meadows, cutting only in late summer. This will be of significant benefit to local pollinators. Herbicides must not be used along these natural verges, and they should be 1.5m – 2m wide at the base. • It is recommended that further actions that are outlined as part of the National Pollinator Plan should be implemented. There is a specific guide for farms (Farmland: Actions to help pollinators - //pollinators.ie/farmland). • Nesting areas for solitary bees could be included by providing south or east-facing banks or areas of bare earth. Bee boxes for cavity-nesting bees could be created by drilling holes in untreated wooden blocks and attaching them to an outdoor structure. The holes should be 10cm in depth and 4-8mm in diameter at a height of at least 1.5-2m. It is important to have holes of different sizes for the different species. • Bat boxes could be installed around the site, on walls, tree trunks and posts. They should be located as high as possible (at least 4m off the ground) in a sunny but sheltered location. If erecting on a mature tree, choose one that has clean bark (no ivy) with no branches for 1m radius around the location of the box. If erecting on a building, erect as close as possible to the eaves. • When erecting bat boxes externally (i.e. on a tree or external wall of a building), put up a minimum of three boxes facing in different directions to	**Neutral, Slight, Long term**

						provide a range of temperature conditions. For example, boxes facing from south-east to south-west allow the sun to fall on each box for part of the day. During very hot days a south-facing box may overheat, but the other boxes should have some shade. Three boxes can be arranged around the trunk of large, mature and clean trunk trees. When erecting bat boxes, erecting three different types of bat boxes will increase the chance of catering the different species likely to be found foraging on the site. Guidelines for the construction of bat boxes can be obtained on the website of Bat Conservation Ireland. • The use of herbicides within the site should be minimised. The clearance of vegetation around fences should be done by hand if possible. Where spraying is necessary, it should be done with a knapsack sprayed to minimise spray and target required areas only. • All rodenticides use on the site should be in accordance with the Campaign for Responsible Rodenticide use. • Lighting should be kept to a minimum around the remaining trees on the site. Guidelines from Bat Conservation Ireland will be provided for considering how to avoid light pollution of the hedgerows to allow for feeding, commuting, and roosting. • There should be no lighting directed from the site towards mature vegetation along the site boundaries or along the watercourse within the site. • Lighting shall be controlled to avoid light pollution of green areas and shall be targeted to areas of human activity and for priority security areas. Motion-activated sensor lighting is preferable to reduce light pollution. None of the remaining mature trees or trees proposed for planting shall be illuminated.	

						• Dark corridor for movement of bats along the grounds of the site. Lighting shall be directed downwards away from the treetops and shall not illuminate the watercourses or the mature vegetation surrounding the site. • All luminaires shall lack UV elements when manufactured and shall be LED. • A warm white spectrum (ideally <2700 Kelvin) to reduce blue light component. • Luminaires shall feature peak wavelengths higher than 550nm. • Tree crowns shall remain unilluminated. • Planting shall provide areas of darkness suitable for bats to feed and commute.	
Pollution to Surface and Ground Water		In the absence of mitigation, run-off from impermeable areas within the Proposed Development site such as roads and car parking areas may contain potentially polluting substances such as hydrocarbons etc. This run-off could be mobilised to watercourse within the site. Structural weaknesses in any of the tanks could lead to pollution of the groundwater. The process will also result in a discharge to the Funshion River under license. Any breach in the ELVs of the discharge could lead to pollution of this watercourse	Negative	Moderate	Long Term	• An Environmental Management System (EMS) will be prepared and implemented by the operating company during the operational phase. This is a practical document which will include detailed procedures to address the main potential effects on surface water and groundwater. • The Proposed Development will operate under an Industrial Emissions Licence (IEL) issued by the Environmental Protection Agency (EPA). The licence will contain several conditions which the operator must remain in compliance with for the entire duration of the AD facility's lifespan. Including: o Emissions Limit Values for all emissions including surface water o Monitoring requirements for surface waters o Storage and transfer of substances o Facility management o Accident prevention and emergency response including fire water retention o Operational Controls Other conditions of relevance to uncontrolled releases will include: • Dedicated hard standing for off-loading areas, with a minimum separation distance from	**Neutral, Slight, Long term**

						adjacent water courses. • Use of spill kits, bunded pallets and secondary containment units, as appropriate. • All bunds sized to contain 110% of the volume of the primary storage vessel. • Environmental operating plan to include site specific standard operating procedures pertaining to waste management and emergency response. • There will be no uncontrolled discharges to surface or groundwater bodies during the operational phase. • The entire digestion tank area of the site will be underlain by an impermeable bund structure, acting as secondary containment in the event of a catastrophic failure. • Tanks and bunds will be subject to integrity assessments by a suitably qualified engineer. • The monitoring of the discharge into the Funshion River will be vital to ensure that ELVs are not elevated. The discharge will be monitored and should there be any increase in ELVs above prescribed limits an alarm will sound and an automated shut off valve will be used to ensure there is no further discharge into the river. • Monitoring frequency and emission limit values will be in line with BAT Waste treatment CID and proposed EPA licence conditions. • Discharge monitoring shall include the following: o TOC to be continuously monitored. o Total N, Total P and Suspended Solids to be tested daily as outlined in BAT 7.	

Table 5.8: Summary of predicted operational phase effects, mitigation measures and residual impact

Appendix A: References

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

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6 Population and Human Health

6.1 Introduction

The 2014 EIA Directive (2014/52/EU)[1], as transposed into Irish legislation, amended the topics to be addressed in an EIAR and has replaced 'Human Beings' with 'Population and Human Health'.

In preparing this chapter, consideration has been given to the other inputs to this EIAR including, in particular, the chapters addressing Air Quality and Climate, Noise and Vibration, and the separate reports addressing the Construction and Environmental Management Plan.

Population and Human Health comprise an important aspect of the environmental impact assessment to be undertaken by the competent authority. Any significant impact on the status of human health, which may be potentially caused by a development proposal, must therefore be comprehensively addressed.

The 'Guidelines on the information to be contained in Environmental Impact Assessment Reports[2]', published by the EPA states that *"In an EIAR, the assessment of impacts on population & human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil etc."*

This chapter of the Environmental Impact Assessment Report (EIAR) focuses primarily on the potential likely and significant effects on Population, which includes Human Beings, and Human Health in relation to health effects/issues and environmental hazards arising from the other environmental factors. The potential effects and mitigation measures are considered in the following broad areas of investigation:

- Population
- Employment
- Community
- Human Health

6.2 Consultation

ORS/JSA have been commissioned to assess the potential effects of the Proposed Development in terms of Population and Human Health during the construction and operational phases.

The principal members of the EIA team involved in this assessment include the following persons:

- **Lead Author**: Luke Wymer – B.A., MRUP, Dip. Environmental and Planning Law, Dip PM, Adv. Cert. Environmental Management. Current Role: Executive Director of John Spain Associates. Experience *ca*. 7 years.

[1] European Union, *EIA Directive 2014/52/EU:* Directive - 2014/52 - EN - EIA - EUR-Lex (europa.eu)
[2] EPA, *Guidelines on the information to be contained in environmental Impact Assessment Reports:* Error: 404 Whoops! Page does not exist. | Environmental Protection Agency (epa.ie)

- **Co-Author:** Mark Fitzgibbon – B.A., MRUP. Current Role: Graduate Planner. Experience *ca*. 1 year.
- **Project Coordinator & Reviewer:** Oisín Doherty – B.Sc. (Geography with Environmental Science), MSc. (Environmental Management), CEnv, MIEnvSc. Current Role : Senior Environmental Consultant. Experience *ca*. 14 years.

Consultation was undertaken between the Applicant, ORS/JSA and other members of the planning/design team in order to obtain information required to assess the potential construction and operational phase effects on Population and Human Health.

6.3 Assessment Methodology & Significance Criteria

6.3.1 Desktop Study

At the time of writing there is no specific guidance from the EU Commission on the 2014 EIA Directive to indicate how the term 'Human Health' should be addressed. However, the European Commission's Guidance on the preparation of the Environmental Impact Assessment Report (2017) does reference the requirement to describe and, where appropriate, quantify the primary and secondary effects on human health and welfare. Moreover, the European Commission guidance states the following in relation to the assessment of Human Health:

"Human health is a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population."

In accordance with this approach to Human Health espoused in the Commission Guidance, this chapter addresses Human Health in the context of other factors addressed elsewhere in further detail within the EIAR. Relevant factors identified include inter alia water, air quality, noise, and the risk of major accidents and disasters.

In addition, this chapter of the EIAR has been prepared with reference to recent national publications which provide guidance on the 2014 EIA Directive including the Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018) and the Guidelines on the information to be contained in environmental impact assessment reports, published by the EPA in 2022.

Moreover, the following guidance published by the Institute of Environmental Management and Assessment [IEMA] in November 2022 has been utilised in the preparation of this chapter:

- The IEMA Guide to Effective Scoping of Human Health in Environmental Impact Assessment.
- The IEMA Guide to Determining Significance for Human Health In Environmental Impact Assessment.

The IEMA Guide on Scoping of Human Health states the following *inter alia*:

"*EIA is a legal requirement for certain types of public and private projects and follows a structured process. EIA informs an application for consent to proceed with a project and is a key public health and environmental sustainability activity.*

It aims to ensure potential positive health impacts and prevent potential negative health impacts of a project. Improving population health and reducing inequalities in health has an intrinsic value that is of huge importance to all communities and it is a highly cost-effective policy objective."

With regard to the selection of a study area for assessing human health impact, the IEMA (2022) guide on scoping for human health assessment states the following:

"Using a single geographically defined neighbouring community (site-specific population) to cover a range of effects across different wider determinants of health can provide appropriate flexibility and is proportionate. If there are clearly distinct localities from which a project's activities occur (e.g. communities along a linear development) it would it be appropriate to present multiple separate site-specific geographic populations.

Reporting should have regard to the geographic audiences most relevant to the health effects of the project. The populations of relevant geographic areas should be defined to aid understanding of the individual and combined health effects due to the project. For projects of a linear nature (e.g. cable, pipeline, road or rail infrastructure), reporting structure should allow the localised conclusions for relevant geographic areas to be understood separately. This does not require that every community has a separate reporting section, but that relevant localised effects should be discussed as appropriate."

The 2018 EIA Guidelines published by the Department of Housing, Planning and Local Government (DHPLG) state that there is a close interrelationship between the SEA Directive and the 2014 EIA Directive. The Guidelines state that the term 'Human Health' is contained within both of these directives, and that a common interpretation of this term should therefore be applied. A comprehensive desk study was undertaken to assess the potential effects of the Proposed Development on Population and Human Health. This study involved the collation and assessment of data from the following sources:

- Central Statistics Office (CSO) Census Data 2011 - 2022[3] .
- Cork County Council Website.
- Cork County Development Plan 2022 - 2028[4].
- Regional Spatial and Economic Strategy for the Southern Regional Assembly[5] (RSES).
- Environmental Protection Agency (EPA).
- Pobal HP Deprivation Index[6].
- OSI Mapping and Aerial Photography to classify land use and identify amenity sites.
- Composting & Anaerobic Digestion Association of Ireland (CRÉ).
- Code of Practice for Chemical Agents, HSA 2016.

[3] Central Statistics Office: Employment, Occupation, Industry and Commuting - CSO - Central Statistics Office
[4] Cork County Council (2022) *CDP:* https://www.corkcoco.ie/en/resident/planning-and-development/cork-county-development-plan-2022-2028
[5] Southern Regional Assembly (2020) *RSES:* https://www.southernassembly.ie/regional-planning/rses
[6] Pobal (Nd) *Pobal HP Deprivation Index:* Pobal HP Deprivation Index Launched - Pobal

- Chemical Agents and Carcinogens Code of Practice 2021, HSA[7].
- Section 20 of the Safety, Health, and Welfare at Work Act 2005.

6.3.2 Field Work

A site walk-over was conducted by ORS consultants in December 2023 and May 2024 to gain an understanding of the site and the surrounding environment. Representatives of the applicant also met face to face with stakeholders within a 1km radius of the Proposed Development.

6.3.3 Impact Assessment Methodology

Once the identification of the baseline environs was conducted, the available data was then utilised to identify and assess the potential effects posed by the development on the Population and Human Health receptors withing the area.

6.3.3.1 Population Sensitivity

The assessment of significance of an impact is a professional appraisal based on the sensitivity of the receptor and the magnitude of effect. Within any area, the sensitivity of individuals in a population will vary.

The Health Impact Assessment Guidance provided by the Institute of Public Health (IPH, 2021) provides a conceptual model of the different components of sensitivity in the public health context (refer to **Figure 6.1**). The conceptual model utilises criteria (segments) and indicative classifications (levels) to underpin a finding on the sensitivity of a receptor.

The resulting outcome may be summarised as high, medium, low or negligible sensitivity to change resulting from a Proposed Development.

The existing sensitivity of the receiving environment (in terms of Population and Human Health) has been appraised for the study area with a desk-based assessment of routine demographic and health indicators, rather than the use of surveys or collection of primary data.

This includes analysis of existing data (as available) from the Central Statistics Office (CSO) and Pobal to gain a profile of the baseline population information and the sensitivity to change within the study area.

Topographical maps and Google maps, along with the information contained within the Planning Report and other application documents have also been used to inform the baseline description of the area in terms of existing economic activity, employment, community infrastructure, emergency services, tourism and recreation amenities.

[7] HAS (2021) *Chemical Agents and Carcinogens Code of Practice 2021:* Chemical Agents and Carcinogens Code of Practice 2021 - Health and Safety Authority (hsa.ie)

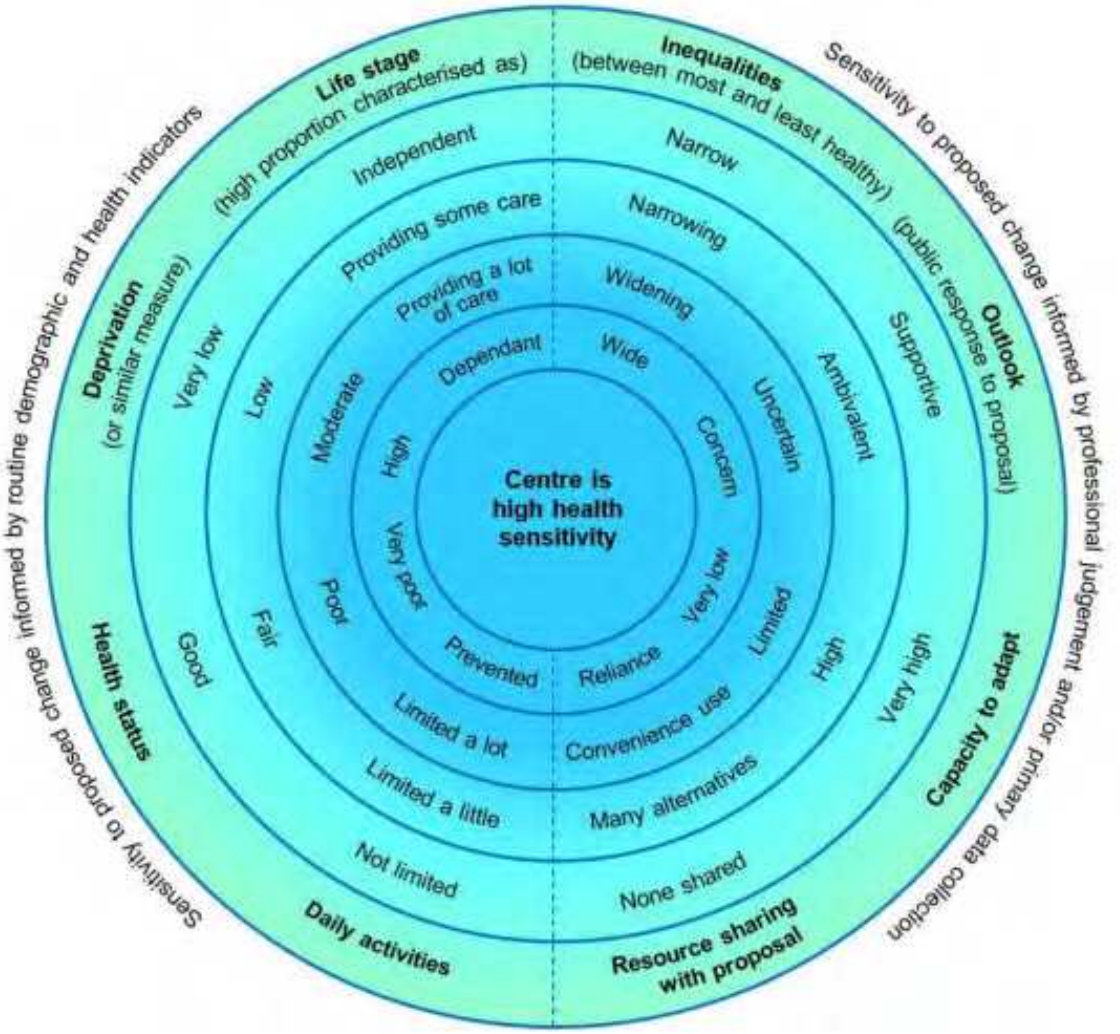


Figure 6.1: Extract from Figure T09 – Health Sensitivity Conceptual Model [IPH 2021]

6.3.3.2 Impact Magnitude

Magnitude considers the characteristics of the change which would affect the receptor as a result of the proposal.

The IPH 2021 Health Impact Assessment Guidance provides a conceptual model of the different components of sensitivity (**Figure 6.2** below refers). In a similar framework to the conceptual model for sensitivity, this model provides different components of magnitude. It uses criteria (segments) and indicative classifications (levels) underpin a finding on impact magnitude. The conclusion from this model can be summarised as a high, medium, low or negligible magnitude of change.

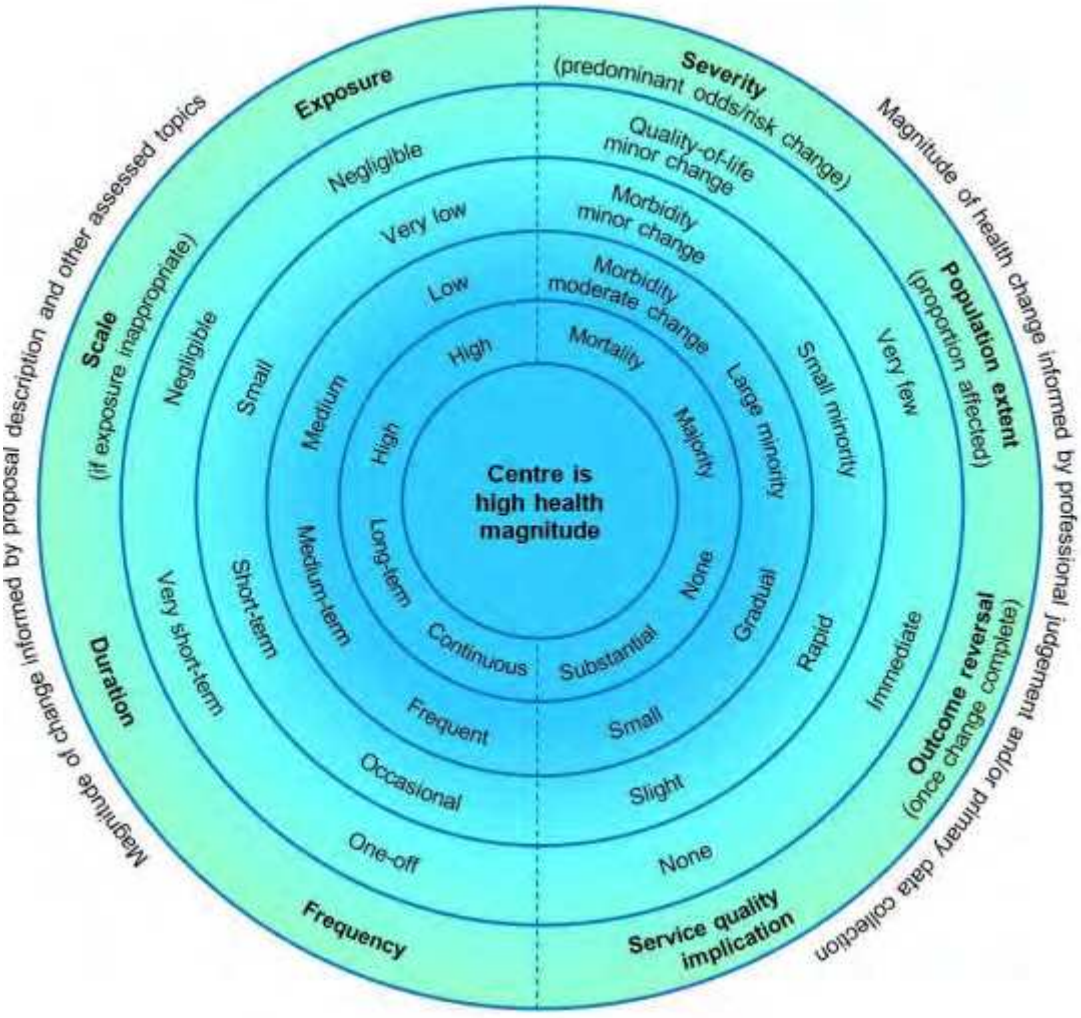


Figure 6.2: Extract from Figure T11 – Health Magnitude Conceptual Model [IPH 2021]

6.3.3.3 Significance

The IPH Guidance states that "*Significance relies on informed, expert judgement about what is important, desirable or acceptable with regards to changes triggered by the proposal in question.*"

The assessment of the significance of effects in this assessment is a professional appraisal and has been based on the relationship between the magnitude of the effects and the sensitivity of the receptor.

The Health Impact Assessment Guidance (IPH, 2021) sets out a conceptual model of the different components of significance (**Figure 6.3** below). It uses criteria (segments) and indicative classifications (levels) to explore, and explain, a finding that a health effect is significant or not significant.

The Health Impact Assessment Guidance (IPH, 2021) model brings together different types of evidence, e.g. scientific literature, public health priorities, regulatory standards and health policy. The model thus not only take into account a range of evidence sources, but also a

diversity of professional perspectives, e.g. academics, public health practitioners, regulators and policy makers.

The model below, includes the factors of magnitude of impact and the sensitivity of receptors as determined by the conceptual models discussed above. This assessment typically relies on regulatory thresholds, where there would be formal monitoring by regulators, to set out the acceptability or desirability of change to population health. The determination of significance also has regard to health priorities, the relevant scientific literature, health policy context, and responses to consultation.

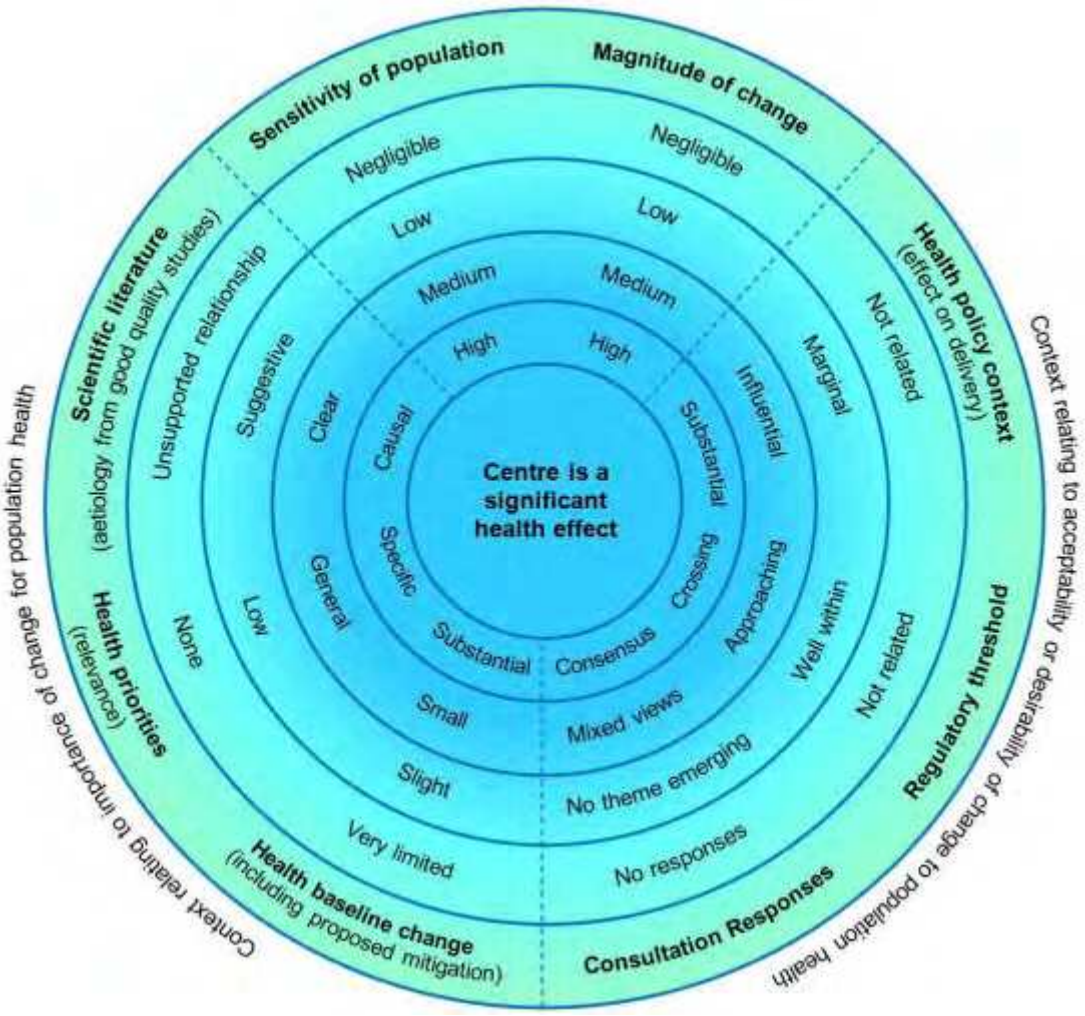


Figure 6.3: Extract from Figure T12 – Health Significance Conceptual Model [IPH 2021]

This chapter also has regard to the guidance on determining impact significance for human health in Environmental Impact Assessment, as provided within the 2022 IEMA Guide. The guidance highlights the importance of aggregating accurate and representative baseline data to help determine the sensitivity of a population, with Table 7.1 of the Guide providing a methodology for rating health sensitivity, Table 7.2 providing a methodology for health magnitude rating, and Table 7.4 providing a categorisation of significance depending on indicative criteria.

The generic indicative EIA Significance Matrix provided within the 2022 EPA Guidelines was also taken account of in the prediction of significance and the categorisation of effects carried out within this EIAR Chapter.

This chapter of the EIAR document focuses primarily on the potential likely and significant effect on Population, which includes Human Beings, and Human Health in relation to health effects/issues and environmental hazards arising from the other environmental factors. Where there are identified associated and inter-related potential likely and significant effects which are more comprehensively addressed elsewhere in this EIAR document, these are referred to. The reader is directed to the relevant environmental chapter of this EIAR document for a more detailed assessment.

6.3.3.4 Human Health Risk Assessment (On-Site)

The assessment of significance of an impact is a professional appraisal based on the sensitivity of the receptor and the magnitude of effect. Within any area, the sensitivity of individuals in a population will vary.

Once the identification of the baseline environs was conducted, the available data was then utilised to identify and assess the potential effects posed by the Proposed Development on the Population and Human Health receptors within the area.

Appraisal of Impact

- Direct Impact: where the existing baseline in the immediate vicinity of the Proposed Development is altered by activities associated with the construction or operational phases of said development.
- Indirect Impact: where the baseline beyond the Proposed Development is altered by activities associated with the construction or operational phases of said development.
- No Significant Impact: The Proposed Development has neither a positive or negative impact upon the local population or human health.

Human Health

The methodology used in the assessment of Human Health in this Chapter was guided by the US Environmental Protection Agency (US EPA) in their Human Health Risk Assessment process. This assessment methodology follows a 4-step process:

- Hazard Identification
- Dose-Response Assessment
- Exposure Assessment
- Risk Characterisation

Hazard Identification

Examines whether a stressor (impact) has the potential to cause harm to humans and/or ecological systems, and if so, under what circumstances.

Dose-Response Assessment

Examines the numerical relationship between exposure and effects.

Exposure Assessment

Examines what is known about the frequency, timing, and levels of contact with a stressor.

Risk Characterisation

Examines how well the data support conclusions about the nature and extent of the risk from exposure to environmental stressors.

6.4 Description of the Receiving Environment

6.4.1 Background

A description of the relevant aspects of the current state of the environment (baseline scenario) in relation to Population and Human Health is provided below. Specific environmental chapters in this EIAR provide a baseline scenario relevant to the environmental topic being discussed. Therefore, the baseline scenario for separate environmental topics is not duplicated in this section; however, in line with guidance provided by the European Commission, the EPA and the DHPLG, the assessment of effects on Population and Human Health refers to those environmental topics under which human health effects might occur, e.g. noise, water, air quality etc.

This section of the chapter provides the baseline information in relation to population and human health that exists in the vicinity of the Proposed Development. The Proposed Development occupies a total area of approximately 5.61 hectares and is primarily situated in the townland of Corracunna, Mitchelstown, Co. Cork. The site also extends into the townlands of Garrane and Coolnanave to provide for a water outfall to a watercourse to the north. This is a rural area beyond the outskirts of Mitchelstown. The site is situated approximately 2km northeast of the settlement of Mitchelstown. The site is primarily surrounded by agricultural land, with the N73 national road to the south, and a rural road (which will provide access to the site) to the west. The site itself accommodates several disused agricultural buildings. To the north of the site is a large agricultural facility (dairy).

The receiving environment is described below under the following headings:

- Population and Settlement Patterns
- Employment
- Community
- Human Health (Off-Site Receptors)
- Human Health (On-Site Receptors)

Table 6.1: Land Use & Settlement Patterns

Location in relation to site	Land Use
North	Farmland and agricultural-related units with dispersed rural housing. Dairy units located c. 300m north of the site.
South	Farmland with dispersed rural housing. Mitchelstown is located c. 2km southwest of the site. The N73 regional road is located immediately to the south.
East	Farmland and dispersed rural housing.
West	Farmland and dispersed rural housing.

6.4.2 Population and Settlement Patterns

The Proposed Development site is located in a sparsely settled rural area known as Corracunna, in the Electoral Division of Mitchelstown (ED hereafter), approximately 2km northeast of the built-up area of Mitchelstown, Co. Cork. This is a rural area beyond the outskirts of Mitchelstown, as indicated in **Figure 6.4**. Surrounding land use and settlement patterns are summarised in **Table 6.1**.

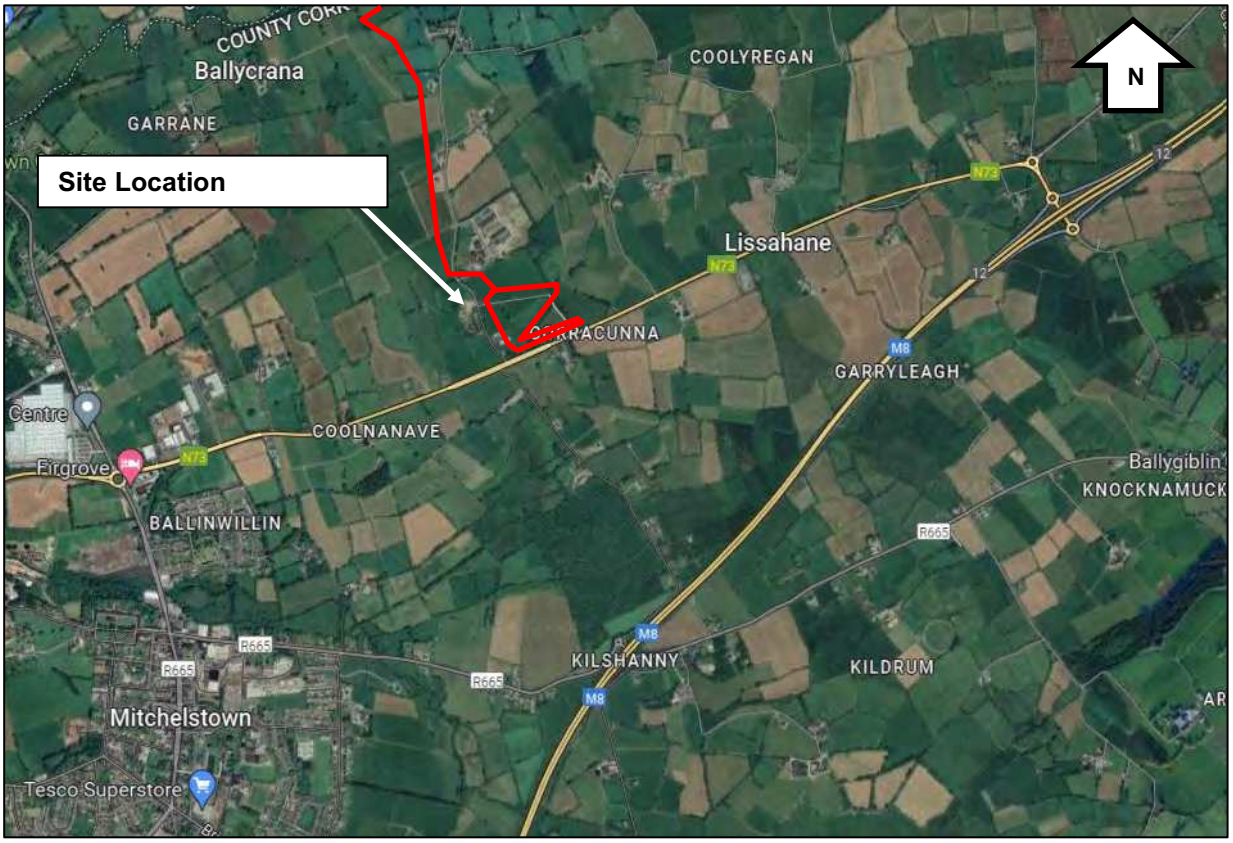


Figure 6.4: Proposed Development Location [Googe Maps]

6.4.2.1 Population Trends

The Proposed Development is situated in the northeastern section of the Mitchelstown ED which sits within the administrative boundary of Cork County Council (County hereafter); approximately 2.7km northeast of the built-up area of Mitchelstown.

Table 6.2 summarises census data for electoral divisions in the vicinity of the Proposed Development site. In the years between the 2016 and 2022 census, the population of Ireland has increased by 387,274 people (8.13%). During the same period, the census figures population of Co. Cork decreased by 57,059 people (-13.68%, from 417,211 to 360,152), although this was as a result of the redrawing of the census boundary for Cork City. Therefore, combined figures for Cork City and County are presented below to allow for like-for-like comparison. The population increase in the combined City and County areas was c. 7.6% over the intercensal period.

Table 6.2: Population Trends for Mitchelstown and Surrounding Areas 2016-2022 [CSO]

Area	2016	2022	% Change 2016-2022
Ireland	4,761,865	5,149,139	8.13%
Cork City and County	542,868	584,156	7.6%
Mitchelstown (town)	3,740	3,744	0.11%

Mitchelstown (ED)	5,135	5,219	1.64%
Small Areas: A047258020	311	282	9.32%

Relative to national and County growth rates, the population of the town of Mitchelstown has not notably changed from 2016 to 2022 (+0.11%), which represents a markedly lower growth rate than the national trend of 8.13% increase, and also significantly lower than the City and County level of population increase. Relatively similar to the ED, the town of Mitchelstown experience a slight increase (+1.64%). However, the small area (047258020) of the Proposed Development site, increased by 9.32% (which is ahead of the national trend).

6.4.2.2 Age Profile

The age profile of the population in the area is an important parameter as it provides a good insight into the potential labour force and assists in defining the sensitivity of the local population.

Table 6.3 shows the age profiles from a County to local level of the study area for 2022.

Table 6.3: Age Profile from County to Local Level 2022 [CSO]

Area	0-14	15-24	25-44	45-64	65+	Total Persons
Cork County Council	76,602 (21.27%)	42,227 (11.72%)	89,453 (24.84%)	95,631 (26.55%)	56,189 (15.60%)	360,152
Mitchelstown (town)	663 (17.71%)	417 (11.14%)	984 (26.28%)	965 (25.77%)	715 (19.10%)	3,744
Mitchelstown (ED)	950 (18.20%)	577 (11.06%)	1,323 (25.35%)	1,366 (26.17%)	1,003 (19.22%)	5,219
Small Areas: A047258020	55 (19.50%)	23 (8.16%)	60 (21.28%)	73 (25.89%)	71 (25.18%)	282

This table shows that in the study area, the dominant age grouping is 45-64 and 25-44. The small area of the Proposed Development site had a higher percentage within the 65+ age profile in comparison to ED, town and county levels. It is evident that the subject area consists of an older population than the county average.

6.4.2.3 Life Stage (Age Dependency)

The Health Impact Assessment Guidance[8] (IPH, 2021) outlines that life-course analysis is often used in public health and reflects differing health sensitivities and needs at different ages. Typically, children and older people are particularly sensitive to change, due to being dependents. Dependents are defined for statistical purposes as people outside the normal working age of 15-64. Dependency ratios are used to give a useful indication of the age structure of a population with young (0-14) and old (65+) shown as a percentage of the population of working age (15-64).

A low dependency ratio indicates that there is a larger proportion of working population age (15-64) years as compared to young (0-14) and old (65+). Conversely, a high dependency ratio indicates that there is a larger proportion of young (0-14) and old (65+) as compared to working

[8] IPH (2021) *Health Impact Assessment Guidance:* Health Impact Assessment Guidance: A Manual and Case Study | Institute of Public Health

population age. High dependency ratio can also indicate if some groups are more likely to be at home during the day (for example, due to childcare, or in the case of retired persons) and would therefore be more likely to be impacted by a development within the area.

Age dependency ratios are available through the Pobal Online Geo-Profiling tools[9] which are based on the national Census.

The age dependency ratio for the study area is shown in **Table 6.4** below. From these dependency ratios we can tell that the small area within which the site is situated is more dependent when compared to the County, however, it is still significantly lower than the national level and the Mitchelstown ED is lower than the county average and significantly below the national average. This indicates a relatively 'independent' population within the study area as compared to the Country as a whole, which can be defined as per the conceptual model as 'providing some care' to 'providing a lot of care'. Since the 2016 census, the dependency ratio of the small area has increased by 2.24% and the ED witnessed a lower increase of 0.24%.

Table 6.4: Age Dependency Ratio within the Study Area [Pobal Geo-Profiling, 2022 Census]

Area	Age Dependency Ratio for Census Year	
	2016	**2022**
Ireland	52.70	53.20
Cork County Council	34.32	34.77
Mitchelstown (town)	-	-
Mitchelstown (ED)	37.23	37.42
Small Areas: A047258020	42.44	44.68

6.4.3 Socioeconomics

6.4.3.1 Education

Census data presenting the highest level of education completed by people in the study area community is presented in **Table 6.5**. The data shows that the percentage of the population with a 'Postgraduate Diploma or Degree' within the small area of the Proposed Development site is higher than the County average, however, the percentage with an 'Honours Bachelor's Degree, Professional Qualification or both' is lower than the County average within the small area. The percentage of the population with 'no formal education' is over double the number in comparison to County levels. At the ED level and within the town of Mitchelstown, the level of attainment of Honours Batchelors Degrees, Professional Qualifications, and Postgraduate Diplomas or Degrees is lower than the county average. The percentage of the population with no formal education is slightly higher than the county level at the ED and settlement level.

Table 6.5: Highest Level of Education Completed Locally and at County Level in 2022 for Key Educational Levels [CSO]

Area	No Formal Education	Primary Education	Upper Secondary	Honours Bachelor's Degree, Professional Qualification or both	Postgraduate Diploma or Degree	Total Persons
Cork County Council	4,766 (2.02%)	15,463 (6.56%)	43,464 (18.44%)	31,192 (13.24%)	23,805 (10.10%)	235,674
Mitchelstown (town)	88 (3.43%)	254 (9.90%)	567 (22.10%)	211 (8.22%)	147 (5.73%)	2,566

[9] Gov of Ireland / EU, *Pobal Maps:* Pobal Maps

Mitchelstown (ED)	123 (3.42%)	342 (9.51%)	777 (21.61%)	331 (9.20%)	227 (6.31%)	3,596
Small Areas: A047258020	10 (5.10%)	12 (6.12%)	32 (16.33%)	21 (10.71%)	23 (11.73%)	196

6.4.3.2 Deprivation

The Health Impact Assessment Guidance referred to previously in this chapter (IPH, 2021) outlines that impact assessments should consider whether the population is already stressed by limited resources or unusually significant burdens as well as whether groups could be affected that have reduced access to financial, social, and political resources.

Deprivation differences between areas are indicative of social gradients, which are central to the consideration of health inequalities and resulting effects.

Deprivation statistics for Ireland are available from the Pobal HP Deprivation Index that shows the overall affluence and deprivation. This index draws on data from the national Census and combines three dimensions of relative affluence and deprivation: Demographic Profile, Social Class Composition and Labour Market Situation that are measured by ten key socio-economic indicators from the Census of Population.

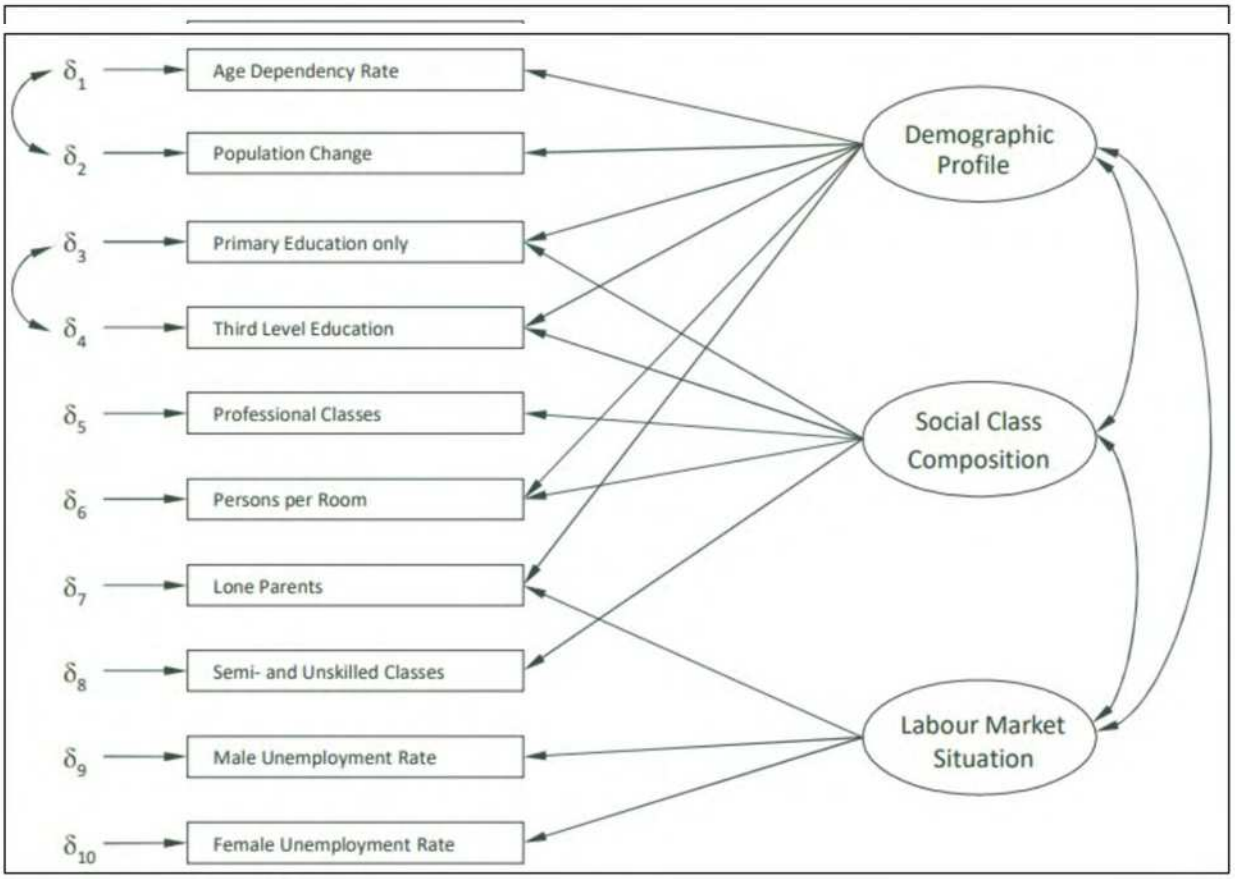


Figure 6.5: Basic Model of the Pobal HP Deprivation Index

The Pobal HP Deprivation Index Relative Index Score allows for the provision of descriptive labels with the scores, which are grouped by standard deviation as seen in **Table 6.6** below.

In order to make a uniform assessment using the conceptual model as set out in **Figure 6.1** above a relative Population Sensitivity the Deprivation Score of 'Very disadvantaged', or 'Extremely disadvantaged' would represent a high sensitivity. Conversely, an 'Extremely affluent' or 'Very affluent' would represent a very low sensitivity.

Table 6.6: Pobal HP Index Relevant Index Score Labels [Pobal HP Deprivation Index]		
Deprivation Score	Pobal HP Description	Sensitivity of Population
>30	Extremely affluent	Very low
20 to 30	Very affluent	Very low
10 to 20	Affluent	Low
0 to 10	Marginally above average	Low
0 to -10	Marginally below average	Moderate
-10 to -20	Disadvantaged	Moderate
-20 to -30	Very disadvantaged	High
< -30	Extremely disadvantaged	High

The data in **Table 6.7** shows the Pobal HP Deprivation Index Relevant Index Scores[10] for the Study Area based on the 2022 census. These figures show for the year of 2022 that the description of the study area is 'marginally below average' which is not consistent with that of the County (which is marginally above average). This indicates a moderate population sensitivity (deprivation) within the study area. Pobal have not released deprivation scores for the Country for 2022, so comparison to the national average is not possible, however it is noted that, for comparison purposes, the area of Dublin County also displays a deprivation level of 2.69 (marginally above average).

Table 6.7: Deprivation Score within the Study Area [Pobal HP Deprivation Score, 2022 Census]		
Area	Deprivation Score	Pobal HP Description
Cork County Council	2.69	Marginally above average
Mitchelstown (ED)	-5.42	Marginally below average
Small Areas: A047258020	-0.35	Marginally below average

6.4.4 Employment

6.4.4.1 Economic and Employment Activity

The CSO's Quarterly Labour Force Survey (which has now replaced the Quarterly Household Survey) for Q3 2023, indicated that there was an annual increase in employment within the State by 89,600 or 3.4% to 2,706,400 in the 12 months to Q4 2023. There were 117,700 unemployed people aged 15-74 years in Q4 2023 using International Labour Organisation (ILO) criteria, with an associated unemployment rate for those aged 15-74 of 4.2%, up from 4.1% in Q4 2022.

The unemployment rate among those aged 15-24 years (the youth unemployment rate) was 9.4% in Q4 2023, up from 9.1% in Q4 2022.

The estimated Labour Force (i.e. the sum of all persons aged 15-89 years who were either employed or unemployed) stood at 2,824,100 in Q4 2023, a rise of 3.5% (94,700) from Q4 2022. The estimated workforce participation rate in Q4 2023 was 65.4%, up from 64.6% in Q4 2022.

An estimated 592,400 or 21.9% of those in employment worked part-time and 23.6 % of those in part-time employment were classified as underemployed (i.e. they would like to work more

[10] Pobal, *Pobal HP Deprivation Index:* Pobal HP Deprivation Index Launched - Pobal

hours for more pay).

In the year to Q4 2023 the age group with the highest employment rate was the 35-44 year-old group, which was unchanged from a year previously at 84.0%. The lowest employment rate by age was observed in the 15-19 year old cohort at 28.1%. All other age groupings saw an increase in employment rate with the exception of 55-59 year olds, where there was a decline of 1.8 p.p. to 72.3%.

The ESRI quarterly economic commentary for Spring 2024 notes that the Irish labour market continues to perform robustly and is now operating close to capacity. In addition, inflation is expected to decline throughout 2024 with a return to growth in real incomes. This is borne out by the latest CSO data on inflation, which records a rate of inflation of 1.6% in the year to April 2024. Irish inflation peaked at almost 10% year-on-year in the middle of 2022 and has fallen steadily over the last 12 months.

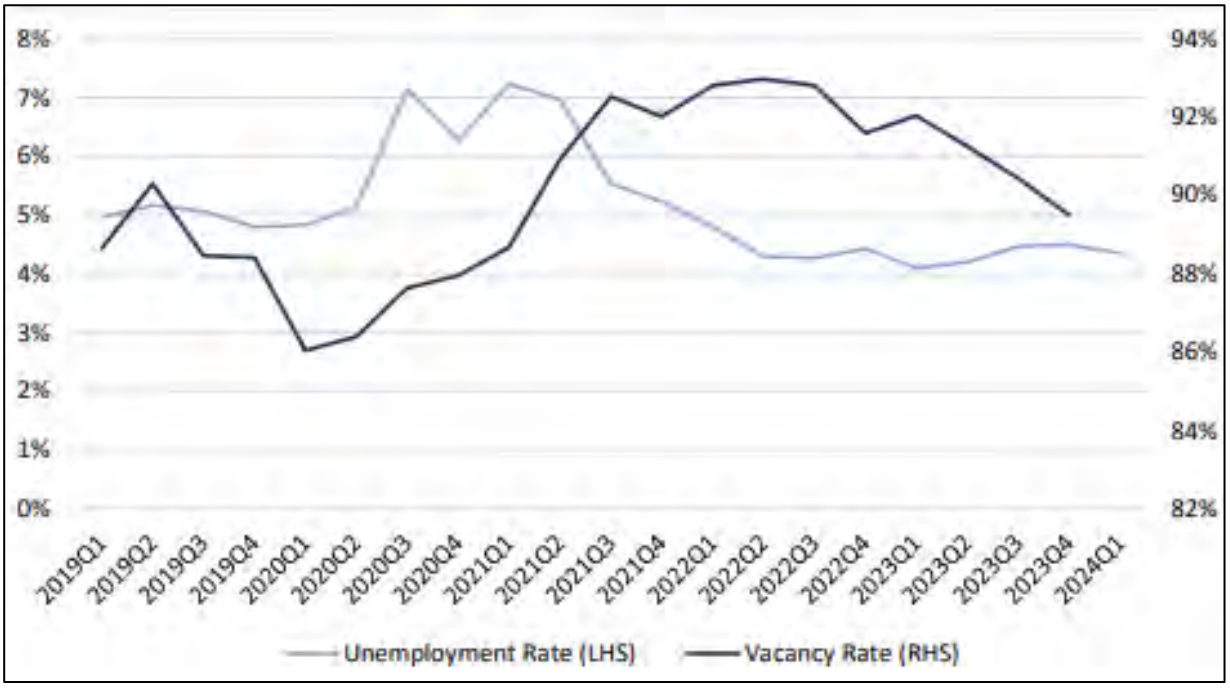


Figure 6.6: Unemployment by Quarter and Job Vacancy Rate within the State (Source: ESRI)

The above sources demonstrate that the national economy and employment levels are experiencing positive trends, which is also accompanied by reduced inflation since the peak in 2022 following the Russian invasion of Ukraine. Overall, the ESRI Quarterly Commentary concludes that developments in the labour market reflect the fact that the domestic economy is growing at a more moderate pace but still operating close to capacity.

6.4.4.2 Cork County Development Plan

The County Development Plan (CDP hereafter) is a statutory document prepared by the Planning Authority in accordance with the requirements of the Planning & Development Act 2000 (as amended) and the Planning & Development Regulations 2001 (as amended).

The purpose of the CDP is to provide a strategic framework, setting out key policies and objectives for a new integrated land use strategy, and the proper planning and sustainable development of the County. The CDP is designed to set out the key policy context for the

development of the County and is set within a hierarchy of national and regional spatial plans and guidelines. The Cork County Development Plan[11] 2022 to 2028 took effect in August 2022.

The CDP states that it aims to:

1. *"Plan for and support the sustainable long-term development of County Cork as an integrated network of vibrant socially and economically successful urban settlements and rural communities, metropolitan and town greenbelts and open countryside, supporting and contributing to the economic development of the County and of the Southern Region.*

2. *Provide for the future wellbeing of the residents of the County in strong inclusive communities by:*

    - *Supporting sustained economic vibrancy and increasing employment opportunities.*
    - *Protecting and improving the quality of the built and natural environments.*
    - *Ensuring the provision of adequate housing, necessary infrastructure and community facilities.*
    - *Promoting and improving quality of life and public health.*
    - *Build on the progress made in the County following the conclusion of the previous development plan."*

6.4.4.3 Central Statistics Office – Census 2022

The percentage of people aged 15 and over who participate in the labour force, as opposed to having another status such as student, retired or homemaker – is known as the labour force participation rate. It is measured as the number in the labour force (at work or unemployed) expressed as a percentage of the total population ages 15 and over.

According to the 2022 Census, there was an 8.35% (203 as a % of 2,432 – unemployed as a % of 'at work' and 'short/long term unemployed') unemployment rate within the Mitchelstown ED. This is compared with the national average unemployment rate of 8% and a County unemployment rate of 5.16% in 2022.

'Managerial and technical' occupies the largest socio-economic group within the Mitchelstown ED (25.68%). 'Semi-skilled' and 'non-manual' occupied the second and third largest groups (17.38% and 16.69%). The smallest socio-economic group identified within the ED was 'unskilled' at 4.58%.

6.4.5 Community

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

- The residential community
- The working community

6.4.5.1 Residential Community

The site of the Proposed Development is located along the northern side of the N73. The closest

[11] Cork County Council (2022) *CDP:* https://www.corkcoco.ie/en/resident/planning-and-development/cork-county-development-plan-2022-2028

established residential area along the N73 is approx. 2km to the west of the Proposed Development site, at Mitchelstown. There are also residential units sparsely located on all sides of the Proposed Development site.

6.4.5.2 Working Community

The working community in the vicinity of the Proposed Development site comprise primarily agricultural-based employment. Other employment within the wider vicinity includes an auto clinic (c. 120m south), forestry, an Aldi distribution centre (c. 1.7km west), and an engineering service (c. 540m southeast). Mitchelstown accommodates a wide range of employment uses including industrial and service related employment.

6.4.6 Human Health (Off-Site Receptors)

6.4.6.1 Health Status (General Health)

The CSO as part of the census records conducted an overall self-reported measure of population health within the State. Areas with a poor health status are typically considered to be of a higher sensitivity and more susceptible to change in environmental conditions.

Table 6.8 below shows the self-reported measure of population health within the study area compared to the Country as a whole. The data shows that over half the population (62.06% within the small area) self-reports their health as 'very good', significantly greater than national trends. The portion of the population reporting their health as 'very good' was slightly lower than the national average at ED and settlement levels for Mitchelstown.

Table 6.8: Self-Reported Measure of Population Health [CSO, 2022 Census]

Area	% Population Describing their General Health					
	Not Stated	**Very Bad**	**Bad**	**Fair**	**Good**	**Very Good**
Ireland	346,824 (6.7%)	16,843 (0.3%)	72,556 (1.4%)	444,895 (8.6%)	1,527,027 (29.7%)	2,740,994 (53.2%)
Cork County Council	15,091 (4.19%)	982 (0.27%)	4,068 (1.13%)	28,024 (7.78%)	106,692 (29.62%)	205,295 (57.00%)
Mitchelstown (town)	176 (4.70%)	11 (0.29%)	53 (1.42%)	371 (9.91%)	1,262 (33.71%)	1,871 (49.97%)
Mitchelstown (ED)	222 (4.25%)	13 (0.25%)	69 (1.32%)	497 (9.52%)	1,681 (32.21%)	2,737 (52.44%)
Small Areas: A047258020	5 (1.77%)	1 (0.35%)	2 (0.71%)	26 (9.22%)	73 (25.89%)	175 (62.06%)

Ability to Perform Daily Activities

People's ability to perform day-to-day activities is relevant to population sensitivity, particularly where there are changes in access to services or community amenities. Persons with disabilities can also be more susceptible to the changes in environmental conditions. The CSO as part of the census records an overall self-reported measure of persons with disabilities within Ireland.

Table 6.9 details the number of persons with a disability compared to the population as a whole, from a national to local level. The data shows that the study area has a similar/consistent percentage of persons with a disability as that of the national average; indicating that for persons within the area there is not an increase of restrictions on daily activity in comparison the Country as a whole.

Table 6.9: Persons with a Disability [CSO, 2022 Census]			
Area	Persons with a Disability	Population	% Persons with a Disability
Ireland	1,109,557	5,149,139	21.5%
Cork County Council	75,625	360,152	24.89%
Mitchelstown (town)	932	3,744	24.89%
Mitchelstown (ED)	1,236	5,219	23.68%
Small Areas: A047258020	55	282	19.50%

6.4.6.2 Summary of Population Health Sensitivity

The sensitivity of the surrounding area had been considered based on the details of the published data available from CSO and Pobal. The study area has seen population growth between the 2016 and 2022 census. The Pobal HP Deprivation Index shows the area to be marginally below average indicating a moderate population sensitivity (deprivation) within the study area, representing a slightly higher level of deprivation than the County.

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’ and a low proportion as ‘bad’ or ‘very bad’. The data shows that the small area has a lower percentage of persons with a disability compared to the national level: 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 a ranking of low to moderate sensitivity.

6.4.7 Human Health (On-Site Receptors)

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:

- 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.

Pest Control

Rodents can be harmful since they may transfer viruses, micro-organisms, parasites etc. and may, therefore, represent an important factor for the spreading of various diseases. Control of rodents is a mandatory prerequisite for any waste management facility. Flies and birds can also pose a problem, where they are attracted to raw waste.

The nature of the wastes treated on-site, i.e. agricultural manures and slurries, is not generally attractive to pests as a feed source, however in the absence of mitigation, animals, flies and

other vermin may be attracted to the site.

Sources of potential public health risks associated with vermin and other pest animals include:

- Nuisance
- Transmission of disease.
- Threat to native flora and fauna.
- Threat to livestock.

There is no reason that waste being handled in the Reception Building will give rise to litter. The proposed treatment facility will process biodegradable waste in a controlled environment.

Due to the nature and rural location of the proposed plant and the probable populous of vermin already present which may be displaced by the construction works, It is intended to employ a specialist pest control firm for the duration of the project to ensure the regular monitoring and control of any vermin present on site or disturbed within the works area as a result of construction work.

Dose-Response Assessment

A dose-response assessment examines the relationship between exposure and effects. The greater the dose to which a receptor (individual) is exposed the greater the likelihood of an adverse response and/or the greater the severity of that response.

The threshold is the level of an agent below which one would expect no adverse response. Human health is one of the fundamental considerations during the formulation of statutory and international standards of safety in relation to dose, exposure, and risk. Such standards are covered in statutory legislation relating to air quality, noise, hydrogeology. **Table 6.10** contains a summary from the Health and Safety Authority on Gas Exposure Limits relevant to AD plants.

Table 6.10: Gas Exposure Limits (Ireland) Code of Practice for Chemical Agents, [HSA 2016]

Gas	Properties	Hazardous Atmosphere	Workplace Exposure Limit (8hr Reference Period)
CO_2	Colourless and odourless gas. Heavier than air.	8 % v / v, danger of asphyxiation.	5000ppm
NH_3	Colourless and pungent-smelling gas. Lighter than air.	Above 30 – 40 ppm mucous membranes, respiratory tract and eyes become irritated. Above 1000 ppm breathing difficulties, potentially inducing loss of consciousness.	20ppm
CH_4	Colourless, odourless gas. Lighter than air.	4.4–16.5%	1000ppm
H_2S	Highly toxic, colourless gas. Heavier than air. Smells of rotten eggs	Above a concentration of 200 ppm the sense of smell becomes deadened and the gas is no longer perceived. Above 700 ppm, inhaling hydrogen sulphide can lead to respiratory arrest.	5ppm

Exposure Assessment

Examines what is known about the frequency, timing, and levels of contact with a stressor (agent). Health based standards rely on the dose response relationship and try to identify by scientific means the threshold below which no significant health effects would occur. When standards are scientifically set by reliable and recognised or statutory agencies, they are a useful method in assessing the effect of any proposed change.

Risk Characterisation

Risk assessment seeks to characterise the nature and magnitude of human health or environmental risk. In this step, data on the dose-response relationship of an agent are integrated with estimates of the degree of exposure in a population to characterise the likelihood and severity of potential impact.

6.5 Description of the Proposed Development

6.5.1 Introduction

Consideration of the characteristics of the Proposed Development allows for a projection of the level of impact on any particular aspect of the environment that could arise. In this chapter the potential impact on population and human health is assessed.

The development will consist of the following:

- Demolition of existing single storey disused agricultural buildings, silos, and tank within the western portion of the site (total demolition gross floor area (GFA) of c. 1,781 sq.m). One single storey agricultural building (with a GFA of 87.8 sq.m) will be stabilised and retained as a biodiversity building.
- Construction of 3 no. digesters (c. 15.5m in height), 2 no. digestate storage structures (c. 15.5m and 11m in height), 2 no. liquid storage tanks (c. 12.2m in height), and a liquid feed tank (c. 8m in height) located in the southeast portion of the site.
- 3 no. pasteurisation tanks (each c. 6m in height), a post pasteurisation cooling tank (c. 12.2m in height) and pre fertiliser manufacturing tank (c. 12.2m in height) located in the centre of the site.
- A part single-storey and part two-storey reception hall (with a GFA of c. 2,112.6 sq.m and an overall height of c. 15.5m) to accommodate a laboratory, panel room, tool store, workshop, and storage areas, with a liquid feed intake adjacent to the reception hall, located in the central portion of the site, to the north of the digesters.
- A single-storey solid digestate storage and nutrient recovery building (with a GFA of c. 879.9 sq.m and an overall height of c. 12.4m in height) located to the west of the reception hall, in the central portion of the site.
- Odour abatement plant (c. 6m in height) and equipment, a digestate offtake area, and a fuel tank (c. 1.6m in height) will be provided to the north of the solid digestate storage and nutrient recovery building.
- Construction of an ESB substation (c. 3.4m in height), 2 no. CO_2 tanks (c. 14.5m in height), along with associated plant structures including a CO_2 loading pump, CO_2 auxiliaries, CO_2 liqueufactor, a CO_2 compressor (c. 6.7m in height), and a CO_2 pre-treatment skid, located in the southwest portion of the site.
- Construction of a biogas treatment skid, a biogas compression system, a biogas upgrading module (with an overall height of c. 5.1m) and a grid injection unit within a fenced compound (c. 2.8m in height), located within the southwestern portion of the site.
- Construction of an emergency biogas flare (c. 11.3m in height) and 2 no. propane tanks (c. 1.3m in height) located further to the west of the site.
- Construction of an O_2 generation unit (c. 2.6m in height), a biomethane boiler (c. 5.6m to top of flue stack) a combined heat and power (CHP) unit and panel room (with a maximum height of c. 6m to top of flue), 2 no. pump houses (c. 2.6m in height, each with a GFA of c. 29 sq.m) located in the southwestern portion of the site.
- Construction of a two-storey ancillary office and administration building (with an overall height of c. 8.6m and a GFA of c. 271.5 sq.m) located within the western portion of the site, adjacent to the main site entrance.

- A discharge pipe route extending to the northwest of the main anaerobic digestion facility site, crossing the L90831 and through agricultural lands to the River Funshion.
- Alterations to the adjacent local road (L90831), to allow for improved access and safety, including provision of a passing bay and setting back of boundaries alongside the site entrance.
- Provision of landscaping and tree planting, including the provision of an extensive treeline alongside the N73 to the southeast of the main site area, along with additional landscaping and planting on lands to the west of the L90831.
- Associated and ancillary works including parking (16 no., including 3 no. EV and 1 no. accessible parking spaces), and bike storage (10 no. spaces), access arrangements (including new access points to the site from the L90831 to the west), internal roads, bunds, a weighbridge, wastewater treatment equipment, attenuation pond, boundary treatments, lighting, services, lightning protection masts, drainage, and all associated and ancillary works.

6.6 Likely Significant Effects

6.6.1 Do-Nothing Scenario

Under the 'Do Nothing' scenario there would be no change to the current land use of the Proposed Development site. If the Proposed Development does not proceed as planned there would be no additional impact on the following receptors:

- **Local Population & Employment** – If the Proposed Development did not proceed this will not lead to any profound or irreversible consequences. However, the opportunity to deliver additional employment opportunities into the rural economy will be lost as will the opportunity to contribute to specific objectives in the Cork County Development Plan and the 2024 Climate Action Plan, which promotes renewable energy generation.
- **Community** - It is likely that the perceptions of the community would remain unchanged. However, the immediate economic and social benefits that would be forthcoming and experienced if the development were to progress would be foregone.
- **Land Use** - The failure of the Proposed Development to proceed will most likely see the land remaining as agricultural land. The disused piggery and degraded agricultural structures would remain on site.
- **Human Health (Off-Site)** - If the Proposed Development were not to proceed this primarily greenfield site would remain in its existing form and there would be no impact on Human Health. However, the unique opportunity of providing renewable energy to the national grid will be missed, given the current economic climate and rising energy costs this Proposed Development provides a safeguard for the area and the country's energy needs. The disused agricultural buildings on site would also be likely to deteriorate further over time.
- **Human Health (On-Site)** – Under the do-nothing scenario, it is likely that the risks associated with uncontrolled pests and vermin on the surrounding the area, livestock and ecological receptors will be slightly reduced, in the absence of the Proposed Development, particularly in uncontrolled conditions (i.e. in the absence of mitigation), however, the production of a biobased fertiliser presents an opportunity to introduce a high-quality fertiliser with reduced pathogens compared to slurries and manures.

The Do-Nothing scenario would also be considered sub-optimal 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 the local bioeconomy would be missed.

6.6.2 Receptor Sensitivity

The sensitivity of the receptors identified are summarised in **Table 6.11**.

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	Low	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.

6.6.3 Sources - Construction Phase

Potential construction phase effects are considered in detail below and summarised in **Table 6.12.**

6.6.3.1 Population

The construction phase is not considered likely to have any significant impact 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, rather than reside in the area during the construction phase of the development.

The construction phase may result in a marginally increased population in the wider area due to increased construction employment in the area, however, this would be temporary in nature and the effect would be imperceptible.

Activities associated with the construction phase are anticipated to have ***positive, slight, temporary*** effects on the local population.

6.6.3.2 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 and the town of Mitchelstown, such as retail services, together with wider benefits in the aggregate extraction (quarry) sector, building supply services, professional and technical professions etc. These beneficial effects on economic activity will be largely temporary but will contribute to the overall future viability of the construction sector and related services and professions over the construction period.

Activities associated with the construction phase are anticipated to have ***positive, moderate, temporary*** effects on employment within the area.

6.6.3.3 Community

It is acknowledged that the construction phase of the project may have some short-term negative effects on local residents. Such effects are likely to be associated with construction traffic and possible nuisances associated with construction access requirements. These effects are dealt with separately and assessed in **Chapter 9: Air, Odour and Climate**, **Chapter 10: Noise and Vibration** and **Chapter 12: Traffic and Transportation** of the EIAR.

Given the overall scale of the Proposed Development, some potential effects may occur locally during the construction phase. 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 and also by construction traffic accessing the Proposed Development.

Activities associated with the construction phase are anticipated to have ***negative, slight, temporary*** effects on the local community.

6.6.3.4 Installation of Gas Pipeline

The proposed gas pipeline connecting to the existing Gas Networks Ireland pipeline will be installed underground. The final pipeline will be designed, consented and delivered by Gas Networks Ireland in accordance with the following standard: *I.S. 328 2021 Gas transmission — Pipelines and pipeline installations*.

Installation of the pipeline will involve temporary excavation work and will result in disturbance of the underlying soil and subsoil. This may have an effect on the exposed soil and subsoil with implications for the soil surface with regard to stock piling and mobile plant. The trenches will be backfilled shortly after excavation following the installation of each section. Trenching along a road network will give rise to asphalt waste material. If they are not properly managed these materials can pose a risk to Human Health due to the presence of Polycyclic Aromatic Hydrocarbons (PAHs). Increased incidences of lung, skin, and bladder cancers are associated with occupational exposure to PAHs.

Activities associated with the construction phase as summarised in **Table 6.12** are anticipated to have ***negative, slight and temporary*** effects on health and safety in the area.

6.6.3.5 Human Health (On & Off Site)

All new developments will give rise to some associated short-term effects and disturbances to the surrounding areas. The construction methods employed and the hours of work proposed will be designed to minimise potential effects. The Proposed Development will comply with all Health & Safety Regulations during the construction of the project. Where possible, potential risks will be omitted from the design so that the impact during the construction phase will be reduced.

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, local residents and the community at large.

Activities associated with the construction phase as summarised in **Table 6.12** are anticipated to have ***negative, slight, and temporary*** effects on health and safety in the area.

Table 6.12 – Construction Phase Effects Summary					
Receptor	**Sensitivity Rating**	**Potential Environmental Effects**	**Quality**	**Significance**	**Duration**
Local Population	Low to moderate	Potential minor increase in population during construction.	**Positive**	**Imperceptible**	**Temporary**
Employment	Low to moderate	Will provide jobs during the construction phase. May attract other sources of employment to the area.	**Positive**	**Moderate**	**Temporary**
Community	Low to moderate	Wear and tear on the infrastructure. Construction traffic. Risk to air/noise.	**Negative**	**Slight**	**Temporary**
Human Health (Off-Site)	Low to moderate	Risk to health from construction methods. Impact of disturbance, air and noise impacts during construction.	**Negative**	**Slight**	**Temporary**

6.6.4 Sources - Operational Phase

Potential operational phase effects are considered in detail below and summarised in **Table 6.13**.

6.6.4.1 Population

The Proposed Development will have no likely significant effect on the existing population. No residential element is proposed as part of the development hence no impact will occur on the local population in this regard.

Given the scale of the Proposed Development, it will not markedly increase the potential working population of the area. There will not be any significant increase in traffic levels to the local road network as outlined within the Traffic and Transport Assessment submitted as part of the application.

There will be no notable increase in demand for community/recreational facilities arising from the completion of the Proposed Development as it will not introduce any resident population to the area. Any demand for additional shopping facilities and services will be met by the existing retailing facilities at Mitchelstown and other nearby settlements. There is no increased visitor population anticipated to the area as a result of the Proposed Development being completed.

Overall, the Proposed Development is likely to have a positive impact on the population in terms of employment and economic benefit in the long term.

Activities associated with the operational phase are anticipated to have ***positive, moderate, long-term*** effects on the local population, via the creation of long-term, sustainable employment to support the local population.

6.6.4.2 Employment

The Proposed Development will offer direct employment in the Anaerobic Digestion Facility, while also supporting existing employment opportunities on surrounding farms. Further indirect employment will be created as a result of the added benefits of the development, such as surrounding businesses catering for employee subsistence and hauliers transporting feedstock materials and biobased fertiliser to and from the plant. The Proposed Development, if undertaken, will be of considerable benefit to the area in terms of employment provision and economic gain leading to a positive, medium-term effect which is significant in the context of its rural location.

The Proposed Development can support between 70-75 jobs in the immediate area (consisting of c. 5 full time jobs in the plant, 13 jobs supported in the applicant's operational team, c. 45 contractors, and an estimated c. 10 third party local suppliers), specifically across rural locations, and protect existing farming employment. The Proposed Development can therefore contribute to reversing the trend of employment losses in the agricultural sector.

Activities associated with the operational phase are anticipated to have ***positive, significant, long-term*** effects on employment within the area.

6.6.4.3 Community

The Proposed Development may have the following potential effects:

- Increased traffic levels, both vehicular and pedestrian in the surrounding area (**Chapter 12: Traffic and Transport**).
- Effects on local services and commercial facilities.

The adjoining residential communities may experience the above effects in a number of ways. The community may experience a slight change in mobility as a result of increased traffic on the road network. An alteration to the actual physical environment of the area may affect the spatial perceptions of the community living in the area. These aspects are dealt with in further detail within the Chapter 12: Traffic and Transportation and Chapter 11: Landscape and Visual Impact chapters of this EIAR.

Activities associated with the operational phase are anticipated to have ***neutral, slight, long-term*** effects on the community within the area.

6.6.4.4 Human Health

The main potential health hazards associated with a typical biogas facility are as follows:

- Prolonged low-level exposure to gases.
- Exposure to hazardous substances.
- Electrical hazards.
- Mechanical Hazards.
- Biological agents.

Pest Control

The presence of vermin or 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.

Activities associated with the operational phase are anticipated to have ***negative, moderate, long-term*** effects on the local pest control.

Fugitive Emissions

Fugitive emissions to both air and water are possible at AD facilities, in the absence of proper controls and mitigation measures.

Hazardous Substances

At an AD plant there is the potential presence of substances that could be toxic, corrosive, sensitising, such as processing aids, oils, effluent, wastes and gases. In the absence of mitigation, potential on-site hazards include:

- Risk of asphyxiation/poisoning from fermentation gases/biogas.
- Release of gases such as hydrogen sulphide during mixing.
- The use of additives and auxiliary materials with hazardous properties.

Biological Agents

A biological agent is any micro-organism, cell culture or human endoparasite which may cause an infection, allergy, toxicity or otherwise create a hazard to human health. An AD plant utilises biological material to synthesise biomethane hence a variety of biological agents may be present in feedstock. Biological agents have the potential to enter and harm humans via the following pathways:

- Inhalation of aerosols containing mould or bacteria.

Electrical Hazards

Regardless of plant type there will be electrical infrastructure on site that has the potential to be hazardous such as CHP units, pumps, agitators, measuring devices. Electrical hazards mainly occur when any such equipment becomes faulty. Hazards include:

- Electric shock through an individual's body. (working too close to overhead powerlines/faulty electric cables on site).
- Electrical or magnetic fields (circulation of induction currents) posing a danger to people with pacemakers installed.
- Static electrical shock.

Mechanical Hazards

Moving mechanical parts may pose hazards such as falling, impact, crushing, cutting. Such hazards are most prevalent in close proximity to rotating parts, around moving vehicles, or from working at height. Repair and maintenance activities in particular have the potential for accidents when inadequate protection measures are applied.

Gas Hazards

Biogas is composed of different gases and this mixture can vary depending on the feedstock

mixture used to produce the gas. Common gases contained in biogas include carbon dioxide, methane, ammonia, and hydrogen sulphide.

Explosion and Fire Hazards

One of the main hazards at an AD plant is the risk of explosion. The mixture of gases can form an explosive atmosphere under certain conditions. Such explosive atmospheres can ignite and cause extensive damage.

Malpractice - Operative Health and Safety

Hazards due to bad work practice from those involved in the plant or other unauthorised persons.

Activities associated with the operational phase could have ***negative, moderate to significant, long-term*** effects on human health in the absence of mitigation.

Major Accidents

Under the Control of Major Accident Hazards Involving Dangerous Substances (COMAH) Regulations 2015 (S. L No. 209 of 2015), P2 Flammable gases (methane) are subject to a threshold quantity of 10 tonnes meaning that any biogas facility storing less than 10 tonnes of Methane will fall outside of the COMAH Regulations. At full operation, the Proposed Development will store less than 3.72 tonnes of flammable gas, and is, therefore not a COMAH regulated site.

Potential operational phase effects in the absence of mitigation are summarised in **Table 6.13**.

Table 6.13 – Operational 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. Projected	**Neutral**	**Imperceptible**	**Long-term**

		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.	**Negative**	**Moderate**	**Long-term**
Human Health (On-Site)	High	Fugitive Emissions	**Negative**	**Moderate to significant**	**Long-term**
		Hazardous Substances			
		Biological Agents			
		Electrical Hazards			
		Mechanical Hazards			
		Gas Hazards			
		Explosion and Fire Hazards			
		Malpractice - Operative Health and Safety			
		Major Accidents			

6.7 Mitigation Measures

6.7.1 Construction Phase

Potential effects during the construction phase will be minimised through the implementation of the Construction Environmental Management Plan.

6.7.1.1 Population

It is considered that the Proposed Development is unlikely to generate any significant adverse impact on the demography of the area, either during the construction phase or the operational phase, and will have positive economic effects. Therefore, no mitigation measures are required during the operational phase.

6.7.1.2 Employment

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

6.7.1.3 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 would actually have positive economic effects. Therefore, no further mitigation measures are required.

6.7.1.4 Installation of Gas Pipeline

The trenches will be backfilled shortly after excavation following the installation of each section of gas pipeline.

Any Asphalt waste material will be correctly segregated and disposed of by a licenced contractor, therefore limiting the risk to human health.

The final pipeline will be designed, consented and delivered by Gas Networks Ireland in accordance with the following standard: *I.S. 328 2021 Gas transmission — Pipelines and pipeline installations.*

6.7.1.5 Human Health

Adverse health and safety effects during the construction phase will be minimised through the implementation of the Construction Management Plan on site.

6.7.2 Operational Phase

Potential effects to the local population, employment and community are neutral to positive hence no mitigation measures are recommended for these receptors. The following measures are recommended for human health.

6.7.2.1 Human Health

Pest Control

Actions and Procedures

Pest control will be regularly carried out and results of bait station checks recorded. The management of the facility will be responsible for the pest program including the chemicals used or actions carried out by independent pest control companies. The activity records of bait stations checks are to be clear and unambiguous and must include any follow up action including preventive measures required by the management.

Chemicals

Any pest control chemical held at the establishment shall be in a clearly designated secure cabinet or facility used only for pest control. The keys to this facility are to be controlled and limited as far as possible. Persons issued with keys are to be nominated in the standard operating procedure. Chemicals used shall be approved and used only in accordance with the instrument of approval.

Physical Barriers

Physical barriers prevent pests entering buildings or eliminate their presence. The barrier must be effective and usually a combination of deterrents is required to achieve the purpose. The effectiveness of these barriers is a key indicator of the effectiveness of the company preventative maintenance program such as self-closing doors mounted in such a way that light cannot be seen between the rubber door seal and the floor or door jam.

Cleaning, Sanitation and Housekeeping

A broad scope cleaning and sanitation program is necessary to control and prevent pests and vermin presence within the establishment.

The Cleaning and Sanitation standard operating procedure should include:

- Removal of food sources which may attract pests and vermin in production and storage areas and operatives' amenities and compete with baits.
- Cleaning pools of water remaining on the floor of reception building and amenities after the cleaning operation to provide a dry environment.
- Cleaning of high-traffic personnel thoroughfares during the day and at the end of the shifts Boot cleaning facilities associated with reception building should be provided to prevent material being carried outside.
- Cleaning of the operatives' lunchroom after each main work break and again at the end of the production shift.
- Routine cleaning of personnel lockers.

Corrective Action

Corrective action for pest and vermin control shall incorporate relevant parts of this program and needs to be specific to each establishment. Must include what is to be done if pests or vermin are detected.

Responsibilities

The On Plant Supervisor is responsible for:

- Recommending the establishment pest control standard operating procedure.
- Monitoring the effectiveness of the pest control standard operating procedure.
- Monitoring chemical usage.

Fugitive Emissions

The following design specifications can help minimise the risks associated with the hazard of biogas escaping:

- Make all civil and process works as gas tight as possible.
- Automatic flare system (to safely combust biogas during mechanical outages).
- Over-pressure release device on all digestion tanks and pipework.
- All digestate storage tanks gas-tight.
- Appropriate, calibrated measuring devices.
- Feedstock Reception Building maintained under negative pressure.

Hazardous Substances

The OSH Framework Directive (89/391/EEC) lays down the obligation of employers to evaluate the risks to the safety and health of workers which includes the following:

- General principles of prevention.
- Elimination of risks and accidents.
- Informing, consultation and balanced participation and training of site operatives.
- Permit-to-work system verifying operatives aware of SOP's.
- Material Safety Data Sheet recorded and maintained.

Biological Agents

High levels of cleanliness, adequate ventilation and appropriate personal protection equipment will minimise operatives' exposure to biological agents.

Electrical Hazards

Electrical works to only be undertaken by suitably qualified personnel.

Standard Operating Procedures to ensure that electrical items are isolated prior to work.

Inclusion of appropriate earthing protection throughout the plant.

Electrical equipment correctly rated for the specific operating environment.

Mechanical Hazards

Most of the risks related to mechanical hazards can be reduced to acceptable levels by applying a risk reduction strategy. If this is impossible, the hazards must be isolated from people by guards that maintain a safety distance between the danger zone and the people, with the main result being to reduce access to the danger zone.

Gas Hazards

The workplace exposure limit is the time weighted average concentration of a substance in air at the workplace over a specified reference period at which no acute or chronic harm to the health of employees is expected to be caused. Actions to prevent gas related illness and injuries include:

- Adequate signage demarcating potentially gaseous atmospheres.
- Permit-to-work system.
- Calibrated and functioning detection devices.
- Adequate employee education and refresher courses.
- Limited work scheduled in confined spaces.

Explosion and Fire Hazards

Explosive atmospheres are mitigated by the following forms of protection:

- Primary Explosive Protection: Prevention of formation of explosive atmosphere (i.e. maintain inert atmosphere via ventilation).

- Secondary Explosive Protection: Prevention of ignition (i.e. zones of prohibited mobile phone use/ignition).
- Tertiary Explosive Protection: Reduction of explosion consequences (i.e. PPE, explosion suppression, evacuation procedure).
- Adequate earthing and lightning protection where necessary.

Malpractice – Operative Health and Safety

Prior to commissioning of the facility detailed standard operating procedures (SOPs) will be drafted which will be implemented during operation of the facility. In accordance with the 'Safety Health and Welfare at Work Act', 2005; 'the Safety, Health and Welfare at Work (Construction) Regulations, 2001' and associated Regulations, a site-specific Safety Statement will be produced which will incorporate all operating procedures at the facility. The site will operate under ISO 45001 management system.

The following measures will be implemented at the facility to minimise the potential for emergency situations:

- All on-site personnel will be adequately trained in relevant areas of employment.
- The facility design will be regularly reviewed for potential safety hazards.
- The facility will be designed to incorporate standby/backup plant in emergency situations.
- Adequate fire detection and fire-fighting infrastructure will be incorporated into the site design.
- All staff will be supplied with appropriate personal protective equipment (PPE).

6.8 Cumulative Effects

The potential cumulative effects of the Proposed Development on Population and Human Health have been considered in conjunction with the ongoing changes in the surrounding area. Visits to the Proposed Development and surrounding area and desk-based review of online planning files have been undertaken to identify the existing pattern of development, nearby uses, and any permitted / ongoing developments of relevance to the current proposals in the context of Population and Human Health.

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

Air Odour and Climate

The assessment of the effects on Air, Odour and Climate (Chapter 9) has established that the emissions to atmosphere during the construction and operational stages will not affect human health.

Air dispersion modelling was completed to evaluate the potential effects of the planned development regarding EU ambient air quality standards which were established with the objective of protecting human health. As shown by the model results, projected ambient concentrations including background levels fall within all National and EU ambient air quality limit values and, thus, will have no effect on human health.

The predicted levels show that additional mitigation, other than the proposed Odour Treatment System, is not required.

Construction and operation phase mitigation measures are outlined in **Chapter 9: Air, Odour & Climate**.

Noise and Vibration

The assessment of the effects on Noise and Vibration (Chapter 10) has established that the noise emissions during the construction and operational stages will not affect human health.

Construction and operation phase mitigation measures are outlined in **Chapter 10: Noise and Vibration.**

6.8.1 Construction Phase

The mitigation measures outlined in the CEMP and above 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.

6.8.2 Operational Phase

The cumulative effects on the local Population and on Human Health for the operational phase of the Proposed Development arise primarily from a slight increase in demand for services in the area, and due to increased employment in the area in combination with wider trends of increasing employment. By taking the mitigation factors into account and promoting sustainable use of all material assets this will help with the anticipated increase in the demand for local services and resources. Given the nature and scale of this development any potential cumulative effects of this Proposed Development will be minor.

6.9 Residual Effects

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 effects on the surrounding populations.

6.9.1 Population

The Proposed Development will have no likely significant adverse effects, whether direct or indirect, on the population of the surrounding areas during the construction or operational phases.

Both direct and indirect employment will be created during the construction and operational phases of the development and as such the proposal will provide a significant economic benefit to the population of the surrounding area.

Following implementation of the mitigation measures proposed in **Section 6.7**, the residual impacts are anticipated to be ***positive, slight to moderate, long-term*** effects on the local population.

6.9.2 Employment

The Proposed Development will give rise to new employment opportunities in terms of the direct employment during the construction phase. There would also be indirect employment

opportunities arising from the construction work taking place as a result of this proposal. These opportunities would include an increase in business for local services such as builders' suppliers as well as shops and other such tertiary industries.

The Proposed Development will provide for a significant gain to the area in terms of employment provision.

Following implementation of the mitigation measures proposed in **Section 6.7**, the residual effects are anticipated to be ***positive, moderate to significant, long-term*** effects on local employment.

6.9.3 Community

It is considered that the Proposed Development is unlikely to generate any adverse effect on the demography of the area either during the construction phase or the operational phase and would actually have positive economic effects.

Following implementation of the mitigation measures proposed in **Section 6.7**, the residual effects are anticipated to be ***neutral, slight, long-term*** effects on the local community.

6.9.4 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.

The various human health parameters discussed in this chapter also interact with many other aspects of the environment. The residual effects in relation to these aspects are detailed in the individual chapters as follows:

- Chapter 9 – Air, Odour and Climate.
- Chapter 10 - Noise and Vibration.

Following implementation of the mitigation measures proposed in **Section 6.7**, the residual effects are anticipated to be, ***neutral, slight, long-term*** effects on Human Health.

6.9.5 Residual Impact Summary

The overall impact 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***.

6.9.6 Monitoring

6.9.6.1 Population

No post development monitoring measures concerning population will be necessary.

6.9.6.2 Employment

No post development monitoring measures concerning population will be necessary.

6.9.6.3 Community

No post development monitoring measures concerning population will be necessary.

6.9.6.4 Human Health

Pest Control

Following implementation of the mitigation measures proposed in **Section 6.6**, the residual effects are anticipated to be ***negative, slight, and long-term*** effects in relation to Pest Control.

Other

The monitoring requirements in relation to Human Health aspects are detailed in the individual chapters as follows:

- Chapter 9 – Air, Odour and Climate
- Chapter 10 – Noise and Vibration

Following implementation of the mitigation measures proposed in **Section 6.7**, the residual effects are anticipated to be, ***negative, slight, and long-***term with respect to Human Health.

6.10 Summary of Significant Effects

The aspects of the environment considered for this assessment are 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.

6.11 Statement of Significance

The significance of impact upon the Population, Employment, Community, and Human Health have been assessed for during both the construction and operational phases.

Where a potential impact has been identified, the significance of impact upon these receptors ranges from minor to moderate.

Where a potential effect has been identified, mitigation measures have been provided which once implemented reduce the significance of impact to ***' negligible'.*** The mitigation steps are presented in **Section 6.7.**

7 Land, Soils and Geology

7.1 Introduction

This chapter comprises an assessment of the soils and geology within the vicinity of the site and the surrounding environs. The potential impacts posed by the construction and operational phases of the Proposed Development are investigated, and suitable mitigation measures are recommended to minimise impacts on the local soil & geological receptors.

The objectives of this chapter are:

- To provide a baseline assessment of the receiving environment in terms of soils and geology.
- To identify any potential negative impacts 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 impacts posed by the Proposed Development.

7.2 Consultation

ORS have been commissioned to assess the potential impacts of the Proposed Development in terms of land, soils, geology and hydrogeology during the construction and operational phases.

The principal members of the ORS EIA team involved in this assessment include the following persons:

- **Project Scientist & Lead Author:**
  Jack Wilton – B.Sc. (Microbiology), M.Sc. (Environmental Sustainability). Current Role: Environmental Consultant. Experience *ca*. 2 years

- **Project Scientist Reviewer:**
  Cathal Tighe – B.Agr.Sc (Agricultural-Environmental Science). Current Role: Senior Environmental Consultant. Experience *ca*. 5 years

- **Project Coordinator & Reviewer:**
  Oisín Doherty – B.Sc. (Geography with Environmental Science), MSc. (Environmental Management), CEnv, MIEnvSc. Current Role: Chartered Environmental Consultant. Experience *ca.* 14 years.

Consultation between ORS and other members of the planning/design team was made in order to obtain information required to assess the potential construction and operational phase impacts on local land, soils, and geology.

7.3 Assessment Methodology & Significance Criteria

The methodology used to produce this chapter included a review of relevant legislation and guidance, a desk study, a site walkover, an intrusive investigation (in the form of trial pits, and laboratory tests), an evaluation of potential effects, an evaluation of significance of the effect

and an identification of measures to avoid and mitigate effects.

This chapter was carried out in accordance with the following guidance documents:

- EPA, (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- EPA, (2004). Land spreading of Organic Waste – Guidance on Groundwater Vulnerability Assessment of Land.
- EPA, (2004). Guidance Note on Storage and Transfer of Materials for Scheduled Activities.
- EPA, (2012). Guidance to Licensees on Surrender, Cessation and Closure of Licensed Sites.
- European Commission, (2017). Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report.
- Institute of Geologists Ireland, (2013). Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements.
- National Road Authority, (2008). Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- Transport Infrastructure Ireland, (2019). Cross Sections and Headroom, Design Standards (DN-GEO-03036)
- CIRIA, (2001). C532 - Control of Water Pollution from Construction Sites – Guidance for consultants and contractors.
- UK CIRIA Report C552 (2001). Contaminated Land Risk Assessment: A Guide to Good Practice
- IGI, (2002). Geology in Environmental Impact Statements – a Guide (Institute of Geologists of Ireland.
- Department Agriculture, Food & Marine, (2017). Nitrate Explanatory Handbook for Good Agricultural Practice For The Protection Of Waters Regulations 2018
- DAFM, (2022). Code of Good Practice for Poultry Litter Hauliers - Legal Obligations and Good Practice Guidelines for Poultry Litter Hauliers in Relation to the Use and Disposal of Poultry Litter.
- Nitrates Directive (91/676/EEC)
- Groundwater Directives (80/68/EEC) and (2006/118/EC).
- EU Soil Strategy 2030
- EU Common Agricultural Policy
- Waste Management Act 1996.
- Möller, K., and Müller, T. (2012). Effects of anaerobic digestion on digestate nutrient availability and crop growth: a review. Engineering in Life Sciences, 12(3), 242-257.
- Doyeni MO, Stulpinaite U, Baksinskaite A, Suproniene S, Tilvikiene V. (2021) The Effectiveness of Digestate Use for Fertilization in an Agricultural Cropping System. Plants (Basel). 2021 Aug 22;10(8):1734.

7.3.1 Desktop Study

A desk study was undertaken in order to collate and review background information in advance of the site survey and to develop a baseline of the land, soil and geology. The following documents and sources were referenced:

- Geological Survey of Ireland (GSI) maps and datasets
- Environmental Protection Agency (EPA) maps and datasets

- National Parks and Wildlife Service (NPWS) maps and datasets
- Ordnance Survey of Ireland (OSI) maps and datasets
- Met Eireann meteorological data
- Office of Public Works (OPW) maps and datasets
- Cork County Development Plan (CDP) 2022-2028
- Strategic Environmental Assessment CDP 2022-2028
- Review of the County Geology of Ireland: Cork
- Aerial Photography from ESRI (ArcGIS).
- 1:50,000 Discovery Series Maps and 6" maps
- South Western River Basin District River Basin Management Plan (DoEHLG)
- Teagasc ISIS GIS maps
- General Soil Map of Ireland 2nd Edition, (1980), The National Soil Survey, An Fóras Taluntais
- An Foras Talúntais (1980). Soil associations of Ireland and their land use potential.

7.3.2 Field Survey

Fieldwork commissioned December 2023 consisted of the following elements:

- Trial Pit Excavations
- BRE Digest 365 Percolation/Soakaway Testing

A site walk-over was conducted by ORS geotechnical consultants on the 12th of December 2023 to verify the finding of the desktop study and identify baseline features on site including:

- Drainage patterns and distribution
- Exposures
- Drainage Infrastructure
- Flora and fauna identification and distribution
- Identification of "Poached" ground.

7.3.3 Impact Assessment Methodology

Chapter 1: Introduction, **Section 1.7** and **1.8**, outlines the impact assessment methodology and rationale applied to each chapter of the study. This section describes some further criteria applied to the assessment of soil and geological receptors.

Risk Appraisal Methodology

The Conceptual Site Model (CSM) identifies potential contaminants, receptors and exposure pathways that may be present based on the construction and operational phase of the Proposed Development. The identification of potential "contaminant linkages" is a key aspect of the evaluation of potentially contaminated land. As such this assessment has been undertaken in line with the Source - Pathway - Receptor Model as per the "Guidelines on the information to be contained in Environmental Impact Assessment Reports" 2022 and IGI 2013 guidance notes. At the impact assessment stage, any potential beneficial or adverse impacts associated with the development are identified and assessed with reference to the baseline environment. This requires consideration of:

- Quality of effects (sensitivity of receptor)
- Significance of effects (severity)
- Description of extent and context of effects (character/ magnitude)
- Probability of effects
- Duration and frequency of effects
- Type of effect (direct, indirect, residual, etc.)

Table 1.1 in **Chapter 1** presents the criteria for the description of effects, as outlined in the EPA guidance report 2022.

Evaluation of Geological Receptors

The 13-step approach to impact assessment proposed in the IGI guidelines (2013) is adopted for the evaluation of potential effects. The baseline environment is assessed by characterising the site topographical, geological and geomorphologic regimes from the data acquired. Following on from the identification of the baseline environment, the available data is utilised to identify and categorise potential effects on the soils and geological environment as a result of the Proposed Development.

These assessments include:

- Undertaking preliminary materials calculations in terms of volumetric soil and subsoil excavation and reuse associated with development design,
- Assessing ground stability risks,
- Assessing the combined data acquired and evaluating any likely effects on the soils, geology, and ground stability,
- Identifying effects and considering measures that would mitigate or reduce the identified effect.

The significance of effects of the Proposed Development has been assessed in accordance with the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, 2022. The effects associated with the Proposed Development are described with respect to the EPA guidance in the relevant sections of this chapter.

Magnitude and Significance of Impact

An impact rating has been developed for each of the phases of the Proposed Development based on the Institute for Geologists Ireland (IGI) Guidance for the preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements. In line with the IGI Guidance the receiving environment (Geological Features) was first identified. Using the National Road Authority (NRA) (2008) rating criteria the importance of the geological features is rated in **Table 7.1** followed by an estimation of the magnitude of the impact (**Table 7.2**). This determines the significance of the impact prior to application of mitigation measures as set out in **Table 7.3**.

Table 7.1: Sensitivity/ Value of the Site's Geological Features (NRA, 2008)

Magnitude	Criteria	Example
Very High	Attribute has a high quality, significance, or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying the site is significant on a national or regional scale	Geological feature on a regional or national scale (NHA). • Large existing quarry or pit. • Proven economically extractable mineral resource
High	Attribute has a high quality, significance, or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying the site is significant on a local scale	Contaminated soil on site with previous heavy industrial usage • Large recent landfill site for mixed wastes • Geological feature of high value on a local scale (County Geological Site) • Well drained and/or high fertility soils • Moderately sized existing quarry or pit • Marginally economic extractable mineral resource
Medium	Attribute has a medium quality, significance, or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and/or soft organic soil underlying the site is moderate on a local scale	Contaminated soil on site with previous light industrial usage • Small recent landfill site for mixed wastes • Moderately drained and/or moderate fertility soils • Small existing quarry or pit • Sub- economic extractable mineral resource
Low	Attribute has a low quality, significance, or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying the site is small on a local scale	Large historical and/or recent site for construction and demolition wastes • Small historical and/or recent landfill site for construction and demolition wastes • Poorly drained and/or low fertility soils • Uneconomic extractable mineral resource

The assessment of the severity/ magnitude of an impact incorporates the timing, scale, size, and duration of the potential effect. The magnitude criteria for geological effects are defined in **Table 7.2**.

Table 7.2: Severity/ Magnitude of Impact on Geological Features (NRA, 2008)

Magnitude	Criteria	Description & Example
Large Adverse	Results in loss of attribute	• Loss of high proportion of future quarry or pit reserves • Irreversible loss of high proportion of local high fertility soils • Removal of entirety of geological heritage feature • Requirement to excavate / remediate entire waste site • Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	• Loss of moderate proportion of future quarry or pit reserves • Removal of part of geological heritage feature • Irreversible loss of moderate proportion of local high fertility soils • Requirement to excavate / remediate significant proportion of waste site • Requirement to excavate and replace moderate proportion of peat, organic soils
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	• Loss of small proportion of future quarry or pit reserves • Removal of small part of geological heritage feature • Irreversible loss of small proportion of local high fertility soils and/or • high proportion of local low fertility soils • Requirement to excavate / remediate small proportion of waste site • Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes
Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature

Based on the determination of the findings from the above **Tables** (**7.1** and **7.2**) the following matrix is used to establish the significance of the impact.

Table 7.3: Rating the Significance of the Impact in Geology (NRA, 2008)

Importance of Attribute	Magnitude of Impact			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Very High	Imperceptible	Significant/ Moderate	Profound/ Significant	Profound
High	Imperceptible	Moderate/ Slight	Significant/ Moderate	Profound/ Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/ Moderate

7.4 Description of the Receiving Environment

7.4.1 Background

This section of the chapter provides the baseline information in terms of geomorphology (landscape and topography), superficial and solid geology. The regional review of geological and hydrogeological conditions covers a zone of at least 2 km from the Proposed Development site, as suggested in the IGI guideline.

The Proposed Development occupies a total area of 5.61 ha (13.86 acres) and is situated in Corracunna, Coolnanave and Garrane, Mitchelstown, County Cork. The Proposed Development is situated to the south of Derra Farms Limited (Industrial Emissions License: P0494-01) with agricultural land to the north, east and south of the site. The Mallow-Dublin / N73 national secondary road is located to the south of the site. The N73 is elevated above topography of the agricultural land to the southeast of the site. A drainage channel lies adjacent to the eastern boundary of the site and flows to the southwest. This drainage channel is unmapped by the EPA and acts as drainage for the surrounding landscape. The Proposed Development lies approximately 2km northeast of Mitchelstown town centre. The site is partially brownfield and contains a former piggery and disused agricultural buildings. The rest of the site is greenfield agricultural pasture.

A number of trees are present on site. Two mature trees are located slightly north of the centre of the site. Removal of these trees will be necessary to complete the construction works. A line of trees exists along the southern boundary of the site, which will be retained in the final development. The southwest boundary of the site is composed of vegetative overgrowth. The disused piggery and dilapidated structures which exist at the southwestern boundary of the site will be demolished as part of the construction works. These structures are composed primarily of concrete, with metal support structures and sheet metal roofs, which have collapsed in some areas. Some ponding has occurred to the south of the delipidated structures. The pond exhibits signs of significant eutrophication which was noted during the initial site walkover.

The underlying geology has a major influence on topographical, hydrogeological and hydrological features within the vicinity of the Proposed Development, hence this chapter is closely linked to **Chapter 8 – Hydrology & Hydrogeology**.

The receiving environment is described below for the Proposed Development under the following headings:

- Topography
- Drift (Quaternary) Geology
- Bedrock Geology
- Soils & Subsoils

7.4.2 Topography

County Cork has a varied and unique landscape. It includes a diversity of landscape types, ranging from coast and lakes to peatlands, farmlands, fertile lowland valleys, forests and uplands. The range of different landscapes found in Co. Cork each have varying visual and amenity values, topography, exposure and contain a variety of habitats. Each landscape type also has varying capacity to absorb development relative to its overall sensitivity.

The Landscape Character Assessment undertaken as part of the Cork CDP 2022-2028 has divided the county into 16 no. Landscape Character Units based on the local landscape features and is further differentiated into twenty-six no. sub-types. The proposed site is situated within landscape unit 5 – "*Fertile Plain with Moorland Ridge*". The topography is described as being *"a low-lying landscape, which comprises an extensive area of predominantly flat or gently undulating topography"*. This landscape unit is assigned a very high landscape value and sensitivity and is considered of County importance, which qualifies it as a High Value Landscape (HVL).

These sub-types are outlined in **Table 7.4**, as per the Landscape Character Assessment of the Cork County Development Plan 2022-2028.

Table 7.4: Landscape Character Assessment of County Cork

ID	Landscape Character Type	Landscape Value	Landscape Sensitivity	Landscape Importance
1	City Harbour and Estuary	Very High	Very High	National
2	Broad Bay Coast	Very High	Very High	County
3	Indented Estuarine Coast	Very High	Very High	National
4	Rugged Ridge Peninsulas	Very High	Very High	National
5	Fertile Plain with Moorland Ridge	Very High	Very High	County
6a	Broad Fertile Lowland Valleys	High	High	County
6b	Broad Fertile Lowland Valleys	Medium	Medium	Local
6c	Broad Fertile Lowland Valleys	Medium	Medium	Local
7a	Rolling Patchwork Farmland	Medium	Medium	County
7b	Rolling Patchwork Farmland	Medium	Medium	Local
8	Hilly River and Reservoir Valleys	High	High	National
9	Broad Marginal Middleground and Lowland Basin	Low	Medium	Local
10a	Fissured Fertile Middleground	Low	Low	Local
10b	Fissured Fertile Middleground	Medium	High	County
11	Broad Marginal Middleground Valley	High	High	Local
12a	Rolling Marginal and Forested Middleground	High	High	Local
12b	Rolling Marginal and Forested Middleground	Medium	Medium	Local
13a	Valleyed Marginal Middleground	High	High	County
13b	Valleyed Marginal Middleground	Medium	Medium	Local
14a	Fissured Marginal and Forested Rolling Upland	Medium	Medium	Local
14b	Fissured Marginal and Forested Rolling Upland	Medium	Medium	Local
15a	Ridged and Peaked Upland	High	High	Local
15b	Ridged and Peaked Upland	Medium	Medium	County
16a	Glaciated and Forested Cradle Valley	High	High	National
16b	Glaciated Cradle Valleys	Low	Medium	Local
16c	Glaciated Cradle Valleys	Medium	Medium	Local

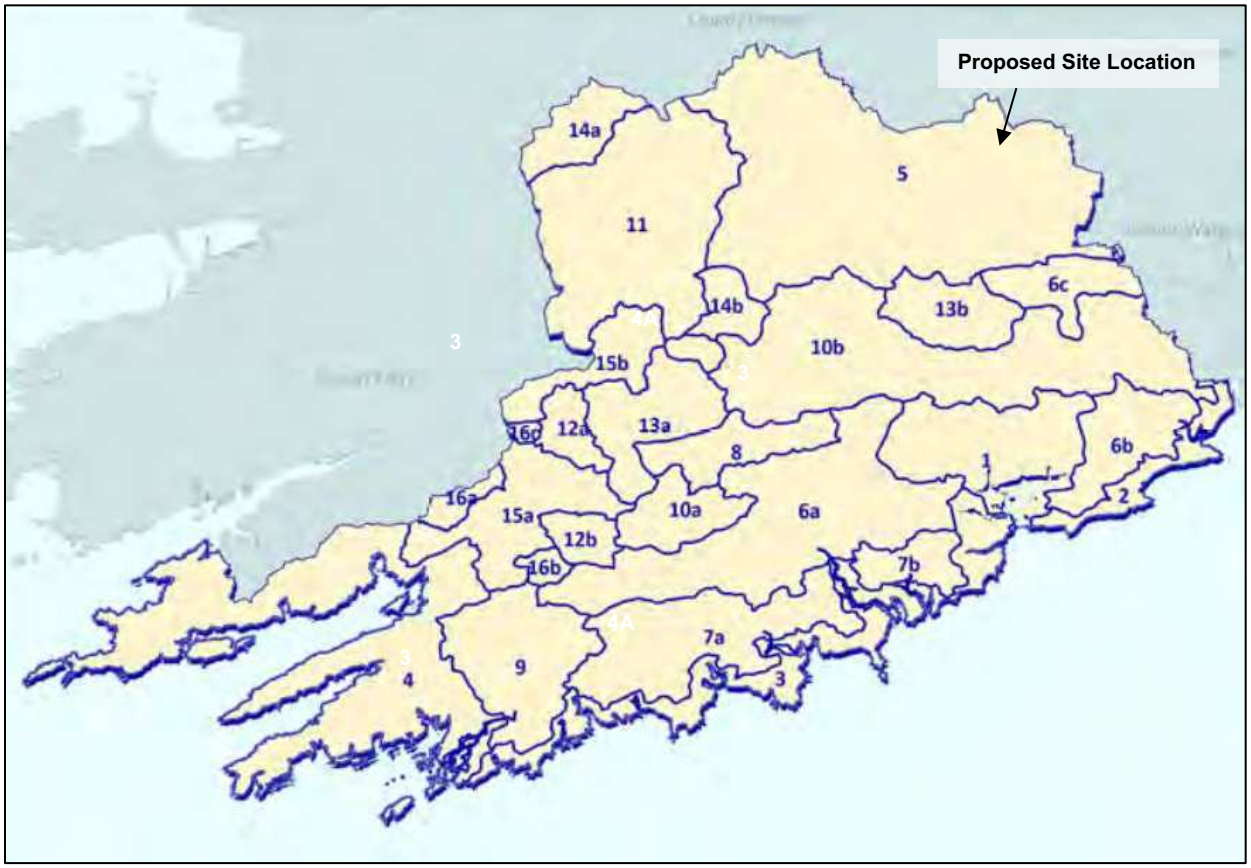


Figure 7.1: Landscape Character Types of County Cork (Appendix F of Cork CDP 2022-2028)

The location of the Proposed Development is characterised as being flat to gently undulating glacial sediments. The Funshion River is indistinguishable in **Figure 7.1**. A peak in the site topography, 107.5m OD, is situated along the northwest boundary of the site with a gradual gradient to the southeast to a low of 96.5m OD slightly north of the southern boundary of the Proposed Development before rising to 98m OD along the southern boundary. The landscape in the immediate area surrounding the development site has a gently undulating character, with slight variations in topography which is in keeping with the landscape character assessment of the site. To the northwest of the peak the land rises in a relatively steep gradient continuing towards the northwest, with an elevation of 131m OD just south of the Funshion River.

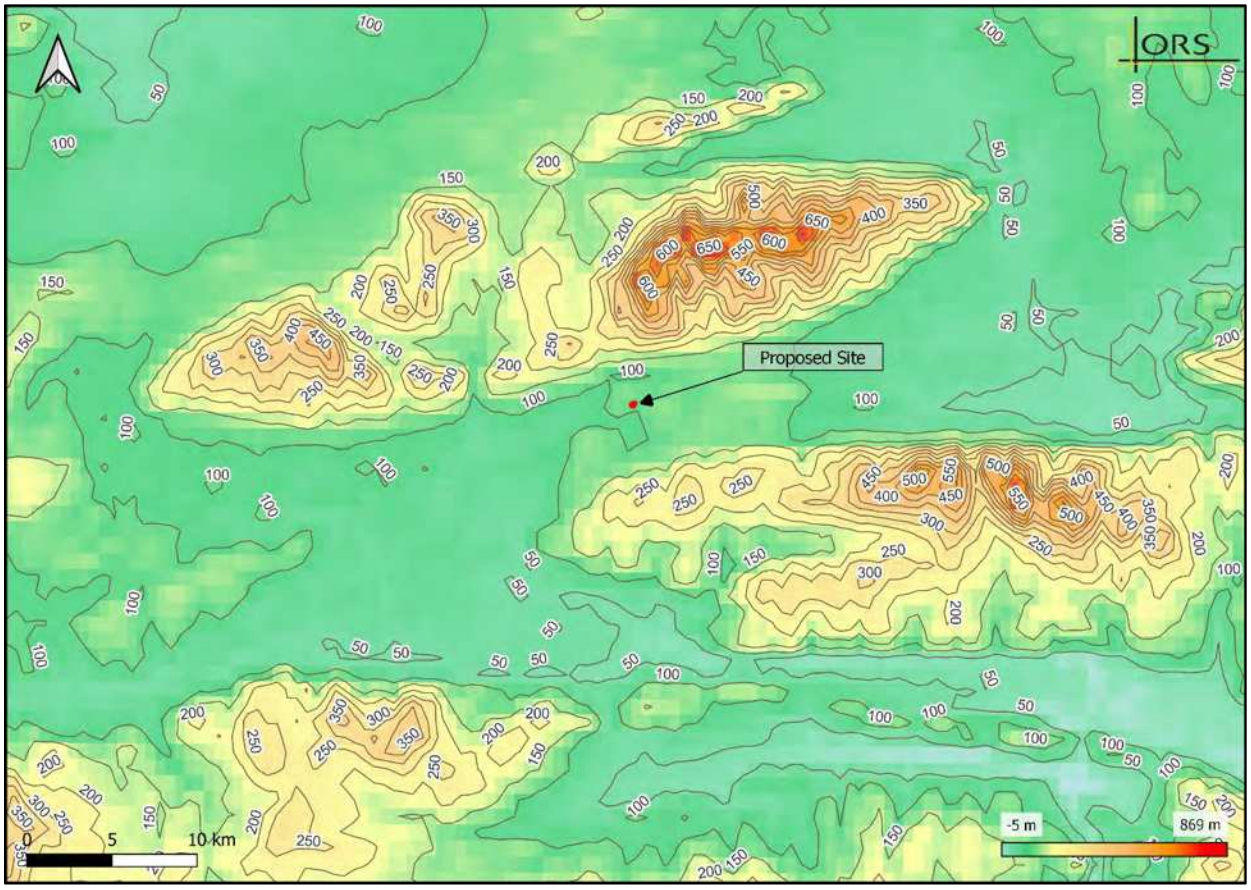


Figure 7.2: Topographical map of the landscape surrounding the site

7.4.3 Receptors

Designated Sites

Figure 7.3 displays the spatial distribution of the Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Natural Heritage Areas (NHA) within the wider region. SAC are prime wildlife conservation areas in the country which are considered to be important on a country and European scale. Sites are selected and designated under the EU Habitats Directive and have been transposed into Irish law under EC (Birds and Natural Habitats) Regulation 2011 (S.I. No. 477/ 2011). Likewise, an SPA is an area selected for conservation due to its importance in the protection of rare or vulnerable bird species, migratory species, and wetlands. Sites are selected and protected under the EU Birds Directive.

There are no designated sites within the 2km study area surrounding the Proposed Development. The closest sites are Galtee Mountains SAC located *ca.* 2.9km north and 4.7km south of the Proposed Development and the Glenacurrane River Valley pNHA located *ca.* 3.1km northwest.

Table 7.5: Protected Areas within 2km study area

Name	Site Code	Designation	Reason for Protection
No designated sites	N/A	N/A	N/A

Taking into consideration the 'Source-Pathway-Receptor' model, the closest waterbody, the drainage channel located adjacent to the eastern site boundary, is likely to act as a pathway and receptor for pollution associated with the Proposed Development in the absence of mitigation measures. The land drainage flows to the southwest and follows the existing land drainage to the north of the N73. Gradoge River is situated *ca.* 1.6km southwest of the Proposed Development. Given the distance of the river from the Proposed Development, it is unlikely that the Gradoge River would act as a pathway / receptor.

An appraisal of the potential effects of the Proposed Development on the constitutive characteristics of European sites identified within 15km of the Proposed Development is set out in the Natura Impact Statement which accompanies the planning application for this project.

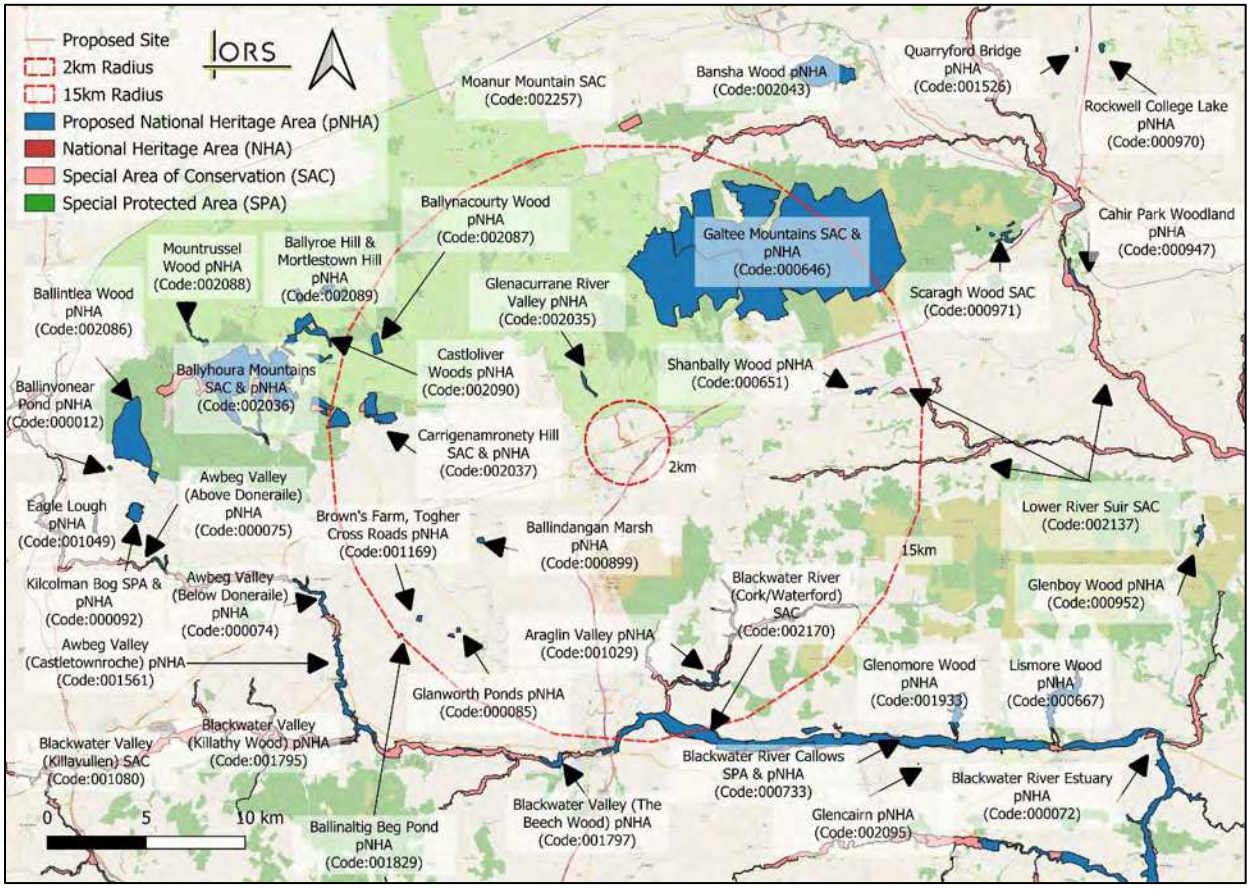


Figure 7.3: SPA, SAC & NHA sites within 2.5km & 15km radius of site

Geological Heritage

The Irish Geological Heritage (IGH) Programme identifies and selects a complete range of sites that represent Ireland's geological heritage under sixteen themes ranging from karst features to hydrogeology. The IGH Programme is a partnership between the GSI and the National Parks and Wildlife Service (NPWS) and sites identified as important for conservation are conserved as Natural Heritage Areas (NHA).

Reference to the GSI online database confirms the proposed site is not within a geological heritage site but that there are no designated sites within the 2 km study area of the Proposed Development. The closest site is the Galtee Mountains pNHA & SAC located *ca.* 6.3km

northeast. **Figure 7.4** below indicates the Geological Heritage Site within the wider region.

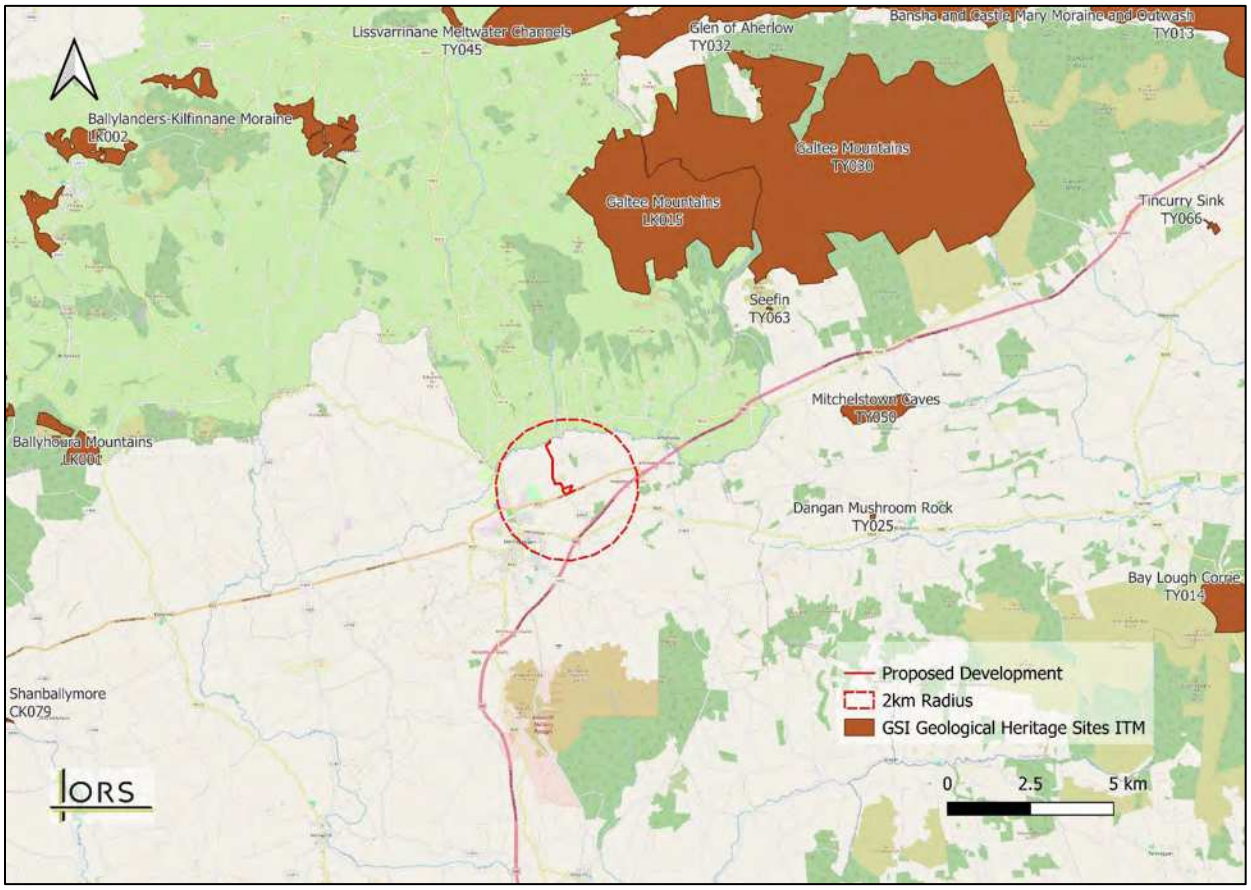


Figure 7.4: Geological Heritage Sites within the vicinity of the site

7.4.4 Drift (Quaternary) Geology

Drift is a general term applied to all mineral material (clay, silt, sand, gravel and boulders) transported by a glacier and deposited directly by or from the ice or as fluvioglacial deposits. It generally applies to deposits laid down during the Pleistocene (Quaternary) glaciations. Drift can also be included under Holocene (Quaternary) deposits. The drift geology of the area principally reflects the depositional process of the last glaciation. Typically, during the ice advance, boulder clays were deposited, sub-glacially as lodgement till over the eroded rock head surface, whilst moraine granular deposits were laid down at the glacier margins. Subsequently, with the progressive retreat of the ice sheet from the region, granular fluvio-glacial deposits were laid down in places by melt waters discharging from the front of the glacier.

The Quaternary Drift of the Proposed Development is described as till derived from Devonian sandstones (TDSs). The subsoils at the majority of the site are described as being moderately permeable and are overlain by well-drained soil. The subsoils along the southern boundary of the site and along the southern section of the adjacent watercourse are described as moderately permeable subsoil overlain by poorly drained gley soil.

The Proposed Development is located within a fertile plain with a moorland ridge according to the landscape character assessment. The area is characteristically lowland with the predominant land usage being agricultural.

The Second Edition General Soil Map of Ireland describes this region as belonging to the Rolling Lowland group of the broad physiographic divisions, comprising of Brown Podzolics with associated soils including Acid Brown Earths and Gleys. Parent material is proposed to consist of Sandstone and Lower Avonian Glacial Till. The entirety of the proposed site overlays a till derived from Devonian sandstones.

In view of the Proposed Development, the soils which are likely to be affected by the development are characteristic in the local and regional context and occur in abundance.

7.4.5 Bedrock Geology

Regional Bedrock Geology

County Cork contains a variety of geological formations dating as far back as the Devonian to the more recent Carboniferous periods, *ca.* 415 to 300 million years. The oldest geology is found in a small cluster to the northeast of the county located *ca.* 4.5km northwest of the Proposed Development, which belongs to the Silurian period *ca.* 450 Ma. Cork is composed of a variety of rock formations, originally formed as an ocean began to spread northwards over Ireland. These different formations ended up, side by side during the formation of Ireland.

Originally Ireland was composed of two ‘halves’ separated by a sea called the Lapetus, with the country split in a north-east to south-west direction from Clogher head to Dingle. The northwestern part of the island was located on the continent of Laurentia, with the southeastern part of the island located on Gondwana. The collision of these two continents and the subsequent folding of both plates resulted in the formation of the mountain ranges located throughout Ireland today, which run in a northeast to southwest axis. These ranges and their surrounds consist of ancient Dalradian metamorphic rocks. Dalradian rocks were originally sedimentary rocks laid at the edge of the Lapetus ocean which were metamorphosed during the aforementioned folding process.

Ireland is divided into a series of physical regions, which were determined by the effects of the last glaciation. The Proposed Development site is located in “the Southern Hill and Vale Province” which is an extension of the Central Plain, a large, low-lying region dominated by the Shannon basin underlaid by limestone rock and covered in glacial drift. In the east, where the drift is *ca.* 60m (197 feet) thick, the plain gently undulates but becomes thinner and more chaotic in the west forcing rivers to braid into many channels, small lakes and bogs. Occasionally, the drift is so thin that the original limestone land surface emerges producing characteristic limestone features. The best example is the Burren in county Clare.

In the “Southern Hill and Vale Province” lowland relief has been interrupted by the remnants of ancient shale plateaux. Where these have been eroded, there are flat-topped mountains with steep skree slopes, often capped by wind-swept bogs. In some areas, deep layers of slate and shale have been folded up through the limestone surface to emerge as mountain ranges. These mountains rise abruptly from the plains such as Galtee Mountains.

The Proposed Development is located between the Galtee Mountains *ca.* 6.3km to the northeast and the Knockmealdown mountains *ca.* 15km to the southeast. The Galtee

Mountains comprises a high mountain range in southwest County Tipperary, extending into southeast County Limerick. The mountains were shaped and moulded during the Quaternary (Ice Age) by glacier ice abrasion. The mountains comprise ice-scoured Devonian Old Red Sandstone bedrock. The Galtees are Ireland's highest inland mountains, and the summit of the range is covered by metres of blanket peat which has formed since the Ice Age. This peat has been cutover and eroded in places and displays high peat hags in some localities, particularly on the southern shoulder of Galtymore. The Devonian sandstones and conglomerates, which make up the Galtees, are also well displayed at outcrops.

The Knockmealdown Mountains are comprised of coarse red sandstones and gritstones, known geologically as the Old Red Sandstone. The original sandy deposits were laid down on river floors and desert sands on an ancient continent, located south of the equator, between 420 and 360 million years ago. Over millions of years, the continent drifted northwards, and the sands were petrified, forming the Old Red Sandstone encountered across northern Europe. These deposits were later covered by the Carboniferous limestones, seen in the lowlands to north and south, with characteristic fossils of tropical seas.

Figure 7.6 below indicates the regional hydro stratigraphic rock unit groups.

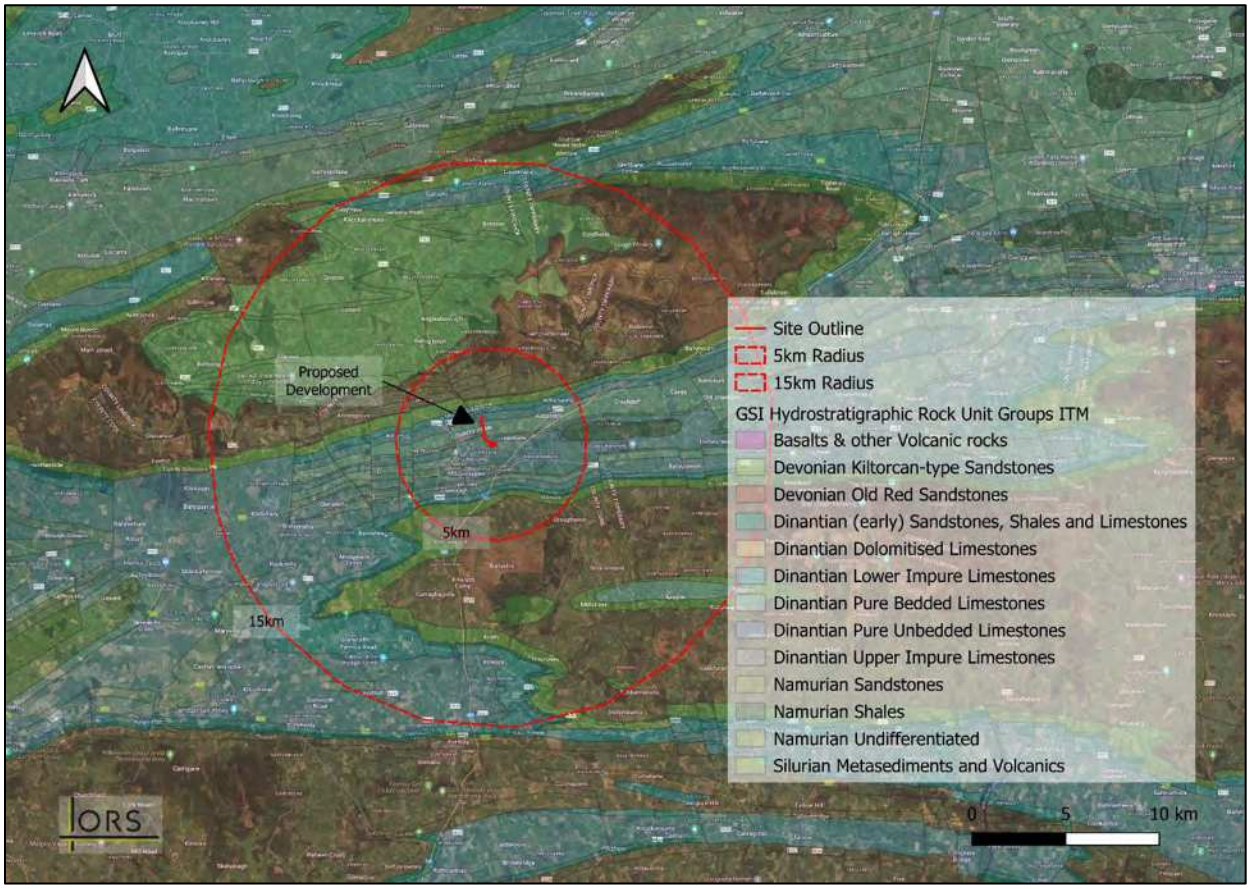


Figure 7.6: Hydro stratigraphic Rock Unit Groups Within Northern Cork (GSI)

Local Bedrock Geology

Bedrock is defined as a consolidated aggregate of minerals underlying the ground surface and any soils present. Above the bedrock is usually an area of broken and weathered

unconsolidated rock in the basal subsoil. Sedimentary rock lies in beds which may comprise different rock types and which may be horizontal or inclined, so that the rock encountered at the ground surface may change over a short distance.

According to the Geological Survey of Ireland and the National Draft Generalised Bedrock Map, the bedrock within the 2km study area of the proposed site is comprised of a number of bedrock formations which are classified as Dinantian series Carboniferous period rocks.

The formation underlying the Proposed Development is known as the Rathronan Formation. The 1:100,000 Bedrock Solid Geology Map indicates that the bedrock type in this formation is pale-grey massive mud-grade limestone. The lithological description of the formation is “typified by massive pale grey clean micrites and crinoidal wackestones with thin-bedded cherts. A resemblance to the Waulsortian facies, but mounds in this formation are dominantly algal-micrite poly-muds, which accumulated in the photic”. The formation is probably lenticular with a maximum thickness of *ca.* 300m. Exposers of the formation can be found along the south and southwest towards Ballinwillin.

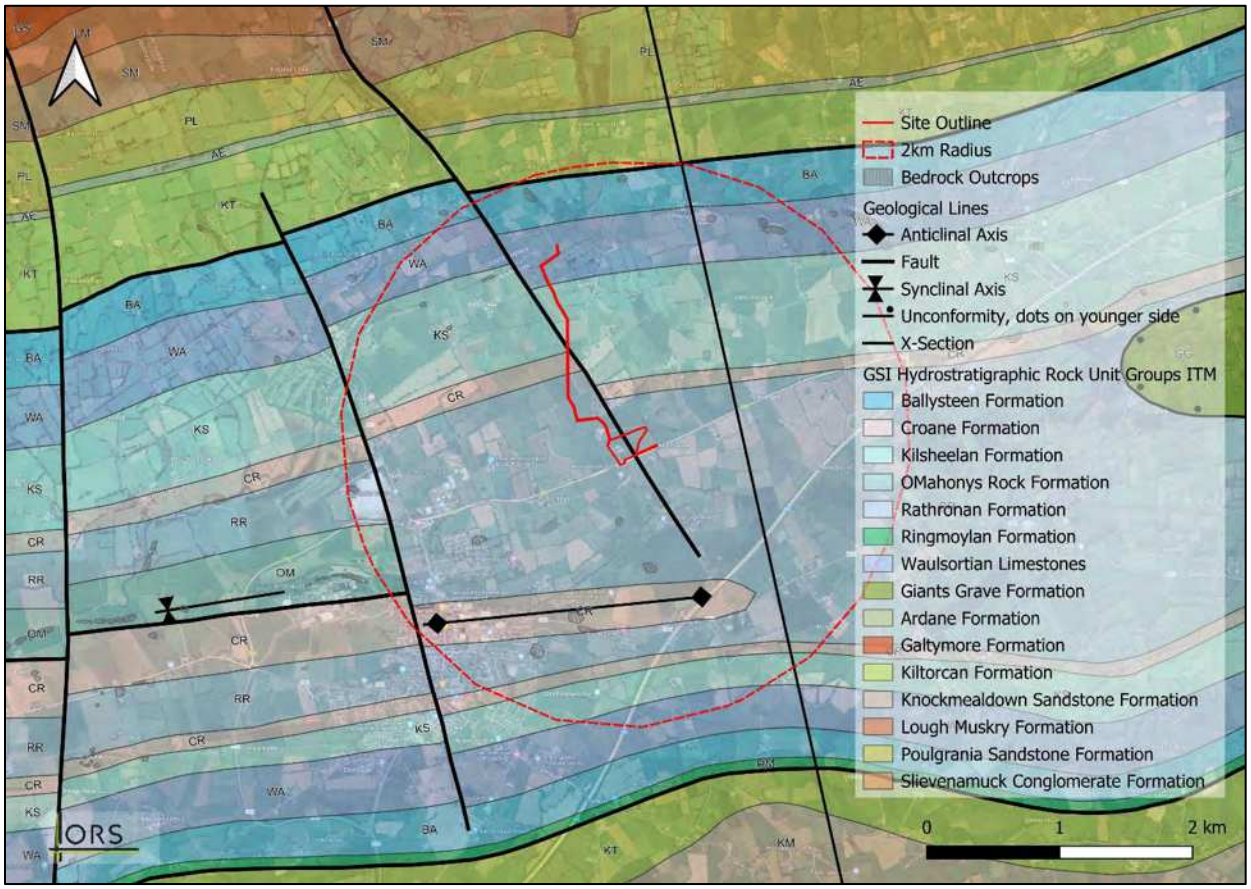


Figure 7.7 Regional Bedrock Formations (GSI)

The bedrock geology & linework on the 1:100,000 scale mapping from the GSI indicates that there are a number of geological linework (e.g. unconformity, faults etc.) within the 2km study area. The Proposed Development is located on a fault line which runs from the northwest to southeast through the centre of the Proposed Development. An additional fault line is located *ca.* 800m east of the Proposed Development. The closest unconformity is located *ca.* 250m

north of Proposed Development. The Croane Formation (Dark shaly cherty fine-grained limestone) begins along the fault line which runs through the centre of the development and runs eastwards in a long, thin bad. See **Figure 7.7**.

Depth to Bedrock

According to the GSI database, there are five groundwater wells within the 2km study area. Details of groundwater wells within 2km of the Proposed Development are outlined in **Table 7.5**. **Figure 7.8** superimposes the approximate location of the groundwater wells listed in **Table 7.5** relative to the groundwater vulnerability rating of the area. The Proposed Development boundary is marked out in red. Groundwater wells within the study area have a varying yield class from moderate to excellent. The lands on which the site location has been proposed have been assigned moderate vulnerability rating and the recorded depth to bedrock encountered for the corresponding wells in the study area are generally between 4 to 15.2 metres below ground level (bgl). The subject site is situated above the Mitchelstown Groundwater Body which is designated by the Geological Survey of Ireland (GSI) National Draft Bedrock Aquifer Map as a Regionally Important Aquifer (karstified) - (Classification reference - Rkd).

Table 7.5: Groundwater Wells with 2km of the site (GSI Well Database)

GSI Reference	Easting Northing	Well Type	Depth (m bgl)	Depth to Rock (m)	Well Use	Yield m^3/d	Proximity to site
1711SWW012	182140, 116330	Borehole	30.5	15.2	Not Defined	99	1.6km NW
1711SWW154	181830, 113050	Borehole	9.7	7.5	Agri & domestic use	Not defined	1.5km SW
1711SWW155	181740, 113050	Borehole	7	Not defined	Agri & domestic use	Not defined	1.6km SW
1711SWW149	181800, 112800	Borehole	24.4	4	Industrial use	3488	1.7km SW
1711SWW153	181830, 112750	Borehole	13	5.5	Agri & domestic use	654	1.8km SW

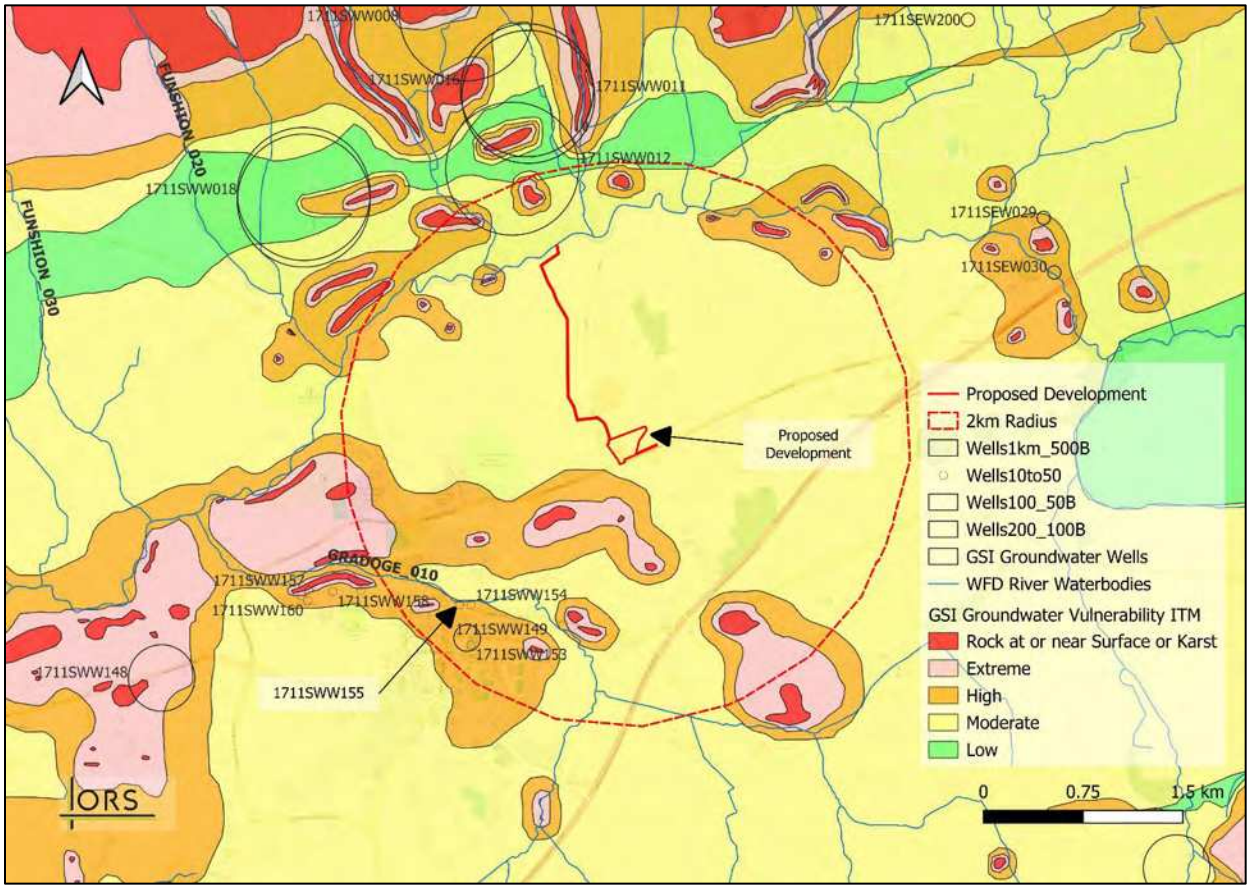


Figure 7.8: Groundwater Vulnerability and location of Groundwater Wells (GSI Maps)

Karst Features

Examples of karst landforms are widespread to the east of Mitchelstown and the wider Cork area. Karstic features are common due to the underlying pure bedded lower carboniferous age limestone bedrock known as the Dinantian Limestones (undifferentiated) Formation underlying the region *ca.* 12km west of the site, see **Figure 7.9** below. There is a high concentration of mapped karst features on the Dinantian Limestones (undifferentiated) formation.

Karst areas are characterised by landforms of dissolution. Karst aquifers can be particularly vulnerable to pollution and karst features can also give rise to flooding. **Figure 7.9** superimposes the approximate location of karstic features relative to the location of the proposed site. There are no karstic features located within the boundaries of the Proposed Development or within the immediate vicinity of the site. There are no karstic features located within the 2km study area. A sinkhole is located to the southeast out the Proposed Development, which was observed during the site characterisation assessment, see **Figure. 7.14.**

The classification of this aquifer as karstified is important as this may have implications for groundwater vulnerability. A karstified aquifer is characterised by soluble rock that has been extensively dissolved over time and as such karst aquifers are highly porous and permeable. In the event of pollutant migration through subsoil on site, the likelihood of a groundwater pollution event is increased given the high permeability of karstified aquifers.

The closest Turlough can be found 27km west of the proposed site. Northern Co. Cork has a significantly high density of karst features. In comparison to the rest of North Co. Cork the 2km study area has a low density of mapped karst features. Tracing of underground flows from swallow holes to springs has been undertaken by GSI and indicates interconnectivity between karst features *ca.* 23km to the east of the study area. No connectivity was confirmed with hydrological features within the 2km study area to date. Traced groundwater movement through karst features *ca.* 24km to the east of the Proposed Development were found to have a west to east flow, away from the development. Traced groundwater movement through karst features *ca.* 22km to the south of the Proposed Development were found to have a north to south flow, away from the development.

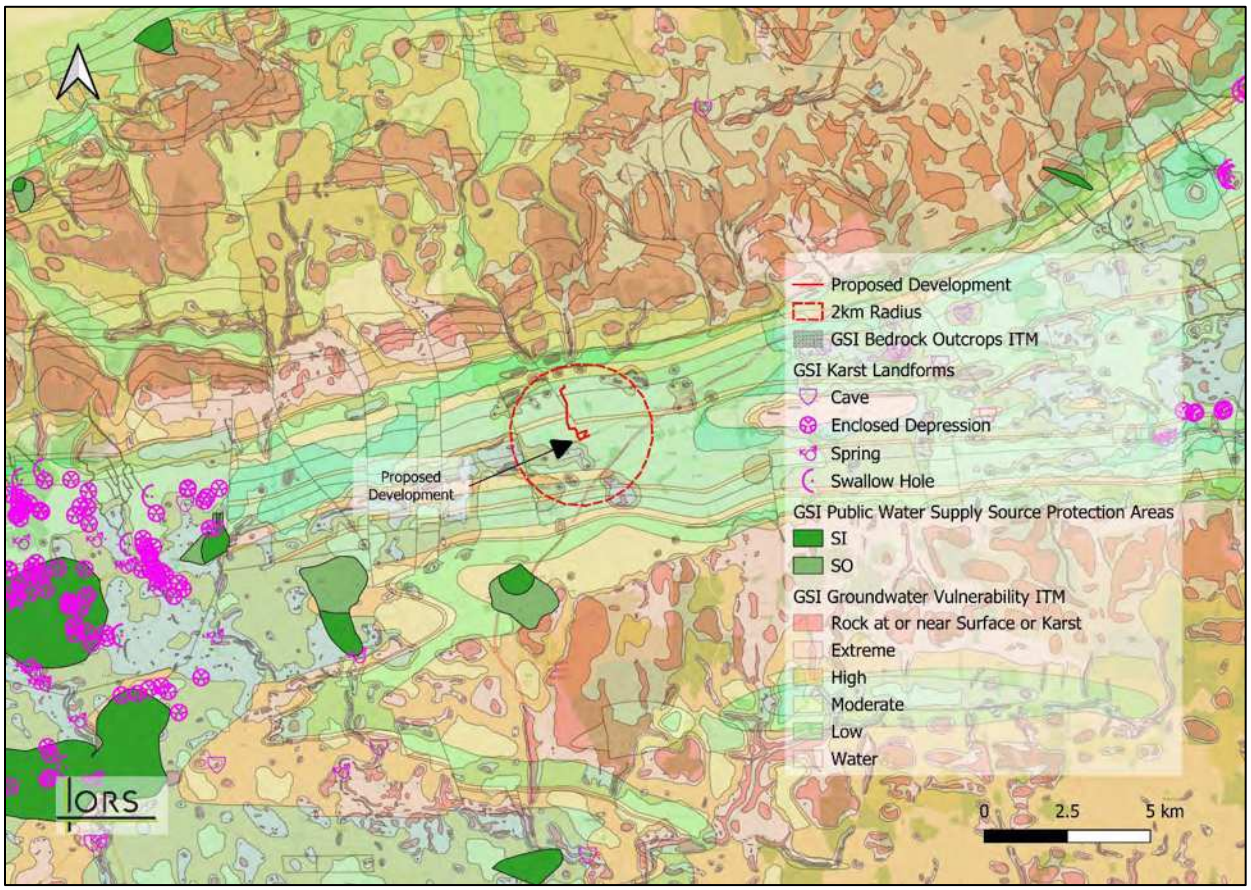


Figure 7.9: Karst Features, Groundwater Vulnerability, And Groundwater Source Protection Areas Overlaying Regional Bedrock Formations and Outcrop Extents. (GSI)

Mineral Aggregate Resources

There are no active quarries on or adjacent to the Proposed Development. The nearest active quarry recorded on the GSI's online database is Gortnahown Stone Quarry *ca.* 5.3km south of the site in Gortnahown, Mitchelstown where Sandstone is quarried and crushed for both construction and road projects.

There are no active mineral localities within the 2km study area. A disused grey limestone quarry is located *ca.*1.6km southwest of the site. Within the wider region several non-metallic mineral localities are identified which include fluorospar, calcite and a disused limestone quarry. To the southeast outcrops of iron have been noted towards Araglin.

Radon

Radon is a naturally occurring radioactive gas formed by the radioactive decay of uranium and thorium which may be present in varying quantities in rocks, soils and groundwater. Classified by IARC (International agency for research on cancer) as Group 1 - carcinogenic to humans - Radon is second only to smoking as the leading cause of lung cancer. It is estimated that some 250 lung cancer cases each year in Ireland are linked to radon exposure and accounts for more than half of the total radiation dose received by the Irish population (EPA, 2016). The acceptable level, or Reference Level, for homes and schools in Ireland is 200 becquerel per cubic metre (Bq/m^3). For workplaces the Reference Level is 400 Bq/m^3.

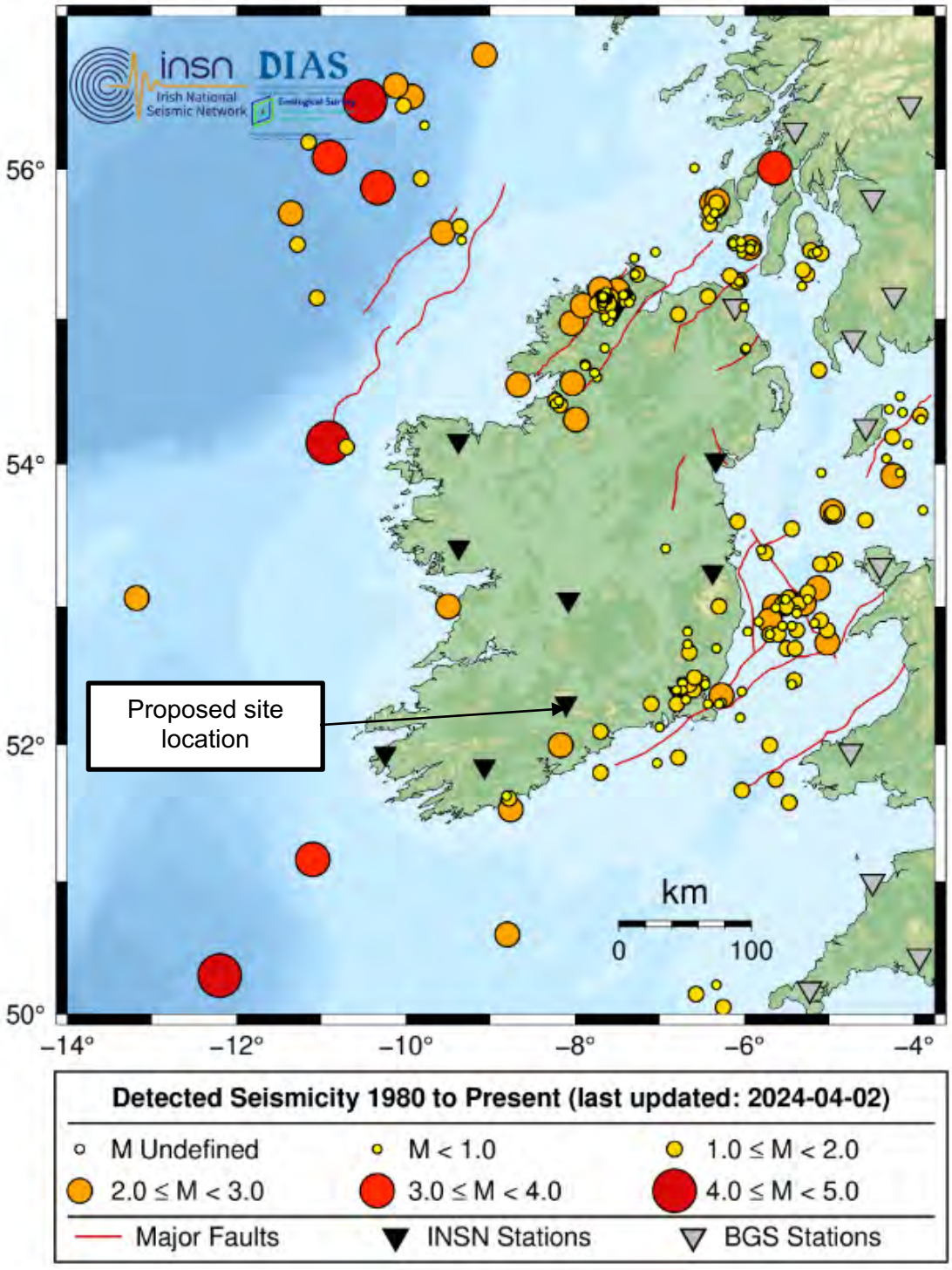
Consultation with the EPA's online Radon Map shows a prediction of the number of homes in a given grid square that exceed the national Reference Level (200 bequerel per cubic metre (Bq/m^3)). Grid squares in which the predicted percentage of homes is 10% or greater are called High Radon Areas.

The EPA's Radon Map shows that the site is located in a High Radon area, with 20% of houses in the vicinity of the site estimated to have radon levels above the Reference Level. As such all-office and canteen structures on site should be fitted with radon barriers to minimise staff exposure. Testing of radon in the workplace is a legal requirement in these zones.

Seismic Activity

No seismicity data is available for the location of the Proposed Development from GSI online resources. Seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics, Dublin Institute for Advanced Studies, has been recording seismic events in Ireland since 1978. **Figure 7.10** overleaf illustrates historical and recorded seismic events since 1980. Ireland is not considered an area to be of high seismic risk. As can be seen below, there is no significant seismic activity recorded within the vicinity of the Proposed Development.

Figure 7.10: Recorded seismic activity in Ireland since 1980.



7.4.6 Soils & Subsoils

Soils can be referred to as topsoil or subsoil. Topsoil is the active layers at ground level where living organisms are found. Changes in soil characteristics are delineated in “horizons”. Topsoil is referred to as horizons ‘A’ and ‘B’. Subsoil is the loose uncemented (unlithified) sediments

present between the soil ‘B’ horizon and bedrock. Subsoils are termed the ‘C’ horizon.

Regional Soil & Subsoil

The formation of soil is dependent upon geology, climate, vegetation, altitude, and landform shape. Soil landscapes found in Ireland are a consequence of the changing climatic conditions over the last 100,000 years (the last glacial age was *ca*.12,000 years ago) and the management of land by farmers.

The soils in Co. Cork are mainly derived from a mixture of calcareous, noncalcareous, mineral alluvium and peat materials. The soils range from deep well drained mineral (mainly acidic) (AminDW); mineral poorly drained (mainly acidic) (AminPD); peaty poorly drained mineral (Mainly acidic) (AminPDPT); shallow well drained mineral (mainly acidic) (AminSW); Shallow, rocky, peaty/non-peaty mineral complexes (mainly acidic) (AminSRPT); Shallow, rocky, peaty/non-peaty mineral complexes (mainly basic) (BminSRPT); shallow poorly drained mineral (mainly acidic) (AminSP); Shallow poorly drained mineral (mainly basic) (BminSP); deep well drained mineral (mainly basic) (BminDW); shallow well drained mineral (mainly acidic) (BminSW); blanket peats (BkPt); alluvial (mineral) (AlluvMIN); lacustrine type soils (Lac) and made ground (made) as shown in **Figure 7.11**.

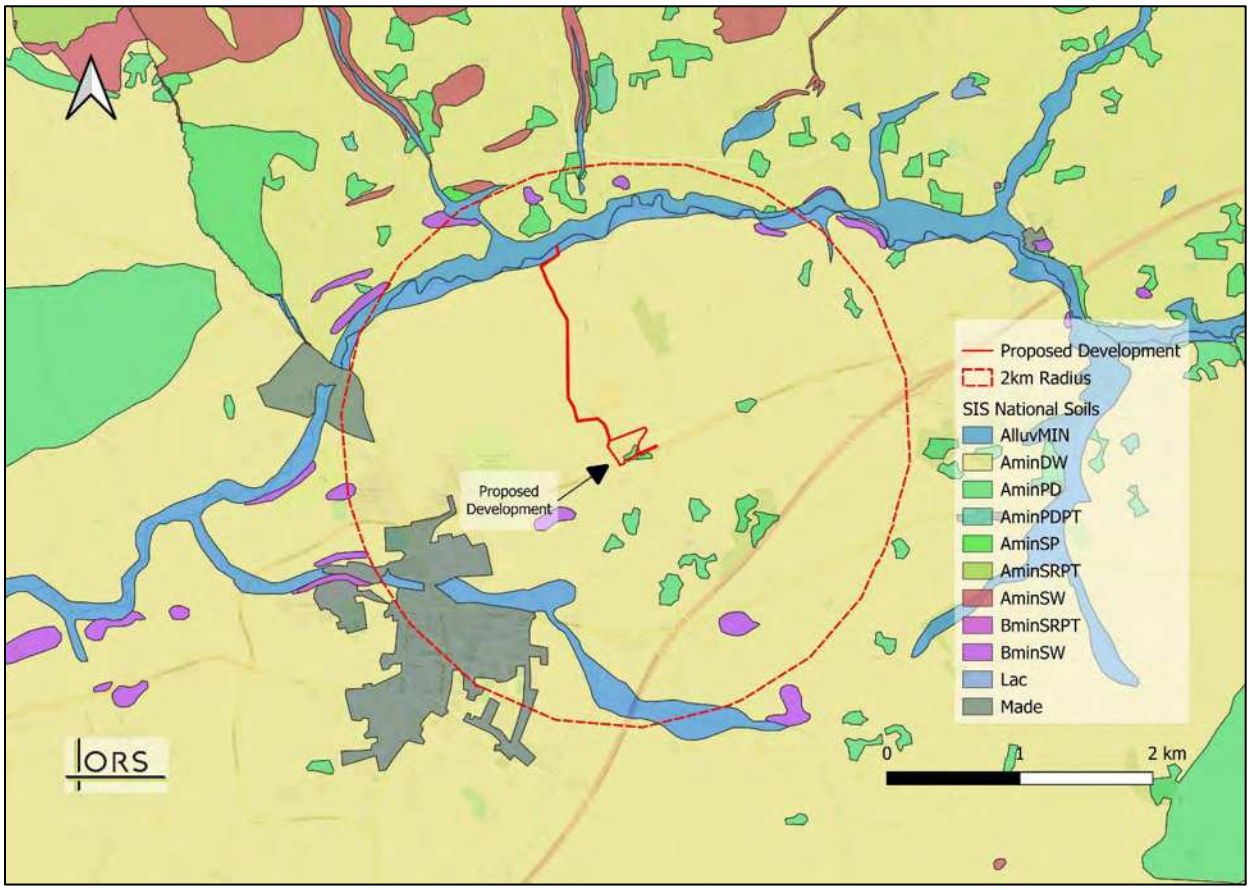


Figure 7.11: National Soil Map of North County Cork (Source: GSI)

Local Soil & Subsoil

GSI online mapping indicates that the majority of the Proposed Development overlies deep well

drained mineral (mainly acidic) (AminDW) derived mainly from non-calcareous parent materials. The soil groups associated with this category are Brown Podzolics and Acid Brown Earths. A portion of the south of the Proposed Development location overlies mineral poorly drained (mainly acidic) (AminPD) derived chiefly from non-calcareous parent materials. The soils groups associated with this category are Surface Water Gleys and Groundwater Gleys.

To the southwest of the site on the outskirts of Mitchelstown and along the banks of the Gradoge stream *ca.* 1.1km, the soil is categorised Alluvium. To the north of the Proposed Development, *ca.* 1.5km, the soil is classified as Alluvium along the banks of the Funshion stream. The built-up urban fabric around Mitchelstown *ca.* 1.2km southwest, are classified as Made/ Built Ground.

The Irish Soil Information System (SIS) project has developed a national association soil map for Ireland at a scale of 1:250,000, together with an associated digital soil information system, providing both spatial and quantitative information on soil types and properties across the country. This resource groups similar soil groups together into 11 soil 'Great Groups' and associated 'Sub-Groups', allowing for the taxonomical classification of soil types throughout Ireland.

The site overlies the Clashmore Series. Under the SIS classification system, this soil group is 'Brown Earths' and the soil sub-group is classified as '1150CM -Typical Brown Earths'.

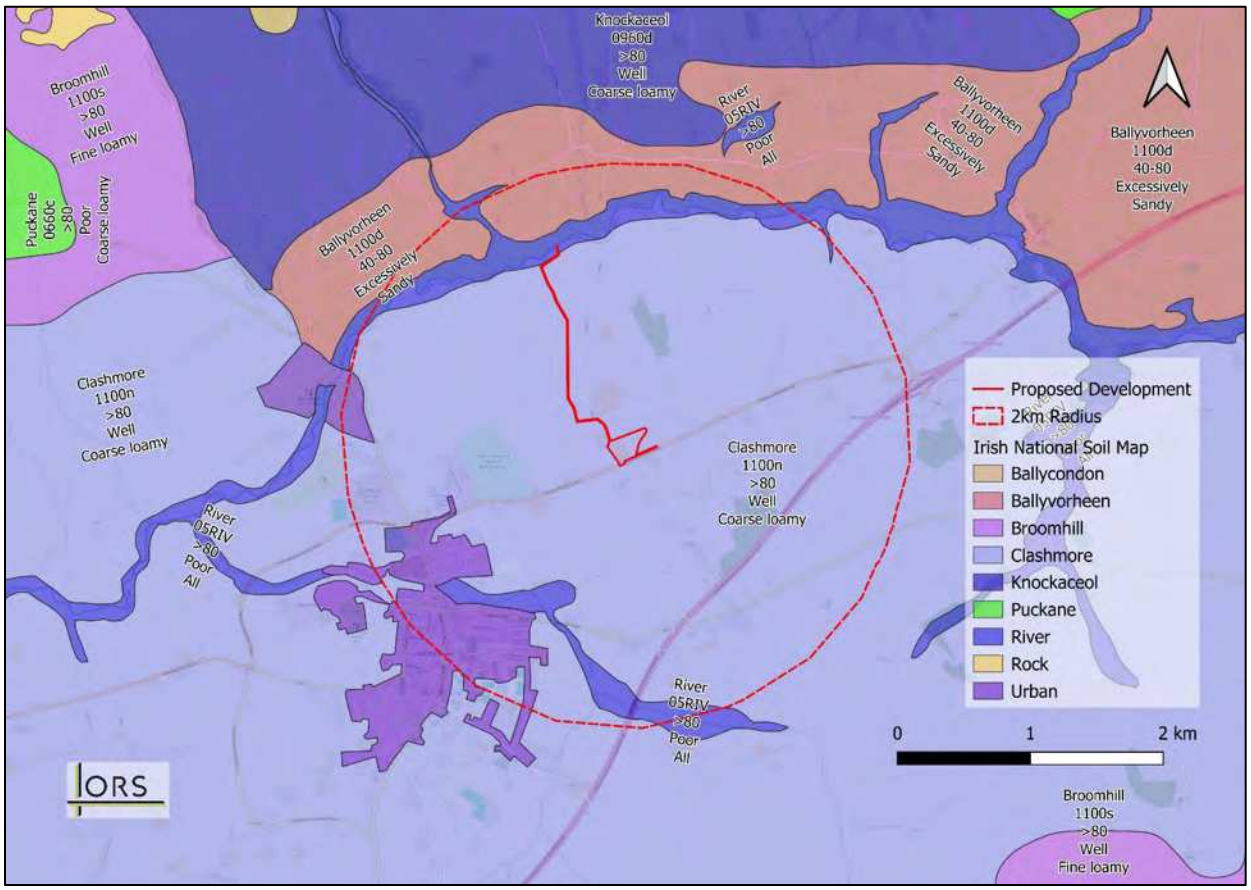


Figure 7.12 Irish Soil Information System (SIS) Map – Surface Soils. Map detailing soil types underlying the site (Teagasc)

The Teagasc representative soil profile description for the 'Clashmore' series notes it as drift with siliceous stones and a coarse loamy texture. The top horizon (0-23cm) has a sandy loam texture, a moderate crumb and moderate fine. The soil is non-cemented and non-compacted, is of friable consistency and is plastic. The soil is non-sticky, contains a medium number of roots, is of low packing density with a medium porosity and amount of macropores. The transitional boundary to the next horizon is described as abrupt and smooth. Throughout the lower horizons (23-26, 26-47 and 47-140cm) this profile description remains relatively similar in terms of particle composition, texture and bulk density.

A detailed representative soil profile description from the Teagasc SIS database of the 'Clashmore' soil series is included in **Appendix 7.1**. This representative soil description available for the 'Clashmore' series is from a subject site in County Kerry and so will differ from the soils underlying the Proposed Development in Mitchelstown.

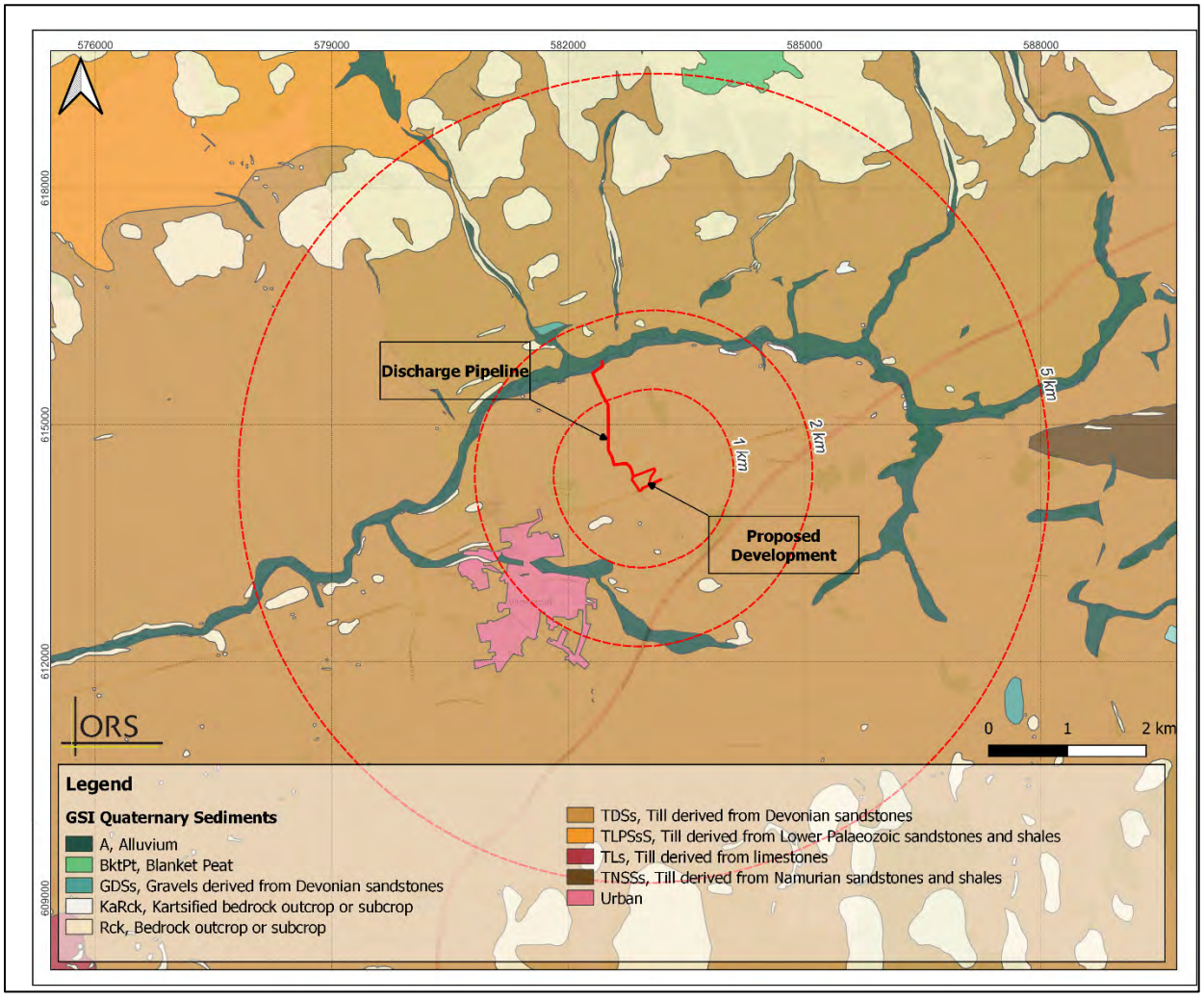


Figure 7.13 Teagasc Subsoil Map detailing subsoil types underlying the site (Teagasc)

The EPA databases indicate the parent material for the subsoils beneath the Proposed Development are till derived chiefly from Devonian Sandstones (TDSs). The till is described as diamicton, which relates to its terrigenous sediment that is 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.

The existing greenfield portion of the site is used for agricultural purposes. Due to its topography and climatic growing conditions, it is well suited to grass production for pastural grazing and silage production.

Licensed Sites

A review of the EPA & DCCAE website for existing and historic, licensed and illegal waste activities, mines and industries was carried out to identify any potential contamination sources present in the area and to identify any potential contaminating activities near the Proposed Development. The desk study indicated that no illegal waste activities sites were present within a 2km radius of the proposed area. A licensed Integrated Pollution Prevention Control (IPPC) facility is located *ca.* 300m north of the Proposed Development. The facility is a Derra Farms Ltd., an operational piggery, which Is classed as industry. Details of the facility are outlined in **Table 7.7** below. Assessment of historic orthographic maps show that the facility expanded significantly between the 1996-2000 and the 2001-2005 series. The facility layout has not changed significantly since this significant expansion.

A previous application for permission on the site is shown to have been incomplete. This plan was invalidated in 2007. The details of licences granted in the immediate area of the development are also outlined in **Table 7.7**.

Table 7.7: Licensed Integrated Pollution Prevention Control (IPPC) Facilities and Industrial Emissions License applications (EPA Maps) within the 2km study area

Licence Number	Major Class of Activity	Distance from site	Name	Licence Status
P0494-01	6.2.0/ Industry	300m N	Derra Farms Limited	Licensed
P0404-02	2.1.0/ 7.1.0/ Industry	1.65km SW	Dairygold Co-operative Society Limited	Licensed
P0174-01	7.4.0/ Waste	1.63km SW	Breedon Foods Limited	Surrendered
P0404-02	2.1.0/ 7.1.0/ Industry	2km SW	Dairygold Co-operative Society Limited	Licensed

There are two active IPPC licensed sites south of the nearby town of Mitchelstown which are located outside the 2km study area, west of Mitchelstown and one more located to the southwest which are located outside of the 2km study area. To the south, the closer of these, *ca.* 3.5km south, is a piggery, Rory & Monica O'Brien Pig Enterprises, that is licensed under major class of activity 6.2.0/ Industry. The second facility located *ca.* 3.8km south is a piggery, known as Ronan Farms Piggery. This is classed under major class of activity 6.2.0/ Industry. To the west, an active License is held *ca.* 6.4km from the site by Mr Conor O'Brien. This is classified under major class of activity 6.2.0/ Industry. An active license is held *ca.* 6.8km by Derra Farms Ltd which is classed under major class of activity 6.2.0/ Industry. An active license is held by Mr Patrick O'Keefe. The site is located *ca.* 8.7km southwest and is classed under major class of activity 6.2.0/ Industry. It is not foreseen that any these licensed facilities will have an effect on the Proposed Development.

There are no mapped current licensed/ unlicensed or historic waste facilities/ dump sites within the immediate vicinity of the Proposed Development. The closest facility is located *ca.* 8.9km

southeast of the Proposed Development to the east of the Kilworth Military Range. The facility was proposed to be a licensed waste facility (W0230-01). Application for the facility was proposed in 2006 and subsequently rejected permission for failure to comply with application regulations.

Due to the significant distance (>15km) of other waste facilities within the wider region to the proposed biogas site, which includes Limerick and Tipperary, is not foreseen that these facilities will have an effect on the Proposed Development.

Historic Land Use

There is the potential for contamination based on the previous use of the site as a piggery. There is potential for previous contamination to the soil and underlying groundwater body. In its current state, the site may also pose a risk of a continuous source of pollution through the further degradation of the existing buildings, by becoming overgrown by plants or through material degradation by weather events such as a storm. The dilapidated silo and former septic pond system may also pose a risk of contaminant leaking to the ground. Given the previous status of the site as an operational piggery, there exists the possibility for there to be historical oil spills on site, the extent and significance of which are currently of unknown.

The 25-inch historic maps (1863-1924) indicate that the area in the immediate vicinity of the Proposed Development site consists of agricultural lands. A quarry (disused) and lime kilns are noted *ca.* 1.2km southwest of the site. A quarry is located *ca.* 1.5km west of the site. A quarry (disused) is located *ca.* 850m south of the site. A lime kiln is located *ca.* 710m northeast of the site. In subsequent maps of the area, none of these structures have had visibly lasting impressions or effects on the environment.

Table 7.8: Historical Land Use (https://webapps.geohive.ie/)

Date	Description
1837-1842	The proposed site and adjacent lands are greenfield. A number of built structures are located along the western boundary of the site. Additional farm structures are located in the surrounding area. Mitchelstown appears to be well developed and populated.
1863-1924	Several of the structures to the west have been expanded or consolidated during this time and one of the structures no longer appears. The aforementioned lime kilns and a quarry are noted *ca.* 1km north and *ca.* 1.2km west of the site.
1995	The piggery on site has been established and expanded during this time. Structures along the western boundary are significantly expanded. Piggery located *ca.* 300m north. The roads and farm units in the surrounding area have been significantly expanded during this time.
2000-2003	The piggery on site still appears to be in relatively good repair. Expansion of the piggery located to the north.
2013-2018	The proposed site is a mix of brownfield / greenfield. No significant changes to the surrounding environs compared to previous years.

Landslides

The GSI's online landslide database indicates there are no historic landslides recorded on the site or within a 2km radius. The nearest recorded landslide is *ca.* 11.5 km northeast of the site on the slopes of the Galtee Mountains. The Proposed Development location occurs within an

area of low landslide susceptibility classification.

7.4.7 Ground Investigation

Ground investigation works were carried out by a chartered ORS environmental scientist for the Proposed Development at Mitchelstown on the 18th of December 2023. These investigations confirmed the general geology and subsoil conditions corresponded to the conditions indicated in the geological mapping. The location and depth of the trial pits is shown on **Figure 7.14**, and details of each investigation location is presented in **Table 7.9**.

The depths of the five trial pits varied significantly from 1.7m to 3m bgl. Bedrock was not encountered in trial pits on site.

As stated in **Section 7.4.2** the topography peaks at 107.5m OD along the northwestern site boundary (trial pit 2) of the proposed site with a gradual gradient (trial pit 1 is in the middle of this gradient) to a low of 96.5m OD at the southeastern boundary where a drainage ditch occurs. A sinkhole was noted adjacent to the drainage ditch during the initial site walkover (trial pit 4).

There was variation in the soil profile across all five trial pits. Similarities between profiles was noted. The topsoil of all trial pits was of loamy texture and dark brown in colour. Soil and subsoil horizons were larger in trial pits 2 & 4. The findings of the site investigation correlated with the GSI soil & subsoil database mapping. The predominant soil underlying the proposed site is a mineral derived from Devonian sandstone parent materials. The majority of the site is characterised by a free draining bedrock (limestone), moderate permeability subsoil overlain by a well-drained topsoil. A portion of the southern boundary of the site is characterised by moderate permeability subsoil overlain by wet, poorly drained gley soils. There is a significant variation in the soil depth from moderately deep (1.7m) to deep (3m). The topsoil throughout the site is characterised as Brown Earth, consisting of a silty brown to dark brown loam. The subsoil is characterised as a sand with a variable clay content and with occasional sandstone cobble / boulder encountered in TP-02, TP-03 and TP-04. The underlying bedrock is a pale-grey massive mud-grade limestone. Large semi-degraded limestone boulders were encountered at a depth of 1.40 - 2.10m in Trial Pit-04. Bedrock was not encountered in any trial pits on site.

A site characterisation assessment (percolation assessment) was conducted by Bolger-Hynes Architectural Design on the 11th of March 2024. This was undertaken adjacent to TP-02 on moderately sloped ground. The trial pit was a dug to a depth of 2.15m and did not encounter bedrock, refer to **Appendix 8.3**.

Figure 7.14: Location of Trial Pits (TP) and Site Characterisation Assessment

A summary of the soil profiles encountered during the ground investigation carried out as part of this report is given in **Table 7.9**.

Table 7.9: Ground profile for each Trial Pit

Location	Depth (m)	Ground Profile	Comments
TP-01	0.0 – 0.30	Silty, uncompacted soil with some clay. High organic matter content. Dark brown in colour.	End trial pit at 3.00m
	0.30 – 0.80	Slightly more compacted silty soil.	Water seepage noted at 1.84m
	0.80 – 1.60	Tan coloured soil. High sand content	
	1.60 – 3.00	Darker coloured, wetter soil.	
TP-02	0.00 – 0.40	Dark Brown silty, clayey loam.	End trial pit at 2.6m
	0.40 – 1.40	Tan coloured and loose sand with small angular stones	Water seepage noted at 1.8m
	1.40 – 2.60	Compacted sand with high clay content. Occasional cobble of old red sandstone.	
TP-03	0.00 – 0.40	Dark brown loam. High organic matter content in top 20mm.	End trial pit at 2.1m
	0.40 – 0.90	Sand / loam mixture	No water seepage noted
	0.90 – 1.40	Dry sand with occasional cobble of old red sandstone	
	1.40 – 2.10	Large semi-degraded limestone boulders, 1 - 1.7m in diameter	
TP-04	0.00 – 0.30	Dark brown loam	End trial pit at 2.6m
	0.30 – 1.00	Uncompacted sand	
	1.00 – 2.60	Compacted sand, higher clay content. Occasional sandstone cobble / small boulder	No water seepage noted
TP-05	0.00 – 0.30	Dark brown loam	End trial pit at 1.70m
	0.30 – 0.50	Clayey gravelly layer. Most likely imported fill.	
	0.50 – 1.70	Uncompacted sand. Light brown colour.	No water seepage noted

A sinkhole was observed during the initial site characterisation assessment, as can be seen in **Figure 7.14.** This sinkhole is indicative of compromise within the structure of the soils underling this portion of the development.

7.5 Likely Significant Effects

The assessment focuses on predicted impacts in relation to soils and geology. The assessment relates to impacts occurring during both the construction and operational phases of the development.

For a risk from ground contamination to exist, a contaminant source, pathway for migration and viable receptor must exist. The presence of all three of these elements is known as a 'pollutant linkage'.

Based on the dataset obtained during the desk study, intrusive site investigation, and anecdotal evidence collected the following risk assessment has been carried out. This identifies the relevant sources, pathways and receptors (pollutant linkages) and assigns a qualitative risk classification of 'Positive, Neutral or Negative/ Adverse' risk to the identified Potential Pollutant Linkages (PPLs).

The likely potential pollutant linkages identified as a result of this assessment and specific for the site have been provided in the initial Conceptual Site Model (CSM). The model has been based upon the site setting at the time of the assessment, the land use (current and reasonably foreseen future use) of the surrounding area and the state of what the proposal is (i.e. development, ongoing use, etc.).

As well as identifying the potential pollutant linkages the model includes a preliminary assessment of risk based upon the probability of effect and the likely severity of effect in the

context of the site setting and proposed future site use.

The criteria used for the risk assessment classifications in this report is detailed in the EPA guidance notes 2022, **Table 1.1** of **Chapter 1** in this report, and in the *CIRIA Report 552*.

7.5.1 Do-Nothing Scenario

If the Proposed Development does not proceed there would be no additional impact on the local soil, geology or geological heritage. The current rate of surface water percolation and run-off would continue to operate in its natural state.

Under the 'Do Nothing' scenario there would be no change to the current land use of the site which would remain as greenfield agricultural land and a brownfield site. A do-nothing scenario would leave the derelict former piggery and eutrophied pond intact. The persistence of these degraded structures could pose a continuous risk to the land, soil and geology as well as the hydrology of the site through their continuous leaching, leakage or decay as mentioned previously.

However, the 'Do Nothing' scenario does infer negative environmental impacts. The Proposed Development is focused on capturing and utilising methane, which is currently being emitted from the anaerobic production of silage and land spreading of farmyard manure and slurry on livestock farms throughout the country. According to the UNECE, over a 100-year period methane has 28-34 times the global warming potential of carbon dioxide, this increases to 84-86 times over a 20-year period. Capturing and utilising this methane by burning it to produce carbon dioxide and heat, which can be used or converted to electricity, significantly reduces its global warming potential. Climate change poses a serious threat to soils by increasing the frequency of extreme weather events such as droughts and storms. The combination of droughts followed by heavy rainfall results in significant soil erosion.

In terms of soils, anaerobic digestion of farmyard manure and other feedstocks is advantageous as it improves its fertiliser potential, through the mineralisation of organic compounds which increases the available nitrogen and phosphorus content. This can help reduce the requirement for inorganic fertilisers which can have adverse impacts on soil structure by altering soil chemistry and microorganism populations.

The 'Do Nothing' scenario may result in the continued pollution of soils and groundwater throughout the local region from damaged farmyard infrastructure and poor agricultural practices. The construction of the anaerobic digester will reduce the storage time in such facilities.

The Proposed Development plans on utilising a combination of grass silage and slurry feedstocks. Grass and grass silage are the primary feedstock of livestock based agricultural enterprises in Ireland, which contrasts with the predominantly grain based business model employed elsewhere. Grass is the key to the success of the Irish livestock and dairy industries, in particular the latter, providing a cheap reliable feed source which enables smaller farm enterprises to remain financially sustainable in comparison to the high-cost grain-based systems, which requires farms of scale in order to maintain profitability. The Proposed Development will result in a diversion of grass feedstock destined for livestock production, and its associated GHG emissions, and will instead be channelled into the sustainable production of renewable biogas.

Convincing farmers to part way with their grass will not be possible unless a fair price is offered to compensate farmers to cover the cost of alternative feedstocks or a reduction in the farm herd number is undertaken to reduce the feed requirements of the farm. The latter is a more likely option and will help the government achieve its 2030 GHG emission reduction of 50%. These reductions include a commitment to reduce emissions from the agricultural sector by 25%. It's anticipated that a reduction in the national herd is required to achieve this. Estimates vary, but the Irish Farmers Journal have said a beef herd reduction of 13%, and 11% for dairy, is required to achieve this reduction.

The 'Do Nothing' scenario would result in a continuation of the status quo with grass being used to produce GHG intensive beef and dairy products. There would be no alternative option available to farmers to reduce emissions and diversify their business portfolio away from livestock production whilst maintaining profit and long-term employment. The overall cattle herd number would remain at record levels within the state, with over 7.3 million cattle as of the 2020 agricultural census. Inflated herd numbers coupled with bad farming practices poses a risk to soils and hydrology features in the form of soil compaction, over grazing, increased soil exposure, soil degradation, run-off and eutrophication of waterways.

7.5.2 Receptor Sensitivity

The sensitivity of the receptors identified during the study of soil & geological features within the vicinity of the Proposed Development are summarised in **Table 7.10** overleaf.

Table 7.10 – Receptor Sensitivity

Receptor	Receptor Importance	Receptor Sensitivity	Rationale
Topsoil	Local Level	Moderate	The local topsoil is acid brown earths (AminDW) which is in abundance within the vicinity of the development. According to GSI maps alluvium soils are noted within the vicinity but were not encountered during the site investigations. The site topsoil contains no known pollutants. The soil across the majority of the site is of good agricultural quality, being a free draining 'Brown Earth' and would be a highly sought-after topsoil for any infill agricultural lands. A portion of the topsoil adjacent to the south-eastern boundary of the site, adjacent to the drainage ditch, demonstrates poor drainage status. The southwestern portion of the site currently consists of a brownfield site. There exists the potential for contamination here as the soil is capped with concrete and through the presence of a eutrophied pond, degraded former piggery structures and a dilapidated silo.
Underlying Deposits	Local Level	Moderate	The development has been designed to utilise the existing site topography as far as possible **(Drawing no.: 231925-ORS-ZZ-00-DR-AR-200)** 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) limestone parent material, which is in abundance within the wider area, evident from the boulders encountered in TP-03. The development site is located in an area defined as a "Fertile Plain with Moorland Ridge" with a varying range in soil depth from shallow to deep.
Bed Rock Geology	Regional Level	Moderate	The underlying bedrock is massive, unbedded pale-grey clean crinoidal wackestone limestones and micritic limestones with thin bedded cherts. Karst features have not been recorded within the site vicinity but are found within the wider Cork region where they are sparsely distributed and occasionally clustered together. This rock is in abundance with the wider region. It is not envisaged that bedrock will be encountered. The underlying aquifer is karst and is classified as being regionally important.

7.5.3 Sources - Construction Phase

The construction phase is likely to yield the most potential impacts on the surrounding land, soil and geology. Potential construction phase impacts are considered in detail below and

summarised in **Table 7.11**.

The Proposed Development will result in the establishment of the site across two main elevations. With the reception hall and processing areas located at 99.5m OD and all digesters and pasteurisation tanks at 97m OD. Given the sites current topography this will involve limited earthworks to both cut and fill the site to a level base upon which the development can be constructed.

Figure 7.15: Site layout with proposed and existing site levels (Drawing No. 231925-ORS-ZZ-00-DR-AR-200)

Excavation works to facilitate the insertion of a *ca.* 1.4km length gas pipeline and new connection to the existing gas line towards Mitchelstown along the existing N73 national secondary road to the south of the site will be required. The following headings outline the potential effects to land, soil and geology posed by the proposed excavation and infilling of the site:

Topsoil Removal

The initial phase of construction will involve the removal and stockpiling of the topsoil. The pre-construction geotechnical site investigations conducted indicate a topsoil horizon of approximately 0.30m to 0.40m in depth of a brown to dark brown loam topsoil which is silty or clayey in certain areas, with varying degrees of organic matter content. This inert material will be stripped throughout the Proposed Development site and be stockpiled. For the gas pipeline

route the topsoil will be temporary stockpiled before being used to redress the installed pipe. The exact installation method will be confirmed by Gas Networks Ireland prior to installation and completed in accordance with *I.S. 328 2021 Gas transmission — Pipelines and pipeline installations standard*.

Stockpiles in the absence of mitigation measures will be susceptible to erosion by climatic and hydraulic factors. Any excess topsoil will be removed from site and disposed of in accordance with current waste management regulations.

The most significant risk posed by the topsoil excavation is through the migration of silt, clay and other sediment off site through wind and water borne modes of transportation. If incorrectly stockpiled and under specific climatic conditions these sediments can find their way into nearby streams. In significant quantities they can pose a risk to aquatic life and result in a degradation of water quality, as outlined in **Chapter 8: Hydrology and Hydrogeology**.

In the absence of mitigation, the removal and stockpile of topsoil would result in a **negative**, **slight to moderate** and **reversible effect** on soil.

Excavation/ Subsoil Removal

Site investigations indicate a relative uniformity in the depth of the subsoil horizon. In Trial Pit 1 (TP-01), located at the centre of the proposed site a distinct subsoil horizon was identified, with bedrock remaining undetected at a depth of 3.0m bgl. The identified horizons in Trial Pit 1 were observed to increase in sand content and moisture with depth. At the remaining Trial Pits the subsoil horizon was similarly pronounced, commencing at roughly 0.4m bgl and extending up to 3.0m bgl. The development proposes retaining the general gradient of the existing topography with the taller structures, tanks and digesters, being installed at a lower elevation to minimise the visual impact. It is hoped to utilise excavated onsite subsoil material where possible for infilling. Refer to the proposed Cut & Fill drawing in **Appendix 7.2**. Mechanical soil compaction will be undertaken to ensure soil stability throughout the site. Excess material will be transported off site for disposal.

The soils beyond *ca.* 0.40m below ground level have been found to consist of a mixture of sand and, sandy-loam and varying proportions of clay throughout the site. Soils across the site contain a heterogeneous moderately sorted drift of primarily a brown, silty, gravelly, sand with sub-angular to round cobbles. Pit 3 was observed to contain large limestone boulders within the 1.4 – 2.1m bgl layer. Sandstone cobbles / small boulders were observed in Trial Pit 4 within the 1.0 – 2.6m bgl layer. Pit 5 was observed to consist of a clayey-gravelly layer at *ca.* 0.3 – 0.5m bgl which is expected to be imported fill.

The till drift on site consists of silt-sized particles which present a moderate susceptibility of becoming entrained in surface water run-off and/or to being blown out of a stockpile by moderate to strong breezes carrying a moderate risk of migrating into surface water receptors. A site characterisation assessment (percolation assessment), **Appendix 8.3**, conducted by Bolger-Hynes Architectural Design on the 11th of March 2024, indicated that the soakage in the subsoil is sufficient, with a T value of 25.67. The excavation of and exposure of the subsoil layer during the construction phase will result in an increased risk to the groundwater vulnerability, as outlined in **Chapter 8**.

The preliminary Cut & Fill Calculations (refer to **Drawing No. 24055-C-DR-0501**) for the Proposed Development indicate that a total of 22,066 cu. M of material is to be excavated, with

22,066 cu. M required to infill the site to the proposed final topography. This results in no net deficit / surplus which will need to be imported or transported and disposed of off-site. Excavated soil will be repurposed and redistributed on site in landscaping and earth berms within the site.

In the absence of mitigation measures, the extraction and reduction in the subsoil horizon / importation and alteration of the of subsoil horizons will have a **negative, moderate** and **permanent effect** on the subsoil.

Excavation of Bedrock

The GSI groundwater vulnerability maps have classed the entire site as overlaying a moderate vulnerability area. Based off the groundwater vulnerability guidelines this would indicate a soil depth of *ca.* >10m throughout the site. The site investigation did not encounter bedrock at throughout any of the 5 Trial Pits (from 1.7m up to a depth of 3.0m bgl).

Exposure of bedrock due to effects of the construction stage is thus unlikely. Excavations of up to 5m bgl will be required to reach the finished floor level (FFL) of the digesters (53, 54, 55), digestate storage tanks (56, 63), reception hall (51), west of bunded area (8, 9) and the attenuation pond. When excavation to FFL has been achieved, further earthworks will then follow to facilitate the construction of foundations and the installation of services/drainage infrastructure. Foundations of up to 2m below the FFL will be required along the structural outline of buildings.

It should be noted that the digestion tanks (53, 54, 55) and the digestate storage tanks (56 and 63) will have a FFL of 97.55m OD. Foundations and hard core will be a further *ca.* 0.7m below the FFL. These structures are planned for the south of the Proposed Development where the current ground level is within 2m of the proposed ground level. Maximum excavations of 2.0m bgl at the attenuation pond to the northeast are required to achieve the desired ground level. Refer to the proposed Cut & Fill drawing in **Appendix 7.2** and relevant structural site layout drawings as referenced in Section 2.2, **Chapter 2 – Project Description**.

Encountering bedrock will have a **negative, significant**, and **permanent effect**.

Passing Bay, Discharge Pipe and Gas Pipeline

During the initial stages of the construction phase, enabling works will consist of stripping and stockpiling of topsoil and subsoil at the proposed compound area, as outlined above. Similarly, excavations are required for the construction of the passing bay on the adjacent local road and to install the gas pipeline along the N73 National Road.

The proposed gas pipeline connecting to the existing Gas Networks Ireland pipeline along the N73 national secondary road will be installed underneath the existing N73 directly to the south of the Proposed Development that provides access to the site. This is an indicative routing of the pipeline to the site and is subject to change pending detailed network modelling and design. Installation of the pipeline will involve temporary excavation work and will result in disturbance of the underlying soil & subsoil. This may have an effect on the exposed soil and subsoil with implications for the soil surface with regard to stock piling and mobile plant. The trenches will be backfilled shortly after excavation following the installation of each section. Trenching along a road network will give rise to asphalt waste material. If unproperly managed these materials can pose a risk to the environment due to the presence of Polycyclic Aromatic Hydrocarbons

(PAHs). PAHs are organic pollutants that persist in the environment and are considered potentially dangerous with side effects related to cancer development (A. Nagalli, 2015).

A discharge pipe running from the northern side of the Proposed Development will be installed. From here the water will be discharged into the Funshion River *ca.* 500m north of the Proposed Development which flows from east to west. A national water monitoring station (StationID: RS18F050100) is located *ca.* 2km downstream of the proposed discharge point.

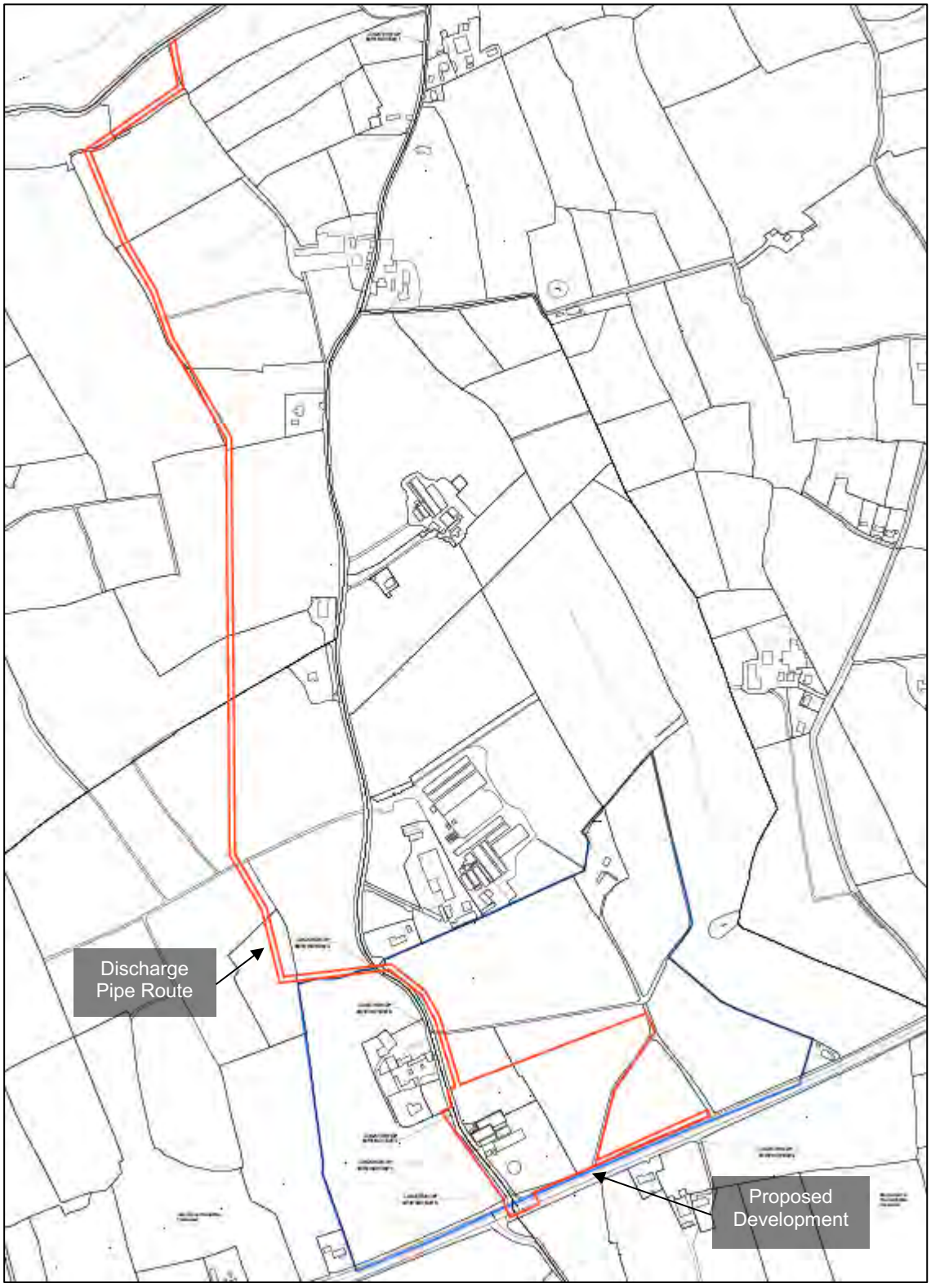


Figure. 7.16: Proposed Route of the Discharge Pipe (Drawing No. 231925-ORS-ZZ-00-DR-AR-100)

Figure. 7.17: Proposed Route of the Discharge Pipe.

The proposed passing bays, discharge pipe and gas pipeline installation would have a **negative, slight** and **temporary effect** on the existing surface level materials and subsoil.

Construction of Built Structures

The construction of the Anaerobic Digestion Plant will result in the conversion of permeable soils to hard standing surfaces. This sealing/ capping of land has a long-term impact on the underlying soil's structure and function to the wider environment. It reduces the water infiltration to the underlying soil/ bedrock and alters the structure and functionality of the soil overtime.

The construction of the built structures requires excavations of up to 5m below current ground levels. As is common practice with the construction of foundations a compressed infill gravel base/ pad is required on top of which a concrete blinding is poured. Steel reinforcements will be installed, with shuttering erected around this to facilitate the final concrete pour. Infilling and compaction of excavations around structures is then conducted to ensure structural integrity. The infill material and concrete poses a risk of contaminating the subsoil and bedrock if installed in adverse weather conditions.

In total the development will result in the construction *ca.* 30,000 m^2 of hard standing, inclusive of built structures and concrete/ asphalt aprons.

The use of plant and machinery during the construction stage will involve the use of hydrocarbon-based fuels and oils. There is a risk of contamination to soils and eventual

percolation to the underlying bedrock. Hydrocarbons should be stored in bunded facilities, and the use of hydrocarbons should be contained to bunded areas with spills cleaned up immediately.

The impact of the construction of built structures would have a **negative, moderate** and **long-term effect**.

Attenuation Pond

The development proposes establishing an attenuation pond to the northeast of the site which will be used for attenuation of stormwater. The soil of the northern portion of the Proposed Development is free draining and may not be suitable for creating an impervious barrier to retain the contents of the ponds. The use of such material may only pose a risk to the underlying bedrock aquifer which will already be at an increased vulnerability due to a reduction in the overlying burden.

It is not envisaged that any material will need to be imported to site in order to line the location of the proposed attenuation pond. It is proposed that excavated material will be re-used on site and may be used in the construction of the proposed attenuation pond. As no importation of soil / clay material is envisaged, the associated risk translocating invasive species and contaminated materials is **not significant**.

The construction of an attenuation pond will result in the degradation of the underlying soil quality and ensure anaerobic conditions. On the contrary the wetlands will result in the addition of a new Fossitt designated habitat within the locality, FL8 “Other artificial lakes and ponds”. Its implied, if appropriately managed, wetlands will result in an increase in flora, fauna and biodiversity. Increased food availability may entice burrowing fauna to establish in the locality. Burrowing animals have a positive effect on soil quality on a localised level.

The constructing of the attenuation pond is foreseen to have a **negative-neutral, moderate** and **permanent effect**.

Demolition of Existing Structures

The excavation and construction activities will cause quantities of excavated materials to be reused on site. The site is a combination of brownfield and greenfield. The portion of the site was formerly a piggery, the remnants of which are still present at the southwest corner of the site. The existing structures and historical site use represent a potential source of contamination. These existing structures will need to be demolished and removed in addition to the concrete capping layer associated with the former piggery, silo and a eutrophied pond. The anaerobic and potentially contaminated soils underneath the pond and degraded structures pose a risk to the soils and geology and groundwater on-site.

The existing structures on site represent a potential continuous source of contamination to the land, soils and hydrology of the site through their continued decay, degradation and leaching. Thus, the demolition and removal of the existing degraded structures is foreseen to have a **positive, minor-moderate** and **permanent effect**.

Historical mapping does not suggest any incidences of land use in the surrounding environment which might result in the contamination of soils. A site investigation conducted at the site in December 2023 did not detect any evidence of contaminated soils. It is not

anticipated contaminated soils will be encountered during construction activities.

The construction management plan will include a set of procedures to be implemented in the incidence of contaminated soils encountered. Encountering contaminated soils would have a **negative, not significant** and **temporary effect**.

Table 7.11 – Severity/ Magnitude of Impact during construction phase

Receptor	Potential Environmental Effects	Quality	Significance	Duration
Topsoil	Topsoil Removal	**Negative**	**Slight/ Moderate**	**Reversible**
	Passing Bays & Gas Pipeline	**Negative**	**Slight**	**Temporary**
Underlying Deposits/ Subsoil	Construction of Built Structures	**Negative**	**Moderate**	**Long-term**
	Excavation/ Subsoil Removal	**Negative**	**Moderate**	**Permanent**
	Attenuation Pond	**Negative/ Neutral**	**Moderate**	**Permanent**
	Contaminated Soils	**Negative**	**Not Significant**	**Temporary**
	Passing Bays, Drainage Pipe & Gas Pipeline	**Negative**	**Slight**	**Permanent**
Bed Rock Geology	Excavation of Bedrock	**Negative**	**Significant**	**Permanent**

7.5.4 Sources - Operational Phase

The operational phase effects anticipated and considered throughout the lifetime of the operation of the facility are considered below and summarised in **Table 7.12**.

It is not envisaged that there will be many potential sources of effects to soil, land or geology during the operation of the facility.

Hydrocarbon Contamination

It is proposed that the site will be frequented by numerous hauliers and farmers transporting both liquid and solid feedstocks for production of biomethane. There is a possible risk of vehicular accidents on the site which could result in the accidental release of hydrocarbons.

Mobile plant and fixed machinery are a potential source of contamination on site. Accidental leaks or spills of fuels and oils from hydraulics would be the source of such contaminates.

The 1000L fuel tank is an obvious source of such contaminants and as such it will be bunded to comply with EPA guidelines.

Strict enforcement of traffic management measures, adherence to standard operating procedures (SOP's) for refuelling and regular inspection of bunds should eliminate the potential for such sources of contamination. On top of this the process area will be bunded which will further reduce the possibility of such chemicals making contact with the local soil and geology.

Hydrocarbon leaks and spills would have a **negative, moderate to significant** and **long-term effect**.

Leaks of Nutrient Laden Liquids/Solids

Accidental discharge, spills or leaks of biobased fertiliser, wastewater from catering facilities, nutrient rich liquids or solid wastes from the Reception Hall, Digestion Tanks, wastewater treatment system could pose a risk to the local soil. Such nutrient rich substances have a high Biological Oxygen Demand (BOD) and would pose a risk to groundwater and bedrock aquifers by potentially introducing microbial contaminants and threatening aquatic life by consuming available dissolved oxygen in watercourses. The long-term threat to soil is considered to be less than hydrocarbons as such nutrient rich substances will be biodegraded in the soil and absorbed by flora. However, excessive volumes can be detrimental to soils by killing off the microbial and microorganism populations and stunting or killing plant growth by inhibiting the absorption of micro-nutrients. The overall effect is dependent on the volume and duration of such nutrient leaks.

In the absence of mitigation, nutrient leaks to the surrounding soil would have a **negative**, **moderate to significant** and **long-term** effect.

Land Spreading of Biobased Fertiliser

Utilising biobased fertiliser (digestate) offers several scientific benefits over the continued use of raw manures, slurries, and chemical fertilisers. These include balanced nutrient availability, slow-release nutrients, improved soil health and a reduction in pathogens and weeds when compared to slurries and manures. These advantages support sustainable agricultural practices whilst simultaneously improving soil conditioning.

Balanced Nutrient Availability: Biobased fertiliser typically contains a balanced mix of essential nutrients, including nitrogen (N), phosphorus (P), potassium (K), and micronutrients crucial for plant growth. This balanced nutrient profile contrasts with chemical fertilisers, which often supply only specific nutrients. Studies have shown that the diverse nutrient composition of digestate supports comprehensive plant nutrition, contributing to improved crop yields and overall plant health (Möller and Müller, 2012). Digestate is particularly rich in ammonium nitrogen (NH4-N), a form of N that is readily available for uptake by plants (Doyeni et al, 2021).

Slow-Release Nutrients: Biobased fertiliser releases nutrients gradually over time as it decomposes in the soil. This gradual release mechanism ensures a sustained supply of nutrients to plants, contrasting with untreated manures, slurries, and chemical fertilisers, which can be prone to leaching or volatilisation. The slow-release nature of digestate reduces the risk of nutrient loss and enhances nutrient uptake efficiency by plants (Yao et al., 2011). Digestion of livestock slurry has also been shown to increase the plant availability of nitrogen in slurry by *ca*. 10%.

Enhanced Soil Health: Rich in organic matter, Biobased Fertiliser improves soil structure, promotes water retention, and stimulates microbial activity. These soil health benefits contribute to improved nutrient cycling, root development, and overall soil fertility (De Vries et al., 2015).

Pathogen and Weed Reduction: Manure and slurry may contain a range of bacterial, viral, and parasitic pathogens and land application of these organic fertilisers typically occurs without

prior treatment. In contrast, Anaerobic Digestion, and subsequent pasteurisation of digestate significantly reduces the presence of pathogens and weed seeds, making it safer for agricultural use compared to untreated manures and slurries (Vinnerås et al., 2006).

At full capacity it is proposed that the total tonnages for transportation off-site from the Proposed Development as biobased fertiliser to local agricultural operators will be *ca*. 8,000 tonnes of Digestate Fibre and ca. 17,000 tonnes of Digestate Liquid Concentrate. Of the maximum 90,000 tonnes of annual feedstock intake to the Proposed Development, *ca*. 35,160 tonnes of untreated manures and slurries would normally be land spread locally. Following, digestate treatment and pasteurisation there will be 8,000 tonnes of solid and 17,000 tonnes of liquid biobased fertiliser. This represents a significant reduction, *ca.* 10,160 tonnes per annum, in the hydraulic loading of land spreading locally.

Post pasteurisation, the biobased fertiliser will meet the standard of an EU fertilising product under Regulation (EC) No 2019/1009 under the criteria outlined for Product Function Category (PFC) 3 B: Inorganic Soil Improver. The proposed operator will apply for End of Waste Criteria. All biobased fertilisers will be used in accordance with S.I. 113 of 2022 European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2022).

The spreading of the biobased fertiliser on the customer farms will be done in accordance with the specific Nutrient Management Plan for that farm.

If appropriately managed land spreading of biobased fertiliser has the potential to have a **positive**, **slight** and **long-term effect** on nutrient management and soil quality.

Attenuation Pond

The existence of the attenuation pond will result in the degradation of the underlying soil quality and ensure anaerobic conditions. However, the attenuation pond will result in the addition of a new Fossitt designated habitat within the locality, FL8 “Other artificial lakes and ponds”. If appropriately managed, the attenuation pond will result in an increase in flora, fauna and biodiversity. Increased food availability may entice burrowing fauna to establish in the locality. At a local level burrowing animals have a positive effect on soil quality.

If inappropriately constructed the attenuation pond may pose a risk to the underlying bedrock aquifer. If contaminated materials are discharged into the attenuation pond they may percolate into the underlying karst regionally important bedrock aquifer. From here they can degrade the quality of the aquifer and migrate downgradient to sensitive receptors. As such, the attenuation ponds will be lined with an impermeable membrane to limit the risk of contaminants leaching into the underlying regionally important bedrock aquifer. There are 5 no. recorded wells (boreholes) or water abstraction points recorded within the 2km study area. The wells are primarily used for industrial or agricultural and domestic purposes.

In the absence of mitigation, the attenuation pond is envisaged to have a **neutral**, **moderate** and **permanent effect**.

Table 7.12 – Severity/ Magnitude of Impact during operation phase

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

7.6 Mitigation Measures & Monitoring

This section highlights the mitigation measures proposed for the operation and construction stages of the Proposed Development to mitigate potential impacts to the near and wider environment.

7.6.1 Construction Phase

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 environmental impacts on site, encompassing soil, geology, noise, dust, air quality, surface and ground water, and highlights the proposed construction methods, activities and procedures. Refer to the preliminary CEMP report submitted in conjunction with this EIAR (Document No. **231925-ORS-XX-XX-RP-EN-13d-010**) The implementation and compliance with the conditions of the CEMP will be overseen by the Project Supervisor Construction Stage (PSCS) and/or onsite Environmental or Ecological Clerk of Works (ECoW) where necessary. Proposed mitigation measures include;

- Site preparation and construction must be confined to the Proposed Development only and it must adhere to all the mitigation measures outlined in this Chapter. Work areas should be kept to the minimum area required to carry out the proposed works and this area should be clearly marked out in advance of the proposed works.
- Prior to the commencement of developments on site, the PSCS/ ECoW will ensure that contractors will be made aware of the sensitive receptors identified in this chapter and the associated mitigation factors. A signed statement saying that they have taken on board the mitigation measures contained herein should be presented to the local authority along with the Notice of Commencement.
- A wheel wash/ power wash facility will be established at the site-setup stage of construction to limit the translocation of sediment onto the local road network.
- A best practice measure in reducing the risk of the translocation of invasive species all machinery initially arriving to site will be inspected. Any dirty equipment will be refused entry to site.
- All construction waste will be removed from site by a registered contractor to a registered site. Evidence of the movement and safe disposal of the construction waste will be retained and presented to the Local Authority upon request. Removal of the construction waste will occur as soon as possible after construction works.
- The following Guideline documents should be adhered to:

- Construction Industry Research and Information Association (CIRIA) (2005) Environmental Good Practice on Site (C692).
- Construction Industry Research and Information Association (2001) Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532).
- Construction Industry Research and Information Association (2000) Environmental Handbook for Building and Civil Engineering Projects (C512).
- Environmental Protection Agency (2015) List of Waste and Determining if Waste is Hazardous or Non-Hazardous.
- Environment Agency et al. (2015) Guidance on the Classification and Assessment of Waste, Technical Guidance WM3.

Topsoil Removal

The removal of topsoil is part of the first stage of the construction process. As mentioned above the initial phase will involve the stripping and stockpiling of the topsoil layer. This material will be reused on site as far as possible during the landscaping stage to remediate slopes and soils within the vicinity of the site, including the buffer zone.

Stockpiles in the absence of mitigation measures will be susceptible to erosion by climatic and hydraulic factors.

- Excavated topsoil will be stockpiled in an area abounded by silt fencing to contain/ reduce any sediment run-off during times of inclement weather.
- Driving machinery on topsoil stockpiles is not advised as it damages the soil structure, reduces porosity, and subsequent percolation rates, and can result in ‘smearing’ of the soil surface, which prevents water infiltration into the soil.
- Any excess topsoil will be removed from site and disposed of appropriately.
- Stockpiling and slight compaction of stockpiles to minimise both hydraulic and climatic erosion.
- Running stockpiles in the direction of prevailing wind to minimise windborne erosion rates, SW-NE. (EPA, 2013).
- Construction of silt fences around topsoil stockpiles to contain sediment run-off.
- 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.
- 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 and it must not be used for the infilling of any area outside of the Proposed Development. If there is more topsoil than is needed for landscaping, it must be removed from site by a registered contractor for appropriate use elsewhere. The end location of the topsoil must be identified and records presented to the local authority if requested.

Excavation

As with all greenfield site construction projects, civil earthworks are the first stage of the construction process. Excavation work to set the site levels, foundation, drainage and buried utilities is essential in facilitating the construction of the built structures. Excavation work will be conducted in stages to minimise the exposure of unprotected soil, subsoil and bedrock.

The development is proposed to be constructed within the range of the existing contours on site. This will limit the extent of significant earth works and greatly reduce the risk of encountering bedrock. Where possible excavated subsoil material will be reworked and used on site.

A full geotechnical investigation of the site will be required in order to assess:

- The potential of the underlying soil, subsoil and bedrock for reuse.
- To confirm waste tonnages and any contamination on the brownfield site.
- To clarify structural engineering requirements for the site

Temporary excavations which are required for the installation of drainage, gas and buried networks will be excavated and backfilled within as short a timeframe as possible to minimise exposure of surfaces to erosion. Excavation stability is important and deep excavations will employ the use of appropriate excavation techniques (e.g. temporary shoring) to ensure excavation wall stability.

The following measures will help mitigate the impacts during excavation:

- Excavation work will be conducted in stages to minimise the exposure of unprotected soil, subsoil and bedrock.
- Where possible excavated subsoil material will be reworked and used on site.
- A geotechnical investigation of the site will be required in order to assess the potential of the underlying soil, subsoil and bedrock for reuse.
- 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 the rate of erosion from climatic methods.
- Stockpile heights should be kept to a minimum to ensure stockpile stability and minimise wind borne erosion.
- Excavations will be postponed in high rainfall conditions to reduce the risk of excavation collapse and erosion to soil and subsoil profiles.
- If extreme weather conditions are forecast high sediment stockpiles will be covered to minimise erosion.
- Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and bedrock.
- 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.
- All long-term soil stockpiles are to be planted with a vegetative cover to bind the soil and improve slope stability.
- 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 install the discharge pipe to the River Funshion. This will limit trenching requirements and reduce the risk of sediment laden run-off.
- The timing of installation of the discharge pipe to the River Funshion will be scheduled to ensure no instream works are carried out during the closed season for instream works. (October 1st to June 30th). IFI must be notified prior to works taking place. The timing of works shall be in accordance with to IFI (2016) Guidelines on the Protection of Fisheries

during Construction Works in and Adjacent to Water. Works associated with the headwall construction should be supervised by an Ecological Clerk of Works (ECoW).

Soil Compaction

Heavy tracked and wheeled construction vehicles will be in use throughout varies stages of the construction process. The soil on site is noted as having different levels of compaction. In Trial Pit 01 soils were observed as being un-compacted and soft to 0.3m bgl. Beyond this, from 0.3-08m bgl the subsoil has been observed as being slightly more compacted. In Trial Pit 02 soils were observed as being uncompacted up to 1.4m bgl. Beyond this, soils were observed as being compacted. To reduce compaction during construction the following mitigation measures will be undertaken:

- 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 as it damages the soil structure, reduces porosity, and subsequent percolation rates, and can result in ‘smearing’ of the soil surface, which prevents water infiltration.
- Works will be avoided during periods of extended rainfall.

Run-Off

Sediment laden run-off from exposed soil and stockpiles poses a risk to waterways and aquatic life. The main pollutants of site water are silt, fuel/oil, concrete and chemicals. There are a number of steps outlined below to eliminate contamination of site surface water runoff.

- As a standard best practice measure a silt fencing will be erected along the southern and eastern extents of the Proposed Development site to limit accidental discharge of sediments into the adjacent drainage channel. The 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 to ensure that they remain functional throughout the construction of the Proposed Development. Maintenance of the fences will be carried out regularly. Fences will be inspected thoroughly after periods of heavy rainfall.
- Excavated and/or imported material will be stockpiled and silt fencing will be constructed around stockpile locations to contain/ reduce any sediment run-off during times of inclement weather.
- Compacting of stockpiles will reduce the rate of airborne and hydraulic 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’s increased surface water flow rates.
- 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.

- 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 at the pre-commencement stage. These will include toilet facilities. All foul discharges from welfare facilities will be collected in a septic storage tank. This tank will be regularly emptied, and the contents disposed of at a registered facility.

Concrete

The underlying bedrock contains a regionally important karst groundwater body. To the southwest of the Proposed Development the overlying burden/ soil is in excess of 8m with a "high" risk associated. To the southwest of the Proposed Development, beyond this "high" vulnerability band there is an area of "extreme" and "X" risk to the waterbody due to the reduced depth of overburden and the proximity of this region to rock which is at or near the surface. The subsoil permeability of this overlying region is not mapped. Due to its elevated pH, unset concrete possesses a risk to adjacent soil, surface waters and the underlying groundwater body. The following mitigation measures are proposed to limit the accidental discharge of concrete and to minimise waste.

- **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 west of the site, away from the drainage ditch.
- 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

A wide array of chemicals and materials will be used during the construction of the development. This includes hydrocarbons which can persist in the wider environment for decades. To mitigate the exposure of the surrounding soil and geology to these substances it is proposed to undertake the following:

- 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 adjacent watercourse.
- 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 offsite 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 checks prior to start-up of plant and machinery will minimise the risk of breakdown and associated contamination risks for on-site repairs. Daily pre-start checks will be undertaken and records maintained. A clean site policy and diligent housekeeping will also reduce the potential of hydrocarbon release on-site.

Importation of Contaminated Materials

The development will involve the importation of *ca.* 9,202m^3 soil, stone and other bulk materials and so there is a risk of importing contaminated materials or invasive species to the Proposed Development.

- All material will be sourced and transported by registered suppliers.
- All materials will be inspected prior to acceptance on site.
- Any deliveries found to be contaminated will be refused access to deposit on site. Any contaminated materials accidentally 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 7-43 materials. The quarantine zone is to be fenced off and surrounded by silt fencing, as a secondary containment measure.

Removal of Eutrophic Pond

The existing pond located at the southwest of the site has undergone significant eutrophication. The waters of this pond represent a potential source of contamination to groundwater and surface water receptors. Therefore:

- Dewatering of the pond will be performed prior to the commencement of construction works
- Drained waters will be transported off-site to a suitable facility for disposal
- Once the pond has been drained and sediment is removed, the area should be graded to match the surrounding landscape. The pond basin may need to be filled with clean fill material (such as gravel, sand, or compacted soil) to create a stable and even surface. The ground will be levelled to achieve the proposed FFL of 101.4 m.
- The fill material should be properly compacted to avoid future subsidence.

Excavation of Contaminated Soils

The existing site consists of open pastures to the east and north. The site formerly housed a piggery which may represent a source of contaminated soils including asbestos. No contaminated soils were detected during site investigations. Excavation of contaminated soils is unlikely. Nonetheless, during construction:

- 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.
- A full geotechnical site investigation will be undertaken prior to commencement of construction to assess the quality and quantity of waste concrete and soils within the brownfield portion of the site.
- An asbestos survey is recommended for the existing structures prior to the commencement of demolition works.

7.6.2 Operational Phase

The disturbance to soil and geology at the proposed site during the operational phase of the Anaerobic Digestion Plant is not foreseen to result in any significant impacts. The most significant threat to the underlying soil and geology is posed by the uncontrolled release of biobased fertiliser or manure and the operation of the attenuation pond.

General Mitigation Measures

An Environmental Operating Plan (EOP) will be prepared and implemented by the plant management company during the operational phase. This is a practical document which will include detailed procedures to address the main potential effects on surface water and groundwater.

Having regard to current law and practice, the Proposed Development will require an application for an Industrial Emissions Licence (IEL) to the EPA. In the event of a grant of licence by the EPA to carry out activities that require such licence, it is expected that 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:

- 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

Uncontrolled Releases & Spillage

Mitigation of relevance to the management of uncontrolled releases will include:

- Dedicated hard standing for off-loading areas, with a minimum separation distance from adjacent water courses.
- Use of spill kits, bunded pallets and secondary containment units, as appropriate.
- All bunds sized to contain 110% of the volume of the primary storage vessel.
- Environmental Management 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 during the operational phase. All stormwater discharges from site will be via the attenuation pond with all areas, with the exception of the roofs, being directed through Class 1 petrol/oil interceptors before passing through the attenuation ponds prior to discharge.
- 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

To mitigate the risk to soil, groundwater and surface water features the following measures will be complied with:

- 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 (Good Agricultural Practice for Protection of Waters) Regulations, 2022).
- The spreading of the biobased fertiliser on the customer farms must be done in accordance with the specific Nutrient Management Plan for that farm.
- 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.

7.6.3 Decommissioning Phase

The decommissioning phase will entail similar activities to the construction phase. The construction stage mitigation measures outlined in **Section 7.6.1** above will be undertaken to limit and avoid effects to the underlying soil from compaction and contamination. The goal of the decommissioning phases is to render the site safe both physically and environmentally so that it no longer poses a risk to the surrounding population and environment. A Closure, Restoration and Aftercare Management Plan (CRAMP) will be developed as a condition of the industrial emission licences and in compliance with the Guidance to Licensees on Surrender, Cessation and Closure of Licensed Sites set by the EPA (2012).

7.7 Cumulative Effects

Within the European Commission - Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, dated May 1999, cumulative effects are described as "impacts that result from incremental changes caused by other development, plans or projects together with the Proposed Development or developments".

The cumulative effects of the proposed construction and operation of an anaerobic digestion plant at Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork with other developments in the area is reviewed in this section with specific regard to the local and regional land, soil and geology. The project will involve the importation of gravel and concrete which will be sourced from local quarries and will result in an increased demand at such sites. The removal and disposal of excess soil and subsoil from site to licensed facilities will have an effect on capacity at such sites. This will result in a **slight cumulative effect** on such sites.

7.8 Residual Effects

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 effects on the surrounding land, soil and geology.

The purpose of this assessment is to specify mitigation measures where appropriate to minimise the 'risk factor' to all aspects of the soil and geological environment such as to minimise the potential for contamination effect to soil, groundwater or aquifers and reduce the risk of erosion and sediment run-off, 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.

7.8.1 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**.

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 significant** and **temporary to permanent**.

7.8.2 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**.

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**.

Table 7.13: Summary of predicted construction phase impacts, mitigation measures and residual impact

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Topsoil Removal	**Topsoil** Soil structure, soil microorganism population, adjacent waterways	Erosion of stockpiles of exposed soils leading to migration of silt into surface water receptors via dust and run-off. Damage to soil structure	***Negative***	***Slight/ Moderate***	***Reversible***	• Temporary drainage system to route run-off through interceptors & settlement ponds • Stockpiles of topsoil to be used in landscaping works as soon as is practicable • Silt fence erected along catchment lines • Soil bunds at base of stockpiles to reduce run-off rates and to prevent vehicles driving on stockpiles and damaging soil structure • Slight compaction of stockpiles to minimise run-off and airborne erosion • Running stockpiles in direction of prevailing wind, SW-NE, to reduce windborne erosion • Minimise handling of material • Keep stockpile heights low to minimise compaction & windborne erosion	***Neutral, Slight, Reversible***
Demolition and Removal of Existing Structures	**Topsoil, Subsoil & Groundwater** Soil microorganism population, adjacent waterways and groundwater	Anaerobic soils. Eutrophied waters. Contamination of subsoil, groundwater & bedrock from hydrocarbons, concrete etc.	***Negative***	***Moderate***	***Long-term***	• Construction Environmental Plan (CEMP) • Outline Construction & Demolition Waste management Plan (CDWMP) • Appropriate collection, handling and disposal of waste materials and contaminants • Silt fencing to be erected • Temporary drainage system to route run-off through interceptors & settlement ponds • Regularly wet down the demolition site, especially during dry and windy conditions, to minimize dust	***Neutral Slight, Short-term***

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Excavations/ Subsoil Removal	**Subsoil** Adjacent waterways, Underlying Karstified Regionally Important Aquifer	Reduction in subsoil horizon by up to 2m will increase groundwater vulnerability and threaten the Karstified Aquifer. Migration of silt into adjacent lands & waterways via dust and run-off	***Negative***	***Moderate***	***Permanent***	• Stockpiling material in appropriate locations, away from water sources, with silt fencing surrounding it to retard the rate of erosion from hydraulic conditions. • Light compaction of stockpiles to minimise the rate of erosion from airborne and hydrological methods. • Stockpile heights should be kept to a minimum to ensure stockpile stability and minimise wind borne erosion. • Excavations will be postponed in high rainfall conditions to reduce the risk of excavation collapse and erosion to soil and subsoil profiles. • If extreme weather conditions are forecast high sediment stockpiles will be covered/ dampened to minimise erosion. • Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and bedrock. • Excavate and backfill temporary excavations within a short timeframe to minimise exposure to erosion and contamination • Installation of silt fencing to capture hydraulic erosion • Risk of contaminating underlying exposed material 'naturally' mitigated by the presence of the of the low permeability subsoil throughout the site	***Neutral, Moderate, Permanent***
	Bedrock Karstified Regionally Important Aquifer	Exposure of bedrock, and/or excavation of bedrock	***Negative***	***Significant***	***Permanent***		***Neutral, Moderate, Temporary***
Passing Bay, Drainage Pipe & Gas Pipeline	**Topsoil & Subsoil** Underlying Geology Regionally Important Aquifer	Exposure & removal of soil & subsoil. Stockpiling of excavated and imported material. Migration of silt into adjacent lands Contamination of subsoil and underlying geology	***Negative***	***Slight***	***Permanent***	• Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsoil • Landscaping to take place as soon as possible to reduce weathering • Installation of drainage headwall to be undertaken outside of fish spawning season	***Neutral, Slight, Long-term***

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Construction of Built Structures	**Topsoil, Subsoil & Bedrock**	Conversion of permeable soil into hard standing. Compaction of soil & subsoil from plant machinery Contamination of subsoil & bedrock from hydrocarbons, concrete, etc.	***Negative***	***Moderate***	***Long-term***	• Construction of access roads to confine plant machinery to designated routes • Construction of site car park to reduce traffic and compaction on site • Chemicals/ hydrocarbons to be stored and used in bunded areas. • Spill kits to be located throughout site • Scheduling and use of ready mixed concrete on site	***Neutral, Slight, Long-term***
Attenuation Pond	**Subsoil & Bedrock**	Anaerobic soils. Percolation of contaminants into the underlying karstified regionally important aquifer	***Negative/ Neutral***	***Moderate***	***Permanent***	• Quarantine zone will be available to isolate any contaminated soils identified. The area will have an impermeable linear, cover and surrounded by silt fencing • Any exposed bedrock will be covered with an impermeable geotextile linear	***Neutral, Slight, Permanent***
Excavation of Contaminated Soils	**Topsoil, Subsoil & Bedrock**	Excavated materials, intended to be reused on-site for landscaping purposes. Potential for soils to contain contaminants from accidental spillages or legacy contamination and leach into surface water receptors	***Negative***	***Not Significant***	***Permanent***	• Brownfield and Greenfield site with previous industrial piggery activities noted at the site meaning incidences of contaminated are possible • Site investigations did not detect any incidences of contamination • Procedure in place for incidence of contaminated land within CEMP • Contaminated soils encountered to be tested, quantified, segregated and transported for disposal by a licenced contractor • Quarantine zone will be available to isolate any contaminated soils identified. The area will have an impermeable linear, cover and surrounded by silt fencing	***Positive, Slight, Short-term***

Table 7.14: Summary of predicted operational phase impacts, mitigation measures and residual impact

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Hydrocarbon Contamination	Topsoil	Accidental release from vehicular crash, leaks from hydraulics, fuel tanks, fuel stores, bunds into the surrounding soil	***Negative***	***Moderate to Significant***	***Long-term***	• Drainage systems will be designed to attenuate excess surface water runoff with suitable storage volumes • Reduction of outflow rate to below the existing greenfield runoff rate before discharging • Installation of Sustainable Urban Drainage Systems (SuDS) features such as permeable paving, filter drains, and petrol interceptors • Environmental Operating Plan • Bunding and regular inspection of bunds • Installation and maintenance of bund area.	***Neutral, Imperceptible, Long-term***
	Subsoil & Bedrock Regionally Important Aquifer	Accidental releases outlined above percolating downwards into lower soil horizon and bedrock aquifer	***Negative***	***Moderate to Significant***	***Long-term***		***Neutral, Imperceptible, Long-term***
Nutrient Leaks	Topsoil	Accidental discharges of high BOD demanding digestate/ feedstock/ sewage into soil. Poses threat to adjacent surface water	***Negative***	***Slight***	***Short-term***	• All sewage/ pipe/ tank infrastructure to be installed in accordance with the relevant industry standards and pressure tested/CCTV surveyed prior to commissioning to ensure absence of defects • Programme of inspection and maintenance to ensure any defects in tanks or bunds are repaired	***Neutral, Imperceptible to slight, Short-term***
	Subsoil & Bedrock Regionally Important Aquifer	Leakage of high BOD sources outlined above into lower soil horizon and bedrock aquifer	***Negative***	***Slight***	***Short-term***	• The process area on site will be completely bunded. This will catch and retain and spills preventing percolation into the lower horizons	***Neutral, Imperceptible to slight, Permanent***
Land Spreading of Digestate	Topsoil, Watercourses Animal welfare	Application of processed digestate to agricultural land Transmissible diseases	***Negative***	***Significant***	***Temporary***	• 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 • Digestate will be pasteurised in accordance with Regulation (EU) 142/2011 on use of animal by products as organic fertiliser	***Positive, Imperceptible, Temporary***

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Attenuation Pond	Subsoil & Bedrock Regionally Important Aquifer	Discharge of contaminated materials into the wetland may have the potential to percolate into the underlying aquifer	***Neutral***	***Moderate***	***Permanent***	• Installation of Sustainable Urban Drainage Systems (SuDS) features such as filter drains and petrol interceptors • Environmental Operating Plan	***Neutral, Moderate, Long-term***

7.9 Monitoring

The Construction Environmental Management Plan (CEMP) and Environmental Operating Plan (EOP) will include provision for the monitoring of construction and operational related activities including the following:

- Water Quality Monitoring of the surface water receptors adjacent to the site boundary
- Daily inspections for housekeeping and site cleanliness
- Dust Suppression on dry days or during concrete cutting
- Risk assessment for the prevention of fuel spillages
- Monitoring of stockpiles to determine if further measures are required to prevent erosion

Daily site inspections to ensure procedures outlined within the CEMP are adhered through throughout the site.

7.10 Summary of Significant Effects

The receptors for this assessment are considered to be shallow soils, the underlying drift, bedrock geology and waters. 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 impacts are reduced to negligible.

7.11 Statement of Significance

The significance of effect upon shallow soils, drift deposits, and bedrock geology have been assessed for both during the construction and operational phases. The results of the assessment are presented on **Table 7.11** and **Table 7.12**.

Where a potential effect has been identified, the significance of effect upon these receptors ranges from slight to profound.

Where a potential effect has been identified, mitigation measures have been provided which if implemented reduces the effect of significance to ***imperceptible*** *to* ***moderate.*** The mitigation steps are presented in **Section 7.6** and summarised in **Table 7.13** and **Table 7.14**.

ORS

Appendix 7.1 Soil Profile Clashmore

REPRESENTATIVE PROFILE DESCRIPTION

SERIES: CLASHMORE

Reference profile: RPQ60GJ01
County: Kerry
Weather: Overcast
Elevation: 144

TOPOGRAPHY
Position: Lower slope
Slope degree: 4
Slope Form: Concave
Aspect: SSE

PARENT MATERIAL
Substrate Type: Drift
Substrate Subgroup: Siliceous stones

TEXTURAL CRITERIA
Textural Class: Coarse loamy
Texturally contrasting:

LAND USE
Land use: Grassland improved,
Human technologies: Fertilizer applications, Slurry applications, Ploughing
Vegetation: Grassland

WATER TABLE None

ROCK OUTCROPS None

SURFACE STONE None

IRISH CLASSIFICATION (2013)
Soil subgroup: 11.0.0 Typical Brown Earth

National Soil Series: Clashmore
Coarse loamy drift with siliceous stones

DESCRIPTION

0 - 23 cm **Ap**

MATRIX COLOR: 75YR31. **MOTTLE:** 5YR46, Very few, Very fne, Prominent, Sharp. **STONES (%):** Common, 2-6 mm, Angular, Quartzite; 2-6 cm, Sub-angular, Old Red Sandstone. **TEXTURE:** Sandy loam. **STRUCTURE:** Moderate, Crumb, Fine, Moderate. **COMPACITY:** Non-cemented and non-compacted. **CONSISTENCY:** Friable. **PLASTICITY:** Plastic. **STICKINESS:** Non-sticky. **ROOTS:** Common, Medium. **PACKING DENSITY:** Low. **POROSITY:** Medium. **MACROPORES:** Medium. **BOUNDARY:** Abrupt, Smooth.

23 - 26 cm **E**

MATRIX COLOR: 5YR62. **VARIEGATION:** weathered stones in situ. **STONES (%):** Common , 2-6 mm, Sub-angular, Old Red Sandstone; 2-6 cm. **TEXTURE:** Sandy loam. **STRUCTURE:** Moderate, Prismatic to Angular blocky, Fine to Coarse. **COMPACITY:** Non-cemented and non-compacted. **CONSISTENCY:** Friable. **PLASTICITY:** Slightly plastic. **STICKINESS:** Non-sticky. **ROOTS:** Very few, Fine. **PACKING DENSITY:** Low. **POROSITY:** Low. **MACROPORES:** Fine. **BOUNDARY:** Clear, Wavy.

26 - 47 cm **Bw**

MATRIX COLOR: 75YR53. **Varie VARIEGATION:** weathered stones in situ. **STONES (%):** Common , 2-6 mm, Sub-angular, Old Red Sandstone; 2-6 cm. **TEXTURE:** Sandy loam. **STRUCTURE:** Moderate, Angular blocky, Fine to Coarse. **COMPACITY:** Non-cemented and non-compacted. **CONSISTENCY:** Firm. **PLASTICITY:** Very plastic. **STICKINESS:** Sticky. **ROOTS:** Very few, Fine. **COATS:** Silt, Few, Faint, Broken, **PACKING DENSITY:** Low. **POROSITY:** Low. **MACROPORES:** Fine. **VOIDS:** Medium. **BOUNDARY:** Gradual, Wavy.

47 - 140 cm **BC**

MATRIX COLOR: 5YR53. **MOTTLE:** 5YR46, Few, Fine, Distinct, Sharp. **STONES (%):** Abundant, 2-6 mm, Angular, Old Red Sandstone; 6-20 cm, Sub-angular. **TEXTURE:** Sandy loam. **STRUCTURE:** Weak, Sub-angular blocky, Fine to Coarse. **COMPACITY:** Non-cemented and non-compacted. **CONSISTENCY:** Friable. **PLASTICITY:** Slightly plastic. **STICKINESS:** Slightly sticky. **ROOTS:** Very few, Very fine. **PACKING DENSITY:** Medium. **POROSITY:** Medium. **MACROPORES:** Very few.

LABORATORY ANALYSIS

Horizon	pH	Total (%)		Organic Carbon (%)	Loss-on-ignition (%)
		Nitrogen	Carbon		
1(Ap)	5.7	0.30	4.17	3.66	
2(E)	5.7	0.11	1.28	1.02	
3(Bw)	5.5	0.10	1.06	0.64	
4(BC)	5.6	0.04	0.26	0.10	

OXALATE EXTRACTABLE		EXCHANGEABLE COMPLEX					
Fe ($g\ kg^{-1}$)	Al ($g\ kg^{-1}$)	CEC ($cmol\ kg^{-1}$)	Exchangeable Bases ($cmol\ kg^{-1}$)				Base Saturation (%)
			Na^+	K^+	Mg^{2+}	Ca^{2+}	
5.38	1.40	8.58	0.08	0.15	0.25	8.02	99
1.47	1.16	4.36	0.08	0.09	0.15	3.18	80
1.98	1.97	3.82	0.08	0.09	0.10	2.24	66
1.41	1.22	1.98	0.08	0.07	0.07	1.07	64

PARTICLE SIZE (%)			Textural Class USDA	Bulk Density g/cm^3	Standard Deviation
Sand 2000-50 μm	Silt 50-2 μm	Clay <2 μm			
62	23	15	Sandy Loam	1.10	0.06
52	31	17	Loamy/Sandy Loam	1.61	0.07
61	25	14	Sandy Loam	1.34	0.08
63	26	11	Sandy Loam	1.57	0.06

ORS

Appendix 7.2 Cut and Fill Levels

	Task	Volume
A	Excavate topsoil *(assumes 250mm thick layer)*	7,754
B	Excavate subsoil	14,312
C	Resoil 200mm thick	3,265
D	Fill to Sub-Formation with subsoil	14,312
E	Fill to landscaped areas with surplus subsoil and topsoil	4,489
E	Dispose surplus topsoil [= A - (C+E)]	-
F	Dispose surplus subsoil [= B - D]	-
G	Import Class 6F2 material to Capping Layer *(assumes 450mm thick layer)*	5,742
H	Stone fill under structures	3,460

INDICATIVE EARTHWORKS SCHEDULE

SURFACE

- General yard / parking- concrete finish
- Energy Hub - concrete finish
- Circulation Road - asphalt finish
- Bunded Area - concrete finish
- Roof
- Grassed Area / Detention Basin

SECTION C-C
SECTION A-A
SECTION B-B
N73
contours for existing ground level at 0.5m intervals
existing overhead line
perimeter of basin
perimeter of basin floor (97.00m OD)
side-slope to Detention Basin max 3:1
Detention Basin 97.00m floor
Class 1 Discharge Bypass Separator to IS EN 858 at S10
denotes cut slope
return slope from yard to existing ground level
indicative outline for fire-water tank
open channel
surface water carrier pipe
retaining wall
gravity flow from roof water drain to fire-water tank (indicative)
yard level
floor level
indicative location for reverse osmosis clean water main discharge to waterway
septic tank & percolation system for office waste
office
weighbridge
water supply
landscaped screening area
Energy Hub
open channel gutter to convey surface flow
ramp
maint. access ramp
bunded area
wall to perimeter of bunded area
sampling chamber, penstock and pumping chamber at CP0. pressure main from CP0 to S80
indicative connection location for water service from existing water main.
return slope from screening area to existing ground level
flow control valve at O1 restricts discharge from basin to maximum permissible rate (Q_{lor} = 12.8 lit/sec)
outfall to watercourse
watercourse
return slope from screening area to existing ground level
landscaped screening area
CP11 CL 98.98m IL 97.65m
CP12 CL 99.13m IL 98.00m
S20 CL 99.24m IL 97.48m
S0 CL 97.81m IL 97.16m
S10 CL 98.75m IL 97.21m
O2 CL 97.30m IL 97.00m
O1 CL 97.90m IL 96.90m
Outfall CL 97.72m IL 96.80m
RW10 CL 99.45m IL 98.03m
S45 CL 99.40m IL 97.98m
S30 CL 101.06m IL 98.20m
S31 CL 100.93m IL 99.50m
RW20 CL 99.41m IL 98.29m
RW30 CL 99.46m IL 98.34m
RW35 CL 101.49m IL 98.65m
RW40 CL 101.45m IL 100.29m
RW15 CL 99.24m IL 98.40m
C20b CL 99.15m IL 98.19m
S20a CL 99.16m IL 98.15m
CP60 CL 97.00m IL 96.16m
CP40a CL 100.73m IL 99.60m
CP40b CL 100.79m IL 99.70m
S40 CL 101.30m IL 98.80m
S120 CL 97.20m IL 96.02m
RW50 CL 101.38m IL 100.44m
S55 CL 100.81m IL 99.61m
S55a CL 100.83m IL 99.75m
S50 CL 101.01m IL 99.35m
S60 CL 100.94m IL 99.63m
S140 CL 97.12m IL 96.08m
CP30 CL 97.10m IL 96.10m
RW60 CL 101.39m IL 100.25m
S61a CL 101.22m IL 99.97m
CP61b CL 101.04m IL 100.05m
S62 CL 101.15m IL 99.96m
S63a CL 101.05m IL 99.80m
S62a CL 101.12m IL 100.00m
S61 CL 101.22m IL 99.85m
CP20 CL 96.97m IL 95.81m
S110 CL 97.23m IL 95.70m
CP50 CL 96.97m IL 95.90m
CP45 CL 97.19m IL 96.14m
S130 CL 97.14m IL 95.77m
CP10 CL 97.08m IL 95.56m
CP40 CL 97.09m IL 95.62m
S70 CL 100.91m IL 99.84m
S71 CL 100.89m IL 99.95m
S80 CL 101.10m IL 99.99m
CP0-PUMP MH CL 96.96m IL 94.00m
FFL 99.50m
FFL 101.50m
FFL 97.55m
FFL 101.40m
FFL 97.37m
99.33m
99.42m
99.25m
99.34m
101.10m
101.35m
97.16m
97.11m
100.84m
97.12m
101.50m
101.31m
97.25m
101.29m
97.09m
375mm / 1:36
450mm / 1:42
300mm / 1:100
225mm / 1:58
225mm / 1:132
225mm / 1:114
225mm / 1:170
225mm / 1:108
225mm / 1:148
225mm / 1:138
225mm / 1:166
225mm / 1:200
225mm / 1:150
225mm / 1:160
225mm / 1:180
225mm / 1:190
225mm / 1:170
225mm / 1:100
225mm / 1:112
225mm / 1:116
225mm / 1:136
225mm / 1:128
225mm / 1:110
225mm / 1:118
225mm / 1:108
225mm / 1:98
225mm / 1:96
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225mm / 1:88
225mm / 1:86
225mm / 1:84
225mm / 1:82
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225mm / 1:74
225mm / 1:72
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225mm / 1:62
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225mm / 1:26
225mm / 1:24
225mm / 1:22
225mm / 1:20
225mm / 1:18
225mm / 1:16
225mm / 1:14
225mm / 1:12
225mm / 1:10
225mm / 1:8
225mm / 1:6
225mm / 1:4
225mm / 1:2
225mm / 1:1
N
0
15
30
Meters

GENERAL

1. Datum for levels is OS Malin Head.
2. Verify existing levels prior to commencement of works. Report any discrepancies immediately to the Employer's Representative.
3. The locations shown for existing services are indicative only and may not be accurate. Furthermore, uncharted services may also be present. The Contractor should assume the existence of services unless proven otherwise.
4. It is the Contractor's responsibility to determine the existence and precise location of any service located within the site. All works shall be carried out in strict accordance with the document 'Code of Practice for Avoiding Danger from Underground Services' as published by the Health and Safety Authority.
5. The Specification for surface water drainage works shall be the TII Specification for Roadworks unless otherwise noted.

SURFACE WATER LEGEND

- Carrier pipe
- Roof water drain
- Open channel
- Chamber (S)
- Chamber with grated cover (CP)
- Roof water chamber (RW)

REV	DATE	BY	DETAILS

STATUS
PRELIMINARY. NOT TO BE USED FOR ANY OTHER PURPOSE.

CLIENT
NEPHIN RENEWABLE GAS

PROJECT
AD Facility, Mitchelstown, Co. Cork

TITLE
GENERAL LAYOUT
SURFACE WATER DRAINAGE / SUDS REGIME
WASTEWATER / WATER SUPPLY

KILGALLEN & PARTNERS
CONSULTING ENGINEERS
E-mail: Info@Kilgallen.ie, Web: www.kilgallen.ie
KYLEKIPROE
WELL ROAD
PORTLAOISE
T +353 56 866 2860
UNIT 3
DANVILLE BUSINESS PARK
KILKENNY
+353 56 777 01090

DRN:	DRAWING NO.:		REV.:
RE	24055-DR-0501		PL01
CHKD:	SCALE:	SIZE:	DATE:
PB	1:500 @ A1	A1	29/08/2024

8 Hydrology & Hydrogeology

8.1 Introduction

This chapter comprises an assessment of the hydrological and hydrogeological environment (collectively known as the water environment) within the site and the surrounding environs. The potential effects posed by the construction and operational phases of the Proposed Development are investigated, and suitable mitigation measures are recommended to minimise effects on the local water receptors.

In terms of Environmental Impact Assessment (EIA):

- "Hydrology" is the study of surface water features.
- "Hydrogeology" is the study of groundwater features.

The objectives of this chapter 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.

8.2 Consultation

ORS have been commissioned to assess the potential impacts of the Proposed Development in terms of hydrology and hydrogeology during the construction and operational phases.

The principal members of the ORS EIA team involved in this assessment include the following persons:

- **Project Scientist & Lead Author:**
  Bianca Severgnini – B.Eng. (Hons) (Environmental). Current Role: Environmental Consultant. Experience *ca*. 3 years.

- **Project Scientist & Reviewer:**
  Luke Martin – B.A. (MOD) (Natural Sciences), M.Sc. (Sustainable Energy and Green Technology), CEnv, MIEnvSc. Current Role: Chartered Environmental Consultant. Experience *ca.* 12 years.

- **Project Coordinator & Reviewer:**
  Oisín Doherty – B.Sc. (Geography with Environmental Science), MSc. (Environmental Management), CEnv, MIEnvSc. Current Role: Chartered Environmental Consultant. Experience *ca.* 14 years.

Consultation between ORS and other members of the planning/design team was made in order to obtain information required to assess the potential construction and operational phase impacts on local hydrology and hydrogeology.

8.3 Assessment Methodology & Significance Criteria

This chapter was carried out in accordance with the following guidance documents:

- EPA, (2022). *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*.
- EPA, (2004). *Land spreading of Organic Waste – Guidance on Groundwater Vulnerability Assessment of Land*.
- European Commission, (2017). *Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report*.
- Institute of Geologists Ireland, (2013). *Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements*.
- NRA, (2008). *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*.
- CIRIA, (2001). C532 - *Control of Water Pollution from Construction Sites – Guidance for consultants and contractors*.

8.3.1 Desktop Study

A desk-based assessment method was used to assess baseline water quality for the receiving environment of the Proposed Development. The baseline information that is detailed in this section of the assessment was obtained from publicly available information.

The following documents and sources were referenced:

- Aquifer classification and vulnerability identification from the Geological Survey of Ireland (GSI web page).
- Search of GSI and Cork County Council files to determine the location of groundwater wells within a 2km radius.
- 1:50,000 Discovery Series Maps and 6” maps (Geohive).
- Water Quality in Ireland 2010-2015 (EPA).
- Water Quality in Ireland 2013-2018 (EPA).
- South Western River Basin District River Basin Management Plan (SWRBD RBMP).
- Meteorological data from Met Eireann and hydrometric data from the Office of Public Works (OPW).
- Cork County Development Plan 2022 – 2028.
- Reports, maps and data published by the Geological Survey of Ireland (GSI) and the National Soil Survey of Ireland.
- General Soil Map of Ireland 2nd Edition, (1980), The National Soil Survey, An Fóras Taluntais.
- An Foras Talúntais (1980). Soil associations of Ireland and their land use potential. Reports, maps and data published by the Environmental Protection Agency (EPA).
- UK CIRIA report C552 (2001). (Contaminated Land Risk Assessment: A Guide to Good Practice.
- IFI (2016), Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Watercourses.
- OPW and DoEHLG (2009), The Planning System and Flood Risk Management - Guidelines for Planning Authorities.
- EPA (2022), River Quality Surveys: Biological - Hydrometric Area 18.
- Möller, K., & Müller, T. (2012). Effects of anaerobic digestion on digestate nutrient availability and crop growth: a review. Engineering in Life Sciences, 12(3), 242-257.

The following technical reports completed in support of the planning application for the Proposed Development were also consulted to further assess baseline water quality.

- Civil Engineering Design Report.
- Site Specific Flood Risk Assessment.
- Site Suitability Assessment for onsite domestic wastewater treatment system.

8.3.2 Field Survey

Fieldwork commissioned December 2023 consisted of the following elements:

- Trial Pit Excavations
- BRE Digest 365 Percolation/Soakaway Testing

A site walk-over was conducted by ORS geotechnical consultants on the 18th of December 2023 and 3rd and 4th of September 2024 to identify hydrological features on site including:

- Drainage patterns and distribution
- Exposures
- Drainage Infrastructure
- Wet ground

8.3.3 Impact Assessment Methodology

Chapter 1: Introduction of the EIAR outlines the impact assessment rationale applied to each chapter of the study. This section describes some further criteria applied to the assessment of hydrological and hydrogeological receptors.

Risk Appraisal Methodology

The Conceptual Site Model (CSM) identifies potential contaminants, receptors and exposure pathways that may be present based on the construction and operational phase of the Proposed Development. The identification of potential "contaminant linkages" is a key aspect of the evaluation of potentially contaminated land. An approach based on this methodology has been adopted within this report. For each of the contaminant linkages, an estimate is made of:

- The potential severity of the risk.
- The likelihood of the risk occurring.

Hydrological and Hydrogeological Receptor Criteria

The level of sensitivity of hydrological and hydrogeological receptors are based on a number of factors which are summarised in **Table 8.1** overleaf.

Table 8.1: Criteria for rating importance of hydrological and hydrogeological attributes (NRA, 2008)

Importance	Criteria	Receptors	
		Hydrological	Hydrogeological
Extreme	Attribute has a high quality or value on an international scale	River, wetland, or surface water body ecosystem protected by EU legislation	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding. Nationally important amenity site for wide range of leisure activities.	Regionally Important Aquifer with multiple wellfields Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source
High	Attribute has a high quality or value on a local scale	Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4) Flood plain protecting between 5 and 50 residential or commercial properties from flooding Locally important amenity site for wide range of leisure activities	Regionally Important Aquifer Groundwater provides large proportion of baseflow to local rivers Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source Inner source protection area for locally important water source
Medium	Attribute has a medium quality or value on a local scale	Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3) Flood plain protecting between 1 and 5 residential or commercial properties from flooding	Locally Important Aquifer Potable water source supplying >50 homes Outer source protection area for locally important water source
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding	Poor Bedrock Aquifer Potable water source supplying <50 homes

River Water Quality Assessment Criteria

Under the Water Framework Directive and SI 722 of 2003 European Communities (Water Policy) Regulations, the EPA carries out water quality assessments of rivers, transitional and coastal water bodies as part of a nationwide monitoring programme. Data is collected from physico-chemical and biological surveys, sampling both river water and the benthic substrate (sediment). **Table 8.2** overleaf summarises the quality classes used to assess the condition of rivers throughout the country.

Table 8.2: Biotic Indices Classification for River Water Quality

Biotic Indices	Community Diversity	Quality	Condition	Quality Status	Quality Class
Q5	High	Good	Satisfactory	Unpolluted	Class A
Q4	Reduced	Fair	Satisfactory	Slightly Polluted - Unpolluted	Class B-A
Q3	Low	Doubtful	Unsatisfactory	Moderately – Slightly Polluted	Class C-B
Q2	Very Low	Poor	Unsatisfactory	Seriously – Moderately Polluted	Class C-D
Q1	Little/None	Bad	Unsatisfactory	Seriously Polluted	Class D

'Biotic Indices' or Quality (Q) Values are indicative of specified groups of macro-invertebrates' sensitivity to pollution. Q-Values are assigned to a waterbody based on the presence or absence of particular species with the Q5 biotic index indicating the least polluted waters and the Q1 biotic index indicating the most polluted waters.

'Quality Class' relates to the potential beneficial use of a water body as summarised in **Table 8.3**.

Table 8.3: Quality Class Descriptions

Quality Class	Description	BOD (mg/l)	Orthophosphate (mg/l)	Dissolved Oxygen (% Sat)
A	Highest water quality with very high amenity value Suitable for abstraction Suitable for game fisheries	<3	~0.015	~100%
B	Variable water quality with considerable amenity value Potential abstraction issues Game fish 'At Risk'	Occasionally exceeds 3mg/l	~0.045	<80% or >120%
C	Doubtful Water Quality with reduced amenity value Advanced Treatment of abstracted water required Coarse fisheries – Fish kills likely	Regularly Exceeds 3mg/l	~0.070	v. unstable
D	Poor to bad water quality with no amenity value Low grade & limited abstraction Fish absent	Levels regularly far in exceedance of 3mg/l	>0.1	Low, approaching 0%

Groundwater Vulnerability Assessment Criteria

Groundwater Vulnerability is a term used to represent the intrinsic geological and hydro geological characteristics that determine the ease with which groundwater may be contaminated by human activities. It is usually dependent on the nature (sandy, gravely, clay, etc.,) and depth of soil/subsoil overlying an aquifer (i.e., its shallowness). The travel time, attenuation capacity of the subsoils (i.e., ability to filter contaminants) and the nature of the contaminants are also important elements in determining the vulnerability of groundwater.

In the context of groundwater protection, Groundwater Vulnerability is the most important factor in determining control measures in areas where potentially hazardous discharge to groundwater might take place. This is because the type, permeability and thickness of the soil and subsoil play a critical role in preventing groundwater contamination by acting as a protecting filtering layer over the groundwater.

The extent of site investigation works required to accurately assess the groundwater vulnerability at a site is determined by the sensitivity of hydrogeological receptors within the site vicinity. The extent of sampling requirements as defined by the hydrogeological sensitivity of the site is defined in **Table 8.4**.

Table 8.4: Summary of Sampling Requirements

	Vulnerability	**Sampling Requirements**
Ground Water Protection Scheme (GWPS) exists	LOW	Simple walkover survey to confirm what has been established in the GWPS, i.e., no evidence of outcrop, depth to bedrock information from wells, etc.[1]
	MEDIUM	
	HIGH	If walkover survey indicates that the lands do not have sufficient thickness of subsoil (i.e. rock outcrops) then site specific information may be required.
	EXTREME[2]	Regionally Important Aquifers - Prove that 2m depth of soil/subsoil cover exists. Minimum of 1 data point per hectare is required.
		Locally Important and Poor Aquifers – Prove that 1m depth of soil/subsoil cover exists. Minimum of 1 data point per 5 hectares is required.
Ground Water Protection Scheme (GWPS) does not exist	**Aquifer Type**	**Sampling Requirements**
	Locally Important / Poor Aquifers	Prove that 1m depth of soil/subsoil cover exists. Minimum of 1 data point per 5 hectares is required. Site investigation points can be based on existing information. New information only required where existing information is insufficient.
	Regionally Important Aquifers	Prove that 2m depth of soil/subsoil cover exists. Minimum of 1 data point per hectare is required. Site investigation points can be based on existing information. New information only required where existing information is insufficient.
Source Protection Areas[3]	**Source Protection Zone**	**Sampling Requirements**
	Outer	A minimum thickness of 3m of subsoil should be demonstrated at a minimum depth to rock data point frequency of one point per hectare.
	Inner	It is not generally acceptable to land-spread unless there is no alternative area available, and that the area has been defined as having moderate vulnerability (i.e. > 10m of moderate permeability subsoil or > 5m of low permeability subsoil) overlying the aquifer. The depth to rock should be demonstrated at a minimum frequency of one point per hectare.

[1] The classification to Low / Medium / High class as part of GWPS indicates that minimum of 3m soil/subsoil depth can be anticipated
[2] To give a rough picture of "extreme vulnerability" areas we can use: GSI Outcrop data & Teagasc Shallow Rock data
[3] In general land-spreading of organic wastes should not be carried out within the source protection area (SPA) of a water supply. However, there are cases where if the subsoil is sufficiently thick it may be deemed acceptable subject to conditions

8.4 Description of the Receiving Environment

8.4.1 Background

This section of the chapter provides the baseline information in relation to geology, hydrogeology and hydrology that exists in the vicinity of the Proposed Development.

The site, located in Corracunna, Coolnanave and Garrane, Mitchelstown, County Cork, encompasses a total area of 5.61 hectares. The Proposed Development is situated to the south of Derra Farms Limited, an operational piggery which holds an Industrial Emissions License (P0494-01). Agricultural land borders the site to the north, east, and south, while the Mallow-Dublin N73 national road runs along its southern boundary. An unnamed watercourse, serving as drainage for the surrounding landscape, lies adjacent to the eastern boundary and flows southwest. This watercourse is not mapped by the EPA. The Proposed Development site is *ca.* 2 km northeast of Mitchelstown town centre.

The underlying geology has a major influence on topographical, hydrogeological and hydrological features within the site vicinity, hence this chapter is closely linked to the previous chapter (**Chapter 7 – Soils & Geology**).

The receiving environment is described below for the Proposed Development under the following headings:

- Topography
- Drift (Quaternary) Geology
- Bedrock Geology
- Hydrology
- Hydrogeology

8.4.2 Topography

County Cork's topography is characterised by a rich and varied landscape. The region features a combination of rolling hills, fertile plains, rugged coastlines, and prominent mountain ranges. Notable among these ranges are the Shehy Mountains in the west and the Boggeragh Mountains in the north, which are known for their rocky terrain, steep slopes, and peaks reaching up to 700 meters, including Knockboy, the highest point in the county.

In contrast, the central and eastern areas of County Cork have more gently undulating terrain, marked by extensive agricultural lands. River Lee and the River Blackwater, carve deep valleys through the landscape, providing essential water sources for both agricultural and urban areas. Additionally, several lakes are scattered across the mountainous regions. While agriculture dominates much of the land use, upland areas also host forests, with boglands and heath found at higher elevations.

County Cork's coastline, stretching over approximately 1,100 km, is dotted with peninsulas, bays, and inlets, with the Beara and Mizen Head peninsulas standing out for their cliffs. The southern and eastern coasts also have sandy beaches.

The Cork CDP 2022-2028 conducted a thorough Landscape Character Assessment, dividing the county into sixteen distinct landscape units, which are further categorised into twenty-six sub-types. Each of these sub-types was evaluated based on its Landscape Value, Sensitivity, and Importance. Landscape Value refers to the environmental or cultural benefits, including the

services and functions, derived from various landscape attributes. Landscape Sensitivity is defined as the capacity of each character type to accommodate change or intervention without causing unacceptable impacts on its character and values. Finally, the Importance of each landscape character type is rated as Local, County, or National.

The sub-types are visually represented in **Figure 8.1**. The Cork County Development Plan 2022-2028 emphasises that Landscape Character Types with very high or high landscape value, coupled with high or very high landscape sensitivity, and designated as either of county or national importance, are recognized as the most valuable landscapes. As a result, these areas are classified as High Value Landscapes (HVL).

The proposed site falls within landscape unit 5, identified as the "*Fertile Plain with Moorland Ridge*." This unit is characterised by *a "low-lying landscape, which comprises an extensive area of predominantly flat or gently undulating topography"*. It is also assigned a very high landscape value and sensitivity and is considered of County importance, which qualifies it as a High Value Landscape (HVL).

Figure 8.1: Landscape Character Types of County Cork (Appendix F of Cork CDP 2022-2028)

The proposed site, as shown on the elevation map (see **Figure 8.2** overleaf), is located in a valley or low-lying area between two elevated regions, the Galtee Mountains to the north and the Knockmealdown Mountains to the south. The site itself is situated at a relatively low elevation compared to the surrounding terrain, which reaches heights of over 650 m. This topographical setting places the proposed site in a sheltered area, possibly making it more prone to water accumulation or runoff from the adjacent higher elevations.

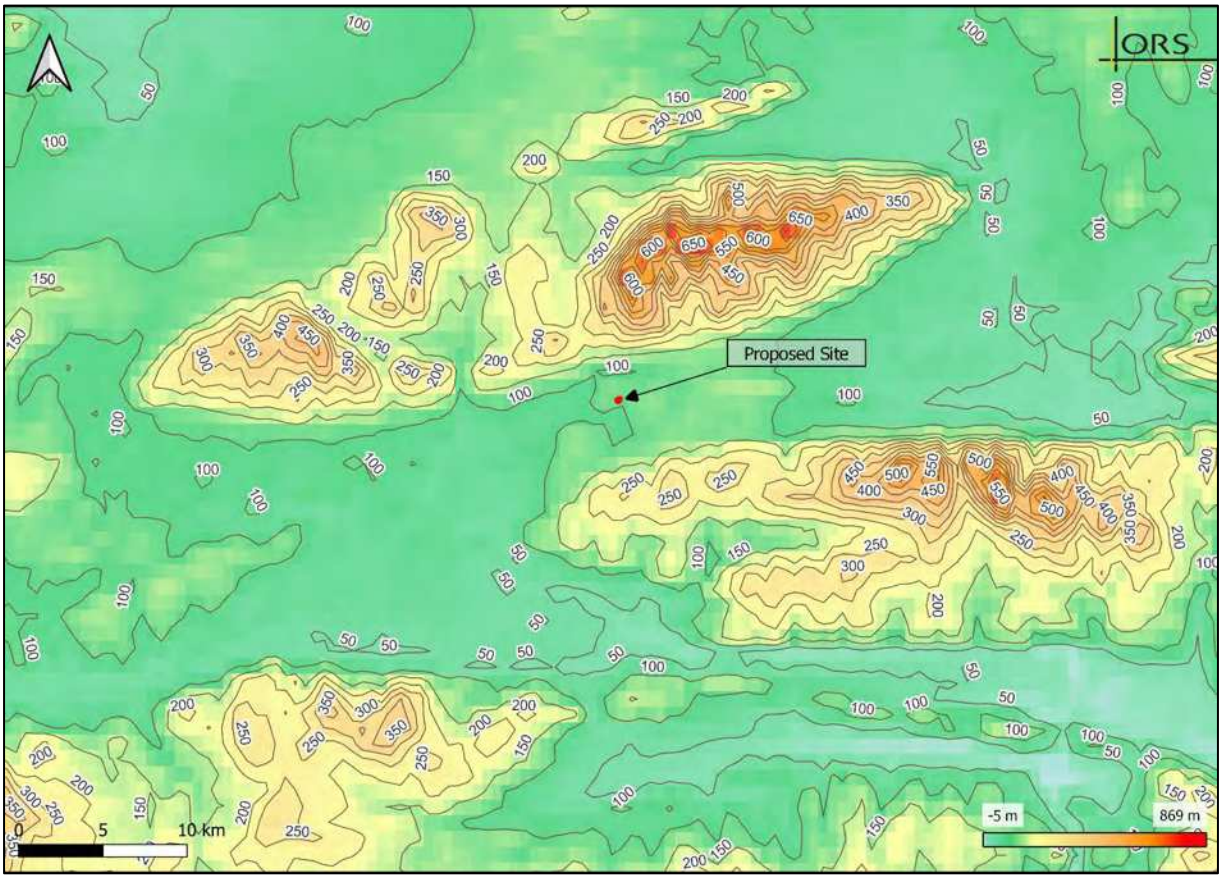

Figure 8.2: Elevation map of the proposed site surrounding area.

The topography of the proposed site is characterised as being flat to gently undulating glacial sediments. A peak in the site topography, 105.5 m OD, is situated along the northwest boundary of the site with a gradual gradient to the southeast to a low of 96.5m OD slightly north of the southern boundary of the Proposed Development before rising to 98m OD along the southern boundary. The landscape in the immediate area surrounding the development site has a gently undulating character, with slight variations in topography which is in keeping with the landscape character assessment of the site. To the northwest of the peak the land rises in a relatively steep gradient, with an elevation of 133m OD just south of the Funshion River as it can be seen in **Figure 8.3**.

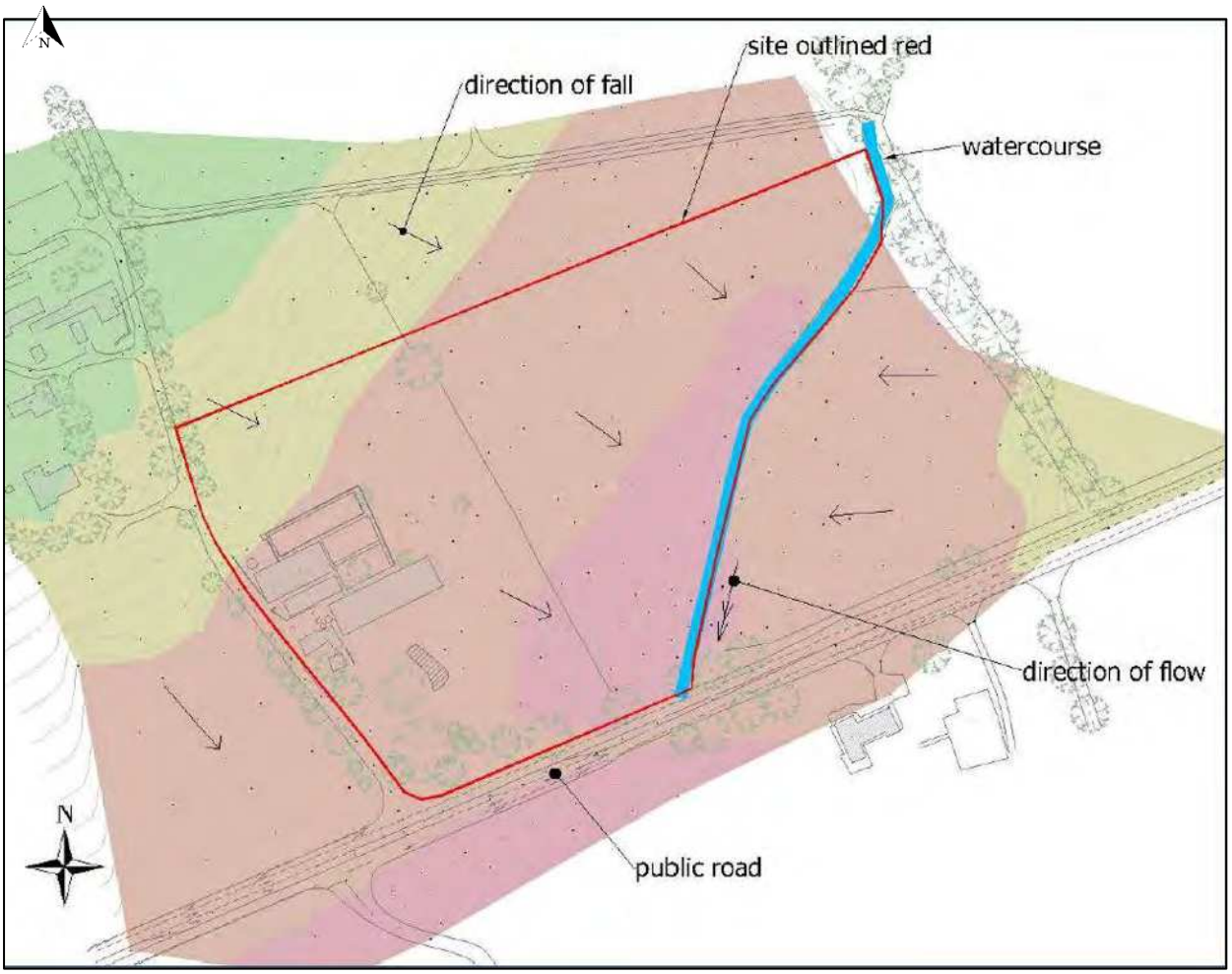

Figure 8.3: Topographical map of the landscape surrounding the site

8.4.3 Drift Geology

Drift is a general term applied to all mineral material (clay, silt, sand, gravel and boulders) transported by a glacier and deposited directly by or from the ice or as fluvioglacial deposits. It generally applies to deposits laid down during the Pleistocene (Quaternary) glaciations but can also be included under Holocene (Quaternary) deposits. The drift geology of a determined area mostly reflects the depositional process of the last glaciation.

The drift geology in County Cork is characterised by a diverse mix of unconsolidated materials such as boulder clay (till), sands, gravels, silts, and peat, which were deposited by glaciers, rivers, and the sea during and after the last Ice Age. The most widespread deposit throughout the County is till, which has a diverse composition due to different parent materials and deposition processes. The county also contains significant sand and gravel deposits in valleys, glaciofluvial deposits particularly in the Blackwater Munster valley, coastal marine and estuarine sediments along the coast, peat in both upland and lowland bogs, and alluvial.

The “Geology of East Cork-Waterford,” Sheet 22 (1995), is one of a series of detailed geological maps published by the Geological Survey of Ireland (GSI). It covers the geological features of the East Cork and Waterford regions, including the Mitchelstown area where the proposed site is situated. The report highlights that, similar to the broader County Cork area, this region is marked by significant glacial deposits such as till, sands, and gravels.

Additionally, it notes that alluvial deposits are prevalent along river systems, particularly in floodplains, contributing to fertile soils and influencing local agriculture. The Quaternary sediments present in the proposed site surrounding area can be seen in **Figure 8.4**.

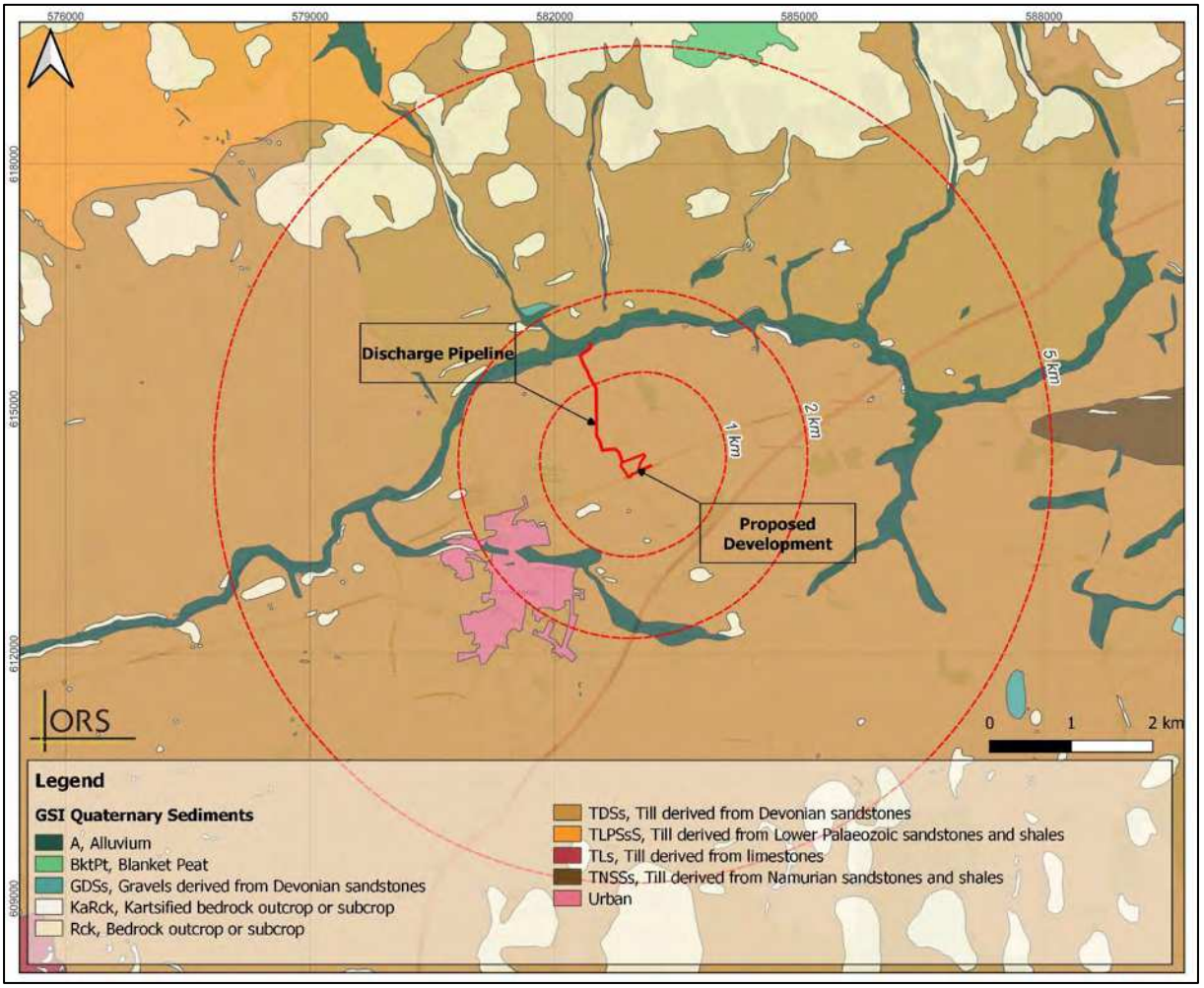

Figure 8.4: Quaternary Sediments for the Proposed Site vicinity based on GSI data.

The Quaternary Drift of the Proposed Development is described as till derived from Devonian sandstones (TDSs). The subsoils at the majority of the site are described as being moderately permeable and are overlain by well-drained soil. The subsoils along the southern boundary of the site and along the southern section of the adjacent watercourse are described as moderately permeable subsoil overlain by poorly drained gley soil.

The Teagasc Soil Map identifies the presence of the Clashmore (1100n) Soil Association at the proposed site, characterised by coarse loamy drift with siliceous stones. This association features well-drained, fertile brown earths and podzols, typically formed on glacial tills and drift deposits in both upland and lowland areas, a classification supported by the Second Edition General Soil Map of Ireland. The latter further categorizes the region within the Rolling Lowland group of physiographic divisions, highlighting the presence of Brown Podzolics alongside Acid Brown Earths and Gleys. The parent material is primarily Sandstone and Lower Avonian Glacial Till.

The site topography gradually falls from the northwest portion of the site towards the southeast. A drainage ditch, unmapped by the EPA, runs from the northeast boundary to the southeast

where the Mallow – Dublin Road runs alongside the development. This ditch represents the lowest point of elevation on site and acts as drainage for the surrounding landscape. The land rises again on the eastern side of the ditch. The ditch flows from the northeast to the southwest.

8.4.4 Bedrock Geology

This section examines the bedrock of the area, defined as the solid rock beneath the ground surface and any overlying soil. Typically, above the bedrock lies a layer of broken, weathered rock known as basal subsoil. Sedimentary rocks are found in beds that can vary in type and orientation, meaning the rock types encountered at the surface can change over relatively short distances.

County Cork presents a diverse geological landscape with rock formations spanning from the Devonian to the Carboniferous periods, *ca.* 415 to 300 million years ago. The oldest bedrock in the county, dating back to the Silurian period *ca.* 450 million years ago, is found mainly in the northern regions near the Galtee Mountains. During the Carboniferous period, an ocean covered Ireland, forming the Munster Basin in southern Cork, which filled with shales, mudstones, and limestones. Southwest-flowing rivers and swamp forests later contributed to the creation of shales and coal deposits, especially in northwest Cork. The Permian period brought the Variscan mountain-building event, which folded the rocks into east-west ridges and valleys, exposing Old Red Sandstone in the ridges and preserving younger Carboniferous rocks in the valleys. During the Jurassic and Paleogene periods, limestone exposures developed caves and fissures, with clays filling some of these features.

The development site is located within the Southern Hill and Vale Province, an extension of the Central Plain, characterised by its varied geological landscape. This region, influenced by the Carboniferous period and shaped by the Variscan Orogeny, includes extensive limestone formations, sandstones, and shales. The eastern part features gently rolling glacial drift terrain, while the western area has thinner drift with braided rivers, small lakes, and bogs. Notable geological features in the region include ancient shale plateaux and flat-topped mountains such as the Slieve Bloom and Galtee Mountains, where slate and shale layers are folded through limestone. The site is positioned between the Galtee Mountains to the north, formed from Devonian Old Red Sandstone and shaped by glacial activity, and the Knockmealdown Mountains to the south, which also consist of Old Red Sandstone covered by Carboniferous limestones with tropical sea fossils.

According to the Geological Survey of Ireland and the National Draft Generalised Bedrock Map, the bedrock within the 2 km study area of the proposed site consists of various formations from the Dinantian series of the Carboniferous period. The GSI 1:1,000,000 Bedrock Solid Geology Map indicates that the site is situated within the Rathronan Formation, characterised by pale-grey, massive mud-grade limestone. This formation includes “massive, unbedded pale-grey crinoidal wackestones and micritic limestones, with thinly bedded cherts.”

The Proposed Development area is positioned along a fault line that extends from north to south through the site’s centre. Another fault line is located *ca.* 800 meters east of the development area. The nearest unconformity is *ca.* 250 meters north of the site. The Croane Formation, consisting of dark shaly cherty fine-grained limestone, begins along the central fault line and extends eastward in a long, narrow band. Refer to **Figure 8.5** for a detailed depiction.

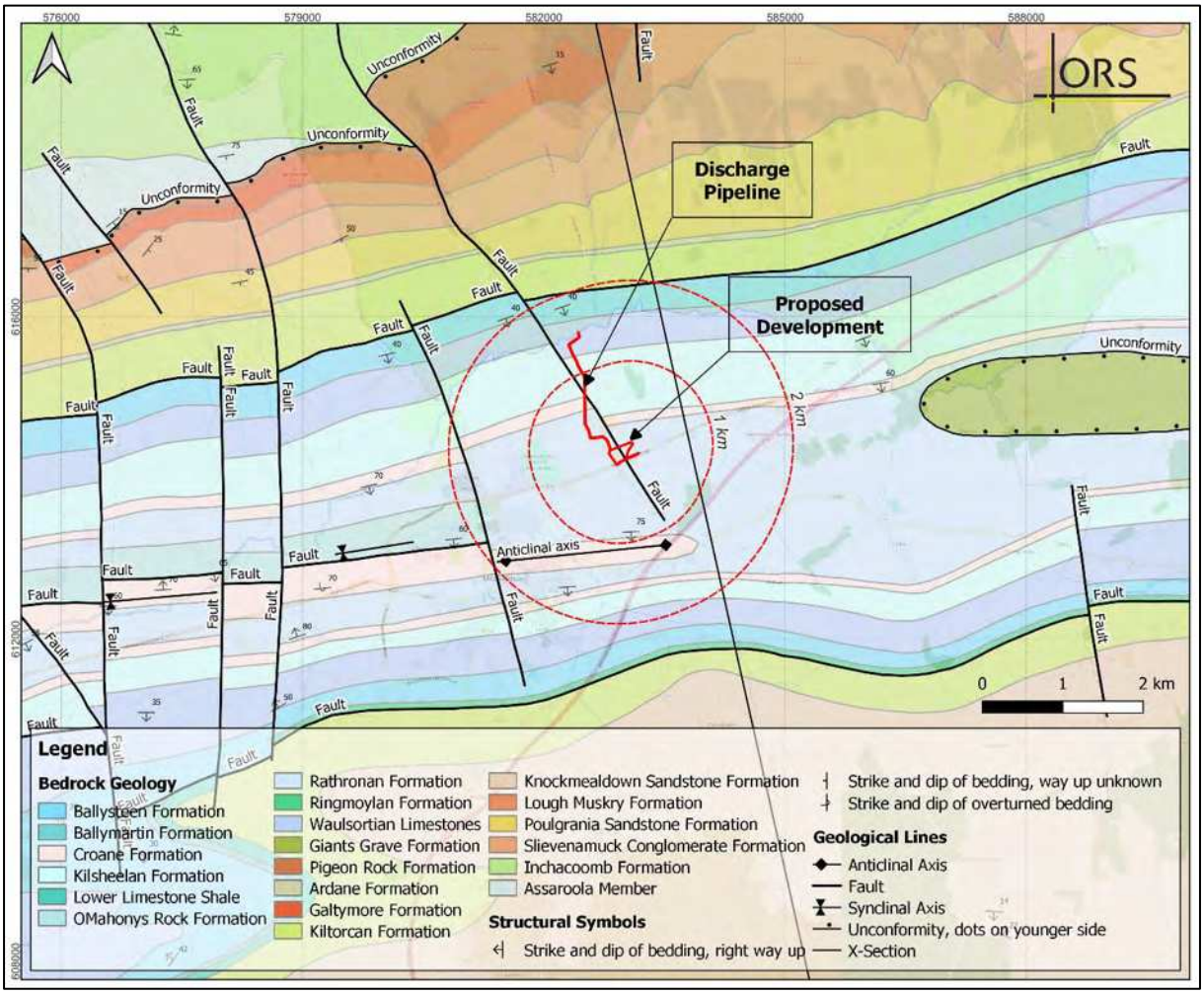

Figure 8.5: Regional Bedrock Formations based on GSI data.

8.4.5 Hydrology

Regional Hydrology

A river basin is the portion of land drained by a river and its tributaries. A river basin district is the area of land and sea, made up of one or more neighbouring river basins together with their associated groundwaters and coastal waters. The Proposed Development lies within the South Western River Basin District (SWRBD). This district spans over 11,000 km^2 of land and an additional 4,000 km^2 of marine waters. It includes most of counties Cork and Kerry, parts of Limerick, South Tipperary and Waterford and all of Cork City. The SWRBD is bordered by the Shannon River Basin District and the South Eastern River Basin District to the north, the Atlantic Ocean to the west, and the Celtic Sea to the south, covering over 1,800 km of coastline.

The South Western River Basin District (SWRBD) encompasses 891 river and canal waterbodies and is organized into five management units: the Munster Blackwater River Basin, the Lee, Cork Harbour & Youghal Bay River Basin, the Bandon-Ilen River Basin, the Dunmanus-Bantry-Kenmare River Basin, and the Laune-Maine-Dingle Bay River Basin. It also includes numerous smaller coastal catchments extending up to 1 nautical mile from the shoreline. The SWRBD features 90 significant lakes, with 20 of these being larger than 50 hectares; notable examples include Lough Leane in County Kerry, and the Carrigadrohid and

Inniscarra reservoirs in County Cork, the latter of which serves as the largest source of drinking water in the county. Additionally, estuarine waters such as Cork Harbour receive inflows from the Lee, Glashaboy, and Owenboy rivers.

A catchment is a land area where all surface water flows toward a single point, such as a river. The proposed site is situated within the Blackwater (Munster) Catchment, which encompasses the region drained by the River Blackwater and all its tributaries that enter tidal waters between East Point and Knockaverry, Youghal, County Cork. This catchment covers a total area of 3,310 km². Mallow is the largest urban center within the catchment, with other significant towns including Fermoy, Mitchelstown, Youghal, Kanturk, and Millstreet. The Blackwater (Munster) Catchment is divided into 28 sub-catchments (which are illustrated in **Figure 8.6**) and contains 158 river waterbodies, three transitional waterbodies (Lower Blackwater M Estuary/Youghal Harbour, Lackaroe/Glendine Estuary, and Upper Blackwater M Estuary), one coastal waterbody (Youghal Bay), and 34 groundwater bodies.

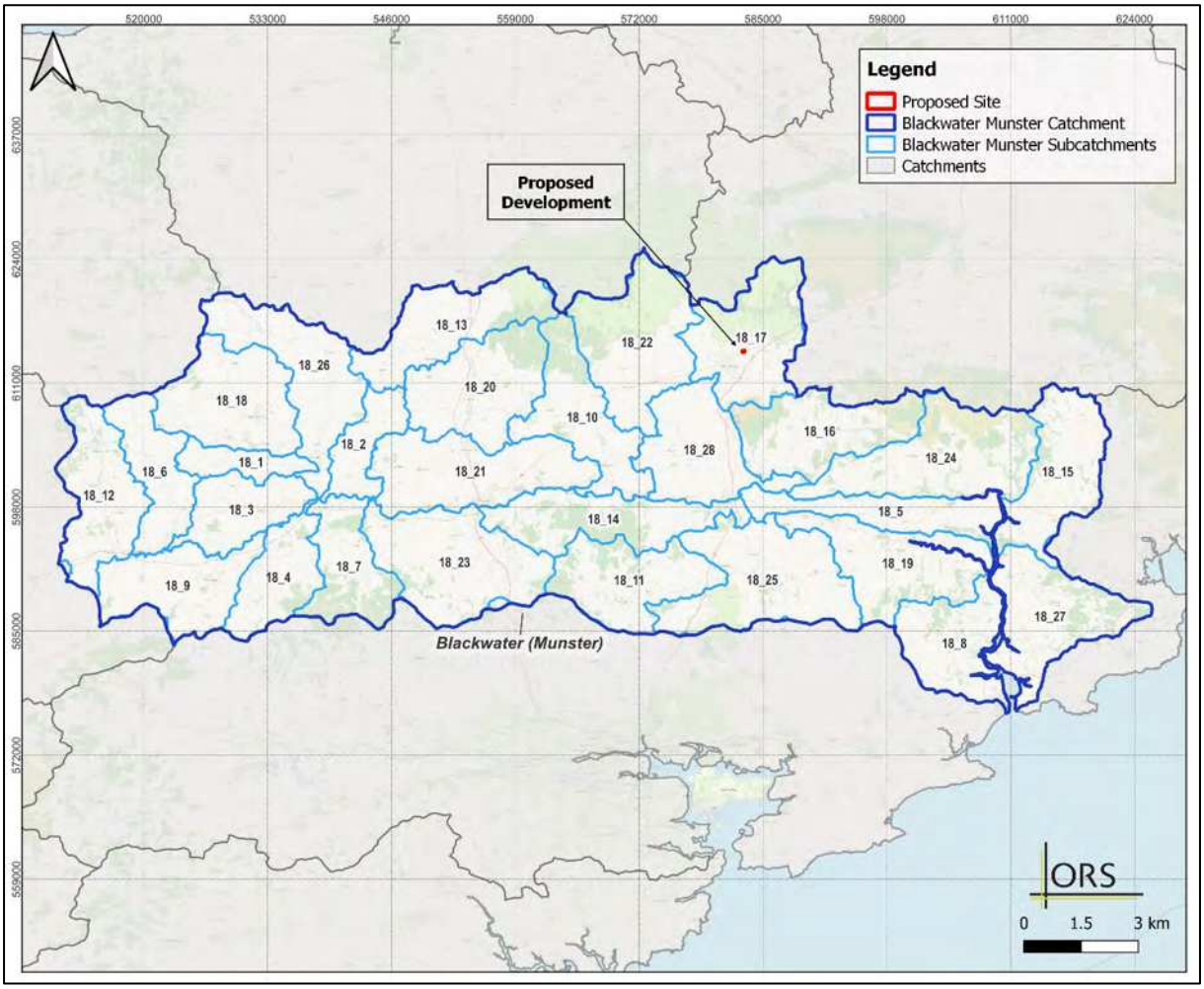

Figure 8.6: Blackwater (Munster) River Catchment and Sub-Catchments (EPA Maps)

The River Blackwater (Munster) originates in the Mullaghareirk Mountains in County Kerry, flowing eastward through County Cork, passing through towns such as Mallow and Fermoy. It continues into County Waterford, flowing through Lismore before turning south at Cappoquin and ultimately draining into the Celtic Sea at Youghal Harbour in Cork. Spanning 169 km (105 miles), it is one of Ireland's largest rivers. Its main tributaries include the Awbeg, Dalua, Bride, Allow, Araglin, Finnow, and Funshion rivers.

Geologically, the catchment is primarily underlain by extensive bands of sandstone, with volcanic rocks and limestone interspersed throughout. In the western part, from Kanturk to Rathmore, there is a significant region of shale and sandstone. The southern section, extending from Rahan Mountain to the southern edge of the catchment, features a large deposit of purple mudstone and sandstone. The northeast, beneath the Galtee Mountains, is characterised by various bands of sandstone running from west to east. Additionally, the central northern area between Carrigeen Mountain and Seefin Mountain is composed of thick bands of greywacke and shale.

As shown in **Figure 8.6**, the Proposed Development site in Corracunna, Coolnanave and Garrane, Mitchelstown, is located in the sub catchment 18_17 of the Blackwater (Munster) river catchment, also identified as Funshion_SC_010 sub-catchment.

Local Hydrology

The primary hydrological feature near the Proposed Development site is the River Funshion (EPA designation: FUNSHION_020). This river drains an area of 56.84 km² and is located approximately 1.5 km north of the site. Originating in the Galtee Mountains at Kilbeheny, near the County Limerick–County Tipperary border, the River Funshion flows south past Galtee Castle, crosses beneath the M8 and R639, and then turns west to form part of the County Limerick–County Cork border. It crosses these roads again at Kilbeheny, continues west through Mitchelstown Golf Club, and then southeast through Glanworth. After passing under the N73 near Kildorrery, the Funshion eventually merges with the Munster Blackwater about 3.5 km downstream of Fermoy.

Upstream of the site, the river is fed by several key tributaries, including the Furrow and Behanagh streams, as well as other unnamed waterbodies (e.g., Funshion Trib 8 and Funshion Trib 4). Downstream, significant tributaries include the Rivers Gradoge and Sheep.

Adjacent to the eastern boundary of the site lies a drainage ditch. This ditch serves the surrounding areas and presents irregular and low water levels with periods of dryness due to minimal or non-existent hydrological input. The ditch's direction follows the local topography, flowing southwest. Without appropriate mitigation measures, it could serve as a pathway for pollution from the Proposed Development, especially during wetter periods.

The River Gradoge (EPA designation: GRADOGE_010), located *ca.* 1.2 km southeast of the proposed site, could potentially be another sensitive receptor due to the local topography. However, given its distance from the site, it is unlikely to act as a significant pathway or receptor for pollution related to the Proposed Development. The River Gradoge, which drains an area of about 33 km² that includes the proposed site, spans *ca.* 32 km, flowing north around Mitchelstown before merging with the River Funshion. Key tributaries of the River Gradoge include the Dromleigh, Turbeagh, and Mitchelstown waterbodies.

The tributaries of both river in the proposed site surrounding area are shown in **Figure 8.7**.

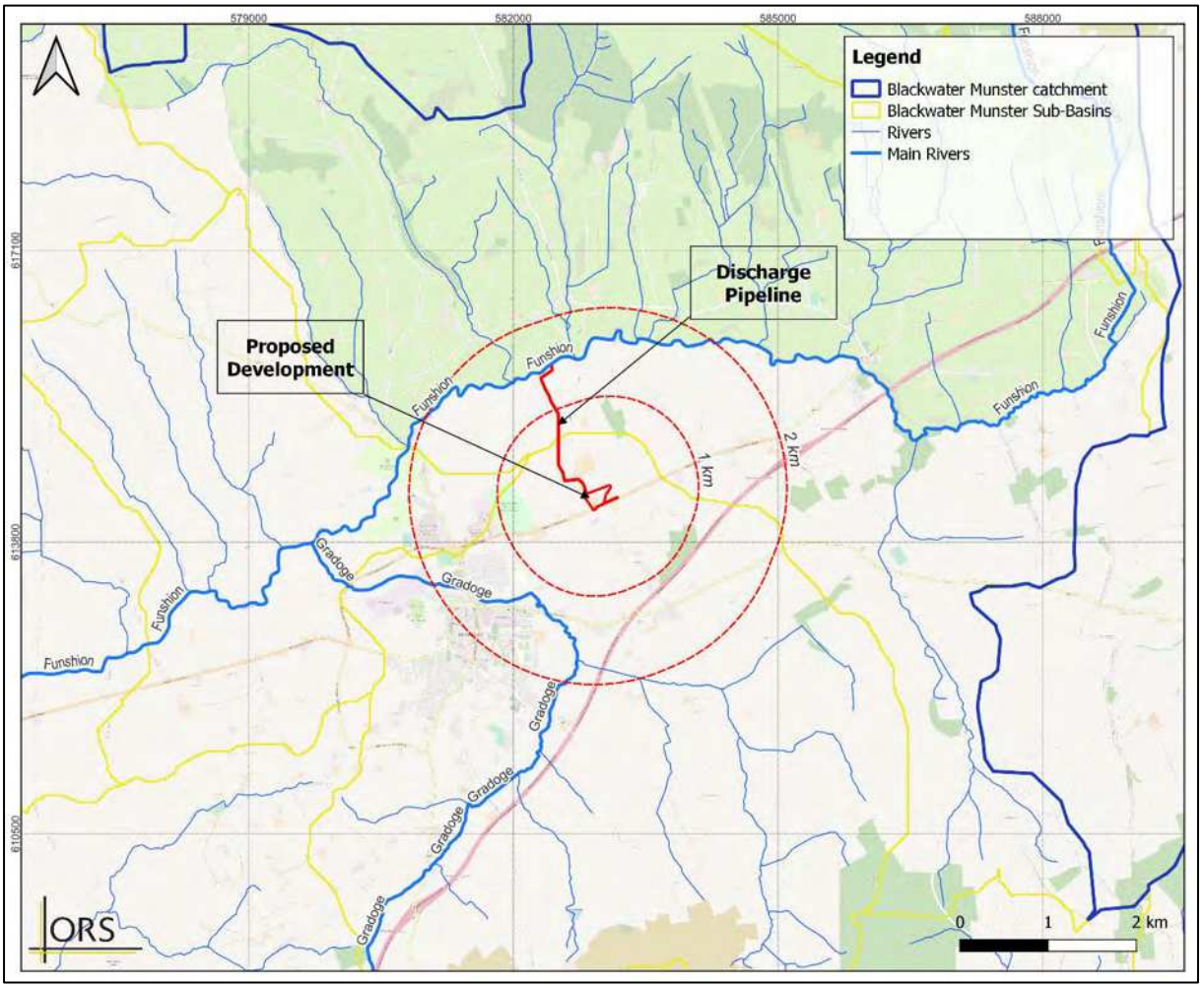

Figure 8.7: Tributaries to the River Gradoge and River Funshion upstream from the proposed site based on EPA Maps.

Protected Areas

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. There are a total of six no. Nature 2000, and twelve no. proposed nationally important sites (also known as Natural Heritage Areas or NHA) within 15km of this Proposed Development. The location of the site in relation to these designated areas are shown in **Figure 8.8.** The closest site is the Galtee Mountains SAC located *ca.* 2.9km north of the Proposed Development.

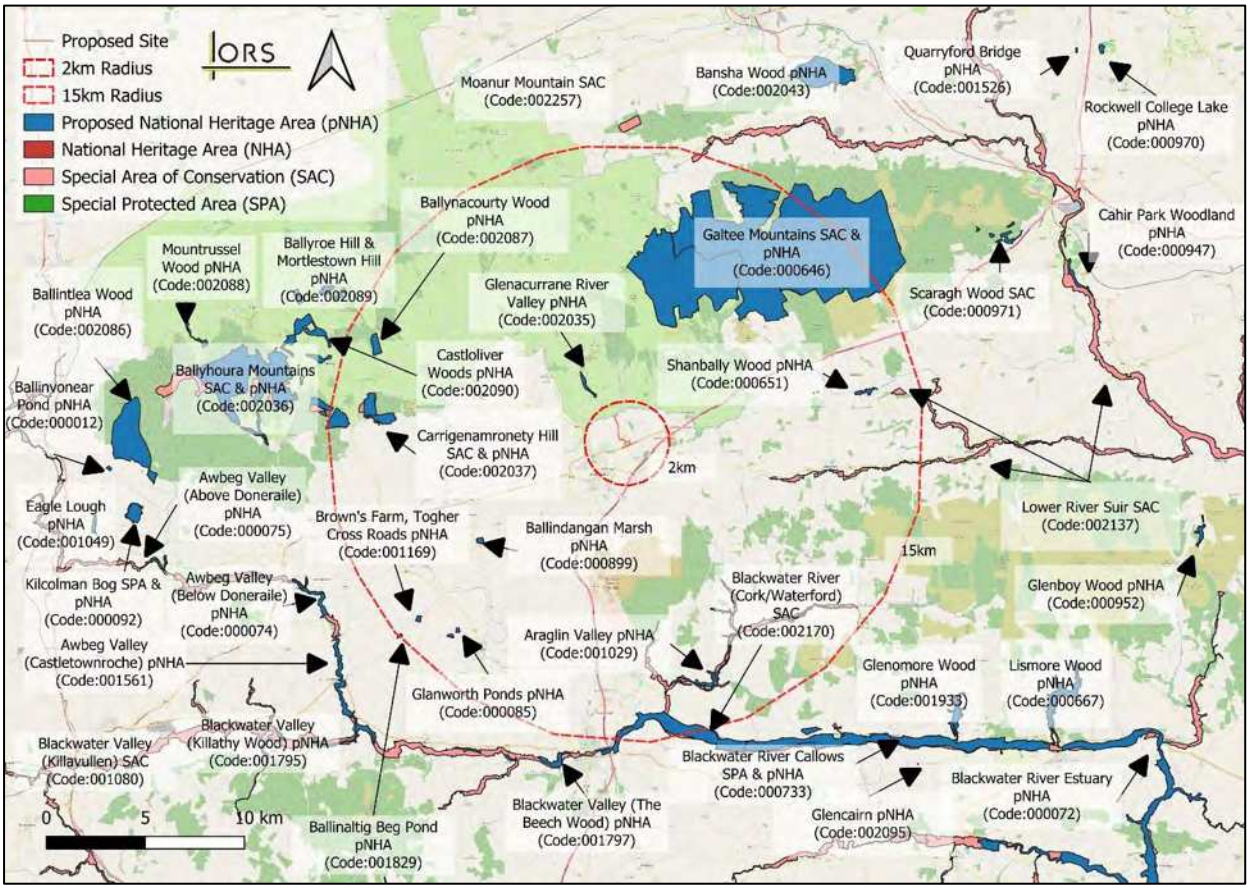

Figure 8.8: Summary of protected areas within the vicinity of the site. (EPA Maps)

A full list and appraisal of the potential effects of the Proposed Development on the constitutive characteristics of European sites identified within 15km of the Proposed Development is set out in the Natura Impact Statement (**Document Ref: 231925-ORS-XX-XX-RP-EN-13d-005**) which accompanies the planning application for this Proposed Development.

A total of two no. sites designated under the Natura 2000 Network (SAC's/SPA's) and one no. site designated as Natural Heritage Areas (pNHA's/NHA's) in proximity (<15km) to the Proposed Development were identified as being hydrologically connected to the Proposed Development. These are listed in **Table 8.5** overleaf.

Table 8.5: Summary designated areas with hydrological connectivity to the proposed site.

Area Name	Area Code	Hydrological Distance	Protected Area Type	Summary of Hydrological Connectivity
Blackwater River (Cork/Waterford) SAC	002170	37.4 km (D/S)	Habitats	Hydrological connectivity to the SAC is established through the Funshion and Gradoge rivers, both located within a 2 km radius of the site. The Gradoge River flows northward into the Funshion River, which eventually discharges into the River Blackwater, *ca.* 37.4 km downstream.
Blackwater Callows SPA	004094	37.4 km (D/S)	Birds	Hydrological connectivity to the SAC is established through the Funshion and Gradoge rivers, both located within a 2 km radius of the site. The Gradoge River flows northward into the Funshion River, which eventually discharges into the River Blackwater, *ca.* 37.4 km downstream. The floodplain meadows lie along the River Blackwater and provide crucial feeding and breeding grounds for birds, contributing to the area's biodiversity and ecological health.
Blackwater River Callows pNHA	000073	37.4 km (D/S)	Floodplain meadows and wetland habitats	Hydrological connectivity to the SAC is established through the Funshion and Gradoge rivers, both located within a 2 km radius of the site. The Gradoge River flows northward into the Funshion River, which eventually discharges into the River Blackwater, *ca.* 37.4 km downstream.

Site Drainage

Arterial Drainage Schemes are schemes the OPW has a statutory duty to maintain. Arterial Drainage Schemes were carried out under the Arterial Drainage Act, 1945 to improve land for agriculture and to mitigate flooding. Rivers, lakes, weirs and bridges were modified to enhance conveyance, embankments were built to control the movement of flood water and various other work was carried out under Part II of the Arterial Drainage Act, 1945. The purpose of the schemes was to improve land for agriculture, to ensure that the 3 – year flood was retained in bank this was achieved by lowering water levels during the growing season to reduce waterlogging on the land beside watercourses known as callows. Flood protection in the benefiting lands was increased as a result of the Arterial Drainage Schemes. Likewise, local authorities are charged with responsibility to maintain Drainage Districts. The Arterial Drainage Act, 1945 contains a number of provisions for the management of Drainage Districts in Part III and Part VIII of the act.

According to the Arterial Drainage Scheme (ADS) and Drainage District (DD) maps, the proposed site is not situated near any drainage scheme (ADS or DD) or their benefitted lands. The nearest DD scheme, Annaslinga, is *ca.* 4.1 km northwest of the site. Although it lies within the Munster Blackwater River Basin, it is not hydrologically connected to the proposed site. Similarly, the closest ADS scheme, Maigue (OPW Ref: C1/31/36), is located *ca.* 10.7 km northwest of the site, within the Shannon Estuary South Catchment, and it is also not hydrologically connected to the proposed site. The location of both OPW Drainage Schemes in relation to the proposed site is shown on **Figure 8.9**.

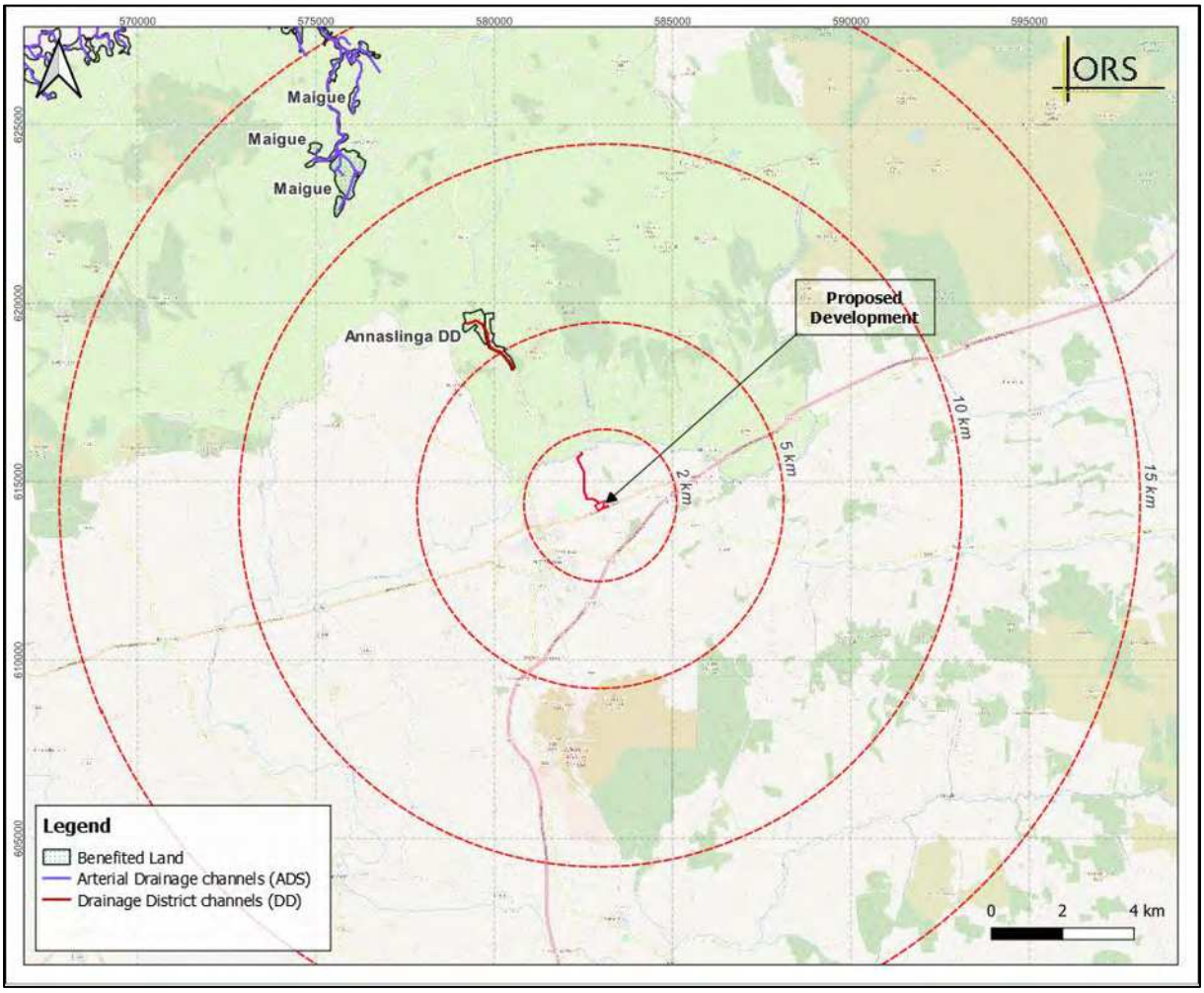

Figure 8.9: Site drainage catchments (OPW)

The Proposed Development site is bounded by an unnamed watercourse to the east. This water feature acts as a drainage ditch for the surrounding areas and has irregular and low water levels with periods of dryness due to minimal or non-existent hydrological input.

Surface Water Rate of Discharge

The permissible rate of surface water discharge from the site is determined based on criteria outlined in the Greater Dublin Strategic Drainage Study and the CIRIA SuDS Manual. To ensure that the Proposed Development does not adversely affect the flood regime of the receiving watercourse, the discharge rate should not exceed either the calculated Qbar value or 2.0 liters per second per hectare (l/s/ha), whichever is greater.

- Qbar, calculated using the IH124 method, is 12.8 l/s.
- The main site area is 3.74 hectares (excluding discharge pipeline area), which corresponds to a discharge rate of 7.48 l/s (3.74 ha × 2.0 l/s/ha).

Therefore, the maximum permissible discharge rate for surface water from the Proposed Development is 12.8 l/s.

Cork County Development Plan 2022 – 2028 – Flood Risk Management

A review of the Cork County Development Plan was carried out to determine the policies and objectives relevant to the management of flood risk throughout the region. **Chapter 11 – Water Management** addresses the impacts of climate change on flooding throughout the county, citing the increase in the number of rainfall days per year, more intense rainfall events, rising sea levels, and higher river flows. Among the Water Management objectives set out by the CCDP, the following can be highlighted:

- ***WM 11-10: Surface Water, SuDS and Water Sensitive Urban Design:***
  a) *Require that all new developments incorporate sustainable drainage systems (SuDS). Efforts should be taken to limit the extent of hard surfacing and impermeable paving.*
  b) *Encourage the application of a Water Sensitive Urban Design approach in the design of new development or other urban interventions. Opportunities to contribute to, protect or re-enforce existing green infrastructure corridors or assets should be maximised.*
  c) *Optimise and maximise the application of Sustainable Urban Drainage Systems (SuDS) to mitigate flood risk, enhance biodiversity, protect and enhance visual and recreational amenity; all in the most innovative and creative manner appropriate and in accordance with best practices. Proposals should demonstrate that due consideration has been given to nature-based solutions in the first instance in arriving at the preferred SuDS solution for any development.*
  d) *Provide adequate storm water infrastructure in order to accommodate the planned levels of growth expected for the County.*
  e) *Where surface water from a development is discharging to a waterbody, appropriate pollution control measures (e,g, hydrocarbon interceptors, silt traps) should be implemented.*
  f) *The capacity and efficiency of the national road network drainage regimes will be safeguarded for national road drainage purposes.*

- ***WM 11-12: Surface Water Management -*** *Manage surface water catchments and the use and development of lands adjoining streams, watercourses and rivers in such a way as to minimise damage to property by instances of flooding and with regard to any conservation objectives of European sites within the relevant catchments and floodplains.*

- ***WM 11-13: Flood plains and Wetlands:***
  a) *Protect the County's floodplains, wetlands and coastal areas subject to flooding as vital green infrastructure which provides space for storage and conveyance of floodwater, enabling flood risk to be more effectively managed and reducing the need to provide flood defences in the future.*
  b) *Ensure that development does not impact on wetland sites within river / stream catchments and seek the restoration of degraded wetlands.*

- ***WM 11-15: Flood Risk Assessments -*** *To require flood risk assessments to be undertaken for all new developments within the County in accordance with The Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009) and the requirements of DECLG Circular P12/2014 and the EU Floods Directive.*
  a) *For sites within Flood Zone A or B, a site-specific Flood Risk Assessment will be required.*
  b) *For sites within Flood Zone C, an examination of all potential sources of flooding, and consideration of climate change (flood risk screening assessment), will be required. In limited circumstances where the 'Flood Risk Screening assessment' identifies potential sources of flood risk, a site-specific flood risk assessment may also be required.*

c) *All Proposed Development must consider the impact of surface water flood risks on drainage design through a Drainage Impact Assessment. The drainage design should ensure no increase in flood risk to the site, or the downstream catchment.*

- ***WM 11-16: Flood Risks Overall Approach -*** *Take the following approach in order to reduce the risk of new development being affected by possible future flooding:*
  a) *Avoid development in areas at risk of flooding; and*
  b) *Apply the sequential approach to flood risk management based on avoidance, substitution, justification and mitigation of risk.*
  c) *Where development in floodplains cannot be avoided, applications for development must meet the definition of Minor Development or have passed the Justification Test for Development Plans in the updated SFRA and can pass the Justification Test for Development Management to the satisfaction of the planning authority. Consider the impacts of climate change on the development.*
  a) *In areas where the Justification Test for Development Plans has not been applied, or has been failed, the sequential approach should be applied as follows:*
  b) *In areas where there is a high probability of flooding - 'Flood Zone A' - avoid highly and less vulnerable development as described in Section 3 of 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' issued in November 2009 by DoEHLG.*
  c) *In areas where there is a moderate probability of flooding - 'Flood Zone B' - avoid 'highly vulnerable development' described in section 3 of 'The Planning System and Flood Risk Management –Guidelines for Planning Authorities' issued in November 2009 by DoEHLG.*
  d) *In areas where there is low probability of flooding – 'Flood Zone C' all uses may be considered subject to a full consideration of all flood risks.*

- ***WM 11-17: Development in Flood Risk Areas***
  When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2 of the Guidelines, the following criteria must be satisfied:
  a) *The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.*
  b) *The proposal has been subject to an appropriate flood risk assessment that demonstrates:*
  c) *The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;*
  d) *The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;*
  e) *The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and*
  f) *The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.*
  g) *The acceptability or otherwise of levels of residual risk should be made with consideration of the type and predicted future use of the development and the local development context.*
  h) *The development is assessed not to have the potential to give rise to negative or*

adverse impacts on the integrity of Natura 2000 sites or Natural Heritage Areas or proposed Natural Heritage Areas.

- ***WM 11-18: Arterial Drainage Schemes and Flood relief Schemes***
  a) *Ensure that access requirements are preserved for the maintenance of Arterial Drainage Schemes, Drainage Districts and Flood Relief Schemes.*
  b) *Where the construction, replacement or alteration of bridges and culverts over any watercourse is proposed, appropriate consent from the Commissioners is required under Section 50 of the Arterial Drainage Act 1945.*

Flood Risk

According to OPW, the main sources of flooding are rainfall (Inland flooding) or higher sea levels (Coastal Flooding). The principal pathways include rivers, drains, sewers, overland flow and river and coastal floodplains. The receptors may include people, their property, and the environment. To accurately determine the potential consequences of flooding, it is essential to assess these three elements – sources, pathways, and receptors - alongside the vulnerability and exposure of receptors.

The Office of Public Works (OPW) and Department of Environment, Heritage and Local Government (DoHLG) published 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' in 2009 (The Guidelines). The Guidelines define the the likelihood of flooding is the probability or frequency of a flood of a specific magnitude or severity occurring or being exceeded in any given year. It is generally expressed as the chance of a particular flood level being exceeded in one year. This return period is described as the Annual Exceedance Probability (AEP). For example, a 1 in 100 or 1% flood is that which would, on average, be expected to occur once in 100 years, though it could happen at any time.

Flood zones are geographical areas within which the likelihood of flooding is in a particular range. There are three types or levels of flood zones defined for the purposes of the Guidelines:

- **Flood Zone A** – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);
- **Flood Zone B** – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and
- **Flood Zone C** – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

In 2018, the Office of Public Works (OPW) launched a new online flood map viewer to provide information on the likelihood of flood risk and the extent of flooding across Ireland. This viewer includes flood risk data derived from several sources including:

1. ***Catchment Flood Risk Assessment and Management (CFRAM) Programme:*** 300 communities at potentially significant flood risk, referred to as Areas for Further Assessment (AFA's).
2. ***National Indicative Fluvial Mapping (NIFM):*** Predictive flood maps showing indicative areas predicted to be inundated during a theoretical fluvial flood event with an estimated probability of occurrence. Indicative flood maps have been produced for all watercourses

that are on the EPA watercourse layers, have a catchment area greater than 5km^2 and for which flood maps were not produced under the National CFRAM Programme.

3. ***Geological Survey Ireland Groundwater Flooding:*** Probabilistic flood extent of groundwater flooding in limestone regions. These maps are focused primarily (but not entirely) on flooding at seasonally flooded wetlands known as turloughs.
4. ***Past Flood Events:*** A Past Flood Event is defined as the occurrence of recorded flooding at a given location on a given date or on a recurring basis. The event is derived from available flood information documentation including flood event reports, news articles, archive information and photos.

A summary of the above-noted flood risk data as derived from the OPW map viewer within the vicinity of the site is presented in **Figure 8.10**.

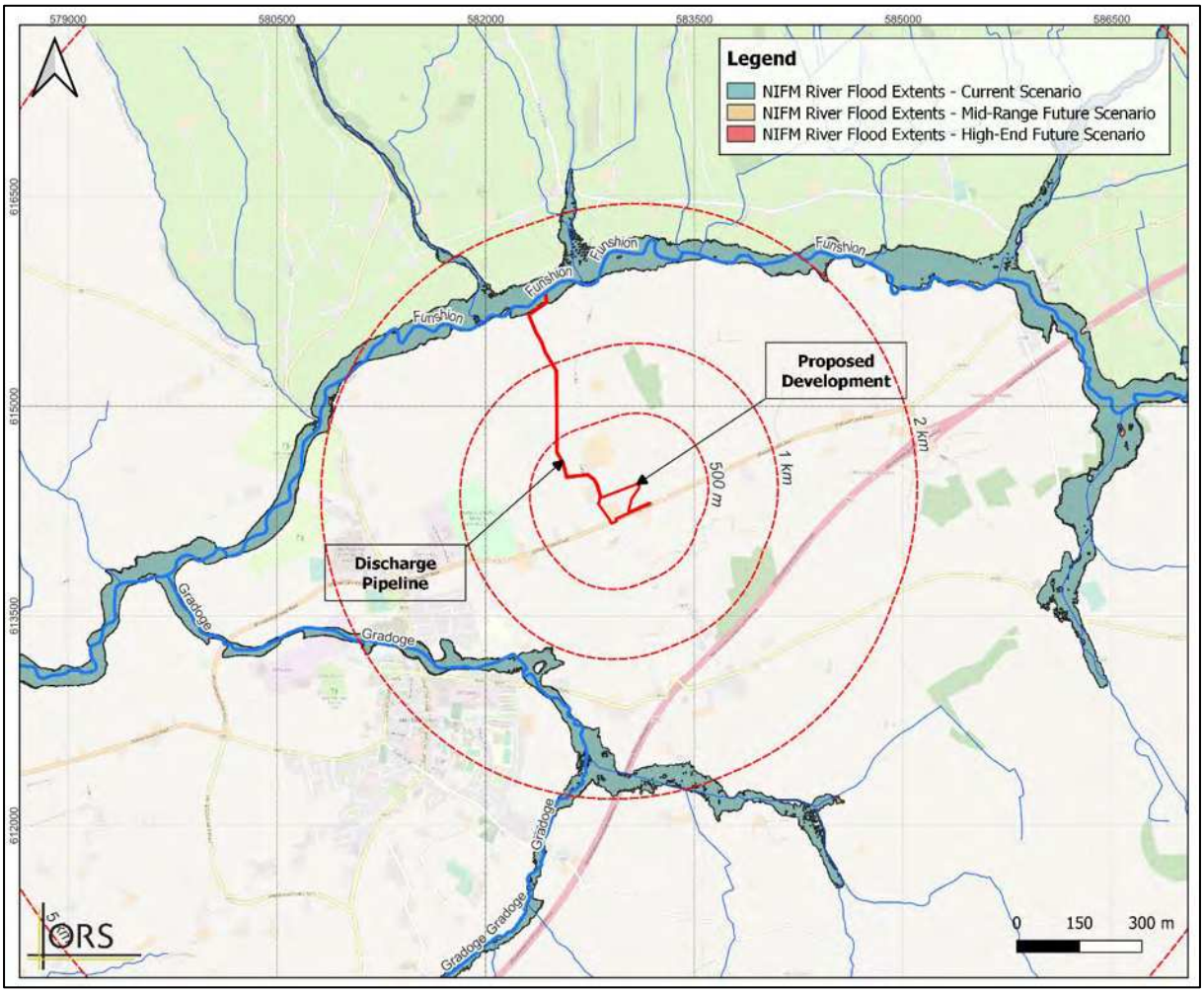

Figure 8.10: Flood Risk Summary (OPW)

The Preliminary Flood Risk Assessment (PFRA) did not identify any significant risk of groundwater or pluvial flooding near the proposed site. However, for fluvial flooding, Mitchelstown had a Flood Risk Index of 480, while the cutoff value for significant flooding is 150, indicating a moderate risk in the town. Coastal flooding is not relevant to this project.

According to the PFRA, Mitchelstown was flagged as a potential Area for Further Assessment (AFA). This designation implies some risk but does not automatically categorize the area as an

AFA without further evidence. Consequently, Mitchelstown was not formally designated as an AFA, and no detailed flood risk information or projections were developed for this area under the CFRAM program.

The NIFM fluvial flood extents for the Present-Day scenario show potential flooding approximately 1 km southwest and 1.3 km north of the site, with no significant extension of these floods towards the site in the mid-range and high-end future scenarios. Additionally, there are no groundwater flood extents, from low to high probabilities, within a 15 km radius of the site.

Based on this assessment, the site is classified as Flood Zone C. Construction is not expected to increase flood risk in the area. This aligns with the findings in the Strategic Flood Risk Assessment part of the Cork County Development Plan (2022-2028), indicating that no specific flood risk mitigation measures are required for this site.

Cork County Development Plan 2022 – 2028 – Water Quality

A review of the Cork County Development Plan was carried out to determine the policies and objectives relevant to the preservation and protection of water quality throughout the region.

Rural Policy Objectives:

- ***EC: 8-14 Business Development in Rural Areas -*** *The development of appropriate new businesses in rural areas will normally be encouraged where […] the provision of adequate water services infrastructure.*

Water Management Policy Objectives:

- ***WM 11-1: EU Water Framework Directive and the River Basin Management Plan***
  - *a) Protect and improve the County's water resources and ensure that development permitted meets the requirements of the River Basin Management Plan and does not contravene the objectives of the EU Water Framework Directive.*
  - *b) Promote compliance with the River Basin Management Plan and associated environmental standards and objectives set out in the European Communities (Environmental Objectives) Surface Water Regulations, 2009 and the European Communities (Environmental Objectives) Groundwater Regulations, 2010, to prevent deterioration; restore good status; reduce chemical pollution, and achieve water related protected areas objectives in rivers, lakes, groundwater, estuaries and coastal waters (as applicable).*
  - *c) Secure the objectives and facilitate the implementation of the associated Programme of Measures of the River Basin Management Plan 2018-2021 and any successor plan for ground, surface, estuarine, coastal and transitional waters in the Plan area as part of the implementation of the EU Water Framework Directive.*
  - *d) Support an integrated and collaborative approach to local catchment management in order to assist in the implementation of the River Basin Management Plan.*
  - *e) In acknowledgement of the sustained pressures on ecological status being experienced in Blue Dot catchment waterbodies, additional measures, as deemed necessary to protect and restore these waterbodies to high status may be required for development permitted in such catchments. Measures may include, but are not limited to, a water management plan (including the construction phase), tertiary treatment and appropriate SUDs measures.*
  - *f) Support the prioritisation of the provision of water services infrastructure in:*

- *Metropolitan Cork, the Key Towns and Main Towns to complement the overall strategy for economic and population growth while ensuring appropriate protection of the environment.*
- *All settlements where services are not meeting current needs, are failing to meet the requirements of the Urban Wastewater Treatment Directive, and where these deficiencies are − interfering with Councils ability to meet the requirements of the Water Framework Directive; or − having negative impacts on Natura 2000 sites; and*

g) *Development may only proceed where appropriate wastewater treatment is available which meets the requirements of environmental legislation, the Water Framework Directive and the requirements of the Habitats Directive.*

- ***WM 11-2: Surface Water Protection***
  a) *Protect and improve the status and quality of all surface waters throughout the County, including transitional and coastal waters.*
  b) *At least secondary treatment should be provided to all wastewater discharges from any new development to surface waters.*

- ***WM 11-6: Protection from Agricultural Pollution -*** *Protect the County's waters from agricultural pollution in accordance with the Nitrates Directive (91/676/EEC) through the implementation of the European Union (Good Agricultural Practice for Protection of Waters) Regulations 2017 (SI 605 of 2017) or any future revised / additional requirements and ensuring that all agricultural development shall comply with those Regulations.*

- ***WM 11-8: Water Supply***
  a) *Support the prioritisation of the supply of adequate sustainable drinking water for the resident population and invest and expand the water supply in line with future population targets.*
  b) *Ensure that all drinking water in the County complies with the European Union Drinking Water Directive 98/83/EC and that all surface water and groundwater supplies comply with the requirements of Surface Water Directive 75/440/EC and Groundwater Directive 80/68/EEC.*
  c) *Conserve sources of drinking water and minimise threats to either the quality or quantity of drinking water reserves that might result from different forms of development or development activity and other sources of pollution.*

- ***WM 11-9: Wastewater Disposal***
  a) *Require that development in all settlements connect to public wastewater treatment facilities subject to sufficient capacity being available which does not interfere with Council's ability to meet the requirements of the Water Framework Directive and the Habitats Directive. In settlements where no public wastewater system is either available or proposed, or where design, capacity or licensing issues have been identified in existing plants, new developments will be unable to proceed until adequate wastewater infrastructure is provided.*
  b) *In assessing proposals for development, it is a requirement that adequate assimilative capacity in the receiving waterbody be retained so as to allow for the overall growth of the settlement.*
  c) *Development proposals incorporating proposals for management of wastewater through use of Integrated Constructed Wetlands should be designed to comply with national guidelines.*
  d) *Development in and around Wastewater Treatment Plants will not generally be permitted within 100m of a treatment works or 25m of a pumping station. This distance*

may be increased if significant environmental issues are likely to arise and will be judged on a site-by-site basis. The buffer area may be used to fulfil open space requirements.

- ***WM 11-10: Surface Water, SuDS and Water Sensitive Urban Design***
  a) *Require that all new developments incorporate sustainable drainage systems (SuDS). Efforts should be taken to limit the extent of hard surfacing and impermeable paving.*
  b) *Encourage the application of a Water Sensitive Urban Design approach in the design of new development or other urban interventions. Opportunities to contribute to, protect or re-enforce existing green infrastructure corridors or assets should be maximised.*
  c) *Optimise and maximise the application of Sustainable Urban Drainage Systems (SuDS) to mitigate flood risk, enhance biodiversity, protect and enhance visual and recreational amenity; all in the most innovative and creative manner appropriate and in accordance with best practices. Proposals should demonstrate that due consideration has been given to nature-based solutions in the first instance in arriving at the preferred SuDS solution for any development.*
  d) *Provide adequate storm water infrastructure in order to accommodate the planned levels of growth expected for the County.*
  e) *Where surface water from a development is discharging to a waterbody, appropriate pollution control measures (e,g, hydrocarbon interceptors, silt traps) should be implemented.*
  f) *The capacity and efficiency of the national road network drainage regimes will be safeguarded for national road drainage purposes.*

Energy and Telecommunications Policy Objectives:

- ***ET 13-2 Renewable Energy***
  a) *Support Ireland's renewable energy commitments as outlined in Government Energy and Climate Change policies by facilitating the development of renewable energy sources such as wind, solar, geothermal, hydro and bioenergy and energy storage at suitable locations within the county where such development has satisfactorily demonstrated that it will not have adverse impacts on the surrounding environment (including water quality), landscape, biodiversity or amenities.*
  b) *Support and facilitate renewable energy proposals that bring about a direct socio-economic benefit to the local community. The Council will engage with local communities and stakeholders in energy and encourage developers to consult with local communities to identify how they can invest in/gain from significant renewable energy development.*
  c) *Support the development of new and emerging renewable energy technologies / fuels for the transport sector.*
  d) *To promote the potential of micro renewables where it can be demonstrated that that it will not have adverse impacts on the surrounding environment (including water quality), landscape, biodiversity or amenities.*

- ***ET 1-17: Bioenergy** – Encourage the development of commercial bioenergy plants on brownfield sites which are adjacent to industrial areas or on lands which are reserved for industrial uses or on brownfield sites in rural areas. The Council may consider other lands for bioenergy production where the applicant has suitably demonstrated a location specific need for the type and scale of facility proposed and there is no adverse environmental or ecological impact on surrounding land, air, water and properties […].*

Biodiversity and Environment Policy Objectives:

- ***BE 15-6: Biodiversity and New Development -*** *Provide for the protection and enhancement of biodiversity in the development management process and when licensing or permitting other activities by […] ensuring that an appropriate level of assessment is completed in relation to wetland habitats subject to proposals which would involve drainage or reclamation. This includes lakes and ponds, watercourses, springs and swamps, marshes, heath, peatlands, some woodlands as well as some coastal and marine habitats […].*

- ***BE 15-16: Waste Prevention and Management: Drinking Water Treatment and/or Wastewater Treatment -*** *Ensure that sludge from drinking water treatment and/or wastewater treatment is appropriately managed, optimising potential for circular economy gains.*

- ***BE 15-17: Waste Prevention and Management -*** *Planning applications for infilling of marginal land through soil importation will be supported where it can be demonstrated that the developments accord with proper planning and sustainable development, ensuring that they are compatible with the protection of environmental resources including water quality, Natura 2000 sites, biodiversity, archaeological and landscape resources.*

8.4.6 Biological Water Quality

Physio-chemical and biological water quality assessments are conducted by the EPA at various sections along the River Funshion and its tributaries. Monitoring stations with complete datasets, in close proximity to the Proposed Development are noted in **Figure 8.11**.

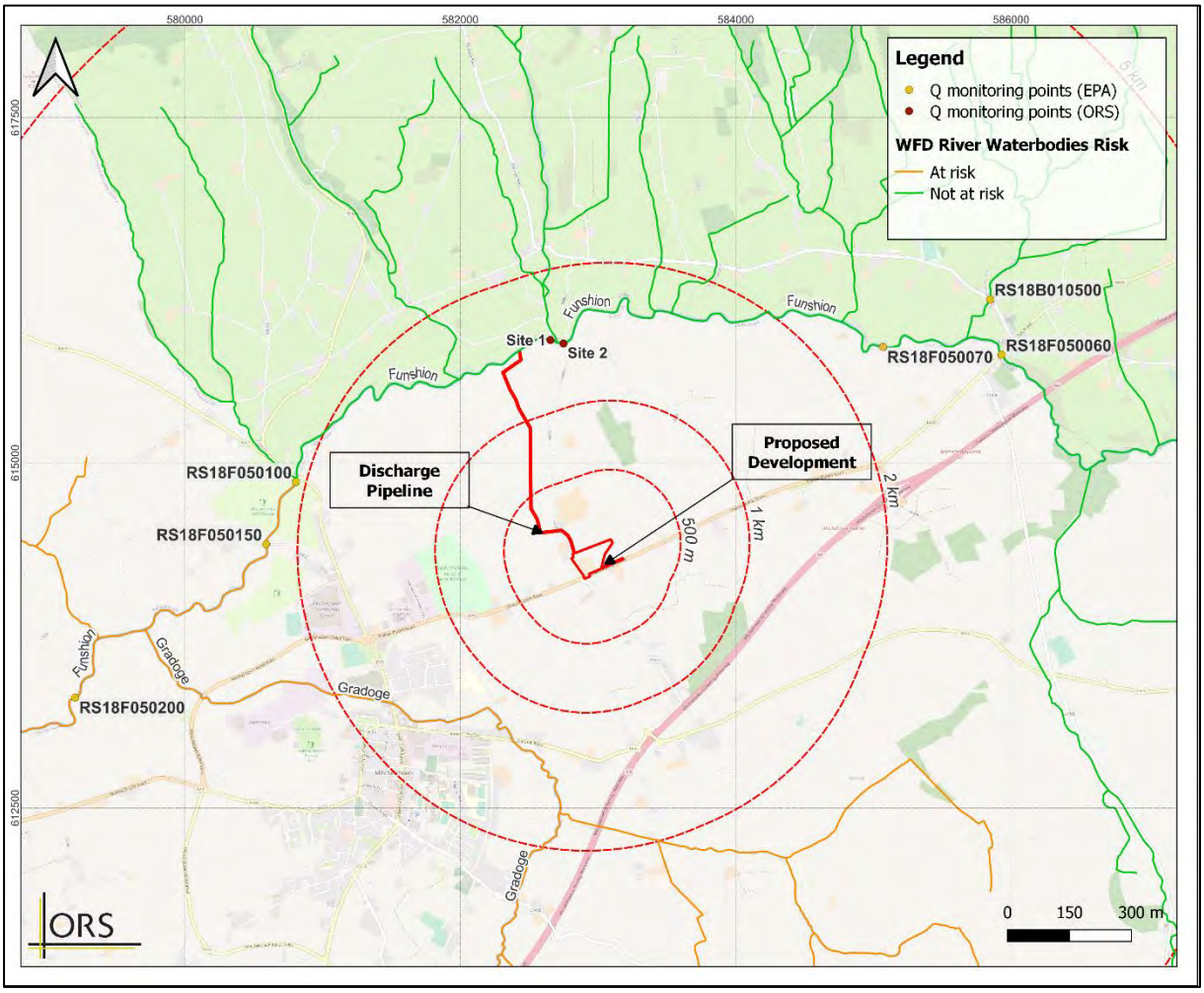

Figure 8.11: Water Framework Directive Risk and locations of water quality monitoring stations (EPA maps)

National surveys of Irish rivers have taken place on a continuous basis since 1971. The National Rivers Monitoring Programme was replaced by the Water Framework Monitoring Programme from 22 December 2006. As part of the Water Framework Directive (WFD) Monitoring Programme approximately one third of our major rivers and their more important tributaries are surveyed and assessed each year by EPA ecologists. A complete survey cycle is completed every three years. The sites are scored on a five-point system developed by the EPA called the Biological Q-Rating system. Macroinvertebrate data is utilised to ascertain the biological quality of a given river or stream as detailed in **Table 8.2** at the beginning of this chapter.

Monitoring stations hydraulically connected to the River Funshion are listed in **Table 8.6** overleaf, along with their associated Q-Ratings.

Table 8.6: Biological Q-Ratings for waterbodies hydraulically connected to the River Funshion (EPA)

Station ID (EPA & ORS monitoring points)	Station Name	Year								
		1971-2000	2003	2006	2009	2012	2015	2018	2019	2021
RS18F050060	FUNSHION - Kilbeheny Br	3-4	-	-	-	-	-	-	-	-
RS18B010500	BEHANAGH - Mill Bridge	4-5	4	4	-	-	-	-	-	-
RS18F050070	FUNSHION - 1.1km d/s Kilbeheny Br	5	-	-	-	-	-	-	-	-
RS18F050100	Ballyaghaderg Br	4-5	4-5	4	4-5	4	4	4	-	4
RS18F050150	FUNSHION - Ballyarthur Br (0.6km d/s Ballaghaderg Br)	4-5	-	-	-	-	-	-	-	-
RS18F050200	0.5km d/s Gradoge R confl	1-3	3	3-4	4	4	3	3	-	3-4

The **RS18F050060** and **RS18F050070** water monitoring stations are situated on the River Funshion, upstream of the proposed discharge point, at hydrological distances of *ca.* 3.9 km and 2.9 km, respectively. The most recent Q-Ratings for these stations, recorded in 1997 and 1990, were '4' and '5,' indicating 'Good' and 'High' status under the Water Framework Directive (WFD) and classifying the water as 'Unpolluted' according to EPA standards.

Additionally, the **RS18B010500** monitoring station, located on the Behanagh Stream (a tributary of the River Funshion), *ca.* 4 km upstream of the discharge point, recorded a Q-Rating of '4' in 2006, also indicating a 'Good' WFD status and an 'Unpolluted' classification by the EPA.

The **RS18F050100**, **RS18F050150**, and **RS18F050200** water monitoring stations are located on the River Funshion, *ca.* 2.6 km, 3.1 km, and 5.3 km downstream from the proposed discharge point. The most recent Q-Rating for **RS18F050150**, recorded in 1990, was '4-5,' indicating a 'High' status under the Water Framework Directive (WFD) and classifying the water as 'Unpolluted' according to EPA standards.

RS18F050100 and **RS18F050200** have extensive data records, with Q-Ratings measured in every monitoring cycle since 1980, except for 2019 and 2020. The **RS18F050100** station has shown stable biological water quality in the River Funshion upstream of its confluence with the River Gradoge, with Q-Ratings consistently ranging from 4 to 5 (sometimes recorded as '4-5'). The most recent rating was a '4,' reflecting a 'Good' WFD status and an 'Unpolluted' classification by the EPA.

In contrast, the **RS18F050200** station shows significant variability in water quality after the River Gradoge merges with the River Funshion. Q-Ratings have ranged from 1 to 4 across different monitoring cycles, indicating periods of a decline in water quality mostly due to the biological load coming from Mitchelstown. The latest available data, a '3-4' rating in 2021, indicates a 'Moderate' WFD status and a classification of 'Slightly polluted' by the EPA.

The section of the River Funshion upstream of the **RS18F050100** water monitoring station is classified as 'Good' under the Water Framework Directive (WFD) and is not considered at risk. However, downstream from this station, the river begins to face the impacts of Mitchelstown and its WFD status is classed as 'Poor', and it is considered to be 'At Risk'. Key pressures identified in the 3rd Cycle Draft Blackwater (Munster) Catchment Report (HA 18) are urban wastewater, industrial discharge, urban runoff, and nutrient and organic pollution from a historically contaminated landfill.

The River Gradoge is classified as 'Poor' under the WFD and is assessed as "At Risk," reflecting concerns about its ecological and chemical health. According to the 3rd Cycle Draft Blackwater (Munster) Catchment Report (HA 18), the river faces pressures similar to those affecting the nearby River Funshion.

8.4.6.1 On-Site Q-Value Assessment

Considering the water monitoring stations hydrologically connected to the proposed site, it can be noticed a lack of recently available biological Q-value data and physio-chemical data upstream of the proposed discharge point. Due to this inconsistency in monitoring data the current water quality status of these waterbodies is inaccurately represented.

ORS attended site on the 24th April 2024 to carry out a Q-value assessment on the River Funshion upstream from the proposed discharge point. Samples were also obtained for hydrochemical parameters analysis and were submitted to an accredited laboratory (Fitz Scientific). The Q-value results are presented below, and hydrochemistry data is presented in the following **Section 8.4.7**.

Sampling was conducted at 2 sites along the Funshion River, at Mitchelstown, County Cork upstream from the proposed discharge point. The samples were collected using kick sampling with a sweep net and of standard 1mm fine mesh to catch invertebrates. At each site, three samples were taken to provide a representative profile of each river section. Vegetative characteristics, including macrophytes, were compiled during sampling to provide additional ecological context. Substrate composition and water body characteristics including flow type, and water depth and width were also measured. Collected specimens were identified to the lowest taxonomic level possible using a taxonomic key and stereoscopic microscope, following standard procedures. Q-values were assigned to identified taxa based on their sensitivity to pollution.

The location of the sampling points can be seen on **Figure 8.11** and **Figure 8.12**.

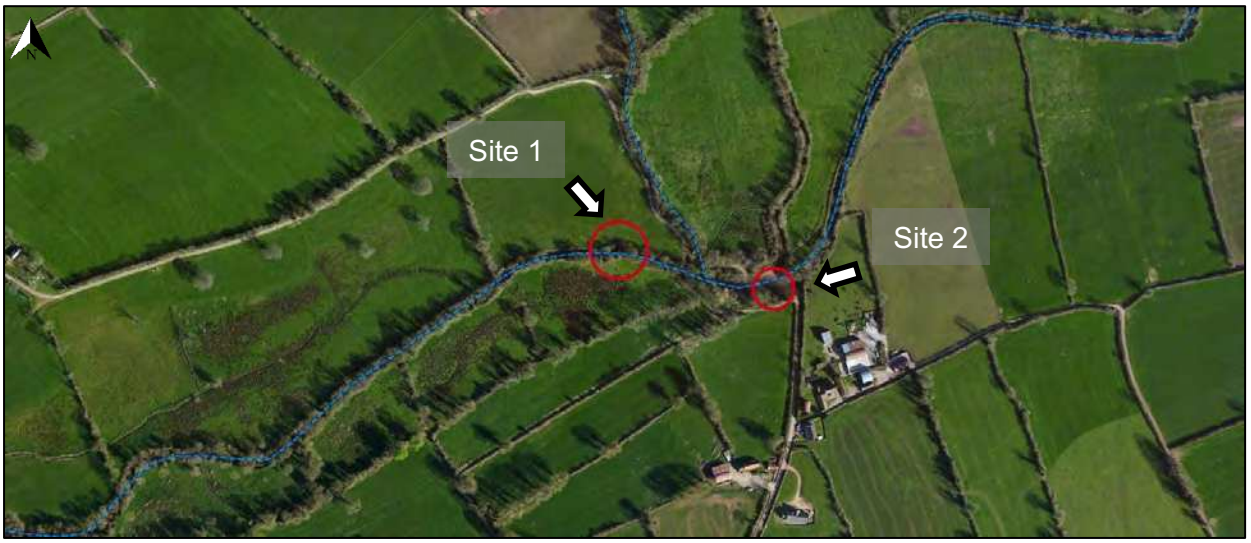

Figure 8.12: Locations of ORS water quality monitoring points

The Q-value monitoring points along the River Funshion which are located at points of hydrological connectivity upstream to the Proposed Development are listed in **Table 8.7** below**,** along with their associated Q-Ratings. The presence of highly sensitive macro-invertebrate species, combined with the compilation of vegetative characteristics including macrophytes

indicates that the stream ecosystem at Site 2 and Site 1 has a WFD status of “High”, a pollution status of “Unpolluted”, and a condition of “Satisfactory”.

The full Q-value Assessment report is presented in **Appendix 8.1**.

Table 8.7: Biological Q-Ratings for the River Funshion upstream from the hydrological connection with the Proposed Development

ORS monitoring point	Q value result
Site 2	5
Site 1	4-5

8.4.7 Hydrochemistry Data

ORS attended site on the 24th April 2024 and obtained baseline samples along the River Funshion upstream (U/S) of the Proposed Development. Samples were sent to an accredited laboratory (Fitz Scientific) and results are presented in **Table 8.8**.

According to the Water Framework Directive (WFD), the Funshion_020— the river section closest to the proposed site and where the proposed discharge point is located —holds a ‘Good’ WFD status and is classified as ‘Not at Risk.’ Given the availability of solid hydrochemical data for this waterbody (Monitoring Station: **RS18F050100**), select EPA parameters were combined with samples collected by ORS to more accurately assess the local water quality and evaluate the potential impact of the site's discharge. An overview of the receiving waterbody is outlined in **Table 8.9** overleaf.

Table 8.8: Hydrochemistry results

Sampling Location	Parameter	Unit	Result
Site 2 – River Funshion	Ammonia	mg/l as N	0.01
	BOD	mg/l	0.9
	COD	mg/l	<5
	Nitrogen (Total Oxidised)	mg/l	1.54
	Nitrogen (Total)	mg/l	1.4
	Oils, Fats, Greases	mg/l	6
	pH	pH units	7.87
	Orthophosphate	mg/l as P	0.01
	Phosphorous (Total)	mg/l as P	0.04
	Total Suspended Solids	mg/l	<5
Site 1 – River Funshion	Ammonia	mg/l as N	0.02
	BOD	mg/l	0.6
	COD	mg/l	<5
	Nitrogen (Total Oxidised)	mg/l	1.52
	Nitrogen (Total)	mg/l	1.4
	Oils, Fats, Greases	mg/l	6
	pH	pH units	7.90
	Orthophosphate	mg/l as P	0.01
	Phosphorous (Total)	mg/l as P	0.09
	Total Suspended Solids	mg/l	<5

Table 8.9: Description of Receiving Waters – Funshion_020 (Catchments.ie)

Characteristic	Classification	Status	Interpretation
Receiving Waterbody Name	FUNSHION_020	Not at risk	Receiving Waters include Funshion_030. Inputting Waterbody includes Behanagh_010 and Funshion_010, which have High and Good WFD Status, respectively and are located east from the Proposed Development.
Waterbody Type	River	-	-
WFD Status	SW 2016-2021	Good	-
Resource	Not Classified		No drinking water abstractions and no abstractions pressures registered for River Funshion.
Hydromorphological Conditions	Not classified	N/A	Hydromorphological Conditions is not included in the Planned Monitoring for this station.
Chemical SW Status	Not classified	N/A	Chemical Surface Water Status is not included in the Planned Monitoring for this station.
Biological Status	Macrophyte Status or Potential	N/A	Eight no. sites on the River Funshion were sampled in 2021 and only one in 2022. The majority of these presented satisfactory ecological condition. The Funshion River, previously facing significant water quality issues downstream of Mitchelstown, showed general improvement in recent surveys. In 2021, the upper reaches maintained High and Good quality, but problems persisted at Mitchelstown's Station 0200, which improved from Poor to Moderate quality but remains unsatisfactory. Downstream stations mostly remained stable, with some maintaining Good quality, but issues persisted at certain points, including a decline at Killee Bridge. In 2022, the uppermost station at Brackbaun Bridge continued to maintain High ecological quality. Macrophyte, Phytobenthos, and Fish Status are not included in the Planned Monitoring for this station.
	Invertebrate Status or Potential	Good	
	Phytobenthos Status or Potential	N/A	
	Fish Status or Potential	N/A	
Supporting Chemistry Conditions	Oxygenation Conditions	High	DO status: High Ammonia-Total (as N) has a 'High' indicative quality. While this parameter showed significant fluctuations between 2009 and 2015, it has been trending upward since then. Despite this increase, the levels remain well within the acceptable threshold. Total Oxidised Nitrogen (as N) holds a 'Good' indicative quality. Following a decline
	Nitrogen	Good	

Characteristic	Classification	Status	Interpretation
	Phosphorus	High	in concentration from 2009 to 2016, an upward trend has been observed. The levels are now approaching the threshold between 'Good' and 'Moderate' quality. Orthophosphate (as P) has consistently maintained a 'High' indicative quality over the past decade, with a stable trend throughout this period. The only exception occurred in 2014, when the orthophosphate levels briefly fell to a 'Moderate' indicative quality. Currently, the levels are close to the threshold between 'High' and 'Good' quality. Specific Pollutant Conditions is not included in the Planned Monitoring for this station.
	Other Nutrients	None	
	Specific Pollutant Conditions	N/A	

8.4.8 Hydrogeology

Regional & Local Hydrogeology

Hydrogeology is the study of groundwater, including its origin, occurrence, movement and quality. Rocks which store and transmit groundwater are known as bedrock aquifers. Different bedrock types have differing abilities to store and transmit water, depending on their permeability and fracture intensity. The Geological Survey of Ireland has classified all aquifers in Ireland in three main categories based on potential yield and extent:

- Regionally Important
- Locally Important
- Poor

County Cork's hydrogeology features a varied geological landscape, with important groundwater resources mainly found in the karstic limestone areas of the north and east. These regions have productive aquifers, though they are more susceptible to contamination due to the quick movement of water through the karst systems. The county's groundwater is closely linked to its surface water, with rivers such as the Lee, Blackwater, and Bandon playing a significant role in recharge. Groundwater quality is generally good in limestone areas, but other regions may face challenges due to local geology and human activities.

The subject site is located above the Mitchelstown Groundwater Body, which spans 549 km² in the low-lying area in North Cork and is classified into three primary aquifer categories as per the 1st Draft Mitchelstown GWB Description Report (GSI). These categories are:

- ***Regionally Important Karstified Aquifer dominated by diffuse flow (Rkd)***, covering 73% of the groundwater body (GWB) area.
- ***Locally Important Aquifer, Moderately Productive Only in Local Zones (Ll)***, occupying 24% of the GWB area.
- ***Poor Aquifer, Generally Unproductive Except for Local Zones (Pl)***, making up the remaining 3% of the GWB area.

The proposed site is located entirely within a ***Regionally Important Aquifer - Karstified***

(diffuse) (Rdk) area, as shown in **Figure 8.13** below. The region features unbedded limestones that are highly productive, often displaying surface karst formations. While the GWB typically has an average thickness of *ca.* 750 m, deeper flows are also possible. In many areas, the subsoil is less than 3m thick, which leads to frequent rock outcrops.

Groundwater in this area moves through numerous faults and joints, which were created by geological deformation and later expanded by karstification. Most of the groundwater flow occurs in a shallow, highly karstified zone near the surface, just a few meters thick. This zone allows for rapid groundwater movement in response to recharge. Generally, the groundwater is unconfined and interacts closely with surface water.

Surface water often enters the groundwater system through features like swallow holes and caves, while groundwater exits through springs or contributes to the baseflow of rivers crossing the area. Due to its flow regime, this aquifer is considered to be heterogeneous, meaning quantitative characteristics such as transmissivity can present considerable changes over short distances. Similarly, other physical attributes, such as the depth to bedrock, can also change significantly across relatively small areas.

The Proposed Development area is positioned along a fault line that extends from north to south through the site's centre (as shown in Figure 8.13). In a karstified aquifer with diffuse flow, faults can impact groundwater dynamics by increasing permeability and altering flow pathways.

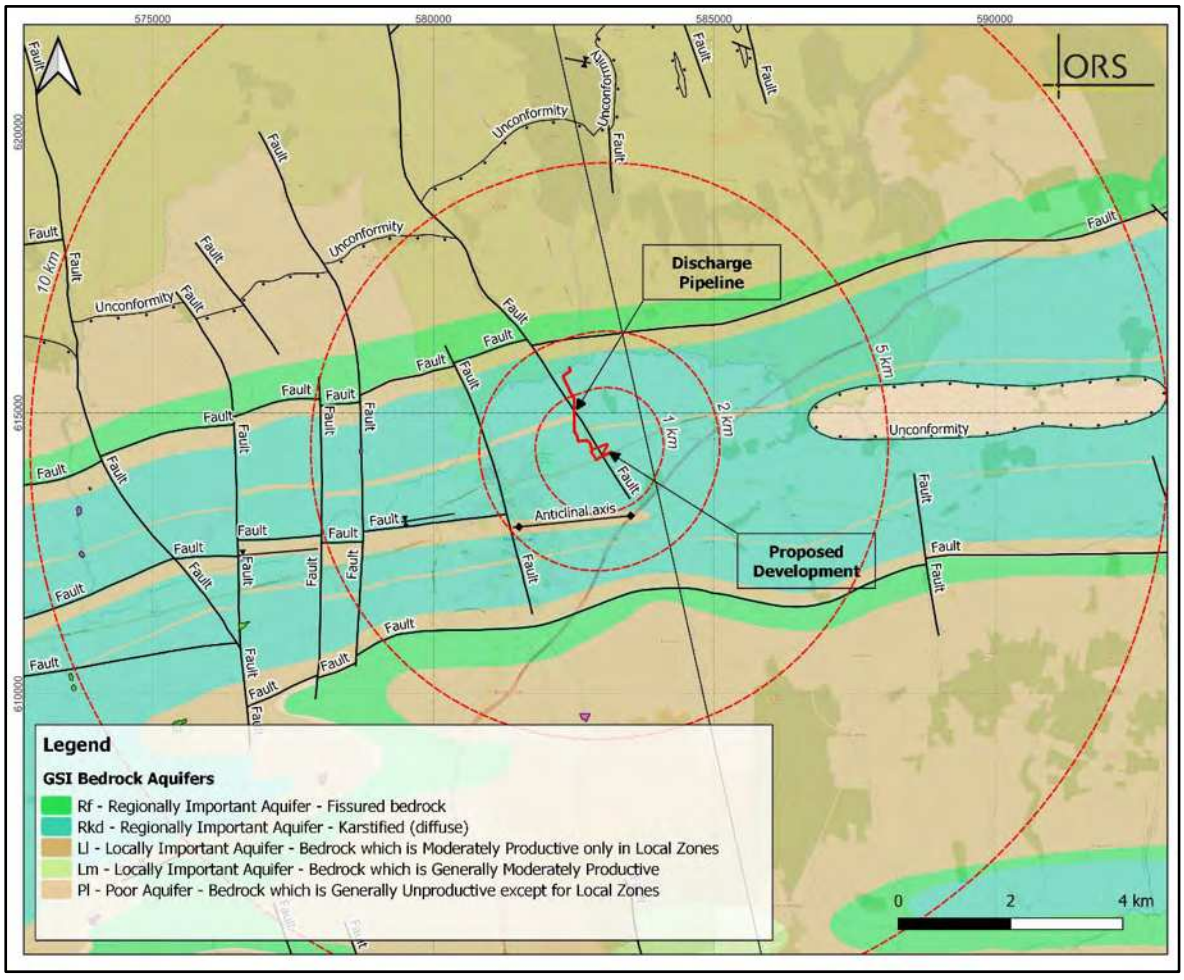

Figure 8.13: Groundwater Bodies & Aquifer Types in site locality. (GSI Maps)

Most of the proposed site features moderate permeability subsoil covered by well-drained soil, categorised as Hydrogeological Setting 3.i. However, a small section at the southeastern boundary has poorly drained soils overlying subsoils of moderate permeability, classified as Hydrogeological Setting 3.ii. The average annual recharge in the area is 162 mm, whereas in the rest of the site, it can reach up to 431 mm.

Groundwater vulnerability is influenced by factors such as subsoil, recharge type (point or diffuse) and thickness of the unsaturated zone, through which potential contaminants can move. The Geological Survey of Ireland (GSI) uses a matrix comprising four categories - extreme, high, moderate and low - for mapping purposes and in the assessment of risk to groundwater. These categories are determined by the thickness of the overburden, as shown in **Table 8.10**, which acts as a barrier to contaminants moving toward the groundwater table. For instance, when the overburden is less than 3 m thick, the vulnerability is classified as extreme, indicating a very high risk of contamination reaching the aquifer. Conversely, with an overburden greater than 10 m thick and low permeability, vulnerability is considered low. In County Cork, groundwater vulnerability varies significantly, ranging from low to extreme, with the highest vulnerability occurring where rock is at or near the surface or where karst features are present. The proposed site is classified as having "Moderate" vulnerability. Refer to **Figure 8.15**.

Table 8.10: Vulnerability Mapping Criteria

Subsoil Thickness	Hydrogeological Requirements				
	Diffuse Recharge (Subsoil Permeability & Type)			Point Recharge	Unsaturated Zone
	High (Sand & Gravel)	*Moderate (Sandy Subsoil)*	*Low (Clay & Peat)*	*Swallow Holes*	*Sand & Gravel Aquifers*
0-3m	Extreme	Extreme	Extreme	Extreme (30m radius)	Extreme
3-5m	High	High	High	N/A	High
5-10m	High	High	Moderate	N/A	High
>10m	High	Moderate	Low	N/A	High

There are no groundwater wells within the proposed site boundaries. According to GSI database, only 5 no. groundwater wells, all boreholes, are located within a 2 km radius distance from the site. These present moderate to excellent yielding and majority are used for Agricultural & Domestic purposes. The recorded depth bedrock is encountered for the corresponding wells in this area are between 4 to 15.2 mbgl. This data is summarised in **Table 8.11** overleaf and the wells location in comparison to the proposed site can be visualised in **Figure 8.14**.

Table 8.11: Groundwater Wells with 2km of the site (GSI Well Database)

GSI Reference	Easting Northing	Well Type	Depth (m bgl)	Depth to Rock (m)	Well Use	Yield m^3/d	Proximity to site
1711SWW155	181740, 113050	Borehole	7	n/a	Agri & domestic	n/a	1.6km SW
1711SWW154	181830, 113050	Borehole	9.7	7.5	Agri & domestic	n/a	1.6km SW
1711SWW149	181800, 112800	Borehole	24.4	4	Industrial	3488	1.7km SW
1711SWW153	181830, 112750	Borehole	13	5.5	Agri & domestic	654	1.8km SW
1711SWW012	182140, 116330	Borehole	30.5	15.2	n/a	99	1.6km NW

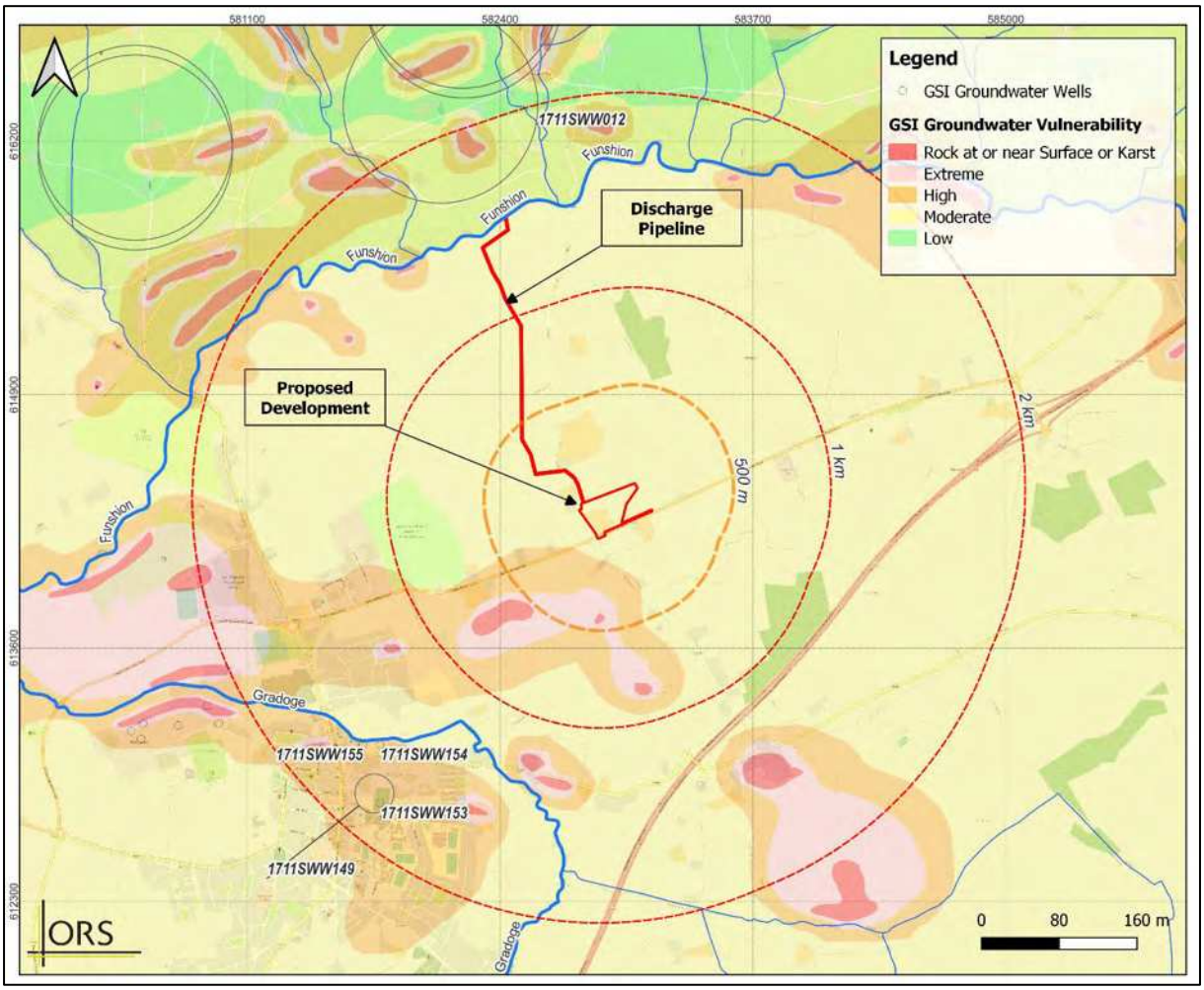

Figure 8.14: Groundwater Vulnerability and location of Groundwater Wells (GSI Maps)

Karst areas, characterised by unique dissolution landforms, often contain aquifers that are highly susceptible to pollution and can contribute to flooding risks. While the region around the proposed site is rich in karst features, none are located within the site itself or within a 5 km radius. The closest karst feature, a cave, lies *ca.* 7.5 km east of the site and the closest Turlough can be found *ca.* 27 km west of the proposed site. Tracing of underground water flows from swallow holes to springs, conducted by the Geological Survey of Ireland (GSI), has demonstrated interconnectivity between karst features *ca.* 23 km east of the study area. These features exhibit a west-to-east flow direction, away from the Proposed Development, as

illustrated in **Figure 8.15** overleaf. No connectivity was identified with features that could affect the study area.

Groundwater sources are critical, particularly for public water supply and industrial use. To protect these sources, Source Protection Areas (SPAs) have been established, imposing stricter controls within the Zone of Contribution (ZOC). SPAs are divided into two zones: the Inner Protection Area (SI), which safeguards against immediate human impacts and microbial pollution, and the Outer Protection Area (SO), covering the remainder of the ZOC. According to the GSI Source Protection Area map, no SPAs are located near the proposed site. The closest SPA is the Mitchelstown PWS (South) Water Supply Scheme, *ca.* 4.2 km southwest of the site. The location of the nearby SPAs in relation to the Proposed Development can be seen in **Figure 8.15**.

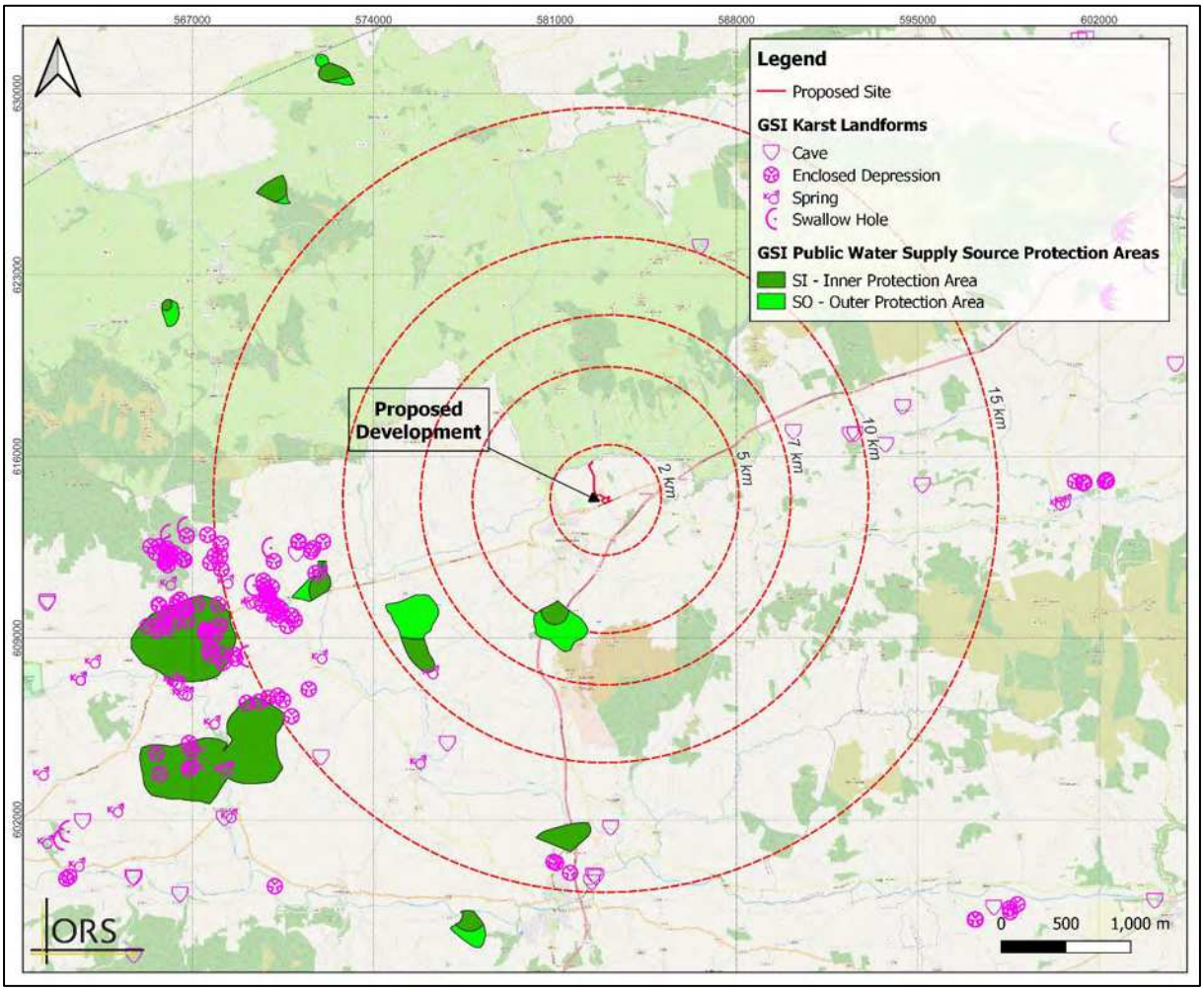

Figure 8.15: Karstic Features and Source Protection Areas (SPAs) location (GSI Maps)

Ground Investigations

Ground investigation works were carried out by a chartered ORS environmental scientist for the Proposed Development at Mitchelstown on the 18th of December 2023. These investigations confirmed the general geology and subsoil conditions corresponded to the conditions indicated in the geological mapping. The location and depth of the trial pits is shown on **Figure 8.16**, and details of each investigation location is presented in **Table 8.12**.

The depths of trial pits varied from 1.7m to 3m bgl. Bedrock was not encountered in trial pits on site.

As stated in **Section 8.4.2,** the topography peaks at 107.5m OD along the northwestern site boundary (trial pit 2) of the proposed site with a gradual gradient (trial pit 1 is in the middle of this gradient) to a low of 96.5m OD at the southeastern boundary where a drainage ditch occurs. During the initial site walkover, a sinkhole was observed near the drainage ditch and close to trial pit 4. The sinkhole is *ca.* 1.5 m deep and is unlikely to be connected to the groundwater body, as no water seepage was detected in the nearby trial pit, which was excavated to a depth of 2.6 m.

There was variation in the soil profile across all five trial pits, but similarities between them was noted. The topsoil on all trial pits were of a loamy texture and dark brown in colour. Soil and subsoil horizons were larger in Trial Pits 2 and 4. The predominant soil underlying the proposed site is a mineral derived from Devonian sandstone parent materials. The topsoil throughout the site is characterised as Brown Earth, consisting of a silty brown loam. The subsoil, which is only found in Trial Pits 3 and 4, is characterised as a grey silty gravelly sand, with occasional limestone cobble. The findings of the site investigation correlated with the GSI soil & subsoil database mapping.

Water was encountered in Trial Pit 2 (TP-02), excavated to a depth of 2.6 mbgl, with seepage observed at 1.84 mbgl. Trial Pit 1 (TP-01), located at the centre of the site, reached a depth of 3 mbgl and, while wetter subsoil and water seepage were noted at 1.8m bgl, no water was found. No water seepage was detected in the other trial pits. Despite the variability of the local aquifer, where groundwater depth and availability can fluctuate over short distances, these findings suggest a relatively consistent hydrogeological profile across the area.

A site characterisation assessment (percolation assessment) was conducted by Bolger-Hynes Architectural Design on the 11th of March 2024. This was undertaken adjacent to TP-02 on moderately sloped ground. The trial pit was a dug to a depth of 2.15m and did not encounter bedrock, refer to **Appendix 8.3**.

Table 8.12: Ground profile for each Trial Pit

Location	Depth (m)	Ground Profile	Comments
TP-01	0.0 – 0.30	Silty, uncompacted soil with some clay. High organic matter content. Dark brown in colour.	End trial pit at 3.00m
	0.30 – 0.80	Slightly more compacted silty soil.	Water seepage noted at 1.84m
	0.80 – 1.60	Tan coloured soil. High sand content	
	1.60 – 3.00	Darker coloured, wetter soil.	
TP-02	0.00 – 0.40	Dark Brown silty, clayey loam.	End trial pit at 2.6m
	0.40 – 1.40	Tan coloured and loose sand with small angular stones	Water seepage noted at 1.8m
	1.40 – 2.60	Compacted sand with high clay content. Occasional cobble of old red sandstone.	
TP-03	0.00 – 0.40	Dark brown loam. High organic matter content in top 20mm.	End trial pit at 2.1m
	0.40 – 0.90	Sand / loam mixture	No water seepage noted
	0.90 – 1.40	Dry sand with occasional cobble of old red sandstone	
	1.40 – 2.10	Large semi-degraded limestone boulders, 1 - 1.7m in diameter	
TP-04	0.00 – 0.30	Dark brown loam	End trial pit at 2.6m
	0.30 – 1.00	Uncompacted sand	
	1.00 – 2.60	Compacted sand, higher clay content. Occasional sandstone cobble / small boulder	No water seepage noted
TP-05	0.00 – 0.30	Dark brown loam	End trial pit at 1.70m
	0.30 – 0.50	Clayey gravelly layer. Most likely imported fill.	
	0.50 – 1.70	Uncompacted sand. Light brown colour.	No water seepage noted

Figure 8.16: Location of Trial Pits (TP) and Site Characterisation Assessment

Cork County Development Plan 2022 – 2028 – Groundwater Protection

A review of the Cork County Development Plan was carried out to determine the policies and objectives relevant to the preservation and protection of groundwater quality throughout the region.

Water Management Policy Objectives:

- ***WM 11-1: EU Water Framework Directive and the River Basin Management Plan***
  a) *Protect and improve the County's water resources and ensure that development permitted meets the requirements of the River Basin Management Plan and does not contravene the objectives of the EU Water Framework Directive.*
  b) *Promote compliance with the River Basin Management Plan and associated environmental standards and objectives set out in the European Communities (Environmental Objectives) Surface Water Regulations, 2009 and the European Communities (Environmental Objectives) Groundwater Regulations, 2010, to prevent deterioration; restore good status; reduce chemical pollution, and achieve water related protected areas objectives in rivers, lakes, groundwater, estuaries and coastal waters (as applicable).*
  c) *Secure the objectives and facilitate the implementation of the associated Programme of Measures of the River Basin Management Plan 2018-2021 and any successor plan for ground, surface, estuarine, coastal and transitional waters in the Plan area as part of the implementation of the EU Water Framework Directive.*
  d) *Support an integrated and collaborative approach to local catchment management in order to assist in the implementation of the River Basin Management Plan.*
  e) *In acknowledgement of the sustained pressures on ecological status being experienced*

in Blue Dot catchment waterbodies, additional measures, as deemed necessary to protect and restore these waterbodies to high status may be required for development permitted in such catchments. Measures may include, but are not limited to, a water management plan (including the construction phase), tertiary treatment and appropriate SUDs measures.

f) Support the prioritisation of the provision of water services infrastructure in:

- *Metropolitan Cork, the Key Towns and Main Towns to complement the overall strategy for economic and population growth while ensuring appropriate protection of the environment.*
- *All settlements where services are not meeting current needs, are failing to meet the requirements of the Urban Wastewater Treatment Directive, and where these deficiencies are − interfering with Councils ability to meet the requirements of the Water Framework Directive; or − having negative impacts on Natura 2000 sites; and*

g) Development may only proceed where appropriate wastewater treatment is available which meets the requirements of environmental legislation, the Water Framework Directive and the requirements of the Habitats Directive.

- ***WM 11-3: Groundwater Protection***
  a) Preserve and protect groundwater and surface water quality throughout the County.
  b) Prevent or limit, as appropriate, the input of pollutants into groundwater and prevent the deterioration of the status of all bodies of groundwater.
  c) Protect, enhance and restore all bodies of groundwater and ensure a balance between abstraction and recharge of groundwater with the aim of achieving good groundwater quantitative status and good groundwater chemical status.
  d) Reverse any significant and sustained upward trend in the concentration of any pollutant resulting from the impact of human activity in order to progressively reduce pollution of groundwater.
  e) Achieve compliance with any standards and objectives established for a groundwater dependant protected area included in the register of protected areas.

- ***WM 11-4: Groundwater Protection Schemes and Zones -*** *In order to protect groundwater quality, new developments must have regard to any Groundwater Protection Scheme and/or Groundwater Protection Zones in place and existing developments and abstractions.*

- ***WM 11-5: Discharges in Unsewered Areas***
  a) Ensure that proposals for development incorporating on-site wastewater disposal systems comply with the EPA Code of Practice Domestic Waste Water Treatment Systems March 2021 (Population Equivalent ≤ 10) and Wastewater Treatment Manual - Treatment Systems for Small Communities, Business Centres, Leisure Centres and Hotels (1999), or relevant successor approved standards / guidelines (including design, installation and maintenance). The cumulative impact of such systems will also be considered in the assessment process.
  b) Continue to support the roll out of the National Inspection Plan 2018–21 for domestic waste-water treatment systems, and any successor plans, with prioritisation of Blue Dot Catchments and Protected Areas.
  c) Protect the County's waters from wastewater pollution, through the implementation of the Local Government (Water Pollution) Acts 1977 to 2007, ensuring that all development shall comply with the provisions where applicable.

- ***WM 11-8: Water Supply***
  a) Support the prioritisation of the supply of adequate sustainable drinking water for the resident population and invest and expand the water supply in line with future population

targets.

b) *Ensure that all drinking water in the County complies with the European Union Drinking Water Directive 98/83/EC and that all surface water and groundwater supplies comply with the requirements of Surface Water Directive 75/440/EC and Groundwater Directive 80/68/EEC.*
c) *Conserve sources of drinking water and minimise threats to either the quality or quantity of drinking water reserves that might result from different forms of development or development activity and other sources of pollution.*

Groundwater Vulnerability Assessment

The site is not located within a Source Protection Area, and this vulnerability assessment will be carried as per excerpt of **Table 8.4**, as follows:

Excerpt of **Table 8.4:** Summary of Sampling requirements for groundwater vulnerability assessments

	Aquifer Type	Sampling Requirements
Ground Water Protection Scheme (GWPS) does not exist	Locally Important / Poor Aquifers	Prove that 1m depth of soil/subsoil cover exists. Minimum of 1 data point per 5 hectares is required. Site investigation points can be based on existing information. New information only required where existing information is insufficient.
	Regionally Important Aquifers	Prove that 2m depth of soil/subsoil cover exists. Minimum of 1 data point per hectare is required. Site investigation points can be based on existing information. New information only required where existing information is insufficient.

Groundwater resources protection zones are determined by combining the aquifer and vulnerability maps. The aquifer map boundaries, in turn, are based on the bedrock map boundaries and the aquifer categories are obtained from an assessment of the available hydrogeological data. The vulnerability map is based on the subsoils map, together with an assessment of relevant hydrogeological data, in particular indications of permeability and karstification.

The location and management of potentially polluting activities in each groundwater protection zone is calculated by means of a groundwater protection response matrix. The level of response depends on the different elements of risk: the vulnerability, the value of the groundwater (with sources being more valuable than resources and regionally important aquifers more valuable than locally important and so on) and the contaminant loading. By consulting the Response Matrix, it can be determined:

- Development's suitability of purpose
- What kind of further investigations may be necessary to reach a final decision; and
- What planning or licensing conditions may be necessary for that development.

The groundwater protection responses are a means of ensuring that good environmental practices are followed.

The matrix in **Table 8.13** gives the result of integrating the two regional elements of land surface zoning (vulnerability categories and resource protection areas) – a possible total of 24 resource protection zones. In practice this is achieved by superimposing the vulnerability map on the aquifer map. Each zone is represented by a code e.g. Rf/M, which represents areas of regionally important fissured aquifers where the groundwater is moderately vulnerable to contamination. In land surface zoning for groundwater protection purposes, regionally important sand/gravel (Rg) and fissured aquifers (Rf) are zoned together, as are locally important sand/gravel (Lg) and bedrock which is moderately productive (Lm).

Table 8.13: Matrix of Resource Protection Zones from EPA Guidance Notes on Groundwater Protection

Vulnerability Rating	Resource Protection Zones					
	Regionally Important Aquifers (R)		Locally Important Aquifers (L)		Poor Aquifers (P)	
	Rk	Rf/Rg	Lm/Lg	Ll	Pl	PU
Extreme (E)	Rk/E	Rf/E	Lm/E	Ll/E	Pl/E	Pu/E
High (H)	Rk/H	Rf/H	Lm/H	Ll/H	Pl/H	Pu/H
Moderate (M)	Rk/M	Rf/M	Lm/M	Ll/M	Pl/M	Pu/M
Low (L)	Rk/L	Rf/L	Lm/L	Ll/L	Pl/L	Pu/L

Combining the proposed site vulnerability rating of Moderate and aquifer classification of – Regionally Important Aquifer; we therefore have a site that is classified as Rk/M.

Groundwater Protection Responses

The Groundwater Protection Responses to the land spreading of organic wastes (see DoE/GSI/EPA publication, 1999) is applicable to this study due to the proposed nature and operational phase of the Proposed Development. The DoE/GSI/EPA states that a 'Regionally Important Aquifer with a moderate vulnerability rating is acceptable, subject to normal practice of land spreading'. This refers to areas where Groundwater Protection Schemes do not exist and there is no known groundwater contamination in the area.

Table 8.14: Vulnerability Rating Summary

Vulnerability Rating	SOURCE PROTECTION AREA		Resource Protection (Aquifer Category)					
			Regionally Important Aquifers (R)		Locally Important (L)		Poor Aquifers(P)	
	Inner	Outer	Rk	Rf/Rg	Lm/Lg	Ll	Pl	Pu
Extreme (E)	R4	R4	R3[2]	R3[2]	R3[1]	R3[1]	R3[1]	R3[1]
High (H)	R4	R2[1]	R1	R1	R1	R1	R1	R1
Moderate (M)	R3[3]	R2[1]	R1	R1	R1	R1	R1	R1
Low (L)	R3[3]	R2[1]	R1	R1	R1	R1	R1	R1

R1 Acceptable, subject to normal good practice.
R2[1] Acceptable subject to a maximum organic nitrogen load (including that deposited by grazing animals) not exceeding 170 kg/hectare/yr.
R3[1] Not generally acceptable, unless a consistent minimum thickness of 1 m of soil and subsoil can be demonstrated.
R3[2] Not generally acceptable, unless a consistent minimum thickness of 2 m of soil and subsoil can be demonstrated.
R3[3] Not generally acceptable, unless no alternative areas are available and detailed evidence is provided to show that contamination will not take place.
R4 Not acceptable

Site Vulnerability

Desktop investigation indicates that the development site is located on a regionally important aquifer with moderate vulnerability, classified as **Rk/M**. An intrusive site investigation, conducted by ORS in December 2023, involved excavating five trial pits across the site of a minimum depth of 1.7m bgl. Bedrock was not encountered in any of the trial pits, and water seepage was observed in two (TP-01 and TP-02). Water was only found in TP-02, which is located just outside of the site perimeter.

Despite the variability of the local aquifer, the site investigation suggests a relatively consistent hydrogeological profile across the area. However, due to the presence of a fault crossing the site, the possibility of encountering groundwater during the excavation stage of the construction phase cannot be ruled out.

It is not foreseen that the operation of the proposed facility will adversely affect the underlying aquifer or nearby wells. 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.

It is still recommended to conduct additional trial pits pre-construction in areas where soil excavation will be necessary. This will help to identify any potential areas of risk at an early stage and allow for the proposal of suitable mitigation measures, if deemed necessary. Additionally, since a soil/subsoil layer of at least 2 meters is required in areas overlying regionally important aquifers, backfilling may be necessary if areas of risk are identified due to insufficient soil depth to meet this requirement.

8.5 Likely Significant Effects

Using data from the desk study, intrusive site investigation, and anecdotal evidence, a risk assessment was conducted to evaluate the predicted impacts on hydrology and hydrogeology during both the construction and operational phases of the development. This assessment identifies relevant sources, pathways, and receptors (pollutant linkages) and assigns a qualitative risk classification—'low,' 'moderate,' or 'high'—to each identified Potential Pollutant Linkage (PPL).

For a risk of surface water and groundwater contamination to exist, a contaminant source, pathway for migration and viable receptor must exist. The presence of all three of these elements is known as a 'pollutant linkage'. The likely potential pollutant linkages identified as a result of this assessment and specific for the site have been provided in the initial CSM. The model has been based upon the site setting at the time of the assessment, the land use (current and reasonably foreseen future use) of the surrounding area and the state what the proposal is (i.e. development, ongoing use, etc.).

As well as identifying the potential pollutant linkages the model includes a preliminary assessment of risk based upon the probability of impact and the likely severity of impact in the context of the site setting and proposed future site use.

The criteria used for the risk assessment classifications as detailed in the CSM table are based on those presented in *CIRIA Report 552*.

8.5.1 Do-Nothing Scenario

The proposed site includes both brownfield and greenfield areas, with the majority of the land being agricultural. The western portion of the site was previously occupied by a piggery, with disused structures still present on the site.

If the Proposed Development does not proceed, in the greenfield portion of the site, surface water percolation and runoff would continue to function naturally. The current land use would remain unchanged as agricultural land and this could result in the continued pollution of soils and potential contamination of the local groundwater system, primarily due to poor agricultural practices.

In the brownfield portion of the site, the 'Do Nothing' scenario could perpetuate or further degrade the already poor environmental quality, rather than offering any positive impact. The eutrophicated pond in this area poses ongoing risks to local water systems, as it may contribute to increased sediment and nutrient loads in the adjacent drainage ditch. This could alter the ditch's flow, potentially worsening flooding and erosion. If these nutrients reach nearby surface water bodies, they could degrade water quality, harm aquatic life, and lead to a loss of biodiversity.

8.5.2 Receptor Sensitivity

The sensitivity of the receptors identified during the study of hydrological & hydrogeological features within the vicinity of the site are summarised in **Table 8.15** overleaf.

Table 8.15: Receptor Sensitivity

Receptor	Receptor Importance	Receptor Sensitivity	Rationale
Groundwater	Regional Level	Moderate	The Mitchelstown Groundwater Body (GWB) is classified as a Regionally Important Karstified Aquifer with diffuse flow (Rkd). This aquifer plays a critical role in sustaining local rivers by contributing significantly to their baseflow, underscoring its designation as a resource of high importance. Additionally, the main rivers overlying the GWB are protected under European and/or National laws or are hydrologically connected to protected sites (SAC/SPA/NHA). The groundwater vulnerability is classified as "Moderate" according to the GSI map viewer. Despite the variability of the local aquifer, the site investigation suggests a consistent hydrogeological profile across the area. However, the presence of a fault crossing the site suggests that the possibility of encountering groundwater during the excavations stage of the construction phase cannot be ruled out. The response matrix (**Table 8.14**) would indicate that vulnerability rating assigned to the site would be "R1 Acceptable, subject to normal good practice", indicating the development location is acceptable with respect to groundwater protection.
Surface Water	Regional Level	Very High	The receiving water body, the River Funshion has a WFD status of "High", a pollution status of "Unpolluted", and a condition of "Satisfactory" (Q4-5). Locally, the river supports highly sensitive macro-invertebrate species and features diverse vegetative characteristics, including macrophytes. While there is a hydrological pathway to the River Blackwater, which is protected under EU legislation due to its SAC and SPA status, significant effects on these protected areas are not anticipated from the Proposed Development. The considerable distance downstream (*ca.* 37.4 km) is deemed sufficient to disperse or dilute any potential pollutants from the River Funshion, in a way that protected areas are likely to remain unaffected.

8.5.3 Sources - Construction Phase

The construction phase is likely to yield the most potentially significant effects on the surrounding water environment. A summary of these potential effects is provided in **Table 8.16** overleaf, with a detailed analysis below.

Table 8.16: Construction Phase Effects (Unmitigated)

Receptor	Potential Environmental Effects	Quality	Significance	Duration
Groundwater Mitchelstown Groundwater Body	Increased Run-off and Sediment Loading	**Negative**	**Slight to Moderate**	**Temporary**
	Accidental Spillages of Harmful Substances	**Negative**	**Moderate to Significant**	**Short-Term**
	Increased Groundwater Vulnerability	**Negative**	**Significant**	**Long-Term**
	Excavation of Bedrock Aquifer	**Negative**	**Significant**	**Long-Term**
	Installation of Gas and Discharge Pipelines	**Negative**	**Moderate to Significant**	**Long-Term**
	Excavation of Contaminated Soils	**Unlikely**	**Negligible Impact**	**Unlikely**
	Demolition Works	**Negative**	**Moderate to Significant**	**Short-Term**
	Eutrophicated pound	**Negative**	**Moderate**	**Short-Term**
Surface Water Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	Increased Run-off and Sediment Loading	**Negative**	**Slight to Moderate**	**Temporary**
	Accidental Spillages of Harmful Substances	**Negative**	**Moderate to Significant**	**Temporary**
	Excavation of Contaminated Soils	**Unlikely**	**Negligible Impact**	**Unlikely**
	Conversion of Permeable Soils to Hard standing	**Negative**	**Moderate**	**Temporary**
	Demolition Works	**Negative**	**Moderate to Significant**	**Temporary**
	Eutrophicated pound	**Negative**	**Moderate**	**Temporary**

Increased Run-off and Sediment Loading

During the demolition phase, loose debris and exposed soil are highly susceptible to erosion, which can lead to sediment-rich runoff entering nearby surface waters. Additionally, the dust and fine particles produced can be carried away by wind or rain, potentially raising sediment levels in surface water bodies.

During the initial stages of the construction phase, enabling works will consist of stripping and removal of a layer of topsoil in some areas throughout the site. Earthworks will then follow to level the site and to facilitate the construction of foundations and the installation of services/drainage infrastructure which will also lead to the removal of some vegetation cover. The resulting stockpiles of the displaced soils and sediments, in the absence of suitable mitigation, will be susceptible to erosion during this period. This can create a potential pathway for silt and sediment to migrate off-site into surrounding water courses via wind-blown dust or run-off in times of heavy rain. The potential consequence for surface water receptors in this circumstance is elevated levels of silt, suspended solids, and nutrients given the previous land use for the site. This in turn can lead to water quality degradation, decline in fisheries resources and serious ecological degradation of aquatic biota.

The subsoil at the site mainly consists of till derived from Devonian sandstones, which includes a mix of sand and gravel-sized particles. These particles are prone to being moved by runoff or blown away by moderate to strong winds, which can lead to their migration into nearby surface waters. Additionally, finer particles in the subsoil, when carried by run-off, tend to remain suspended in the water, leading to increased turbidity and potential disruption of aquatic ecosystems.

Given the moderate permeability of the subsoil on the site, the risk of runoff contamination reaching the Mitchelstown Groundwater Body through typical infiltration processes is not considered to be significant. During the site walkover, a sinkhole was observed near the eastern boundary, *ca.* 1.5 m deep. Although the sinkhole is unlikely to be connected to the groundwater body—evidenced by the absence of water seepage in a nearby trial pit excavated to a depth of 2.6 meters—its presence suggests a shallower soil/subsoil layer in that specific area. Additionally, the presence of a fault crossing the site suggests that the possibility of encountering groundwater during the excavations stage of the construction phase still exists. These indicate that there may be a heightened vulnerability in some punctual areas across the site.

Although hydrogeological connection has not been confirmed, any potential groundwater contamination could negatively impact the surrounding wells and their users, exacerbating the complexity of the impact. Within 2 km radius from the site, there are 5 no. recorded wells (boreholes), primarily used for industrial or agricultural and domestic purposes.

Considering the natural topography of the proposed site and the surrounding areas along with the hydrological connection with the adjacent drainage ditch***, in the absence of mitigation***, uncontrolled releases of sediment run-off would result in a ***negative, slight to moderate, temporary effect*** on the water quality of the River Gradoge. River Funshion could be similarly impacted during the construction of the proposed discharge pipeline.

In the absence of mitigation, uncontrolled releases of sediment run-off would result in a ***negative, slight to moderate, temporary effect*** on the water quality of the Mitchelstown Groundwater Body underlying the proposed site.

Accidental Spillages of Harmful Substances

During the construction and demolition phase, there is a possibility of a spillage of contaminants such as fuels, oils, chemicals and cement material, posing a potential risk to surface and groundwater quality. Fuels, oils and chemicals have a number of hazardous properties, and the constituents of concrete are alkaline and corrosive. Each one of these substances can have a significant deleterious effect on water quality and aquatic life should any become entrained in the receiving water environment.

The drainage characteristics of the site area, as outlined in **Section 8.4.5,** concluded that the Qbar value for the site is 12.8 l/s. In the event of any spillages, contamination would likely be carried by the site run-off and migrate into the adjacent drainage ditch and subsequent downstream receptors.

The groundwater vulnerability assessment in **Section 8.4.8** concluded that groundwater vulnerability at the site was classed as ‘moderate’ due to the moderately permeable subsoils beneath the site. These conditions offer some protection to groundwater receptors providing a natural barrier between the potential release of harmful substances and the groundwater body below and impeding vertical migration throughout the soils. However, the presence of a

sinkhole on the eastern boundary of the site is a concern and, as such mitigation measures must be implemented to address it and prevent any potential adverse impacts on the groundwater body.

Although hydrogeological connection has not been confirmed, any potential groundwater contamination could negatively impact the surrounding wells and their users. Within 2 km radius from the site, there are 5 no. recorded wells (boreholes), primarily used for industrial or agricultural and domestic purposes.

In the absence of mitigation, uncontrolled releases of hydrocarbons, chemicals or cement would result in a ***negative, moderate to significant, temporary effect*** on the adjacent drainage ditch. This would lead to impacts on the water quality of the River Gradoge and River Funshion, and, although unlikely, the contamination could extend to downstream receptors, including the River Blackwater SPA and SAC, and the Blackwater Callows pNHA.

In the absence of mitigation, uncontrolled releases of hydrocarbons, chemicals or cement would result in a ***negative, moderate to significant, short-term effect*** on the water quality of the Mitchelstown Groundwater Body underlying the proposed site. Due to the high level of interaction between this GWB and the local surface water bodies, the potential for contamination to cause particularly complex environmental impacts exists but is unlikely.

Increased Groundwater Vulnerability

The removal and disturbance of a significant amount of soil required in order to level the site is anticipated during the construction phase which carries the potential to increase the vulnerability of a groundwater body to incidences of contamination at surface level.

The preliminary Cut and Fill analysis for the Proposed Development indicates that a total of 14,312m³ of subsoil will be excavated, all of which will be reused on-site as capping layers and fill. Consequently, no surplus subsoil will need to be disposed of off-site. Additionally, an estimated 7,754m³ of topsoil will be excavated and reused to enhance on-site landscaping areas. To meet construction requirements, 5,742m³ of Class 6F2 material will need to be imported for the capping layer, along with 3,460m³ of stones for use beneath the structures. These estimated volumes may be subject to change based on further ground investigations prior to construction.

Excavations of up to 2 m bgl will be required to reach the finished floor level (FFL) of the General Yard/Parking, located in the north of the site, the Digestate Tanks and the bounded area, located at the centre-south area of the site, and the attenuation pond to the northeast of the site. When excavation to FFL has been achieved, further earthworks will then follow to facilitate the construction of foundations and the installation of services/drainage infrastructure, which will extend to depths of approximately 3m bgl extending into subsoils. Foundations of up to 2m below the FFL will be required along the structural outline of buildings.

GSI maps indicate the groundwater vulnerability throughout the site was classed as ‘moderate’. The groundwater protection response matrix (**Rk/M**) assigns the site a vulnerability rating of "**R1**," indicating that the development location is acceptable with respect to groundwater protection. However, a soil or subsoil cover of 2 m at minimum is recommend in order to comply with EPA guidelines, given the presence of a ‘Regionally Important Aquifer’ in the area.

Desktop study suggests a subsoil depth of >10m throughout the area, given the moderate groundwater vulnerability on the site. Geotechnical investigations conducted on-site support this, as no bedrock was encountered during the excavation of trial pits. However, while unlikely,

the possibility of encountering groundwater during excavations cannot be entirely ruled out due to the presence of a fault crossing the site. An excavation depth of 2-3m bgl could increase the vulnerability in areas from 'moderate' to 'high'. Further trial pits pre-construction to determine soil depth within the site and installation of impermeable liners under the attenuation pond are recommended.

In the absence of mitigation, the removal of soil/subsoil cover during the construction phase would have a ***negative, significant, long-term effect*** on groundwater vulnerability at the Proposed Development site.

Excavation of Bedrock Aquifer

As depicted in **Table 8.11**, groundwater wells in the surrounding area typically encounter bedrock at depths ranging from 4 m to 15.2m bgl. The site investigation carried out by ORS involved the excavation of five trial pits, ranging from 1.7m to 3.0m bgl, none of which encountered bedrock. Since the maximum excavation depth required to level the site is expected to reach 3m bgl, interaction with bedrock is possible, but unlikely to happen.

Further trial pits pre-construction to determine soil depth within the site and installation of impermeable liners under the attenuation ponds are recommended.

If excavation into bedrock is necessary and ***control and mitigation measures are not implemented***, predicted effects will have ***negative, significant and long-term effect*** on hydrogeology.

Gas and Discharge Pipelines

During the initial stages of the construction phase, enabling works will consist of stripping and stockpiling of topsoil and subsoil at the proposed compound area, as outlined above.

The proposed gas pipeline connecting to the existing Gas Networks Ireland pipeline along the N73 will be installed alongside the existing N73. This is an indicative routing of the pipeline to the site and is subject to change pending detailed network modelling and design. The final pipeline will be designed, consented and delivered by Gas Networks Ireland in accordance with the following standard: *I.S. 328 2021 Gas transmission — Pipelines and pipeline installations*.

Installation of the pipeline will involve temporary excavation work and will result in disturbance of the underlying soil and subsoil. This may have an effect on the exposed soil and subsoil with implications for the soil surface with regard to stock piling and mobile plant. The trenches will be backfilled shortly after excavation following the installation of each section. Trenching along a road network will give rise to asphalt waste material. If unproperly managed these materials can pose a risk to the environment due to the presence of Polycyclic Aromatic Hydrocarbons (PAHs).

A discharge pipe running from the northern boundary of the site and discharging directly into the River Funshion will be installed. Refer to **Figure 8.17** for more details on the proposed discharge pipe route. The proposed method of installation is via a "Mole Plough". Mole ploughing is not strictly a trenchless technology but involves creating a narrow temporary trench/ slit in the soil for installing small diameter mains and services.

In the absence of mitigation, the removal of soil/subsoil cover during the installation of the discharge and gas pipelines would have a **negative, moderate to significant, long-term effect** on groundwater vulnerability at the Proposed Development site.

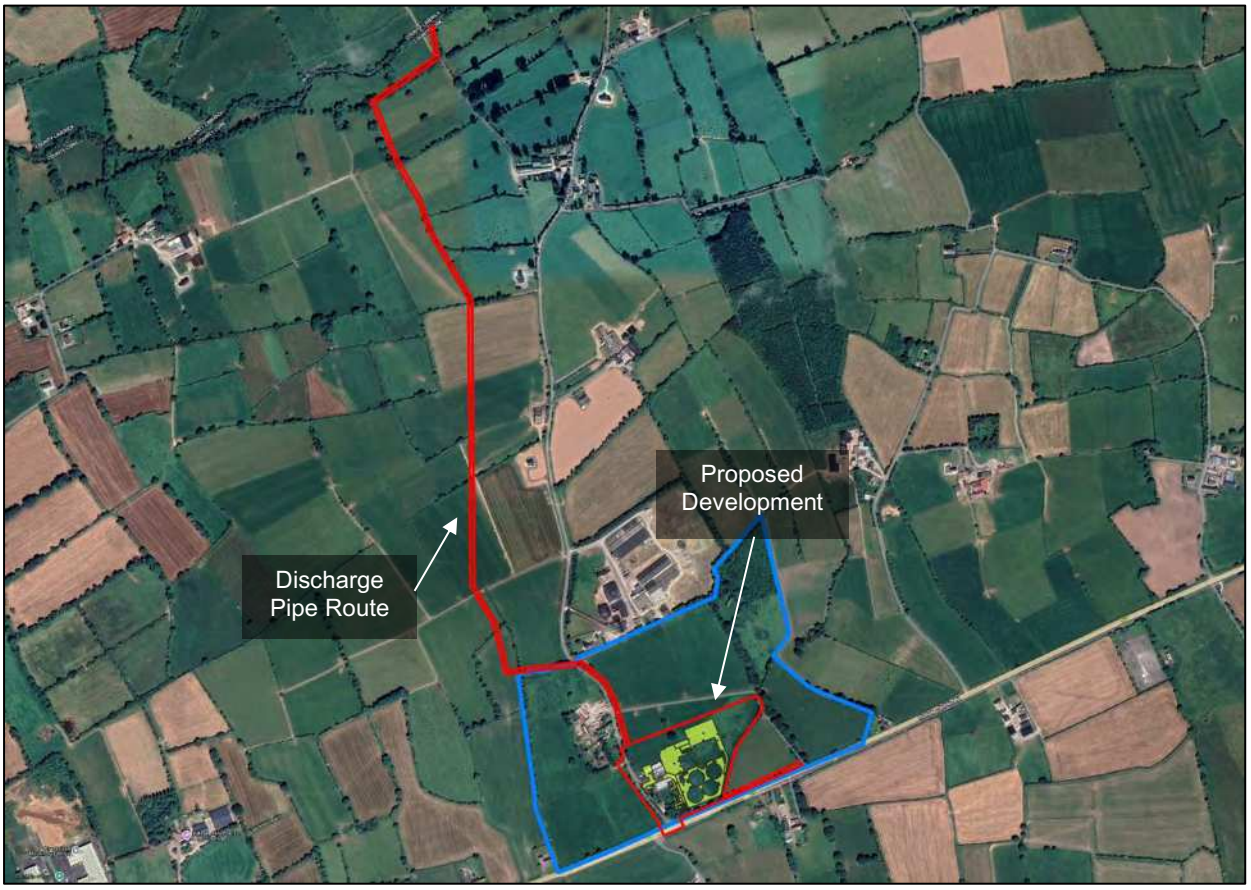

Figure 8.17: Proposed Discharge Pipe route.

Excavation of Contaminated Soils

The excavation and construction activities will require the reuse of excavated materials on site. The proposed site includes both brownfield and greenfield areas. The western portion of the site was previously occupied by a piggery. Historical mapping does not suggest any incidences of land use which might result in the contamination of soils. Furthermore, a geotechnical site investigation conducted at the site in December 2023 did not detect any evidence of contaminated soils. It is not anticipated contaminated soils will be encountered during construction activities hence no adverse effects on the groundwater or surface water quality are expected as a result of contaminated soils.

The Outline Construction Environmental Management Plan (**Document Ref: 231925-ORS-XX-XX-RP-EN-13d-010**) will include a set of procedures to be implemented in the incidence of contaminated soils encountered nonetheless despite ***negligible impact or lack of significance*** to hydrogeology and hydrology

Conversion of Permeable Soils to Hard standing

The construction phase will involve the gradual conversion of the areas of permeable soil to areas of hardstanding on the site. Under this scenario, the risk of flooding within the receiving catchment will increase due to an increase in impervious land area and associated drainage systems, which leads to an increase in volume and intensity of surface water run-off within a given catchment. The encroachment of development onto existing flood plains can lead to a reduction in flood storage capacity, with a resultant increase in flood risk both upstream and

downstream. The increase in impervious area means that a greater proportion of the incident rainfall will appear in the drainage system as surface run-off. The provision of sealed pipes to convey runoff from the Proposed Development to existing watercourses will result in larger volumes being discharged at point locations within a shorter duration, thereby increasing flood risks.

In the absence of mitigation, the predicted effects of the Proposed Development resulting in an increase of flood risk to the receiving catchment are ***negative, moderate and temporary***.

Demolition Works

Part of the site is a brownfield area, previously occupied by a piggery, with some remaining structures still present. Demolition and site clearance works will be required. During demolition, loose debris and exposed soil are highly vulnerable to erosion, potentially leading to sediment-laden runoff entering nearby surface waters. Additionally, dust and fine particles generated by the works can be carried by wind or rain, raising sediment levels in surface water bodies.

There is also a risk of contaminant spills, including fuels, oils, and chemicals, which could pose a threat to both surface and groundwater quality. Materials such as asbestos, heavy metals, or chemicals may be released during demolition. If not managed properly, these contaminants could infiltrate the soil and groundwater. However, given the moderate permeability of the site's subsoil, the risk of contamination reaching the Mitchelstown Groundwater Body through typical infiltration is not considered significant.

Demolition waste must be collected and disposed of at licensed facilities to prevent potential obstruction or contamination of the ditch and downstream hydrological receptors, which could occur if the material remains on site for an extended period.

The Outline Construction and Demolition Waste Management Plan (Document Ref: **231925-ORS-XX-XX-RP-EN-13d-017**) will include a set of procedures to be implemented during demolition and construction phases.

In the absence of mitigation, the impacts caused by the demolition works on local hydrology are expected to be ***negative, moderate to significant and temporary***.

In the absence of mitigation, the impacts caused by the demolition works on local hydrogeology are expected to be ***negative, moderate to significant and short-term effect***.

Eutrophicated Pond

A small eutrophicated pond located near the old piggery structures on the site will need to be decommissioned. The process will involve a dewatering stage, where water will be pumped out and sent to a licensed facility for treatment before discharge. Following this, the ground will be levelled to achieve the proposed FFL of 101.4 m. Depending on the extent of eutrophication, sediment removal may also be required which will also be accordingly disposed at licensed facilities.

During dewatering and sediment removal, there is a risk of releasing accumulated nutrients and organic matter from the pond into the adjacent drainage ditch and potentially into groundwater, which could degrade water quality and contribute to eutrophication in other water bodies. However, due to the moderate permeability of the site's subsoil, contamination reaching the Mitchelstown Groundwater Body through typical infiltration is unlikely.

In the absence of mitigation, uncontrolled release of nutrients and organic matter from the eutrophicated pound would result in a ***negative, moderate, temporary effect*** on the on the adjacent drainage ditch. This would lead to impacts on the water quality of the River Gradoge and River Funshion, and, although unlikely, the contamination could extend to downstream receptors, including the River Blackwater SPA and SAC, and the Blackwater Callows pNHA.

In the absence of mitigation, uncontrolled release of nutrients and organic matter from the eutrophicated pound would result in a ***negative, moderate, short-term effect*** on the water quality of the Mitchelstown Groundwater Body underlying the proposed site.

8.5.4 Sources - Operational Phase

A summary of the potential operational phase effects is provided in **Table 8.17**, with a detailed analysis below.

Table 8.17: Operation Phase Effects Summary (Unmitigated)

Receptor	Potential Environmental Effects	Quality	Significance	Duration
Groundwater Mitchelstown Groundwater Body	Contaminated Run-off	**Negative**	**Moderate to Significant**	**Short-Term**
	Foul Water	**Negative**	**Moderate to Significant**	**Short-Term**
	Increased Groundwater Vulnerability	**Negative**	**Significant**	**Long-Term**
	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 Pond	**Negative**	**Moderate**	**Long-Term**
Surface Water Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	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**	**Significant**	**Long-Term**
	Uncontrolled Releases & Spillage of Digestate and Feedstocks	**Negative**	**Slight to Moderate**	**Temporary**
	Fire and Resultant Firewater	**Negative**	**Significant**	**Temporary**
	Uncontrolled Release of Discharge	**Negative**	**Significant**	**Temporary**
	Landspreading of Biobased Fertiliser	**Negative**	**Slight**	**Temporary**
	Attenuation Pond	**Neutral**	**Moderate**	**Long-Term**

Contaminated Run-off

Run-off from impermeable areas within the Proposed Development such as roads and car parking areas are likely to contain potentially polluting substances such as hydrocarbons, heavy metals and sodium chloride arising from de-icing of these surfaces during winter months.

The risk of failure in the runoff collection and discharge system should be considered; however, it remains unlikely. In the event of a failure, there is a potential for contaminated runoff to reach the underlying aquifer system. ***In the absence of suitable design & mitigation measures***, there would be a ***negative, moderate to significant, short-term effects*** on the water quality of the Mitchelstown Groundwater Body.

In the absence of suitable design & mitigation measures, there would be a ***negative, moderate to significant, temporary effects*** on the water quality of the River Funshion. Although unlikely, the contamination could extend to downstream receptors, including the River Blackwater SPA and SAC, and the Blackwater Callows pNHA.

Foul Water

A domestic scale wastewater treatment plan is proposed to cater for the foul water arising from staff facilities on-site only (Population Equivalent 'PE' of 2). The accompanying site suitability assessment has concluded that the soils at the site have sufficient absorption capacity for the installation of a percolation area suited for this PE.

The inherent risk associated with wastewater treatment systems is leakage of untreated foul water. This situation can arise from poor construction methods, inadequate maintenance and failure to scale the system to an appropriate projected population equivalent.

During incidences of leakage foul water would likely follow preferential pathways created by permeated backfill and infiltrate into the site drainage system ultimately impacting both surface water and groundwater receptors. Adverse effects associated with foul water leakages consist of contamination relating to the of the following:

- Pathogens, (E. Coli etc.).
- Elevated levels of ammonia and nitrate.
- Elevated levels of phosphorus.

In the absence of suitable design & mitigation measures, such leakages could degrade the water quality of both surface and groundwater bodies, potentially leading to negative consequences for aquatic life. Overall, the predicted effects of foul water leakage on hydrological & hydrogeological receptors are ***negative, moderate to significant and short-term.***

Increased Groundwater Vulnerability

The proposed Finished Floor Levels (FFL's) will be up to 2m below the existing elevation of the site in certain areas, potentially increasing the vulnerability of the underlying regionally important aquifer from 'Moderate' to 'High' or even 'Extreme' in case groundwater is encountered during site excavation.

In the absence of mitigation measures, the removal of soil/subsoil cover to reach the proposed FFL's would have a ***negative, significant, long-term effect*** on groundwater vulnerability at the Proposed Development site.

On-Site Flooding

A flood event occurring on the Proposed Development would cause the Sustainable Urban Drainage Infrastructure (SuDS) to become overwhelmed, creating additional pathways for potential contaminants to migrate off-site into downstream receptors along with elevated flow rates.

The Proposed Development is not located in a Flood Zone, according to the OPW and the likelihood of flooding occurring on the site is very low. Please refer to Site Specific Flood Risk Assessment (**Document Ref: 231925-ORS-XX-XX-RP-EN-13d-011**) which accompanies the application.

Overall, ***in the absence of suitable design & mitigation measures,*** the predicted effects of the occurrence of a flood event on hydrological receptors is ***negligible, not significant, and unlikely*** to hydrogeology and hydrology.

Conversion of Permeable Areas to Hard standing

The operational phase will see a portion of the existing greenfield site converted to areas of hardstanding. Under this scenario, the risk of flooding within the receiving catchment will increase due to an increase in impervious land area and associated drainage systems, which leads to an increase in volume and intensity of surface water run-off within a given catchment.

The increase in impervious area means that a greater proportion of the incident rainfall will appear in the drainage system as surface run-off. The provision of sealed pipes to convey run-off from the Proposed Development to existing watercourse will result in larger (concentrated) volumes being discharged at point locations within a shorter duration, thereby increasing flood risks.

In the absence of mitigation, the predicted effects of the Proposed Development resulting in an increase of flood risk to the receiving catchment are ***negative, significant, and long-term.***

Uncontrolled Releases & Spillages

During the operational phase, there is a possibility of leakage or spillage of biobased fertiliser or feedstocks via vehicle movements or from a failure of a tank or feed line. While such substances are significantly less hazardous than fuels, oils, chemicals, and cement material, they still pose a potential risk to surface and groundwater quality. Biobased fertiliser or animal slurries in high quantities can have a deleterious effect on water quality and aquatic life if they reach any water receptors.

Uncontrolled releases of biobased fertiliser, feedstock, hydrocarbons or chemicals, ***in the absence of mitigation measures***, would result in ***negative, slight to moderate, temporary effects*** on the water quality of the River Funshion and the Mitchelstown Groundwater Body. Although unlikely, the contamination could extend to downstream receptors, including the River Blackwater SPA and SAC, and the Blackwater Callows pNHA.

Fire and Resultant Firewater

Appropriate storage facilities will be provided for combustible and flammable materials (i.e. fuel) required for the operation of the Proposed Development.

In the event of a fire, significant quantities of water resources will be utilised to quench the fire. Water used to quench a fire is known as “firewater”. Firewater is known to contain the following harmful substances:

- Products of combustion
- Extinguishing foam / fluid
- Hazardous substances (fuels, oils & chemicals)

Due to the presence of these hazardous substances, firewater poses a significant risk to surface and groundwater quality.

Uncontrolled releases of firewater ***in the absence of mitigation measures*** would result in ***negative, significant, temporary effects*** on the water quality of the River Funshion. Although unlikely, the contamination could extend to downstream receptors, including the River Blackwater SPA and SAC, and the Blackwater Callows pNHA.

Uncontrolled releases of firewater, ***in the absence of mitigation measures***, would result in ***negative, significant, short-term effects*** on the water quality of the Mitchelstown Groundwater Body underlying the proposed site.

Uncontrolled Release of Discharge

The Proposed Development includes digestate treatment using separation, ultrafiltration, and reverse osmosis to recover the water content within the digestate.

The Digestate Treatment System has a design capacity to treat a minimum of 78,000 tonnes of whole digestate per annum. Following treatment of the whole digestate, ca. 8,000 tonnes of digestate fibre, and ca. 17,000 tonnes of liquid digestate concentrate will be produced. The treatment process will recover ca. 53,000 tonnes of clean water which will be reused on site for cleaning, with the remaining volume returned to the process as a feeding liquid.

The digestate treatment process involves the following stages:

- Screwpress Separation
- Ultrafiltration
- Reverse Osmosis

Following the RO stage, the purified water generated by the process will be stored in a balance tank before being reused onsite for cleaning activities. The remaining volume of water will be diverted through an overflow pipe to undergo continuous water quality monitoring. Upon confirmation that the discharge emissions limit values (ELV) are met, the purified water will be released under discharge.

Assimilative capacity calculations and assessment are included in **Appendix 8.2**. Discharge values following RO are outlined in **Table 8.18** below:

Table 8.18: Discharge values

Parameter	Value
Total Oxidised N (mg/l)	60
Ammonal Total N (mg/l)	13
BOD (mg/l)	125
Orthophosphate (mg/l)	3
pH (pH units)	5.5 - 8.5
Nitrate (as N) (mg/l)	60
Nitrate (as NO3) (mg/l)	0
Nitrate (as NO2) (mg/l)	0
Discharge Rate (m3/hour)	8

Uncontrolled releases of discharge ***in the absence of mitigation measures*** would result in ***negative, significant, temporary effects*** on the water quality of the River Funshion and further downstream receptors River Blackwater SAC/SPA and Blackwater Callows pNHA.

Landspreading of Biobased Fertiliser

The biobased fertiliser produced will be a rich source of nutrients that will be used by customer farmers for the fertilisation of their land. In the worst-case scenario and in absence of mitigation, any inappropriate land-spreading of the biobased fertiliser could lead to impacts upon the receiving waters in local catchments and it can result in eutrophication, algal blooms, fish kills and loss of biodiversity. Designated habitats and species can be impacted upon. There is a greater risk when groundwater vulnerability at the lands for spreading is high, or when land-spreading is undertaken close to drains or streams. In these situations, the Pollution Impact Potential for both phosphates and / or nitrates is high.

The farms of the customer farmers have been identified; however, these will be subject to local change on an annual basis. All farmers will use the biobased fertiliser on lands that have an agronomic requirement for fertiliser. Spreading will be done in accordance with the specific Nutrient Management Plan for the farm and in accordance with S.I. 113 of 2022. Records for the movement of all biobased fertiliser will be kept.

Inappropriate land spreading ***in the absence of mitigation measures*** would result in ***negative, significant, temporary effects*** on the water quality of the River Funshion. Although unlikely, the contamination could extend to downstream receptors, including the River Blackwater SPA and SAC, and the Blackwater Callows pNHA.

Contamination of the local groundwater body is unlikely to occur due to the moderate permeability of subsoils and the considerable distance to the bedrock. However, this will depend on the local characteristics of the land where the biobased fertiliser will be applied. If contamination is to reach the groundwater body, ***in the absence of mitigation measures***, the effects would be ***negative, significant, and short-term.***

The positive benefits of using the biobased fertiliser produced must also be considered, as this provides an alternative to the land-spreading of liquid slurry. Using biobased fertiliser presents several scientific advantages over the continued use of untreated manures, slurries, or chemical fertilisers, particularly concerning plant nutrient availability and the mitigation of nutrient leaching into watercourses. The benefits are outlined below.

- **Balanced Nutrient Availability:** Biobased fertiliser typically contains a balanced mix of essential nutrients, including nitrogen (N), phosphorus (P), potassium (K), and

micronutrients crucial for plant growth. This balanced nutrient profile contrasts with chemical fertilisers, which often supply only specific nutrients. Studies have shown that the diverse nutrient composition of biobased fertiliser supports comprehensive plant nutrition, contributing to improved crop yields and overall plant health (Möller and Müller, 2012)[4].

- **Slow-Release Nutrients:** Biobased fertiliser releases nutrients gradually over time as it decomposes in the soil. This gradual release mechanism ensures a sustained supply of nutrients to plants, contrasting with untreated manures, slurries and chemical fertilisers, which can be prone to leaching or volatilisation. The slow-release nature of biobased fertiliser reduces the risk of nutrient loss and enhances nutrient uptake efficiency by plants (Yao et al., 2011)[5]. Analysis has shown that approximately 80% of the total nitrogen in biobased fertiliser is present as readily available nitrogen. Digestion of livestock slurry has also been shown to increase the plant availability of nitrogen in slurry by *ca*. 10%.

  Compared to untreated manures and slurries, biobased fertiliser poses a lower risk of nutrient leaching into watercourses. The balanced nutrient composition and slow-release nature of biobased fertiliser minimise the likelihood of excess nutrients washing away into streams or groundwater. This reduction in nutrient leaching coupled with land spreading best practice helps mitigate water pollution and eutrophication, safeguarding aquatic ecosystems and maintaining water quality (Möller and Müller, 2012).

- **Enhanced Soil Health: R**ich in organic matter, biobased fertiliser improves soil structure, promotes water retention, and stimulates microbial activity. These soil health benefits contribute to improved nutrient cycling, root development, and overall soil fertility (De Vries et al., 2015).[6]

- **Biobased Fertiliser Usage:** At full capacity the total tonnages for transportation off-site as biobased fertiliser to local agricultural operators are summarised below:

  - Biobased fertiliser Fibre - 8,000 tonnes
  - Biobased fertiliser Liquid Concentrate - 17,000 tonnes

Of the maximum 90,000 tonnes of annual feedstock intake, circa 36,572 tonnes of untreated manures and slurries would normally be land spread locally. Following the AD, pasteurisation, and biobased fertiliser treatment there will be 8,000 tonnes of solid and 17,000 tonnes of liquid biobased fertiliser. This represents a significant reduction in the hydraulic loading of land spreading locally of circa 11,572 tonnes per annum.

Post-pasteurisation the biobased fertiliser will meet the standard of an EU fertilising product under Regulation (EC) No 2019/1009 under the criteria outlined for Product Function Category (PFC) 3 B: Inorganic Soil Improver. The operator will apply for End of Waste status upon grant of permission.

All biobased fertilisers will be used in accordance with S.I. 113 of 2022 European Communities (Good Agricultural Practice for Protection of Waters Regulations, 2022). The spreading of the biobased fertiliser on the customer farms will be done on accordance with the specific Nutrient

[4] Möller, K., & Müller, T. (2012). Effects of anaerobic digestion on biobased fertiliser nutrient availability and crop growth: a review. Engineering in Life Sciences, 12(3), 242-257.
[5] Yao, R., Li, G., Xie, H., Zhao, B., & Liu, H. (2011). *Release characteristics of nutrients from aerobic composted swine manure in soil. Journal of Soils and Sediments*, 11(1), 103-111.
[6] De Vries, J. W., Groenestein, C. M., & Kool, P. L. (2015). *Effects of anaerobic digestion and composting on reducing the environmental impact of pig manure*. Journal of Environmental Management, 162, 230-237.

Management Plan for that farm.

Attenuation Pond

The Proposed Development includes an attenuation pond to the northeast of the site which will be used for attenuating surface water run-off from roads, yards, roofs and the impermeable bunded area. Although bedrock was not encountered during site investigations, excavation for the pond could reduce the overburden separating the development from the underlying regionally important aquifer.

If inappropriately constructed it may pose a risk to the underlying aquifer. As such, the attenuation ponds will be lined with an impermeable membrane to limit the risk of contaminants leaching into the underlying regionally important bedrock aquifer. There is also a potential risk of contaminants to reach surface water receptors via run-off.

Although hydrogeological connection has not been confirmed, any potential groundwater contamination could negatively impact the surrounding wells and their users, exacerbating the complexity of the impact. Within 2 km radius from the site, there are 5 no. recorded wells (boreholes), primarily used for industrial or agricultural and domestic purposes.

The attenuation pond, ***if not properly constructed and in the absence of mitigation measures*** is foreseen to have potentially ***negative, moderate, and long-term effects*** on surface water bodies and on the groundwater body.

8.6 Mitigation Measures

Mitigation measures proposed in this section relate primarily to the preservation of the existing subterranean drainage regime, the protection of groundwater receptors and the protection of surface water receptors.

Mitigation Measures proposed in this section are in response to the risks identified in **Section 8.5.**

8.6.1 Construction Phase

General Mitigation Measures

The Construction Environmental Management Plan (CEMP) and Construction and Demolition Waste Management Plan (CDWMP) accompanying this application will be implemented and updated (as required) by the main contractor during the construction phase. These are practical documents which will include detailed procedures to address the main potential effects on surface water and groundwater.

Increased Run-off and Sediment Loading

The main pollutants of site water are silt, fuel/oil, concrete and chemicals. There are a number of steps outlined below to eliminate contamination of site surface water runoff. The below recommendations are advised with reference to the Eastern Regional Fisheries Board recommendations for protection of adjacent water courses during the construction phase:

- 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 and demolition debris stockpiles when high wind and inclement weather are encountered if required.
- Storage of harmful materials and stockpiles should not be in close proximity to the adjacent drainage ditch and/or the sinkhole present at the eastern boundary of the site.
- 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 minimize weathering and reduce the increased vulnerability in the area surrounding the sinkhole.

Accidental Spillages of Harmful Substances

The following measures will minimise the risk of a release of fuels, oils, chemicals or cement products at the site:

- 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 drainage ditch and sinkhole on the east of the site.
- 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.
- Demolition waste must be stored away from the adjacent drainage ditch and sinkhole on the eastern side of the site until it is collected by a licensed contractor.

Increased Groundwater Vulnerability / Excavation of Bedrock Aquifer / Gas and Discharge Pipelines

The site has been assigned a moderate vulnerability rating. An excavation depth of up to 3m bgl would increase the vulnerability in particular areas of the Proposed Development from 'moderate' to 'high' or even 'extreme' in case groundwater is encountered during site excavations. Mitigation measures to ensure maximum protection of groundwater include:

- 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 minimize weathering and reduce the increased vulnerability in the area surrounding the sinkhole.
- Additional trial pits are recommended prior to construction to verify the presence of a minimum 2-meter depth of subsoil beneath the proposed locations for built structures and ponds, as required in areas with Regionally Important Aquifers
- Installation of impermeable liner is recommended under the attenuation pond.

Excavation of Contaminated Soils

It is not anticipated contaminated soils will be encountered during construction activities hence no adverse effects on the groundwater or surface water quality are expected as a result 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 Areas to Hard standing

The construction phase will involve the gradual conversion of the existing greenfield site to areas of hardstanding. The following measures will be implemented in the construction phase to minimise an increase of flood risk to the receiving catchment:

- The rate of discharge to the stream will be restricted to a maximum permissible rate of 12.8 lit/sec. 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
- Floor levels upstream of the storage areas are at least 500mm above the top water level in the detention basins for the 100-year event.
- Overtopping does not occur during rainfall events ranging from 30 minutes to 1440 minutes. No risk of flooding of adjacent areas.

- Attenuation Pond will accommodate the total catchment area capacity and will provide a minimum storage capacity of 1,864.74 m^3 (designed to accommodate the estimated rainfall events)

Demolition Works

Part of the site is a brownfield area, previously occupied by a piggery, with some remaining structures still present. Therefore, demolition and clean-up works will be required. The following measures will be implemented in the demolition phase to ensure maximum protection of surface and groundwater systems:

- Prior to demolition, a comprehensive building survey must be conducted to assess the condition of existing structures, including construction materials, building fabric, the presence of wastewater, hazardous substances (e.g., asbestos), and any potentially dangerous areas.
- Ensure all cutting, grinding, or sawing equipment on site is equipped with or used alongside dust suppression methods, such as water sprays or local extraction systems.
- Covers are to be provided over demolition debris stockpiles when high wind and inclement weather are encountered if required.
- Demolition waste must be stored away from the adjacent drainage ditch and sinkhole on the eastern side of the site until it is collected by a licensed contractor.
- Further mitigation measures are present on the accompanying CDWMP.

Eutrophicated Pond

A small eutrophicated pond located near the old piggery structures on the site will need to be decommissioned. The process will involve a dewatering stage, where water will be pumped out and sent to a licensed facility for treatment before discharge. Following this, the ground will be levelled to achieve the proposed FFL of 101.4 m. Depending on the extent of eutrophication, sediment removal may also be required which will also be accordingly disposed at licensed facilities.

The following measures will be implemented in the construction phase to ensure maximum protection of surface and groundwater systems:

- Before the abstraction of water from pond, conduct a water quality test to determine if any potentially harmful algal species/ toxins are present in the sample.
- To reduce spread of contamination, the EPA should be notified, and a suitably licenced contractor should safely remove the polluted pondwater from site to be transported to a licenced wastewater treatment facility for further treatment.
- After draining, nutrient-rich sediments that have accumulated at the bottom of the pond should be segregated, tested and disposed of by a suitably licenced contractor.

8.6.2 Operational Phase

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

It is proposed to take run-off from the buildings and yards in the facility in a sealed pipe network which will discharge to the watercourse. 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 facility. The system is designed to accommodate the 1:100-year rainfall event plus normal design parameter of +20% based on a combination of duration and volume.

Design criteria adopted for the development include:

- Overtopping from rainfall is concentrated at the detention basin only.
- Floor levels upstream of the storage areas are at least 500mm above the top water level in the detention basins for the 100-year event.
- Drainage systems will be designed to attenuate excess surface water runoff with suitable storage volumes
- Reduction of outflow rate to below the existing greenfield runoff rate before discharging into the watercourse from the attenuation pond.
- Sumps in gullies and manholes collect silts in run-off from roads
- Where feasible, run-off will discharge to filter drains. The filter material will treat run-off before its entry to pipes
- Class 1 discharge bypass separator treats surface water for hydrocarbons run-off before its discharge to the attenuation pond
- All surface water run-off will discharge to the attenuation pond. The floor of the basin will be shaped to allow for the retention of silts in the pond.
- Regular inspection and maintenance of all treatment measures to remove accumulated silts and disposed of to an appropriately licenced landfill
- Regular testing prior to discharge to ensure treatment effectiveness.
- The digestion process area will be completely bunded and constructed to Eurocode standard (BS EN 1992-3)
- The rate of discharge to the stream will be restricted to a maximum permissible rate of 12.8 lit/sec. 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.

Foul Water

A domestic scale wastewater treatment plant is proposed to cater for the foul water arising from staff facilities on-site only (Population Equivalent 'PE' of 2). A Site Suitability Assessment conducted by *Bolger-Hynes Architectural Design* in line with the EPA Code of Practice for onsite domestic wastewater treatment systems (2022) has concluded that the soils at the Proposed Development have sufficient absorption capacity for the installation of a percolation area suited for this PE.

The sizing of the proposed packaged wastewater treatment plant shall be minimum of 2Pe @150l/day = 300l/day + 2,000 litres = 2,300l (minimum) rounded up to a $3m^3$ tank.

The overburden is determined to be 'suitable for percolation purposes' and available to support Groundwater Protection Responses (GWPR). The wastewater treatment plant will comprise a secondary treatment system (septic tank), followed by a percolation area.

The total required length of percolation shall be 72.0m. The maximum run per trench length shall be 18.0m with 4no. trenches. There shall be an air vent upstand attached at the end of each percolation pipe run the width of each percolation trench shall be 0.5m. There shall be a gradient of 1 :200 for each percolation pipe.

The treatment plant will be specified and installed by an appropriately qualified technician and will be subject to regular desludging and maintenance, subject to manufacturers recommendations. Pressure tests and CCTV surveys will be carried out prior to commissioning to ensure absence of defects.

Increased Groundwater Vulnerability

The proposed Finished Floor Levels (FFL's) will be up to 2 m below the existing elevation of the site in certain places, increasing the vulnerability of the underlying regionally important aquifer from 'Moderate' to 'High'. Mitigation measures to ensure maximum protection of groundwater include:

- The site bunding is designed in accordance with IPC Guidance Note on storage and Transfer of Materials for Scheduled Activities (EPA, 2004)
- 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 existing flood risk to the Proposed Development is negligible with the proposed site located in 'Flood Zone C'. No specific mitigation measures to alleviate flood risk to the site are recommended.

The proposed stormwater management system is designed in accordance with industry standards and is projected to emulate the current runoff rates calculated at the site.

Increase in Flood Risk to Receiving Catchment

Drainage systems will be designed to attenuate excess surface water runoff with suitable attenuation volumes for the site and reduce the outflow rate to below the estimated greenfield rate before discharging.

- An attenuation pond is provided to facilitate the existing gradients on the site. The attenuation pond is designed for a 1:100-year event and well as to regulate the outflow from the site.
- The attenuation pond will accommodate the total catchment area capacity and will provide a minimum storage capacity of 1,864.74 m^3.

The attenuation pond will discharge the storm water and a flow control valve at the outfall from the basin will deliver a max flow less than that of greenfield run off of 12.8 l/s.

Uncontrolled Releases and Spillage

An Environmental Management System (EMS) will be implemented and accredited to ISO: 4001:2015. 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. Conditions of relevance to uncontrolled releases will include:

- 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 pond to limit percolation of contents into the underlying regionally important karst aquifer.
- The entire tank farm area of the Proposed Development will be bunded.
- The Reception Hall, Digestate Storage building, and Nutrient Recovery Building 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 and wastewater discharge to the River Funshion and watercourse on site, respectively.

Fire and Resultant Firewater

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.

The conclusions and recommendations of the Firewater Risk Assessment Report will ensure

that fire response and firewater retention are adequately scaled for the size of the facility. The operator of the facility will be obliged to ensure:

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

Uncontrolled Release of Discharge

The Proposed Development includes digestate treatment using separation, ultrafiltration, and reverse osmosis to recover the water content within the digestate. The following measures will be implemented to minimise the risk of uncontrolled release of discharge to the receiving waterbody (River Funshion) during the operation phase:

- Discharge (trade effluent) licence conditions ensure that discharge is treated and controlled in a manner that protects the receiving environment. Monitoring frequency and emission limit values (ELV's) for discharge (trade effluent) will be in line with BAT Waste treatment CID and proposed EPA licence conditions. Trigger levels will be established and agreed with the Agency.
- Following the RO stage, the purified water generated by the process will be stored in a balance tank before being reused onsite for cleaning activities. The remaining volume of water will be diverted through an overflow pipe to undergo continuous water quality monitoring.
- Upon confirmation that the discharge emissions limit values (ELV) are met, the purified water will be released under a discharge license. However, should the ELV not be met, an automated shut-off valve will be activated to prevent discharge, diverting the water back into the processing system.
- The reverse osmosis system will be specified and installed by an appropriately qualified technician and will be subject to regular maintenance, subject to manufacturers recommendations.

Conversion of Permeable Soils to Hard standing

The operation phase will involve the conversion of the existing greenfield site to areas of hardstanding. The following measures will be implemented to minimise an increase of flood risk to the receiving catchment during the operation phase:

- Sustainable Urban Drainage Systems (SuDS) such as such as sediment chambers, oil traps into drainage ditches and attenuation ponds included.
- Drainage systems will be designed to attenuate excess surface water runoff with suitable storage volumes for the Proposed Development and reduce the outflow rate to below the estimated greenfield rate before discharging.

Land Spreading of biobased fertiliser

The operation phase will involve the production of a biobased fertiliser which will be used by

customer farmers for the fertilisation of their land. Mitigation measures to ensure maximum protection of receiving environment include:

- 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 of animal by products as organic fertiliser.

Attenuation Pond

The Proposed Development includes an attenuation pond to the northeast of the site which will be used for attenuating surface water run-off from roads, yards, roofs and the impermeable bunded area. The following mitigation measures are proposed in order to ensure maximum protection of the surface and groundwater systems:

- The attenuation pond 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 pond.

8.7 Cumulative Effects

8.7.1 Interactions

Within the European Commission - Guidelines for the Assessment of Indirect and Cumulative effects as well as Impact Interactions, dated May 1999, cumulative effects are described as "effects” that result from incremental changes caused by other development, plans or projects together with the Proposed Development or developments".

Hydrology and hydrogeology are linked with land soils and geology as discussed in Chapter 7. In terms of hydrogeology specifically, the recharge capacity at the site will be diminished as a function of surface sealing, which has the potential to adversely enhance flood events downstream of the site. This is addressed in the above sections in regard to flood risk assessment and mitigation i.e. attenuation and SUDs and more detailed information can be found in the Site-Specific Flood Risk Assessment accompanying this application.

Hydrology is linked with ecology and biodiversity as discussed in Chapter 5. With the successful implementation of adequate mitigation measures potential hazards will be managed and the likelihood of environmental incidents occurring is very low. Any potential impacts are therefore resolved or minimised.

8.7.2 Potential Cumulative Impacts

Construction Phase

The phasing/commencement of any other permitted developments in the locality could potentially result in the scenario where a number of other construction sites are in operation at the same time as the Proposed Development. A review of the planning applications in the region reveals that there are no recent approvals or pending applications likely to result in cumulative impacts.

Considering the mitigation measures outlined in this report and the expected residual effect pending successful implementation of those measures, the development is not considered to significantly contribute to cumulative adverse impacts to the associated hydrological network. However, assuming all potential construction activities require similar mitigation, socio cumulative impacts could potentially arise, for example, excessive loading of foul sewer systems with construction water trade effluents.

Operational Phase

In the absence of mitigation measures, surface sealing (paving, buildings on previously exposed ground), reduction in recharge to groundwater, and rapid transmission of runoff to surface water systems has the potential to significantly contribute to the cumulative / catchment hydrological response to rainfall.

The planned discharge into the River Funshion is not expected to adversely affect water quality cumulatively. There are no records of licensed emissions upstream of the site, and the distance to the confluence with the River Gradoge downstream is sufficient to mitigate any potential cumulative effects.

Considering the mitigation measures outlined in this report and the expected residual effect pending successful implementation of those measures, the development is not considered to significantly contribute to cumulative adverse impacts to the associated hydrological network.

8.8 Residual Effects

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 effects on the surrounding hydrological and hydrogeological features.

The purpose of this assessment is to specify mitigation measures where appropriate to minimise the 'risk factor' to all aspects of the water environment such as to minimize the potential for hydrocarbons to contaminate the streams or groundwater, reduce the risk of erosion and run-off, 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.

8.8.1 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 8.19**.

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.***

8.8.2 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 8.20.**

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***, ***slight***, and ***short-term*** to ***long-term***.

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

Table 8.19: Summary of predicted construction phase effects, mitigation measures and residual impact

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Increased Run-off and Sediment Loading	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	Loose debris from demolition works along with erosion of stockpiles of exposed soils on both demolition and construction phase leading to migration of silt into surface water receptors via dust and run-off.	***Negative***	***Slight to Moderate***	***Temporary***	• 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 and demolition debris stockpiles when high wind and inclement weather are encountered if required. • Storage of stockpiles should not be in close proximity to the adjacent drainage ditch.	***Neutral, Slight, Temporary***
	Groundwater Mitchelstown Groundwater Body Regionally Important Aquifer	Loose sediments becoming entrained in open excavations or the sinkhole and infiltrating downwards into aquifer	***Negative***	***Slight to Moderate***	***Temporary***	• 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 minimize weathering and reduce the increased vulnerability in the area surrounding the sinkhole. • Storage of stockpiles should not be in close proximity to the sinkhole present in the eastern boundary of the site.	***Neutral, Slight, Temporary***
Accidental Spillages of Harmful Substances	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	Spillage of contaminants such as fuels, oils, chemicals and cement material and subsequent migration into surface water receptors	***Negative***	***Moderate to Significant***	***Temporary***	• 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 drainage ditch and sinkhole on the east of the site.	***Negative, Slight, Temporary***

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
	Groundwater Mitchelstown Groundwater Body Regionally Important Aquifer	Spillage of contaminants becoming entrained in open excavations or the sinkhole and infiltrating downwards into aquifer	***Negative***	***Moderate to Significant***	***Short-term***	• 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. • Demolition waste must be stored away from the adjacent drainage ditch and sinkhole on the eastern side of the site until it is collected by a licensed contractor.	***Neutral, Slight, Temporary***
Increased Groundwater Vulnerability	**Groundwater** Mitchelstown Groundwater Body Regionally Important Aquifer	An excavation depth of 2-3m bgl would increase the vulnerability in punctual areas from 'moderate' to 'high' or even 'extreme' in case groundwater is encountered during site excavations	***Negative***	***Significant***	***Long-Term***	• 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 minimize weathering and reduce the increased vulnerability in the area surrounding the sinkhole. • Additional trial pits are recommended prior to construction to verify the presence of a minimum 2-meter depth of subsoil beneath the proposed locations for built structures and pond, as required in areas with Regionally Important Aquifers • Attenuation ponds to be underlain by an impermeable layer.	***Negative, Slight, Temporary***
Excavation of Bedrock Aquifer		Potential removal of bedrock in certain parts of the site to create a uniform base.	***Negative***	***Significant***	***Long-Term***		***Negative, Slight, Temporary***
Gas and Discharge Pipelines		Removal of soil/subsoil cover during the installation of the discharge and gas pipelines	***Negative***	***Moderate to Significant***	***Long-Term***		***Negative, Slight, Temporary***

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Excavation of Contaminated Soils	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	The proposed site includes both brownfield and greenfield areas. The western portion of the site was previously occupied by a piggery. Historical mapping and preliminary site investigations does not suggest any incidences of land use which might result in the contamination of soils; hence excavation of contaminated soils is unlikely.	***Unlikely***	***Negligible Impact***	***Unlikely***	• Further site investigations are anticipated to confirm the absence of contaminated land on the site • Procedure in place for incidence of contaminated land within CEMP • Contaminated soils encountered to be tested, quantified, segregated and transported for disposal by a licenced contractor	***Unlikely, Negligible, Unlikely***
	Groundwater Mitchelstown Groundwater Body Regionally Important Aquifer		***Unlikely***	***Negligible Impact***	***Unlikely***		***Unlikely, Negligible, Unlikely***
Conversion of Permeable Soils to Hard standing	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	The construction phase will involve the gradual conversion of the existing greenfield site to areas of hardstanding. Under this scenario, the risk of flooding within the receiving catchment will increase due to an increase in impervious land area and associated drainage systems, which leads to a large increase in volume and intensity of surface water run-off within a given catchment.	***Negative***	***Moderate***	***Temporary***	• The rate of discharge to the stream will be restricted to a maximum permissible rate of 12.8 lit/sec. 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 • Floor levels upstream of the storage areas are at least 500mm above the top water level in the detention basins for the 100-year event. • Overtopping does not occur during rainfall events ranging from 30 minutes to 1440 minutes. No risk of flooding of adjacent areas. • Attenuation Pond will accommodate the total catchment area capacity and will provide a minimum storage capacity of 1,864 m^3 (designed to accommodate the estimated rainfall events)	***Negative, Slight, Temporary***

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Demolition works	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	Materials such as asbestos, heavy metals, or chemicals released during demolition or improper management of demolition waste migrating to surface water receptors via site run-off. Improper disposal of demolition waste increasing risk of flooding on-site.	***Negative***	***Moderate to Significant***	***Temporary***	• Prior to demolition, a comprehensive building survey must be conducted to assess the condition of existing structures, including construction materials, building fabric, the presence of wastewater, hazardous substances (e.g., asbestos), and any potentially dangerous areas. • Ensure all cutting, grinding, or sawing equipment on site is equipped with or used alongside dust suppression methods, such as water sprays or local extraction systems. • Covers are to be provided over demolition debris stockpiles when high wind and inclement weather are encountered if required • Demolition waste must be stored away from the adjacent drainage ditch and sinkhole on the eastern side of the site prior to collection by a licensed contractor. • Further mitigation measures are present on the accompanying CDWMP.	***Negative, Slight, Temporary***
	Groundwater Mitchelstown Groundwater Body Regionally Important Aquifer	Materials such as asbestos, heavy metals, or chemicals released during demolition or improper management of demolition waste migrating to groundwater receptors via infiltration.	***Negative***	***Moderate to Significant***	***Short-Term***		***Negative, Slight, Temporary***
Eutrophicated Pond	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	Release of accumulated nutrients and organic matter into surface water receptors during pound dewatering and sediment removal.	***Negative***	***Moderate***	***Temporary***	• Former pond to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and the aquifer. • To reduce spread of contamination, the EPA should be notified, and a suitably licenced contractor should safely remove the polluted pondwater from site to be transported to a licenced wastewater treatment facility for further treatment. • Landscaping should be carried out as soon as possible to minimise weathering and reduce the increased vulnerability in the area • 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.	***Negative, Slight, Temporary***
	Groundwater Mitchelstown Groundwater Body Regionally Important Aquifer	Release of accumulated nutrients and organic matter into groundwater receptors during pound dewatering and sediment removal.	***Negative***	***Moderate***	***Short-Term***		***Negative, Slight, Temporary***

Table 8.20: Summary of predicted construction phase effects, mitigation measures and residual impact

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Contaminated Run-off	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	Run-off from impermeable areas within the Proposed Development site discharging into surface water bodies	***Negative***	***Moderate to Significant***	***Temporary***	• Drainage systems will be designed to attenuate excess surface water runoff with suitable storage volumes • Reduction of outflow rate to below the existing greenfield runoff rate before discharging into the watercourse from attenuation pond. • 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 pond.	***Neutral, Slight, Long-term***
	Groundwater Mitchelstown Groundwater Body Regionally Important Aquifer	Run-off from impermeable areas within the Proposed Development site infiltrating downwards through soils into aquifer	***Negative***	***Moderate to Significant***	***Short-term***	• The digestion tank process area will be completely bunded and constructed to Eurocode standard (BS EN 1992-3)	***Neutral, Imperceptible, Long-term***

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Foul Water	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	Leakage of untreated foul water and infiltration via preferential pathways to site drainage system and subsequent discharge to surface water receptors	***Negative***	***Moderate to Significant***	***Short-Term***	• All sewage infrastructure to be installed in accordance with the relevant industry standards and pressure tested/CCTV surveyed prior to commissioning to ensure absence of defects • Programme of inspection and maintenance to ensure any defects are repaired	***Negative, Slight, Long-term***
	Groundwater Mitchelstown Groundwater Body Regionally Important Aquifer	Leakage of untreated foul water and infiltration downwards through sediments into aquifer	***Negative***	***Moderate to Significant***	***Short-Term***	• A domestic scale wastewater treatment plant is proposed to cater for the foul water arising from staff facilities on-site only (Population Equivalent 'PE' of 2). A Site Suitability Assessment conducted by Bolger-Hynes Architectural Design in line with the EPA Code of Practice for onsite domestic wastewater treatment systems (2022) has concluded that the soils at the Proposed Development have sufficient absorption capacity for the installation of a percolation area suited for this PE. • The sizing of the proposed packaged wastewater treatment plant shall be minimum of 2Pe @150l/day = 300l/day + 2,000 litres = 2,300l (minimum) rounded up to a 3m3 tank. • The overburden is determined to be 'suitable for percolation purposes' and available to support Groundwater Protection Responses (GWPR). The wastewater treatment plant will comprise a secondary treatment system (septic tank), followed by a percolation area.	***Negative, Slight, Long-term***

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
						• The total required length of percolation shall be 72.0m. The maximum run per trench length shall be 18.0m with 4no. trenches. There shall be an air vent upstand attached at the end of each percolation pipe run the width of each percolation trench shall be 0.5m. There shall be a gradient of 1 :200 for each percolation pipe. • The treatment plant will be specified and installed by an appropriately qualified technician and will be subject to regular desludging and maintenance, subject to manufacturers recommendations.	
Increased Groundwater Vulnerability	**Groundwater** Mitchelstown Groundwater Body Regionally Important Aquifer	The proposed Finished Floor Levels (FFL's) will be up to 2m below the existing elevation of the site in certain places, increasing the vulnerability of the underlying aquifer from 'Moderate' to 'High'.	***Negative***	***Significant***	***Long-Term***	• The tank farm area will be completely bunded and constructed to Eurocode standard (BS EN 1992-3:2006)	***Negative, Slight, Long-term***
On-Site Flooding	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	The site is located at an elevated point within its catchment and the likelihood of flooding occurring on the site are unlikely.	***Negligible***	***Not significant***	***Unlikely***	• 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.	***Negligible, Not significant, Unlikely***

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Conversion of Permeable Soils to Hard standing	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	The operational phase will see a significant portion of the existing site converted to areas of hardstanding. Under this scenario, the risk of flooding within the receiving catchment will increase due to an increase in impervious land area and associated drainage systems, which leads to an increase in volume and intensity of surface water run-off within a given catchment.	***Negative***	***Significant***	***Long-Term***	• Sustainable Urban Drainage Systems (SuDS) such as such as Sumps in gullies and catchpits collect silts in run-off from roads, filter drains, discharge bypass separator and an attenuation pond. • Drainage systems will be designed to attenuate excess surface water runoff with suitable storage volumes for the Proposed Development and reduce the outflow rate to below the estimated greenfield rate before discharging.	***Neutral, Slight, Long-term***
Uncontrolled Releases & Spillage of Digestate and Feedstocks	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	During the operational phase, there is a possibility of leakage or spillage of biobased fertiliser or feedstocks via vehicle movements or from a catastrophic failure of a tank or feed line. While such substances are significantly less hazardous than fuels, oils, chemicals and cement material, the still pose a potential risk to surface and groundwater quality.	***Negative***	***Slight to Moderate***	***Temporary***	• Compared to untreated manures and slurries, fertiliser poses a lower risk of nutrient leaching into watercourses. The balanced nutrient composition and slow-release nature of biobased fertiliser minimise the likelihood of excess nutrients washing away into streams or groundwater. This reduction in nutrient leaching coupled with land spreading best practice helps mitigate water pollution and eutrophication, safeguarding aquatic ecosystems and maintaining water quality. • 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.	***Neutral to Negative, Slight, Long-term***

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
	Groundwater Mitchelstown Groundwater Body Regionally Important Aquifer		***Negative***	***Slight to Moderate***	***Temporary***	• 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. • The treatment process will recover ca. 53,000 tonnes of clean water which will be reused on site for cleaning, with the remaining volume returned to the process as a feeding liquid. • Discharge from the attenuation pond to the River Funshion shall be monitored in accordance with facility licence conditions. • The digestion process area (tank farm) will be completely bunded & constructed to Eurocode standard (BS EN 1992-3:2006) • All bunds and pipelines (foul & process) will be subject to integrity assessments every 3 years by a suitably qualified engineer.	***Neutral to Negative, Slight, Long-term***
Fire and Resultant Firewater	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	Given the presence of flammable substances on the site, there is a risk of fire prevalent at the facility, during the operational phase. In the event of a fire, significant quantities of water resources will be utilised to quench the fire. Water used to quench a fire is known as “firewater”. Firewater is	***Negative***	***Significant***	***Temporary***	• 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. • All retention infrastructure systems will be automatically activated in the event of a fire alarm being triggered.	***Negative, Slight, Short-Term***

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
	Groundwater Mitchelstown Groundwater Body Regionally Important Aquifer	known to contain several harmful substances, as detailed in **Section 8.5.4.**	***Negative***	***Significant***	***Short-Term***		***Negative, Slight, Short-Term***
Land Spreading of biobased fertiliser	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	Application of processed biobased fertiliser to agricultural land. Reduction in chemical fertiliser use, pathogen and diseases which may be contained and spread in untreated manures Discharge of contaminated materials into the attenuation ponds may have the potential to percolate into the underlying aquifer and to reach surface water receptor via run-off.	***Negative***	***Slight***	***Temporary***	• 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 of animal by products as organic fertiliser.	***Positive, Imperceptible, Temporary***
	Groundwater Mitchelstown Groundwater Body Regionally Important Aquifer		***Negative***	***Slight***	***Short-Term***		***Positive, Imperceptible, Temporary***

Potential Source	Environmental Receptor	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Attenuation Pond	**Surface Water** Rivers Gradoge and Funshion, Blackwater River SAC and SPA, and Blackwater Callows pNHA	Discharge of contaminated materials into the attenuation ponds may have the potential to percolate into the underlying aquifer and to reach surface water receptor via run-off.	***Neutral***	***Moderate***	***Long-Term***	• The attenuation pond 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 pond.	
	Groundwater Mitchelstown Groundwater Body Regionally Important Aquifer		***Negative***	***Moderate***	***Long-Term***		***Neutral, Moderate, Long-term***

8.9 Monitoring

The Construction Environmental Management Plan (CEMP) and Environmental Operating Plan (EOP) and the Industrial Emissions Licence (IEL) will include provision for the monitoring of construction related activities including the following:

- Water Quality Monitoring of the surface water receptors *ca.* 1.5 km north to the site boundary – River Funshion U/S and D/S
- Daily inspections for housekeeping and site cleanliness
- Dust Suppression on dry days or during concrete cutting
- Risk assessment for the prevention of fuel spillages
- Monitoring of stockpiles to determine if further measures are required to prevent erosion
- Daily site inspections to ensure procedures outlined within the CEMP are adhered through throughout the Proposed Development.

The site may be subject to inspection by the Environmental Protection Agency (EPA) who will critically assess the site's compliance with Surface Water Regulations (S.I. No. 77/2019)

Monitoring for the Proposed Development will be conducted in line with BAT Waste treatment CID and conditions set out in the proposed EPA licence. Monitoring results will be reported to the EPA annually. The site will be subject to inspection by the Environmental Protection Agency who will critically assess the site's compliance with the conditions of the Industrial Emissions licence (IEL).

8.10 Summary of Significant Effects

The surface water receptors considered in this assessment include the River Gradoge, the River Funshion, and, further downstream, the River Blackwater SPA and SAC, as well as the Blackwater Callows pNHA. The groundwater receptor is the Mitchelstown Groundwater Body, a Regionally Important Aquifer underlying the Proposed Development. While the development has the potential to adversely impact these sensitive receptors, the implementation of the recommended mitigation measures will reduce the risk of such effects to negligible levels.

8.11 Statement of Significance

The significance of impact upon shallow soils, drift deposits, and bedrock geology have been assessed for both during the construction and operational phases. The results of the assessment are presented on **Table 8.19** and **Table 8.20**.

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***.

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***, ***slight***, and ***short-term*** to ***long-term***. There are no controlled or uncontrolled emissions anticipated as a result of the Proposed Development.

ORS

Appendix 8.1 Q Value Assessment

1 Introduction

This report presents the findings of a study conducted to assess stream water quality as part of the EIAR process for the proposed NRG Biogas facility development at Mitchelstown, County Cork. Macro-invertebrate sampling was employed, utilising kick sampling upstream and downstream with a sweep net, followed by examination using a taxonomic key and stereoscopic microscope. Results indicate both good water quality and poor water quality, supported by the presence of highly sensitive species, and supplemented by compilation of vegetative characteristics including macrophytes present in the stream. These findings are essential for regulatory compliance and informed management strategies aimed at preserving and protecting freshwater ecosystems.

1.1 Regulatory Context

Surface water quality assessment is critical for maintaining ecosystem health and meeting regulatory standards such as the Water Framework Directive 2000/60/EC, the importance of assessing water quality, the regulatory framework in Ireland, and the significance of macro-invertebrates as indicators of ecological health.

The directive states that:

“The Water Framework Directive (WFD) is the primary legislation. It is supported by two so-called daughter directives on the quality and quantity of groundwater and on the quality of surface water. The WFD contains provisions regarding the deadlines for meeting the objectives of the Directive, as well as provisions on exemptions. The annexes to the WFD specify details as regards, for example, monitoring requirements, the criteria for assessing water body status, and the contents of the RBMPs.

At present, the WFD includes in its Annex X the list of priority substances that Member States must monitor in surface waters, but the standards for them are set in the Environmental Quality Standards Directive (EQSD) and must be met to achieve good surface water chemical status in accordance with WFD Article 4 and Annex V point 1.4.3. The WFD also requires Member States to set and meet Environmental Quality Standards (EQS) for substances of national concern, i.e. river basin specific pollutants; the monitoring of which currently contributes to the assessment of ecological status. This list of priority substances needs to be reviewed, and updated if necessary, every 6 years.

Similarly, the list of pollutants and standards of EU-wide concern in Annex I to the Groundwater Directive (GWD) must also be reviewed every 6 years; these contribute to the assessment of chemical status in groundwater. That Directive also complements the WFD by including requirements as regards pollutant trends and quantitative status.”

The above directive is supported by County Council discharge license agreements, the

stipulations of which, license holders must adhere to. One such stipulation is the annual monitoring of water quality upstream and downstream of a discharge site to assess biological, and concomitantly, water health via macro-invertebrate presence or absence. The biotic assessment in this report provides a long-term template for pre and post construction monitoring as well as long term monitoring for the site where a discharge license must be obtained.

1.2 Objectives

The primary objective of this study is to evaluate stream water quality in accordance with EPA licensing requirements. Specifically, the study aims to utilise macro-invertebrate sampling to gather Q-value ratings to obtain a biotic assessment of the water body in which a discharge license will be sought. The biotic assessment will provide a Q – value rating and will be supplemented by examination of vegetative characteristics, including macrophytes present in the stream, to assess ecological health and support regulatory compliance.

1.3 Methodology

Sampling was conducted at 2 sites along the Funshion River see Figure 1.1. At Mitchelstown, County Cork both upstream (site 2) and downstream (site 1), using kick sampling with a sweep net and of standard 1mm fine mesh to catch invertebrates. At each site, three samples were taken to provide a representative profile of each downstream and upstream section. Vegetative characteristics, including macrophytes, were compiled during sampling to provide additional ecological context. Substrate composition and, water body characteristics including flow type, and water depth and width were also measured. Collected specimens were identified to the lowest taxonomic level possible using a taxonomic key and stereoscopic microscope, following standard procedures. Q-values were assigned to identified taxa based on their sensitivity to pollution.

Figure 1.1. Map of the sampling locations 1 and 2 at the Funshion River at Mitchelstown, County Cork.

1.3 Data Analysis

Q-value ratings were calculated for each sampling site based on the composition of macro-invertebrate communities as per table 1. The presence of highly sensitive species was emphasised as an indicator of good water quality. Vegetative characteristics, including macrophytes, were also included as ancillary data to supplement the assessment of stream health. The taxonomic groupings at family level, with which a Q-value may be assigned, is presented in Table 2. The taxa presented in this report are specific to Ireland and Britain. Indicator groups were calculated from their relative abundance and then into their respective proportional values per grouping. The relative abundance value helps to assign the Q-Value score for each taxonomic group with the following methodology where:

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

Table 1. Biotic indices ("Q Values") reflect average water quality as per table:			
Q Value	**WFD Status**	**Pollution Status**	**Condition**
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2, Q1	Bad	Seriously polluted	Unsatisfactory

Table 2. Taxonomic indicator groups at family level and their assigned sensitivity to pollution.

Group A	**Group B**	**Group C**	**Group D**	**Group E**
Sensitive	**Less Sensitive**	**Tolerant**	**Very Tolerant**	**Most Tolerant**
Isoperla Perla Chloroperla Ecdyonurus Rithrogena Heptagenia Siphlonuridae	Leuctra Protonemura Amphinemura Ephemerella Ephemera Baetidae Pschomyidae Sericostomatidae Odontoceridae Lepidostomatidae Goeridea Molannidae Beraeidae Odonata Aphelocheirus Rheotanytarsus	Caenis Baetis rhodani Limnephilidae Hydroptilidae Glossosomatidae Gammaridae Rhyacophilidae Philopotamidae Polycentropidae Hydropsychidae Coenagridae Hemiptera Tricladida Coleoptera Hydracarina Gammaridae Sialidae Tipulidae Simuliidae Ancylidae Neritidae Viviparidae Haliplidae Ceratopogonidae Elminthidae	Hirudinae Valvatidae Hydrobiidae Lymnea Physidae Planorbidae Sphaeriidae Asellidae Chironomidae Culicidae	Tubificidae Chironomus

1.4 Results

Results for the Upstream Site 2 sampling location at Mitchelstown presented in table 3 and table 4. A Q-value of ***Q-5*** has been assigned to the upstream sample, the rational being that taxonomic indicator groups A and C were numerous in the sample, the highest proportion of taxa were dominated by indicator group C where they represented a total of 69% of the sample, indicator group A accounted for 27% of the sample (Numerous) and indicator group E represented 4% (small numbers) of the sample. The Upstream sample therefore has a WFD status of "High", a Pollution Status of "Unpolluted", and a Condition of "Satisfactory". Results for the Downstream Site 1 sampling location at Mitchelstown are presented in table 6, table 7 and table 8. A Q-Value of ***Q 4-5*** has been assigned to the Downstream site 2 sampling location, the rational being that the highly sensitive taxonomic indicator groups A (very sensitive) were present and "numerous". The taxonomic groups B (sensitive) were present but in smaller numbers, and C (tolerant) were found to be the dominant group with group E (most tolerant) found in small numbers. The Downstream site 2 has a WFD status of "high", a pollution status of "Unpolluted", and a condition of Satisfactory. It must be noted that the downstream site was in an area of considerably higher flow, due to a narrowing in the river. While there were highly sensitive species present in the sample, physiological adaptations to life in high volume water flow in a glide environment where large rocks made up much of the substrate, would have limited biodiversity. For example, cased caddis fly larvae would have struggled to maintain a position in the riverbed.

Table 3. Macro-invertebrates identified down to family level, their abundance, indicator groupings and proportion (%) found within the Upstream Site 2 kick sample.

Taxon	Abundance	Indicator Group	Indicator Group Proportion (%)
Ecdyonuridae	22	A	27
Coleoptera	2	C	3
Dyptera	2	E	3
Elminthidae	1	C	1
Bloodworm	1	E	1
Gammarus	53	C	65

Table 4. Indicator Groups representative of the kick sample and their total combined proportion (%) for the Upstream Site 2 sample.

Indicator Group	Total Combined Proportion (%)
A	27 (Numerous)
C	69 (Dominant)
E	4 (Small numbers)

Table 5. Stream properties for Upstream Site 2 sample.	
GPS coordinates	52°17'39.1"N 8°15'09.2"W
Water body width (cm)	8 - 25
Water depth (cm)	5 - 72
Flow type	Riffle
Overhead shade (%)	5 - 10
Macrophytes	River Water-crowfoot (*Ranunculus fluitans*), Blunt-fruited water starwort (*Callitriche obtusangula*), Hemlock water-dropwort (*Oenanthe crocata*), Curled pondweed (*Potamogeton crispus*)
Substrate composition	Sand 20%, Gravel (medium) 80%

Figure 2. River Water-crowfoot (*Ranunculus fluitans*), Blunt-fruited water starwort (*Callitriche obtusangula*), Hemlock water-dropwort (*Oenanthe crocata*), Curled pondweed (*Potamogeton crispus*) present at site 2 Upstream.

Table 6. Macro-invertebrates identified down to family level, their abundance, indicator groupings and proportion (%) found within the Downstream Site 1 kick sample.			
Taxon	**Abundance**	**Indicator Group**	**Indicator Group Proportion (%)**
Gammeridae	31	C	54
Dyptera	2	E	3
Ecdyonurus	19	A	33
Coleoptera	1	C	2
Odontoceridae	1	B	2
Plecoptera	1	B	2
Hydropsychidae	2	C	4

Table 7. Indicator Groups representative of the kick sample and their total combined proportion (%) for the Downstream Site 1 sample.

Indicator Group	Total Combined Proportion (%)
A	33 (Numerous)
B	4 (Small numbers)
C	60 (Dominant)
E	3 (Small numbers)

Table 8. Stream properties for Downstream Site 1 sample.

GPS coordinates	52°17'40.0"N 8°15'18.6"W
Water body width (cm)	400
Water depth (cm)	40 - 75
Flow type	Glide
Overhead shade (%)	80
Macrophytes	None present
Substrate composition	Large rocks 80%, Sand 20%

2 Conclusion

The presence of highly sensitive macro-invertebrate species, combined with the compilation of vegetative characteristics including macrophytes upstream at site 2, indicates that the stream ecosystem at **Site 2 Upstream and Site 1 Downstream** has a WFD status of “high”, a pollution status of “Unpolluted”, and a condition of Satisfactory. The results of this study meet the criteria outlined in the EPA license requirements, demonstrating compliance with water quality standards and regulatory thresholds. Continued monitoring and management efforts are recommended to maintain and enhance water quality in the long term.

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Appendix 8.2 Assimiliative Capacity Calculations

Assimilative Capacity

Background Concentrations (Cback)	BOD5	Total Oxidised Nitrogen	Total Ammonia	Ortho P	Nitrate(as N)	Nitrite (as NO2)
Mitchelstown (Funshion river)	0.9	1.54	0.01	0.01	1.53	0.039

Assimilative Capacity Calculations	BOD AC cal	TON AC Calc	Total Ammonia AC Calc	Ortho P AC Calc	Nitrate as N AC Calc	Nitrite as NO2
Max permissible conc. (EQS) (mg/l)	2.60	N/A	0.140	0.075	8.00	N/A
AC (kg/day)	35.10	N/A	2.68	1.34	133.60	N/A
Total Amount Discharge to River (kg/day)	0.17	N/A	0.00	0.00	25.65	N/A
Capacity Impact %	68.37	N/A	92.98	42.91	0.00	N/A
Mass Balance	2.5	1.71	0.07	0.07	0.50	0.04
OK TO DISCHARGE?	Ok to discharge	N/A	Ok to discharge	Ok to Discharge	Ok to Discharge	N/A

Formula 1

Assimilative capacity = (Cmax – Cback) x F95 x 86.4 kg/day

Where:
C_{max} = maximum permissible concentration (EQS – 95%ile value) (mg/l)
C_{back} = background upstream concentration (mg/l mean value)
F95 = the 95%ile flow in the river (m^3/s)

Note: (60x60x24)/1000 = 86.4

Formula 2

Assimilative capacity = (Cmax – Cback) x DWF x 86.4 kg/day

where:
C_{max} = maximum permissible concentration (EQS - 95%ile value) (mg/l)
C_{back} = background upstream concentration (mg/l mean value)
DWF = dry weather flow in the river (m^3/s)

Discharge Flow (m3/day)	Flow (L)	Flow (m3/s) (95%ile Flow m3/sec)
192.0	192000	0.23900

SW REGS S.I. No. 77/2019 Quality	Nitrate (as N)	Orthophosphate	Ammonia- Total N	BOD
High River Quality	4	0.025	0.09	N/A
Good River Quality	8	0.035	0.14	2.6

Flow (m3/s) (95%ile Flow m3/sec) From Catchments.ie	
Flow	**Funshion**
NATQ1 (m^3/s)	8.021
NATQ5 (m^3/s)	4.98
NATQ10 (m^3/s)	3.786
NATQ20 (m^3/s)	2.599
NATQ30 (m^3/s)	1.981
NATQ40 (m^3/s)	1.548
NATQ50 (m^3/s)	1.2
NATQ60 (m^3/s)	0.914
NATQ70 (m^3/s)	0.671
NATQ80 (m^3/s)	0.485
NATQ90 (m^3/s)	0.31
NATQ95 (m^3/s)	0.239
NATQ99 (m^3/s)	0.147
NATAMF (m^3/s)	1.76
NATMMF1 (m^3/s)	3.096
NATMMF2 (m^3/s)	2.588
NATMMF3 (m^3/s)	2.049
NATMMF4 (m^3/s)	1.547
NATMMF5 (m^3/s)	1.161
NATMMF6 (m^3/s)	0.917
NATMMF7 (m^3/s)	0.74
NATMMF8 (m^3/s)	0.88
NATMMF9 (m^3/s)	1.026
NATMMF10 (m^3/s)	1.698
NATMMF11 (m^3/s)	2.505
NATMMF12 (m^3/s)	2.915
F	**6.95665**

Mass Balance Calcs (mg/l) T	
Total Oxidised N	0.949733792
Ammonia- Total N	0.029106042
BOD	1.294853224
Orthophosphate	0.028408107
Nitrate (as N)	0.891523954
Nitrite (as NO2)	0.006684377

Discharge from RO (mg/l)	
Total Oxidised N	60
Ammonia- Total N	13
BOD	125
Orthophosphate	3
pH	6.2
Nitrate (as N)	0
Nitrate (as No3)	0
Nitrite (as N)	0
Nitrite (as NO2)	0

Discharge Load (kg/day) - Parameter	mg/l
Total Oxidised N	11.52
Ammonia- Total N	2.496
BOD	24
Orthophosphate	0.576
pH	N/A
Nitrate (as N)	0
Nitrate (as No3)	0
Nitrite (as N)	0
Nitrite (as NO2)	0

Discharge Rate (m3/h)	8
Discharge Load (m3/day)	192

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Appendix 8.3 Site Suitability Test Report

Bolger-Hynes
Architectural Design

SITE SUITABILITY TEST REPORT

Client: Nephin renewable – Corracunna Ltd

Site Location: Corracunna, Mitchelstown,

Co. Cork

Ballinabarna House, The Rower, Co.Kilkenny.
Mobile: (087) 2800576
Email: williambolgerhynes@gmail.com

Site Location Map

APPENDIX A: SITE CHARACTERISATION FORM

File Reference:

1.0 GENERAL DETAILS (From planning application)

Prefix: First Name: Nephin renewable Surname: - Corracunna ltd

Address: Corracunna, Mitchelstown, Co.Cork

Site Location and Townland: Corracunna, Mitchelstown, Co.Cork

Number of Bedrooms: Maximum Number of Residents:

Comments on population equivalent

Design population for the proposed 10 workers @ 30 litres/day is Pe 2. Allowing for moderate to good P/T results a proposed wastewater treatment system should able to be installation within the site boundaries meeting all site restriction requirements.

Proposed Water Supply:

Mains ☑ Private Well/Borehole ☐ Group Well/Borehole ☐

2.0 GENERAL DETAILS (From planning application)

Soil Type, (Specify Type): Acid brown earths, Brown Podzolics

Subsoil, (Specify Type): Till derived chiefly from Devonian Sandstones

Bedrock Type: Dinantian pure unbedded limestones

Aquifer Category: Regionally Important Rf | Locally Important ____ Poor ____

Vulnerability: Extreme ☐ High ☐ Moderate ☑ Low ☐

Groundwater Body: Mitchelstown Status Good

Name of Public/Group Scheme Water Supply within 1 km:

Source Protection Area: ZOC ☐ SI ☐ SO ☐ Groundwater Protection Response: R1

Presence of Significant Sites (Archaeological, Natural & Historical): None

Past experience in the area: None

Comments:

(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, and/or any potential site restrictions).

Soils: Deep well drained mineral. Soil drainage - Dry.
There are no immediate potential targets at risk or site restrictions. The studies so far indicate that the ground conditions could be potentially suitable for discharging treated wastewater.
sources: www.gsi.ie, archaeology.ie, epa maps.ie, osi.ie, corkcoco.ie

Note: Only information available at the desk study stage should be used in this section.

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment

Landscape Position: Side of gentle sloped hill

Slope: Steep (>1:5) ☐ Shallow (1:5-1:20) ☑ Relatively Flat (<1:20) ☐

Slope Comment: moderate slope

Surface Features within a minimum of 250m (Distance To Features Should Be Noted In Metres)

Houses:

Nearest Houses approximately:
1) 45m same gradient in a westerly direction.
2) 100m down gradient in a south westerly direction.

Existing Land Use:

Agricultural - grazing

Vegetation Indicators:

Grass.

Groundwater Flow Direction: unknown.

Ground Condition:

Ground conditions firm on 11/03/2024. No evidence of ponding or poaching.

Site Boundaries:

North - Timber post and electric wire fence with Farm access road to the rear.
West - Natural hedgerow with local road to the rear.
Remainder open area.

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment (contd.)

Roads:

Nearest road approximately:
1) Local road 30m west. 2) Farm access road 30m north.
3) N73 road 215m in a southerly direction.

Outcrops (Bedrock And/Or Subsoil):

None evident.

Surface Water Ponding:

None evident.

Lakes:

None evident.

Beaches/Shellfish Areas:

None evident.

Wetlands:

None evident.

Karst Features:

None evident.

Watercourses/Streams:*

None evident.

*Note and record water level

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment (contd.)

Drainage Ditches:*

None evident.

Springs:*

None evident.

Wells:*

None evident.

Comments:
(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, the suitability of the site to treat the wastewater and the location of the proposed system within the site).

Vegetation indicators suggest that there is good potential drainage on this site
There is evidence of watermain on adjoining road.
There are no apparent targets at risk.

*Note and record water level

3.2 Trial Hole (should be a minimum of 2.1m deep (3m for regionally important aquifers))

To avoid any accidental damage, a trial hole assessment or percolation tests should not be undertaken in areas which are at or adjacent to significant sites, (e.g. NHAs, SACs, SPAs, and/or Archaeological etc.), without prior advice from National Parks and Wildlife Service or the Heritage Service.

Depth of trial hole (m): 2.150

Depth from ground surface to bedrock (m) (if present):

Depth from ground surface to water table (m) (if present):

Depth of water ingress:

Rock type (if present):

Date and time of excavation: 09-Mar-2024 10:00 Date and time of examination: 11-Mar-2024 10:30

Depth of Surface and Subsurface Percolation Tests	Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
0.1 m	Horizon 1 0.0m - 0.250m Clay loam		Crumb	Very soft	Brown	Frequent grass rootlets
0.2 m						
0.3 m					Orange Brown	Variable grass rootlets Variable /occasional gravels
0.4 m	Horizon 2 0.250m - 0.900m cohesive feel Gravelly CLAY	Threads 6/7 Ribbons 130-160mm Dilatancy none	Structureless	Very soft		
0.5 m						
0.6 m						
0.7 m						
0.8 m	Horizon 3 0.900m - 2.150m Slightly raspy feel GRAVELLY Clay	Threads 5/6 Ribbons 110-140mm Dilatancy - no	Subangular Structureless	Very Soft	Brown	Variable gravels Occasional cobbles & boulders
0.9 m						
1.0 m						No signs of mottling
1.1 m						
1.2 m						
1.3 m						
1.4 m						
1.5 m						
1.6 m						
1.7 m						
1.8 m						
1.9 m						
2.0 m	Bottom of Trial hole 2.150m	No Bedrock present @ 2.150m	No W.T.L present @ 2.150m on 09/03/2024			
2.1 m						
2.2 m						
2.3 m						
2.4 m						
2.5 m						
2.6 m						
2.7 m						
2.8 m						
2.9 m						
3.0 m						
3.1 m						
3.2 m						
3.3 m						
3.4 m						
3.5 m						

Likely Subsurface Percolation Value: 25

Likely Surface Percolation Value: 20

Note: *Depth of percolation test holes should be indicated on log above. (*Enter Surface or Subsurface at depths as appropriate).

** See Appendix E for BS 5930 classification.

*** 3 samples to be tested for each horizon and results should be entered above for each horizon.

**** All signs of mottling should be recorded.

3.2 Trial Hole (contd.) Evaluation:

Horizon 1 & 2 are free draining soil and could be suitable for percolation purposes. Horizon 3 looks to have moderate permeability that contains a variable amount of sandstone gravels and cobbles. There is no Bedrock present at 2.150m with no water table present. Following the trial hole analysis there seems to be good potential for percolation in this ground.

3.3(a) Subsurface Percolation Test for Subsoil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm) (A)	300	300	300
Depth from ground surface to base of hole (mm) (B)	700	700	700
Depth of hole (mm) [B - A]	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

		1	2	3
Pre-soak start	Date	09-Mar-2024	09-Mar-2024	09-Mar-2024
	Time	09:30	09:33	09:36
2nd pre-soak start	Date	09-Mar-2024	09-Mar-2024	09-Mar-2024
	Time	11:30	11:32	11:34

Each hole should be pre-soaked twice before the test is carried out.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	11-03-2024	11-03-2024	11-03-2024
Time filled to 400 mm	10:30	10:33	10:35
Time water level at 300 mm	11:00	11:04	11:08
Time (min.) to drop 100 mm (T_{100})	30.00	31.00	33.00
Average T_{100}			31.33

If T_{100} > 480 minutes then Subsurface Percolation value >120 – site unsuitable for discharge to ground
If $T_{100} \leq 210$ minutes then go to Step 4;
If T_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)
1	11:02	11:56	54.00	11:06	11:55	49.00	11:10	12:02	52.00
2	12:00	13:50	110.00	12:00	13:48	108.00	12:05	13:38	93.00
3	14:00	16:25	145.00	13:52	16:30	158.00	13:40	16:15	155.00
Average Δt Value			103.00			105.00			100.00
	Average Δt/4 = [Hole No.1]		25.75 (t_1)	Average Δt/4 = [Hole No.2]		26.25 (t_2)	Average Δt/4 = [Hole No.3]		25.00 (t_3)

Result of Test: Subsurface Percolation Value = 25.67 (min/25 mm)

Comments:

Horizon 2 & 3 has good potential percolation values in the range of 21-40

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No. 1

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_p = T_f / T_m$	T – Value = 4.45 / K_p
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 1 = (T_1)			0.00

Percolation Test Hole No. 2

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_p = T_f / T_m$	T – Value = 4.45 / K_p
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)			0.00

Result of Test: Subsurface Percolation Value =

0.00 (min/25 mm)

Percolation Test Hole No. 3

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_p = T_f / T_m$	T – Value = 4.45 / K_p
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_3)			0.00

Comments:

3.3(b) Surface Percolation Test for Soil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm)	0	0	0
Depth from ground surface to base of hole (mm)	400	400	400
Depth of hole (mm)	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

		1	2	3
Pre-soak start	Date	09-Mar-2024	09-Mar-2024	09-Mar-2024
	Time	10:36	10:38	10:40
2nd pre-soak start	Date	09-Mar-2024	09-Mar-2024	09-Mar-2024
	Time	12:10	12:12	12:15

Each hole should be pre-soaked twice before the test is carried out.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	11-Mar-24	11-Mar-24	11-Mar-2024
Time filled to 400 mm	10:40	10:43	10:45
Time water level at 300 mm	11:12	11:15	11:18
Time to drop 100 mm (T_{100})	32.00	32.00	33.00
Average T_{100}			32.33

If T_{100} > 480 minutes then Surface Percolation value >90 – site unsuitable for discharge to ground
If $T_{100} \leq 210$ minutes then go to Step 4;
If T_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)
1	11:20	12:18	58.00	11:17	12:15	58.00	11:22	12:16	54.00
2	12:20	13:55	95.00	12:20	13:47	87.00	12:22	13:53	91.00
3	14:00	16:26	146.00	13:55	16:12	137.00	14:06	16:38	152.00
Average ΔT Value			99.67			94.00			99.00
	Average ΔT/4 = [Hole No.1]		24.92 (T_1)	Average ΔT/4 = [Hole No.2]		23.50 (T_2)	Average ΔT/4 = [Hole No.3]		24.75 (T_3)

Result of Test: Surface Percolation Value = 24.39 (min/25 mm)

Comments:

Horizon 1 & 2 has good potential percolation values in the range of 21 - 40.

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No. 1

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 1 = (T_1)			0.00

Percolation Test Hole No. 2

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)			0.00

Percolation Test Hole No. 3

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_3)			0.00

Result of Test: Surface Percolation Value = 0.00 (min/25 mm)

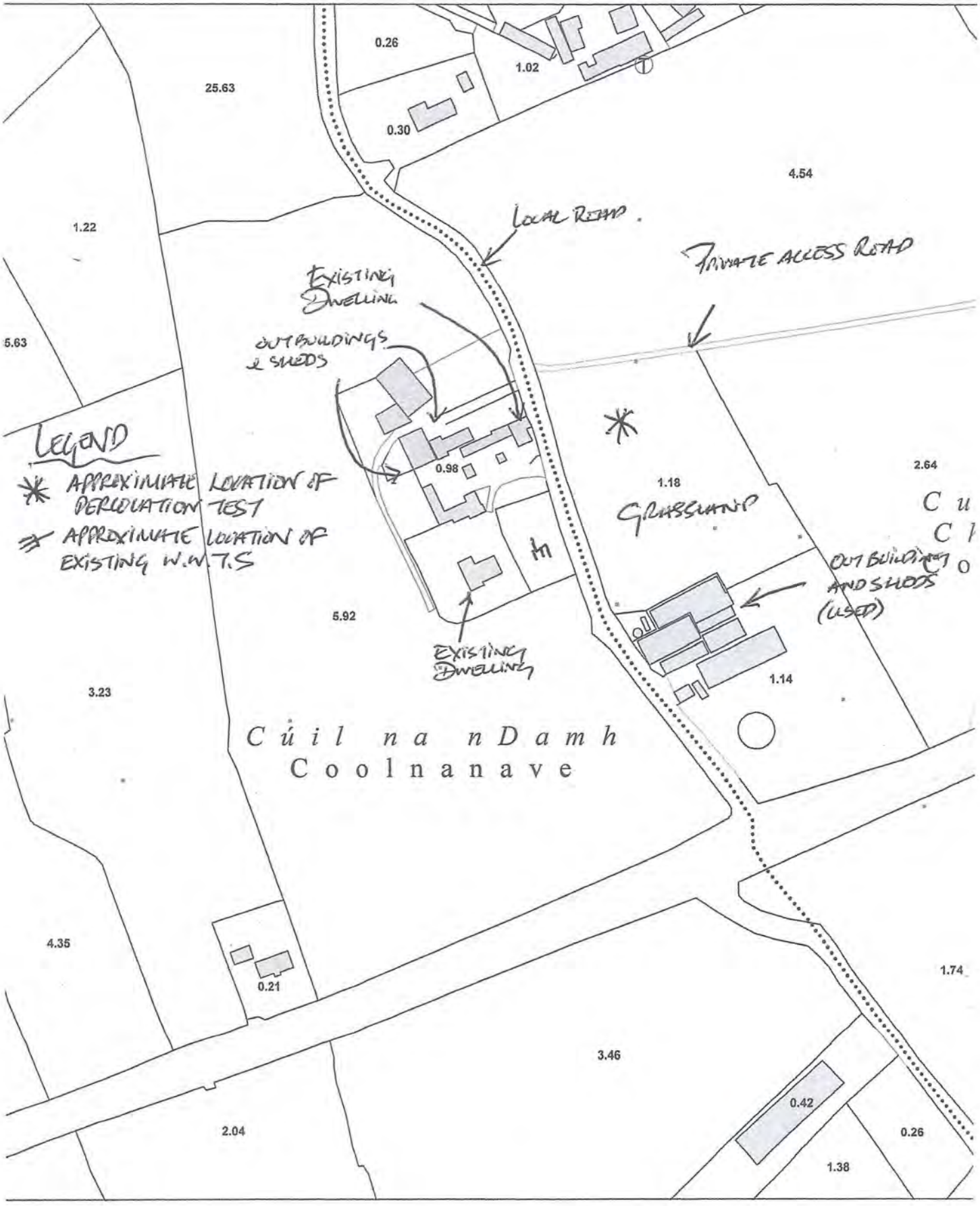
Comments:

3.4 The following associated Maps, Drawings and Photographs should be appended to this site characterisation form.

1. Discovery Series 1:50,000 Map indicating overall drainage, groundwater flow direction and housing density in the area.
2. Supporting maps for vulnerability, aquifer classification, soil, subsoil, bedrock.
3. North point should always be included.
4. (a) Scaled sketch of site showing measurements to Trial Hole location and
   (b) Percolation Test Hole locations,
   (c) wells and
   (d) direction of groundwater flow (if known),
   (e) proposed house (incl. distances from boundaries)
   (f) adjacent houses,
   (g) watercourses,
   (h) significant sites
   (i) and other relevant features.
5. Site specific cross sectional drawing of the site and the proposed layout[1] should be submitted.
6. Photographs of the trial hole, test holes and site including landmarks (date and time referenced).
7. Pumped design must be designed by a suitably qualified person.

[1] The calculated percolation area or polishing filter area should be set out accurately on the site layout drawing in accordance with the code of practice's requirements.

Planning Pack Map



0 50 100 150 200 250 Metres

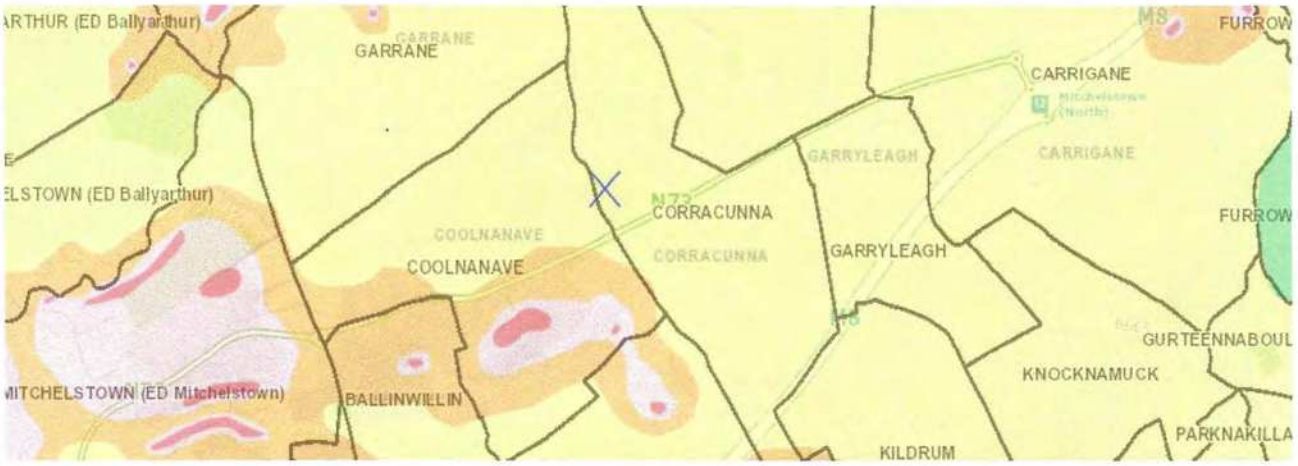
0 100 200 300 400 500 Feet

OUTPUT SCALE: 1:2,500

CAPTURE
The map c
resolution
Output sca
Further inf
www.tailte

GROUNDWATER AQUIFER MAP

GROUNDWATER VULNERABILITY MAP



SOILS MAP

SUBSOILS MAP

BEDROCK MAP

GROUNDWATER RECHARGE DATA MAP

TRIAL HOLE

SIDE PROFLIE OF TRIAL HOLE

HORIZON 1

HORIZON 2

HORIZON 3

SUB SURFACE T-TEST HOLE 1

SUB SURFACE T-TEST HOLE 2

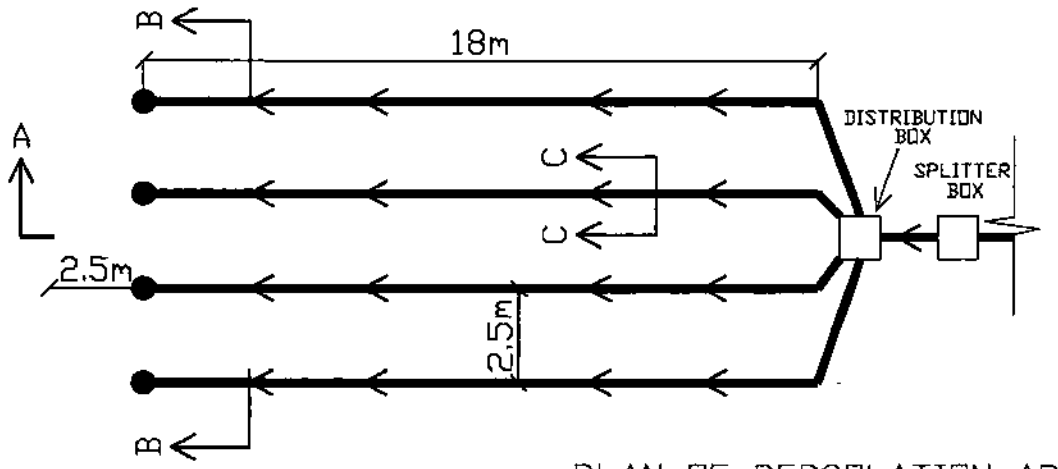
SUB SURFACE T-TEST HOLE 3

SURFACE T-TEST HOLE 1

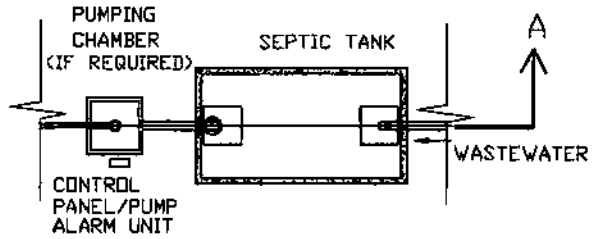
SURFACE T-TEST HOLE 2

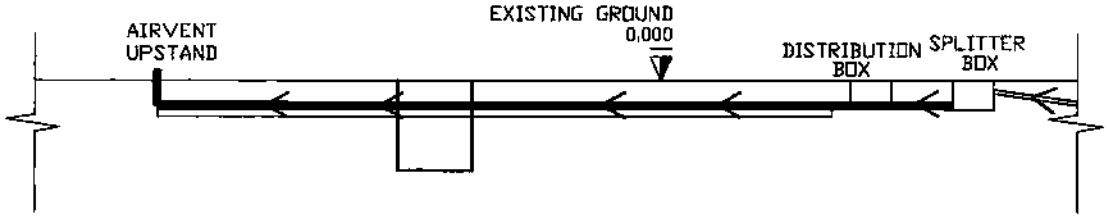
SURFACE T-TEST HOLE 3

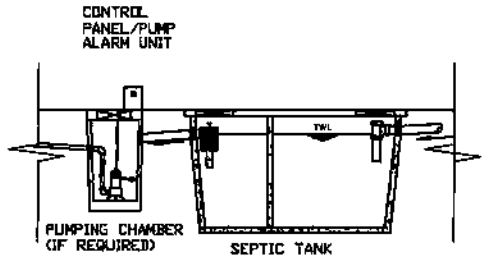
100mm Ø PERCOLATION PIPES @ 1:200
72M OF PERCOLATION PIPE REQUIRED



PLAN OF PERCOLATION AREA







LONGITUDINAL SECTION A-A

LEGEND

DISTRIBUTION BOX

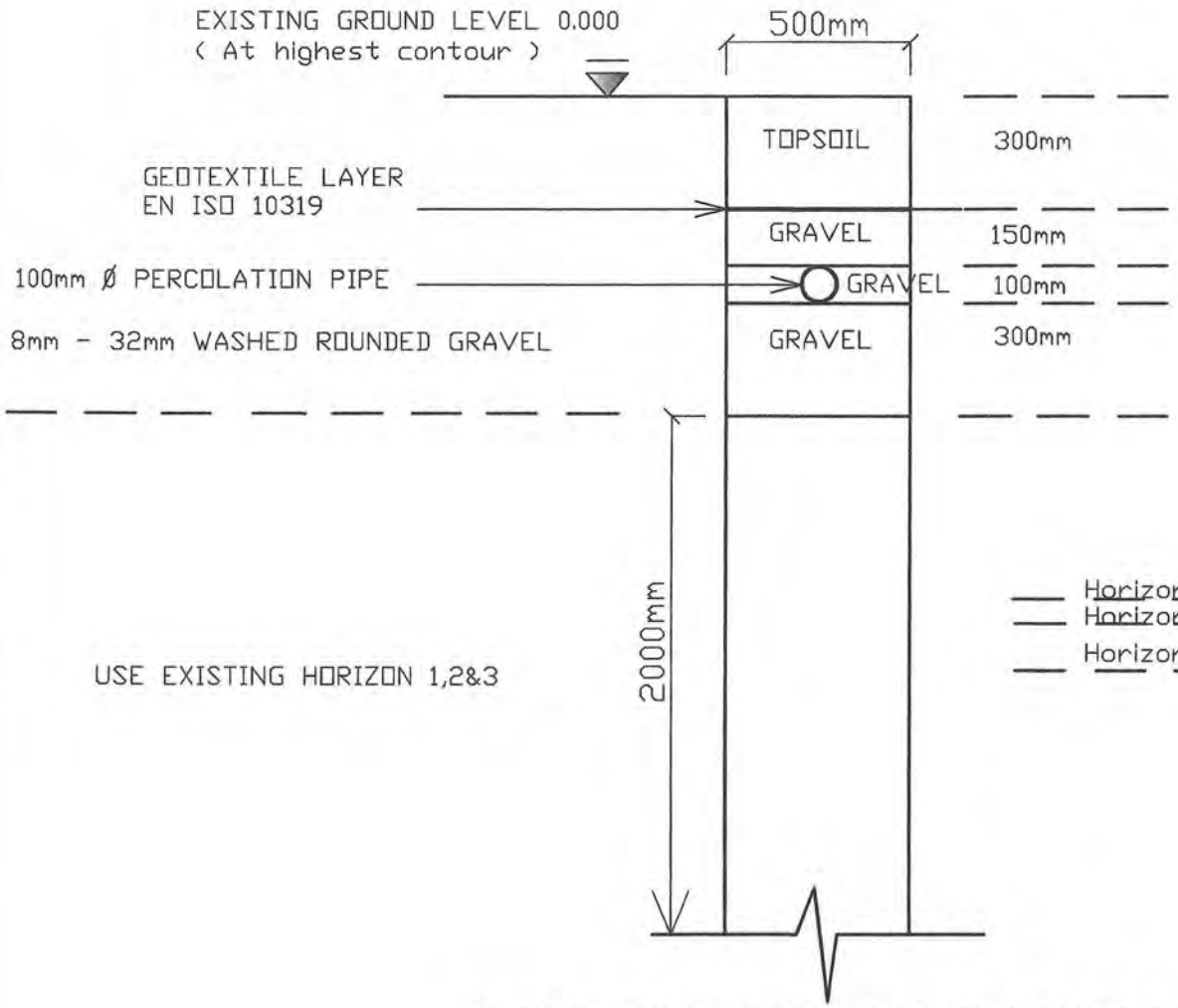
SPLITTER BOX

PERCOLATION PIPE & AIR VENT UP STAND

Project	Sheet 01
Date APRIL 2024	
Scale 1:200	

Project Name and Address
NEPHIN RENEWABLE-CORRACUNNA LTD
CORRACUNNA, MITCHELSTOWN,
CO. CORK
Project Title
PERCOLATION AREA PLAN / LONGITUDINAL SECTION

Firm Name and Address
BOLGER-HYNES ARCHITECTURAL DESIGN
Ballinabarna House,
The Rower, Co. Kilkenny
Mobile: 087 2800576
email: williambolgerhynes@gmail.com



PERCOLATION TRENCH AREA SECTION C-C

CROSS SECTION B-B

Project	Sheet 02
Date APRIL 2024	
Scale 1:20 / 1:200	

Project Name and Address
NEPHIN RENEWABLE -CORRACUNNA LTD
CORRACUNNA, MITCHELSTOWN,
CO. CORK
Project Title
CROSS SECTION THROUGH
PERCOLATION TRENCH

Firm Name and Address
BOLGER-HYNES ARCHITECTURAL DESIGN
Ballinabarna House,
The Rower, Co. Kilkenny
Mobile: 087 2800576
email: williambolgerhynes@gmail.com

4.0 CONCLUSION of SITE CHARACTERISATION

Integrate the information from the desk study and on-site assessment (i.e. visual assessment, trial hole and percolation tests) above and conclude the type of system(s) that is (are) appropriate. This information is also used to choose the optimum final disposal route of the treated wastewater.

Slope of proposed infiltration / treatment area:	1:30
Are all minimum separation distances met?	✓
Depth of unsaturated soil and/or subsoil beneath invert of gravel (or drip tubing in the case of drip dispersal system)	1.20

Percolation test result: Surface: 24.39 Sub-surface: 25.67

Not Suitable for Development ☐ **Suitable for Development** ✓

Identify all suitable options

1.	Septic tank system (septic tank and percolation area) **(Chapter 7)**	Yes
2.	Secondary Treatment System **(Chapters 8 and 9)** and soil polishing filter **(Section 10.1)**	
3.	Tertiary Treatment System and Infiltration / treatment area **(Section 10.2)**	

Discharge Route[1]

Discharge to ground

5.0 SELECTED DWWTS

Propose to install: Septic tank system (septic tank and percolation area)

and discharge to: Ground Water

Invert level of the trench/bed gravel or drip tubing (m) -0.55

Site Specific Conditions (e.g. special works, site improvement works testing etc.

It is proposed to install a Septic tank system (septic tank and percolation area)
Design criteria of Septic tank system
The sizing of the proposed packaged wastewater treatment plant shall be minimum of 2Pe @150l/day = 300l/day + 2000l = 2300l (min) round up to a 3m3 tank.(Refer to EPA CoP 2021)

Design criteria for soil polishing filter. (Percolation area)
It is proposed to invert of percolation pipes -0.550m below top of existing ground. This will ensure there is a minimum of 1.2 of soil /subsoil below the percolation trench.
The total required length of percolation shall be 72m. The max. run per trench length is 18m with 4no. trenches
(Refer to EPA CoP 2021 table 7.2 page 38) - Please this is the minimum amount of trench length allowed.
There shall be an air vent upstand attached at the end of each percolation pipe run the width of each percolation trench shall be 0.5m. There shall be a gradient of 1:200 for each percolation pipe.
(See drawings attached.)

[1] A discharge of sewage effluent to "waters" (definition includes any or any part of any river, stream, lake, canal, reservoir, aquifer, pond, watercourse or other inland waters, whether natural or artificial) will require a licence under the Water Pollution Acts 1977-90. Refer to Section 2.4.

6.0 TREATMENT SYSTEM DETAILS

SYSTEM TYPE: Septic Tank Systems (Chapter 7)

Tank Capacity (m^3)	3.00	Percolation Area		Mounded Percolation Area	
		No. of Trenches	4	No. of Trenches	
		Length of Trenches (m)	18.00	Length of Trenches (m)	
		Invert Level (m)	-0.55	Invert Level (m)	

SYSTEM TYPE: Secondary Treatment System (Chapters 8 and 9) and polishing filter (Section 10.1)

Secondary Treatment Systems receiving septic tank effluent (Chapter 8)

Media Type	Area (m^2)*	Depth of Filter	Invert Level
Sand/Soil			
Soil			
Constructed Wetland			
Other			

Packaged Secondary Treatment Systems receiving raw wastewater (Chapter 9)

Type

Capacity PE

Sizing of Primary Compartment

m^3

Polishing Filter*: (Section 10.1)

Surface Area (m^2)*

Option 1 - Direct Discharge
Surface area (m^2)

Option 2 - Pumped Discharge
Surface area (m^2)

Option 3 - Gravity Discharge
Trench length (m)

Option 4 - Low Pressure
Pipe Distribution
Trench length (m)

Option 5 - Drip Dispersal
Surface area (m^2)

SYSTEM TYPE: Tertiary Treatment System and infiltration / treatment area (Section 10.2)

Identify purpose of tertiary treatment	Provide performance information demonstrating system will provide required treatment levels	Provide design information

DISCHARGE ROUTE:

Groundwater	✓	Hydraulic Loading Rate * ($l/m^2.d$)	16.00	Surface area (m^2)	
Surface Water **		Discharge Rate (m^3/hr)			

* Hydraulic loading rate is determined by the percolation rate of subsoil

** Water Pollution Act discharge licence required

6.0 TREATMENT SYSTEM DETAILS

QUALITY ASSURANCE:

Installation & Commissioning

Installation and commissioning shall be carried out by a qualified personal in accordance in accordance with the EPA manual code of practice 2021.

On-going Maintenance

Regular de-sludging and maintenance on an annual basis accordance with the EPA Code of practise 2021.

7.0 SITE ASSESSOR DETAILS

Company: Bolger-Hynes Archectitural Design

Prefix: Mr First Name: William Surname: Bolger- Hynes

Address: Ballinabarna House, The Rower, Co.Kilkenny

Qualifications/Experience: Dip in Civil Eng. Fetac Certification in site suitability assessment

Date of Report: 11-Apr-2024

Phone: 087 2800576 E-mail williambolgerhynes@gmail.com

Indemnity Insurance Number: AP10002006

Signature: William Bolger-Hynes

ARACHAS
The Irish for Insurance

Broker Reference: **BOLG05PI01**
Date: **26/04/2023**

TO WHOM IT MAY CONCERN

Bolger-Hynes Architectural Design and Planning
Ballinabarna House The Rower Co Kilkenny

We act as insurance broker for the above client and as such can confirm the following cover

Business Description

Engineer

Professional Indemnity Insurance

Limit of Indemnity	:	€ 1,000,000, any one claim
Policy Excess	:	€ 1,000 each and every claim
Period of Cover	:	26/04/2023 to 25/04/2024
		Both days inclusive local standard time at above address
Insurers	:	Lloyds -Professional Indemnity
Policy No	:	API0002006
Note	:	Policy extends to include PSDP cover

The cover provided contains no unusual terms or conditions and is fully applicable to any work which the Insured Practice may be appointed in connection with his business description.

Conor Brennan
Arachas Corporate Brokers Limited

9 Air, Odour and Climate

9.1 Introduction

This air quality chapter describes the outcomes of the air quality, odour and climate impact assessment that was carried out to assess the possible impacts from the Construction and Operational stages of the Proposed Development with respect to relevant guidelines.

The likely impacts on air quality and climate from the construction phase of the Proposed Development have been qualitatively evaluated. The outcomes of this assessment were used to suggest appropriate mitigation measures to be employed during the construction phase to reduce potential impacts.

With regard to the operational phase, air dispersion modelling was completed to assess the impact of emissions from the planned air and odour emissions points associated with the Anaerobic Digestion Facility to local ambient air quality pollutant concentrations. The location and highest of the worst-case ground level concentrations for each pollutant were also identified.

The Proposed Development of an Anaerobic Digestion Facility on a site of *ca.* 5.61 hectares is located in the townlands of Corracunna, Coolnanave and Garrane approximately 2km northeast of the town of Mitchelstown and 43km north of Cork City, Co. Cork. The Proposed Development will accept and treat 90,000 tonnes per annum of locally sourced agricultural manures, slurries, food processing residues and crop-based feedstocks to produce grid quality biomethane (renewable natural gas) suitable for direct injection into GNI's distribution network. The renewable natural gas (RNG) produced at the facility will be used as a direct replacement for conventional natural gas and in doing so contribute towards the Government's aspiration to develop 5.7TWh of indigenous biomethane production. In addition to RNG, the facility will produce a nutrient rich biobased fertiliser which can be used as a direct replacement for fossil fuel derived fertiliser. The facility will also be specified to allow the recovery of biogenic carbon dioxide (CO_2).The proposed supporting infrastructure to be developed includes:

- Demolition of existing single storey disused agricultural buildings, silos, and tank within the western portion of the site (total demolition gross floor area (GFA) of c. 1,781 sq.m). One single storey agricultural building (with a GFA of 87.8 sq.m) will be stabilised and retained as a biodiversity building.
- Construction of 3 no. digesters (c. 15.5m in height), 2 no. digestate storage structures (c. 15.5m and 11m in height), 2 no. liquid storage tanks (c. 12.2m in height), and a liquid feed tank (c. 8m in height) located in the southeast portion of the site.
- 3 no. pasteurisation tanks (each c. 6m in height), a post pasteurisation cooling tank (c. 12.2m in height) and pre fertiliser manufacturing tank (c. 12.2m in height) located in the centre of the site.
- A part single-storey and part two-storey reception hall (with a GFA of c. 2,112.6 sq.m and an overall height of c. 15.5m) to accommodate a laboratory, panel room, tool store, workshop, and storage areas, with a liquid feed intake adjacent to the reception hall, located in the central portion of the site, to the north of the digesters.

- A single-storey solid digestate storage and nutrient recovery building (with a GFA of c. 879.9 sq.m and an overall height of c. 12.4m in height) located to the west of the reception hall, in the central portion of the site.
- Odour abatement plant (c. 6m in height) and equipment, a digestate offtake area, and a fuel tank (c. 1.6m in height) will be provided to the north of the solid digestate storage and nutrient recovery building.
- Construction of an ESB substation (c. 3.4m in height), 2 no. CO_2 tanks (c. 14.5m in height), along with associated plant structures including a CO_2 loading pump, CO_2 auxiliaries, CO_2 liqueufactor, a CO_2 compressor (c. 6.7m in height), and a CO_2 pre-treatment skid, located in the southwest portion of the site.
- Construction of a biogas treatment skid, a biogas compression system, a biogas upgrading module (with an overall height of c. 5.1m) and a grid injection unit within a fenced compound (c. 2.8m in height), located within the southwestern portion of the site.
- Construction of an emergency biogas flare (c. 11.3m in height) and 2 no. propane tanks (c. 1.3m in height) located further to the west of the site.
- Construction of an O2 generation unit (c. 2.6m in height), a biomethane boiler (c. 5.6m to top of flue stack) a combined heat and power (CHP) unit and panel room (with a maximum height of c. 6m to top of flue), 2 no. pump houses (c. 2.6m in height, each with a GFA of c. 29 sq.m) located in the southwestern portion of the site.
- Construction of a two-storey ancillary office and administration building (with an overall height of c. 8.6m and a GFA of c. 271.5 sq.m) located within the western portion of the site, adjacent to the main site entrance.
- A discharge pipe route extending to the northwest of the main anaerobic digestion facility site, crossing the L90831 and through agricultural lands to the River Funshion.
- Alterations to the adjacent local road (L90831), to allow for improved access and safety, including provision of a passing bay and setting back of boundaries alongside the site entrance.
- Provision of landscaping and tree planting, including the provision of an extensive treeline alongside the N73 to the southeast of the main site area, along with additional landscaping and planting on lands to the west of the L90831.
- Associated and ancillary works including parking (16 no., including 3 no. EV and 1 no. accessible parking spaces), and bike storage (10 no. spaces), access arrangements (including new access points to the site from the L90831 to the west), internal roads, bunds, a weighbridge, wastewater treatment equipment, attenuation pond, boundary treatments, lighting, services, lightning protection masts, drainage, and all associated and ancillary works.

9.2 Consultation

ORS have been commissioned to assess the potential effects of the Proposed Development in terms of air quality/climate and odour during the construction and operational phases.

The principal members of the ORS EIA team involved in this assessment include the following persons:

- **Project Scientist and Lead-Author:** Neil Kelly – B.Sc. (Environmental Science),

MCERTs, MIAQM. Current Role: Senior Environmental Consultant. Experience *ca.* 8 years.

- **Project Consultant and Co-Author:** Christopher Carr (Irwin Carr) – B.Sc. (Environmental Health), Post-Grad Diploma (Acoustics & Noise Control), MIAQM, MIEnvSc. Current Role: Consultant. Experience *ca.* 11 years.
- **Project Lead & Reviewer:** Oisín Doherty – B.Sc. (Geography with Environmental Science), MSc. (Environmental Management), CEnv, MIEnvSc. Current Role: Chartered Environmental Consultant. Experience ca. 15 years.

Consultation between ORS and other members of the planning/design team was undertaken in order to obtain information required to assess the potential construction and operational phase effects on local air quality and climate.

9.3 Assessment Methodology and Significance Criteria

9.3.1 Desktop Study

A desk-based assessment method was used to assess baseline air quality for the receiving environment of the proposed site. The baseline information that is detailed in this section of the assessment was obtained from publicly available sources.

The following documents and sources were referenced:

- EPA Ambient Air Monitoring Station Data (EPA web page)
- Air Quality in Ireland Reports 2017 – 2023 (EPA web page)
- Meteorological Data 2017 – 2024 (Met Éireann)
- Composting and Anaerobic Digestion Association of Ireland (CRÉ)
- Local Terrain Data (OSI)
- Government of Ireland (2024) Climate Action Plan 2024
- Transport Infrastructure Ireland (2011) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (DoEHLG)
- Other Maps and plans published by the Ordnance Survey of Ireland (OSI)
- UK Highways Agency (2007) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 - HA207/07 (Document and Calculation Spreadsheet)
- World Health Organisation (2006) Air Quality Guidelines - Global Update 2005 (and previous Air Quality Guideline Reports 1999 and 2000)
- Institute of Air Quality Management (IAQM) (2024) Guidance on the Assessment of Dust from Demolition and Construction Version 2.2
- Reports, maps and data published by the Environmental Protection Agency (EPA).
- Hanrahan, P (1999a) The Plume Volume Molar Ratio Method for Determining NO2/NOX Ratios in Modelling – Part 1: Methodology J. Air and Waste Management Assoc. 49 1324-1331
- Hanrahan, P (1999b). The Plume Volume Molar Ratio Method for Determining NO2/NOX Ratios in Modelling – Part 21: Evaluation Studies J. Air and Waste Management Assoc. 49 1332-1338
- UN Economic and Social Council, Executive Body for the Convention on Long-Range Transboundary Air Pollution, ECE/EB.AIR/WG.5/2007/3
- Cork County Development Plan 2022 - 2028

9.3.2 Assessment Methodology and Significance Criteria

This chapter was prepared using the following guidance documents:

- Institute of Air Quality Management (IAQM) (2024) Guidance on the Assessment of Dust from Demolition and Construction Version 2.2.
- Biosurf - S. Majer, K. Oehmichen and F. Kirchmeyr (2016) D5.3 Calculation of GHG Emission Caused by Biomethane.
- EPA, (2024) Ireland's Provisional Greenhouse Gas Emissions
- EPA, (2024) Ireland's Greenhouse Gas Emissions Projections
- Economic Assessment of Biogas and Biomethane in Ireland, SEAI
- EPA, (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- EPA (2020) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4).
- EPA (2021) Air Guidance Note 5 (AG5) Odour Impact Assessment Guidance for EPA Licensed Sites.
- EPA (2019) Odour Emissions Guidance Note (Air Guidance Note AG9)
- Transport Infrastructure Ireland (2011) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes.
- UK DEFRA (2018) Part IV of the Environment Act 1995: Local Air Quality Management (LAQM) Technical Guidance (TG16).
- UK DEFRA (2016a) Part IV of the Environment Act 1995: Local Air Quality Management (LAQM). Policy Guidance (PG16).
- UK Highways Agency (2007) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 - HA207/07 (Document and Calculation Spreadsheet).
- Clean Air for Europe (CAFÉ) Directive 2008/50/EC.
- S.I. No.180 of 2011, Air Quality Standards (AQS) Regulations 2011.
- UK Dep. BEIS Combined Heat and Power – Environmental A detailed guide for CHP developers – Part 3

Detailed legislation and standards relating to air quality and odour relevant to the evaluation are addressed in the sections below.

The significance criteria used throughout this assessment to rate the impacts to air quality, odour and climate are based on those outlined within the EPA Guidance document Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022).

Construction Emissions – Applicable Limit Values for Dust and Dust Deposition

The EU ambient air quality standards outlined in **Table 9.1** have set ambient air quality limit values for PM_{10} and $PM_{2.5}$ dust particles which are less than 10 microns and are of greatest concern when considering human health.

In relation to larger dust particles fractions that can give rise to unwanted dust spoiling, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland.

Generally, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) is applied and states a maximum permissible emission level for dust deposition

of 350 mg/m^2/day averaged over a one-year period at any receptors outside the site boundary.

Recommendations from the Department of the Environment, Heritage and Local Government (DOEHLG, 2004) apply the Bergerhoff limit of 350 mg/m^2/day to the site boundary of quarries. This limit value can be applied with regard to dust impacts from construction of the development.

Construction Emissions – Methodology for Assessing Ambient Air Impacts

During the construction stage of the Proposed Development the most likely effect on air quality will be from construction dust emissions (nuisance dust and PM_{10}/$PM_{2.5}$ emissions) associated with activities such as excavations, infilling materials, stock piling and movement of vehicles. For the purposes of this assessment the Institute of Air Quality Management (IAQM) construction dust guidance (IAQM, 2024) was utilised.

To assess the potential effects accordingly, construction activities are divided into 4 categories:

- Demolition (not required in this assessment)
- Earthworks
- Construction; and
- Trackout (described as the transport of dust and dirt from the construction / demolition sites onto public road network, where it may be deposited and then re-suspended by vehicles using the network).

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 six 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 approximately nine sensitive receptors within 250 meters of the site boundary and six within 50 metres of the applicable construction routes.

Human receptors are largely residential houses located to the South and West of the site. There are farmyards *ca.* 50m West and 145m Southeast of the site boundary.

The nearest human and residential receptor to the site is a residential house located approximately 55m West 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.**

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

The construction on site effect has been assessed qualitatively to evaluate the risk of dust effects and decide suitable mitigation measures to control risk appropriately. The degree of mitigation advised for each activity is then established, being proportionate with the associated risk (Low, Medium or High risk). In accordance with the IAQM construction dust guidance, mitigation is advised for all risk levels.

Construction phase traffic also has the potential to affect air quality and climate. The UK DMRB guidance (UK Highways Agency, 2007), states that road links meeting one or more of the following criteria (described below) can be defined as being 'affected' by a Proposed Development and should be included in the local air quality assessment. The use of the UK guidance is recommended by the TII (2011) in the absence of specific Irish guidance, this approach is considered best practice and can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- A change in speed band;
- A change in carriageway alignment by 5m or greater.

The construction stage traffic will not increase current levels by 1,000 AADT or 200 HDV AADT and therefore does not meet the above scoping criteria. Consequently, a detailed air assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant effects to air quality.

Odour Emissions

Appendix 9.4 gives background on odour as a nuisance and describes how the possibility for odour occurrences were evaluated for this EIAR. Dispersion modelling has been employed to calculate the impacts of the Proposed Development on the neighbouring environment with respect to odour and the assessment has been completed with reference to the EPA guidance document titled EPA Air Dispersion Modelling Guidance Note (AG4), (EPA, 2020). Dispersion modelling information regarding input and methodology are described in **Section 9.3.4**.

A full description of the odour abatement system can be found in **Chapter 2 Section 2.2.10.**

The UK Environment Agency (Environment Agency, 2011 and adapted for Irish EPA use) has published detailed guidance on appropriate odour threshold levels based in part on the offensiveness of the odour. Specific exposure criteria with respect to the "annoyance potential" which is described as "the likelihood that a specific odorous mixture will give reasonable cause for annoyance in an exposed population". Three categories are used to rank industrial sources with regard to their offensiveness, these are "low", "medium" and "high" with exposure criteria linked to each category. Exposure criteria range from 1.5OUE/m^3 for highly offensive sources, 3.0 OUE/m^3 for moderately offensive sources to 6.0 OUE/m^3 for the least offensive sources. There are no details with regard to an anaerobic digestion facility and affiliated odour treatment system covered, however, it is expected to be of medium to high offensiveness, therefore the exposure criteria are classified as worst case at 1.5 OUE/m^3.

Process Emissions

Carbon monoxide (CO), nitrogen oxides (as NO_2) and odour will be emitted from the development during the operational stage and have been included as part of the ambient baseline monitoring and air dispersion modelling. Sulphur dioxide (SO_2), VOCs, hydrogen sulphide (H_2S), ammonia (NH_3), PM_{10} and $PM_{2.5}$ were not modelled and only included in the baseline modelling as there is no emissions expected of these pollutants. This will be covered in more detail in **Section 9.3.4**.

Details with respect to ambient air quality pollutants are covered below, these sections also cover the assessment for the potential for ambient air quality impacts. Ambient air quality impacts from the Proposed Development on the local environment have been determined using air dispersion modelling, this modelling has been completed in conjunction and compliance with Air Dispersion Modelling from Industrial Installations Guidance Note (AG4), (EPA, 2020).

Ambient Air Quality Standards

National and European statutory bodies have established limit values in ambient air for a variety of pollutants to safeguard and minimise the risk to human health. These limit values are referred to as "Air Quality Standards" and are derived from health and environmental factors. Refer to **Table 9.1** and **Table 9.2** below.

Suitable standards or limit values are applied in terms of compliance to gauge air quality significance criteria. The relevant standards which apply to Ireland include the Air Quality Standards Regulations 2011 (S.I. No 180 of 2011), which transposed the requirements of

Directive 2008/50/EC on ambient air quality and cleaner air for Europe which outlines limit values for the pollutants NO_2, PM_{10}, and $PM_{2.5}$.

Directive 2008/50/EC merges the previous Air Quality Framework Directive (96/62/EC) and its successive daughter directives (including 1999/30/EC and 2000/69/EC) and includes ambient limit values describing $PM_{2.5}$.

With regard to VOCs, the limit for benzene has been used for the purpose of this project and a worst-case assumption made that all VOCs released are benzene. In reality, there will be a variety of VOCs within the process emissions, not limited to benzene. The limit value for benzene has been employed as it is the only VOC with a legislated ambient air quality standard (**see Table 9.1**), the limit value is also quite stringent which makes this approach extremely conservative and robust and grossly overestimates the effect and significance of VOCs.

Table 9.1: Air Quality Standards Regulations 2011 (based on EU Council Directive 2008/50/EC)

Pollutant	Regulation (Note 1)	Limit Type	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m³ NO_2
		Annual limit for protection of human health	40 µg/m³ NO_2
		Critical limit for protection of vegetation	30 µg/m³ NO + NO_2
Sulphur dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	350 µg/m³
		Daily limit for protection of human health - not to be exceeded more than 3 times/year	125 µg/m³
		Annual and Winter critical level for the protection of ecosystems	20 µg/m³
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	10 mg/m³ (8.6 ppm)
Benzene*	2008/50/EC	Annual Limit Value for protection of human health	5 µg/m³
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m³ PM10
		Annual limit for protection of human health	40 µg/m³ PM10
$PM_{2.5}$	2008/50/EC	Annual limit for protection of human health	25 µg/m³ PM2.5

* Expressed as Volatile Organic Compounds (VOCs) in this assessment for worst case analysis.

Table 9.2: EA, UN and EPA Ambient Air Quality Standards

Pollutant	Guidance	Limit Type	Value
Ammonia*	EA, UK H1 Part 2	1-hour average 100%ile	< 2,500 µg/m³
		Annual average	< 180 µg/m³
	UNESC	Annual average for protection of sensitive lichens / bryophytes	< 1 µg/m³
		Annual average for the protection of woodland / heath lands	< 3 µg/m³
Hydrogen sulphide	EA, UK H1 Part 2	1-hour average 100%ile	< 140 µg/m³
		Annual average	< 150 µg/m³
Odour	Irish EPA AG4 & AG9	Expressed as 1 hr average at the 98%ile	< 1.50 OuE/m³

* Source UN Economic and Social Council, Executive Body for the Convention on Long-Range Transboundary Air Pollution, ECE/EB.AIR/WG.5/2007/3

Methodology for Assessing Ambient Air Effects – Operational Traffic Emissions

Assessment of operational traffic emissions associated with the Proposed Development was carried out using the UK DMRB spreadsheet. The modelling assessment determined that the change in emissions of NO_2 and PM_{10} at the nearby sensitive receptor road link because of the Proposed Development will be imperceptible. Therefore, the operational phase effect to air quality is **long-term, localised, neutral and imperceptible** (see **Section 9.3.4** for more detail).

The evaluation of air quality effects from traffic (both operational and construction) was considered utilising methodology proposed by the UK DEFRA (2016b). This approach involves modelling by way of the UK DMRB Screening Model (Version 1.03c, July 2007), the NOx to NO_2 Conversion Spreadsheet (Version 6.1, October 2017) (UK DEFRA, 2017), and following guidance issued by the TII (2011), UK Highways Agency (2007), UK DEFRA (2016a; 2016b; UK DETR 1998) and the EPA (2015; 2017).

The TII guidance (2011) states that the air quality assessment must progress to detailed modelling if:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills etc).

The UK DMRB guidance – UK Highways (LA 105, 2019 and 2007 guidance), on which the TII guidance (2011) is based, states that road links meeting one or more of the following criteria can be defined as being 'affected' by a Proposed Development and should be included in the local air quality assessment:

- Road alignment change of 5 metres or more;

- Daily traffic flow changes by 1,000 AADT or more;
- HGV flows change by 200 vehicles per day or more;
- Daily average speed changes by 10 km/h or more; or
- Peak hour speed changes by 20 km/h or more.

Guidance from Transport Infrastructure Ireland (TII, 2011) advises the use of the UK Highways Agency DMRB spreadsheet tool for evaluating the air quality effects from road schemes. The DMRB spreadsheet tool was last reviewed in 2007 and allows for modelled years up to 2025. Vehicle emission standards up to Euro V are contained but since 2017, Euro 6d standards are appropriate for the new fleet. In addition, the model does not allow for electric or hybrid vehicle use. Therefore, this is a slightly outdated assessment tool. The LA 105 guidance document states that the DMRB spreadsheet tool may still be used for simple air quality assessments where the possibility of exceeding the air quality standards is low. Due to its use of a "dirtier" fleet, vehicle emissions would be higher than more modern models and therefore any results will be robust in nature and will deliver a worst-case assessment.

9.3.3 Field Survey

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 Birr monitoring station was utilised for the Carbon Monoxide values as it is representative of a Zone D site and data from the Tipperary Town monitoring station was utilised for the $PM_{10/2.5}$ values. Fieldwork was completed January 2024 and consisted of the following elements;

- $PM_{2.5}$ and PM_{10} Monitoring (EPA Monitoring Station)
- NO, NO_2 and NOx Monitoring
- SO_2 Monitoring
- H_2S Monitoring
- NH_3 Monitoring
- CO Monitoring (EPA Monitoring Station)

Table 9.3: Baseline Air Quality Monitoring Data in the Vicinity of Proposed Plant

Compound	Site specific baseline monitoring 21st Dec 23 to 17th Jan 24
Carbon Monoxide (1 Location)	< 0.57 (Below LOD of Monitoring Unit) (mg/m³)
Oxides of Nitrogen (4 locations)	Avg. 3.62 (Min 2.25 - Max 5.09) (µg/m³)
Sulphur Dioxide (4 locations)	Avg. < 1.64 (Min/Max < 1.52 (LOD)) (µg/m³)
Dust (4 Locations)	Avg. 76.25 (Min 39 – Max 167) (mg/m²/day)
Particulate matter as PM_{10} (1 Location)	Avg. 18.28 (Min 1.63 - Max 287.51) (µg/m³)
Particulate matter as $PM_{2.5}$ (1 Location)	Avg. 14.81 (Min 1.00 - Max 282.44) (µg/m³)
Ammonia (4 locations)	Avg 5.37 (Min 3.33 - Max 7.22) (µg/m³)
Hydrogen Sulphide (4 locations)	Avg 0.12 (Min <0.11 (LOD) - Max 0.13) (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.

Site walkover surveys were conducted by ORS consultants on the 21st December 2023 and 17th January 2024 to identify and assess features on site including:

- Site Terrain
- Current Site Odour (Sniff Test according to AG5 EPA Assessment – not used as input as per AG4 guidelines, for evaluation and information purposes only)
- Site receptors

Please refer to **Appendix 9.2 and 9.3** for details of monitoring locations and a further breakdown of monitoring data collected from onsite monitoring.

9.3.4 Impact Assessment Methodology

This section describes criteria applied to the assessment of air quality and odour receptors.

Methodology for Assessing Ambient Air Impacts from Process Emissions

AERMOD is an USEPA model which relies on steady-state Gaussian plume theory and is used to evaluate odour and pollutant concentrations linked to industrial emissions. AERMOD is a step up from the Industrial Source Complex-Short Term 3 (ISCST3) model which has been extensively utilised for industrial emissions. Simulation of dispersion in the boundary layer has been improved significantly with AERMOD resulting in a more exact representation of real-world scenarios and therefore increase the precision of the model with respect to maximum ambient concentrations.

EPA Guidance document “Air Dispersion Modelling from Industrial Installations Guidance Note 2020 (AG4)” recommends AERMOD as an applicable model for gauging the impact of odour and air industrial emissions. The dispersion modelling project comprised of the below steps:

- Evaluation of applicable emission data and other related material to run the modelling software.
- Review of background/baseline sulphur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO) etc. concentrations.
- Running the air dispersion model with regard to odour and specified pollutants under maximum/worst case emission setting.
- Reporting of modelled ground level concentrations.
- Review of the impact of the modelled concentrations with respect to relevant air quality limit values

The modelling project has been undertaken using biomethane/natural gas as a fuel source for the CHP and boiler. These have been inputted within the model to operate at maximum concentrations and volumetric flow rates. The abatement stack emission point regarding odour is also based on maximum concentrations and volumetric flow rates. It was also assumed within the model that the CHP, biomethane boiler and odour abatement stack emission points in the plant would be operating 24 hrs per day, 365 days per year.

The model created was used to evaluate concentrations of carbon monoxide (CO), nitrogen oxides (as NO_2) and odour outside the site boundary and how this may affect air quality at various receptor locations.

Model input data relied on details with respect to the physical environment (i.e. terrain, buildings etc.), design details of all industrial emission points situated on site and meteorological data. The model was then able to project odour and ambient air pollutants outside the limits of the site boundary. As this model adopted a robust approach where input parameters have been overestimated (as per AG4 guidance), this will lead to an over-approximation of actual ambient air levels that will occur.

AERMOD Dispersion Modelling Data

The inputs for the dispersion modelling assessment are described in detail in this Section. The site layout, including the nearest residential properties, is shown in **Appendix 9.2**.

AERMOD Dispersion Modelling Package Description

The AMS.EPA Regulatory Model (AERMOD) is the current US EPA regulatory model used to predict pollutant concentrations from a wide range of sources that are present at typical industrial facilities.

The model accepts hourly meteorological data to define the conditions for plume rise, transport, diffusion and deposition. It estimates the concentration or deposition value for each source and receptor combination for each hour of input meteorology and calculates user-selected short term averages. The model also takes into account the local terrain surrounding the facility. Since most air quality standards are stipulated as averages or percentiles, AERMOD allows further analysis of the results for comparison purposes.

Percentile analysis for emissions is calculated for the maximum averages using the AERMOD-percent post-processing utility. This utility calculates the maximum concentration of a pollutant from all receptors at a specific percentile, for a specific period. Employing the percentile facilitates the omission of unusual short-term meteorological events that may cause elevated pollutant concentrations and hence a more accurate representation of the likely average pollutant concentrations over an averaging period.

The following information was input into the model for the prediction of maximum ground level ambient pollutant concentrations from the proposed renewable facility.

Input Parameters

The site layout map, building plans and elevations were used as a template for all sources, relevant structures and the boundary of the facility. Below are general details of the proposed facility.

Odour Emissions

The main source of emissions from the proposed site have been confirmed as:

- Reception Hall
- Solid Digestate Storage Building
- Liquid Feed Tanks
- Pasteurisation Tanks

It has also been confirmed that the emissions from each of these potential sources will pass

through a proposed Odour Treatment System. The total odour emissions from the Odour Treatment System are based on the maximum odour concentration from the system, as well as the total volume of air passing through the system, as summarised below:

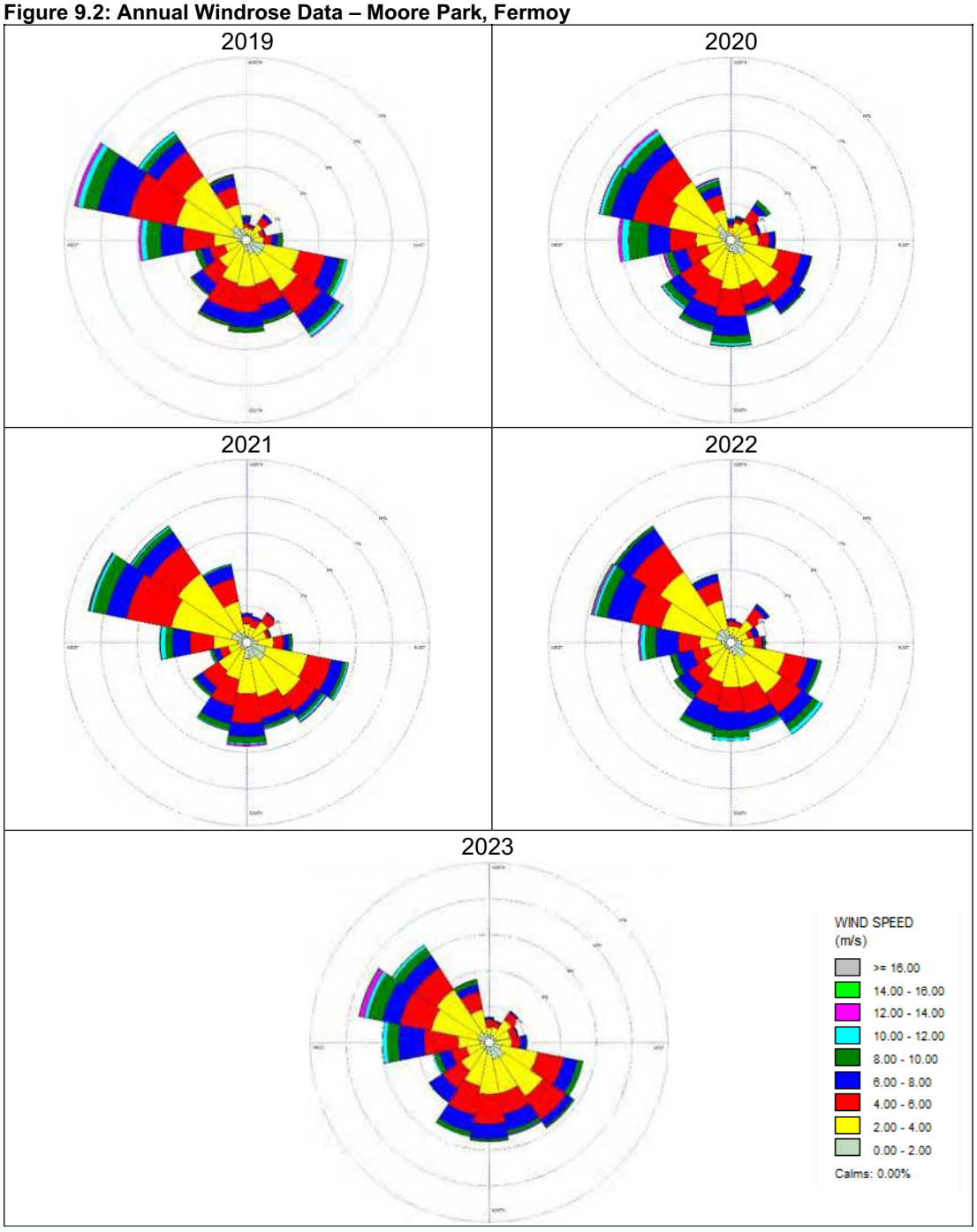
- The maximum odour concentration from the Odour Treatment System is 1,000ou/m^3.
- The Reception Hall has a volume of approx. 19,000m^3 and the Solid Digestate Storage building has a volume of approx. 8,000m^3, which corresponds to a total volume of 27,000m^3.
- The ventilation and Odour Treatment System will be designed to achieve a minimum 2no. air changes per hour which corresponds to a flowrate of 54,000m^3/hour, providing adequate air changes in accordance with BAT.
- The Odour Treatment System will be designed to treat 60,000-70,000m^3/hour providing an overcapacity of approx. 10-12% and an odour destruction efficiency of 95-99.5%.

Meteorological Data

Five years of hourly sequential meteorological data was used for the AERMOD dispersion modelling assessment.

The closest weather station to the site can be identified on Figure 6.1 of the EPA's AG4 Guidance Note as Fermoy (Moore Park), which has an annual mean wind speed of 3.0m/s. Fermoy has been deemed representative of the average wind in the vicinity of the site, which allowed for the determination of the predicted overall average impact of emissions from the facility. The windrose data for each individual year is presented in **Figure 9.2** below.

Figure 9.2: Annual Windrose Data – Moore Park, Fermoy



Building Downwash

When one or more buildings in the vicinity of a point source interrupt wind flow, an area of turbulence known as a building wake is created. Pollutants emitted from a relatively low level can be caught in this turbulence, affecting their dispersion. This phenomenon is called building downwash. In order to conduct an analysis of downwash effects of the point sources created to mimic the release of air from the facility, the dimensions/ heights of the proposed buildings on-site were obtained from drawings.

Digital Terrain Data

AERMOD contains a terrain data pre-processor called AERMAP. Receptor and source elevation data from AERMAP output is formatted for direct insertion into an AERMOD control file. The elevation data are used by AERMOD when calculating air pollutant concentrations.

Regulatory dispersion models applicable for simple to complex terrain situations require information about the surrounding terrain. With the assumption that terrain will affect air quality concentrations at individual receptors, AERMAP first determines the base elevation at each receptor and source. For complex terrain situations, AERMOD captures the essential physics of dispersion in complex terrain and therefore needs elevation data that convey the features of the surrounding terrain. In response to this need, AERMAP searches for the terrain height and location that has the greatest influence on dispersion for each individual receptor. This height is the referred to as the hill height scale. Both the base elevation and hill height scale data are produced by AERMAP as a file or files which can be directly inserted into an AERMOD input control file.

A baseline survey was completed at the proposed site location for selected priority pollutants, the current impact of pollutants from other sources in the vicinity of the planned site have therefore been evaluated as part of this input data (i.e. any other emission source facilities in the locality). To remain as robust and conservative as possible the CHP and odour abatement stack were assumed to be in constant operation, in reality there will need to be down time for maintenance, which could be 5 - 7% of the operating year. The CHP, biomethane boiler and odour abatement stack emissions are considered the worst-case results as the flare will only operate for a short duration throughout the full year and will never operate simultaneously.

Process Emissions Data

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 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 Biogas Upgrading Unit, CO_2 Liqueufactor and Grid Injection Unit (GIU) have been scoped out of the air dispersion modelling as they are designed to be gas tight with no risk of emissions.

The total odour from the Odour Treatment System is detailed in the Table below.

Table 9.4: Odour Emission Rate from Odour Treatment System

Stack	Odour Concentration (ou/m^3)	Total Volume (m^3/hour)	Total Volume (m^3/second)	Total Odour Emission Rate (ou/s)
Odour Treatment System	1,000	60,500	16.81	**16,806**

It can be seen from the table above that the total odour emission rate from the Odour Treatment System is 16,806ou/s, which has been included as part of the odour model.

Pollutant Emissions

The two main identified sources of atmospheric emissions are the CHP and biomethane boiler proposed on site.

Table 9.5 details the normalised volume flow (Nm^3/s) for each of the emission points associated with the proposed site.

Table 1.5: Normalised Flow Rates from Stacks

Stack	Actual Volume Flow (m^3/hr)	Normalised Volume Flow (Nm^3/hr)*	Normalised Volume Flow (Nm^3/s)
CHP	7,756	4,675	1.30
Biomethane Boiler	365	260	0.07

**Normalised volume flow of both stacks is based on 273.15K, 101.3kPa and 5% 0_2*

The suppliers have provided information which details the expected level of pollutants from the identified sources.

Table 9.6: Expected Emission Levels

Pollutant	Unit	CHP	Boiler
Oxides of Nitrogen (NO_x)	mg/Nm^3	250	93
Carbon Monoxide (CO)	mg/Nm^3	1,000	N/A

Table 9.7 below relates to the emission concentrations values through the flues associated with the CHP unit and gas boiler on the proposed site, based on the expected emission levels detailed in the Table above.

Table 9.7: Emission Concentrations

Pollutant	CHP Emission Concentration Values (mg/Nm^3)	Boiler Emission Concentration Values (mg/Nm^3)	Stack Emissions (g/s)	
			CHP Engine (1.30 Nm^3/s)	Boiler (0.07 Nm^3/s)
Oxides of Nitrogen (NOx)	250	93	**0.325**	**0.007**
Carbon Monoxide (CO)	1,000	N/A	**1.30**	**N/A**

In line with EPA AG4 Guidance, further assessment of the site has been undertaken to account for the stack emissions operating at 75%, rather than at a maximum which is reflected above. This additional assessment is included in **Appendix 9.5**.

Detailed dispersion modelling was carried out for NO_2 and CO. SO_2 has not been modelled for these sources as it has been shown that there is no sulphur content in the fuel of natural gas which is structurally identical to biomethane. The emissions for SO_2 using these systems are therefore negligible (Department for Energy Security and Net Zero and Department for Business, Energy & Industrial Strategy, UK. 2021: Combined Heat and Power – Environmental A detailed guide for CHP developers – Part 3).

Table 9.8: Sources scoped in/out of modelling

Potential Source	Modelled	Justification
CHP	Yes	Will be emitting to air
Boiler	Yes	Will be emitting to air
Odour Abatement	Yes	Will be emitting to air
Biogas Upgrading Unit	No	Designed to be gas tight – no risk of emissions
CO_2 Liqueufactor	No	Designed to be gas tight – no risk of emissions
Grid Injection Unit (GIU)	No	Designed to be gas tight – no risk of emissions

Stack Emission

Table 9.9 below shows the ventilation rates of the stacks relied upon in the assessment.

Table 9.9: Ventilation Rates from Odour & Pollutant Emission Stacks

Parameter	Odour Treatment System	CHP	Boiler
X – coordinate	182987	182988	182985
Y – coordinate	114274	114163	114161
Stack Height (m)	6.0	10	5.6
Stack tip diameter (m)	1.5	0.3	0.2
Actual Volume Flow (m^3/hr)	60,500	7,756	365
Flue Gas Temp (K)	293	453	383
Efflux Velocity (m/s)	9.51	30.49	3.23

Potential and Fugitive Emission Points

The usage of the emergency flare is envisaged to be infrequent and would operate for approximately 6% operating time/annum. 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.

Operational Traffic Emissions

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.

Table 9.10 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 utilised when assuming background concentrations (i.e. 2.77 $\mu g/m^3$ for NO_2 and 18.28 $\mu g/m^3$ for PM_{10} – highest values taken from **Table 9.12** locations below). **Table 9.11** (shown below) shows the results of "Do Minimum" (DM) and "Do Something" scenarios for 2025 assuming (as a worst-case scenario), receptors are 3m away

from road links.

Table 9.11 Projected NO_2 and PM_{10} traffic concentrations

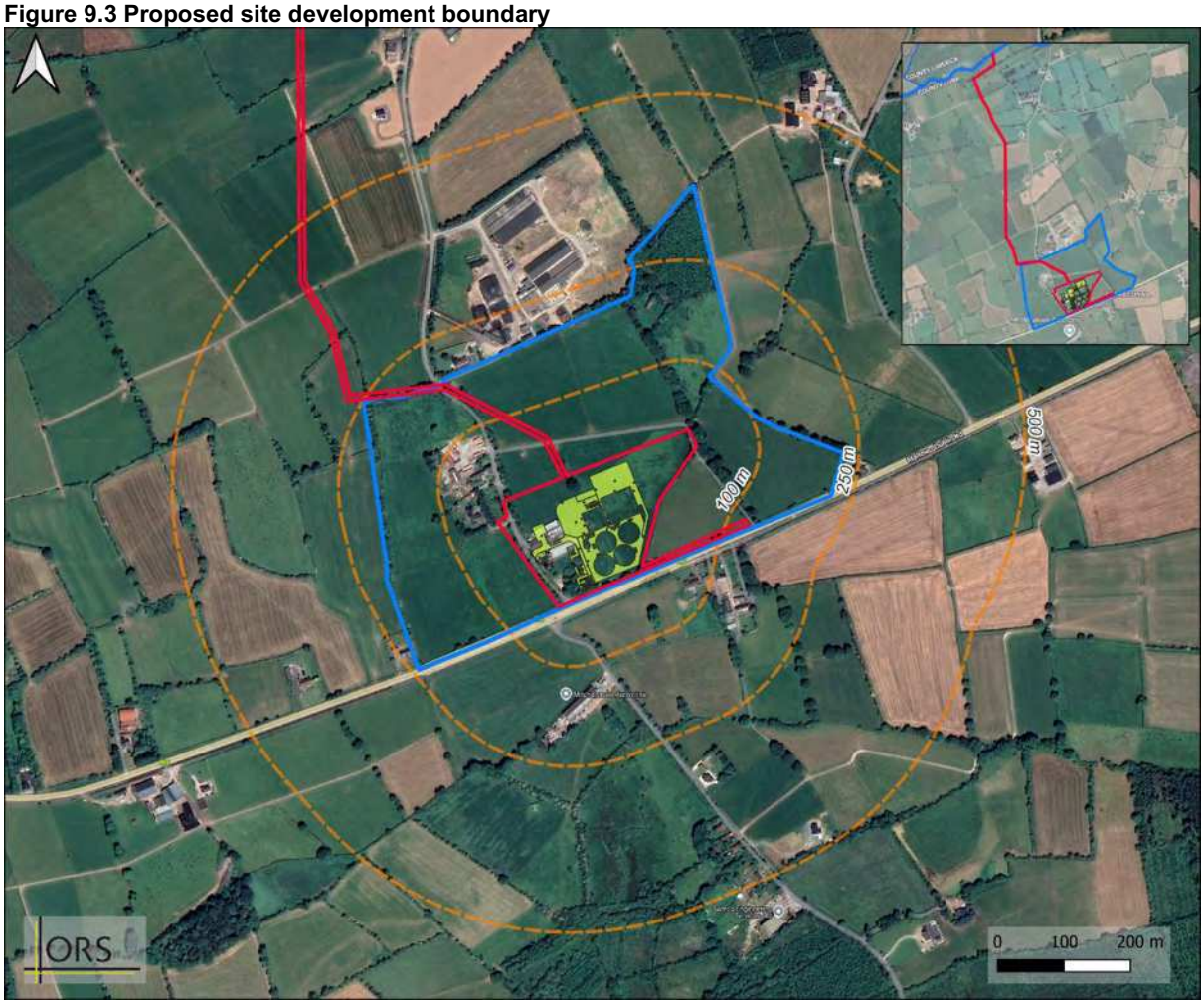
Receptor	NO_2				PM_{10}			
	DM (µg/m3)	DS (µg/m3)	Change (µg/m3)	Magnitude	DM (µg/m3)	DS (µg/m3)	Change (µg/m3)	Magnitude
R1	2.8	2.9	0.1	Negligible	18.28	18.29	0.01	Negligible

9.4 Description of the Receiving Environment

9.4.1 Background

This section of the chapter provides the baseline information in relation to air quality and odour that exists in the vicinity of the Proposed Development. The subject site occupies a total area of *ca.* 5.62 Ha and is situated in the townlands of Corracunna, Coolnanave and Garrane approximately 2km northeast of the town of Mitchelstown and 43km north of Cork City, Co. Cork. The approximate grid reference location for the centre of the site is R 82966 14199, ITM: 582918, 614234.

Figure 9.3 Proposed site development boundary



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 2022" (EPA 2023), 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 (EPA 2021), see **Figure 9.4** below. Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000 is defined as Zone D. In terms of air monitoring, the location of the Proposed Development is categorised as Zone D (EPA 2021). The development site was assessed as Zone D.

The typical baseline air quality data outlined below in **Table 9.12** is based on a review of the Air Quality Monitoring Report 2022 (EPA, 2023).

Table 9.12: Typical Air Quality Monitoring Data Representative of EPA Zone D Monitoring Sites

Pollutant	Zone D Monitoring Stations	EPA Baseline Monitoring Data Annual Mean 2022 (µg/m^3)	Average (µg/m^3)	Relevant Limit Value
NO_2	Emo Court	3.3	7.3	NO_2 annual mean limit for the protection of human health = 40 µg/m^3
	Birr	12.4		
	Castlebar	7.5		
	Carrick-on-Shannon	11.5		
	Kilkitt	2		
	Edenderry	7.3		
NO_X	Emo Court	4.6	14.0	NO_x annual mean limit for the protection of human health = 30 µg/m^3
	Birr	29.8		
	Castlebar	11.4		
	Carrick-on-Shannon	23.7		
	Kilkitt	2.6		
	Edenderry	11.8		
CO	Birr	0.3	0.3	CO maximum daily 8–hour mean value = 10 mg/m^3
PM_{10}	Castlebar	11.2	9.3	PM_{10} annual mean limit for the protection of human health = 40 µg/m^3
	Kilkitt	8.5		
	Claremorris	7.9		
	Askeaton	9.4		

It can be seen from the Table above that the annual mean concentrations for all pollutants are below the relevant limit values for the protection of human health.

The background concentrations utilised within this assessment represent an average of the above values.

As per AG4 guidance monitoring of background odours is inappropriate and cannot be added to modelled odour concentrations.

In summary, existing baseline levels of the pollutants based on extensive long-term data from the EPA 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.

9.4.2 Climate and Regional Air Quality

Applicable Agreements and Emissions Ceilings

Ireland ratified the Gothenburg Protocol at the 1979 UN Convention on Long Range Transboundary Air Pollution. The European Union directive on ambient air quality assessment and management came into effect in September 1996 96/62/EC and describes the policy framework for 12 air pollutants identified to have harmful effects on human health and the environment. Air quality limit levels (i.e. ambient pollutant concentrations not to be breached), for the pollutants are described through a series of daughter directives. The first daughter directive, 1990/30/EC, sets limit values for NO2, amongst other pollutants, in ambient air. Following the daughter directives, EU council directive 2008/50/EC came into effect in June 2008, combining the existing air quality legislation. Directive 2008/50/EC was transposed into Irish national legislation in 2011 through the Air Quality Standards Regulations 2011. The directive consolidated the four daughter directives and one council decision into a single directive on air quality. The new directive also introduced a new limit value for fine particulate matter, $PM_{2.5}$, but does not alter the existing air quality standards.

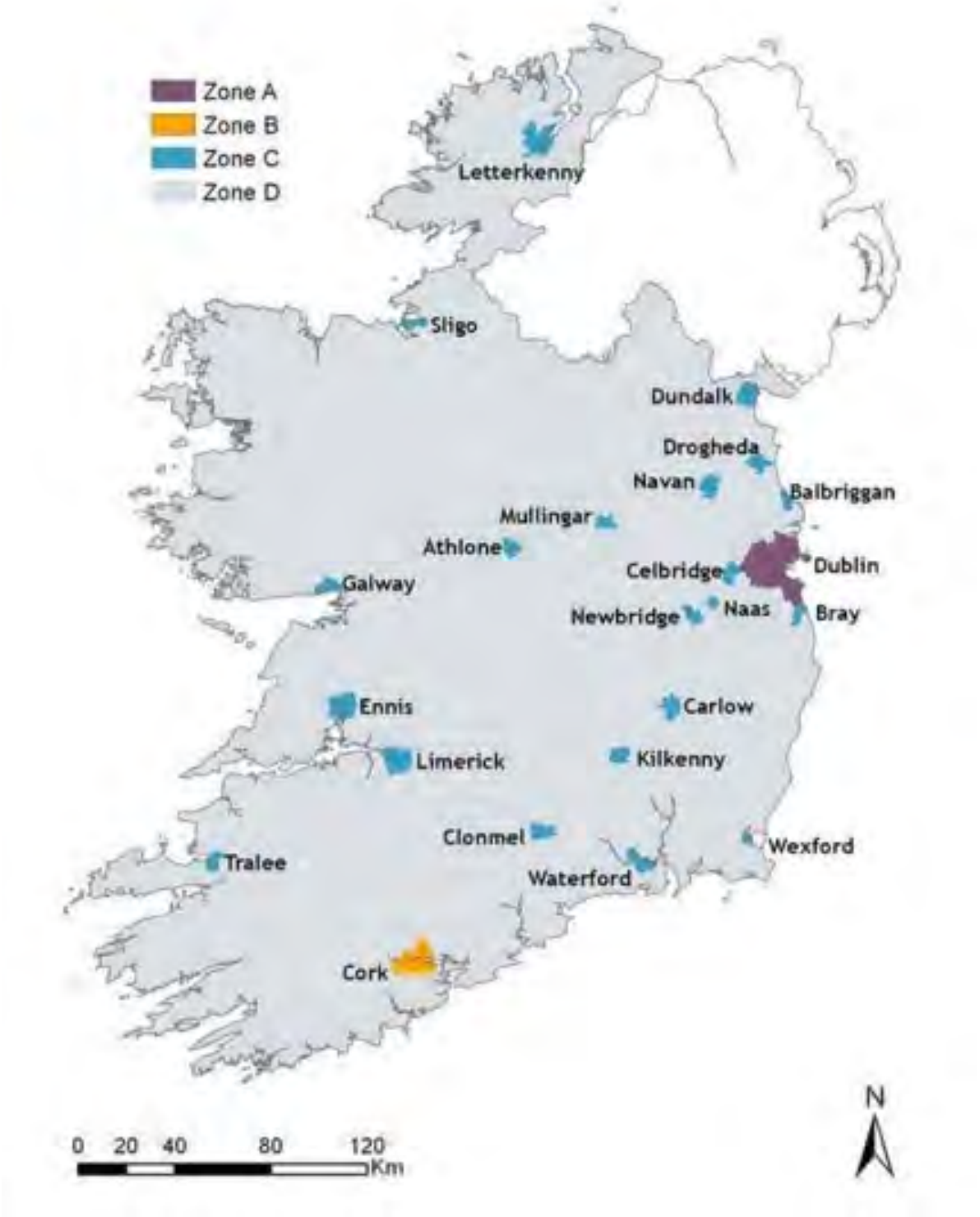
National emission reduction obligations defined targets for the main air pollutants to be attained in 2020 and into the future and to also contain emission reduction obligations for PM2.5. In relation to Ireland, 2020 emission targets are 25 kt for SO2 (65% below 2005 levels), 65 kt for NOX (49% reduction), 43 kt for VOCs (25% reduction), 108 kt for NH3 (1% reduction) and 10 kt for PM2.5 (18% reduction). The National Emissions Ceiling Directive (NECD - European Commission Directive 2001/81/EC) also proposed the same limit values as the Gothenburg Protocol (1999).

On a national level, the Air Pollution Act (1987) is the main legislation concerning air quality in Ireland and defines the process by which local authorities can take steps which are deemed necessary to manage air pollution appropriately.

As described above, the Air Quality Standards Regulations transpose Directive 2008/50/EC into Irish law. Limit values for various pollutants in ambient air are described in these regulations. With regard to this project/development the ambient background pollutant levels deemed applicable for human health and the environment in terms of annual mean are described in **Table 9.1 and 9.2.**

It is also important to note that 4 air quality zones have been established in Ireland for evaluation and management purposes. Dublin is categorized as Zone A and Cork as Zone B. Zone C consists of 23 towns with a population of greater than 15,000. The remainder of the country, which denotes rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D. The development site lies within Zone D.

Figure 9.4: Air Framework Directive Zones (EPA, Air Quality in Ireland Report 2016)



Climate Agreements

Ireland ratified the United Nations Framework Convention on Climate Change in April 1994 and the Kyoto Protocol in principle in 1997 and formally in May 2002. For the purposes of the European Union burden sharing agreement under Article 4 of the Kyoto Protocol, in June

1998, Ireland agreed to limit the net growth of the six Greenhouse Gases under the Kyoto Protocol to 13% above the 1990 level over the period 2008 to 2012.

The UNFCCC is continuing detailed negotiations in relation to GHGs reductions and in relation to technical issues such as Emission Trading and burden sharing. The most recent Conference of the Parties to the Convention (COP28) took place in United Arab Emirates from the 30th November to the 13th December 2023 and focussed on accelerating the implementation of the Paris Agreement having shown progress was too slow. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The "Paris Agreement", agreed by 200 nations, has a stated aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to greenhouse gas emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020.

The EU, on the 23rd/24th of October 2014, agreed the "2030 Climate and Energy Policy Framework". The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

The Climate Action and Low Carbon Development Act 2015 identifies plans to be drafted and accepted by the Government in relation to climate change for the purpose of a transition to a low carbon, climate resilient and environmentally sustainable economy. The act required the establishment of the Climate Change Advisory Council and the establishment and approval by the government of a National Mitigation Plan (to be published every five years), National Adaptation Framework and an Annual Transition Statement. The first National Mitigation Plan for Ireland was published in July 2017 and defines the central roles of the key Ministers accountable for the sectors covered by the Plan – Electricity Generation, the Built Environment, Transport and Agriculture. This first Plan defines the initial foundations to be implemented to transition Ireland to a low carbon, climate resilient and environmentally sustainable economy by 2050. The Plan also includes over 100 individual actions for various Ministers and public bodies to take forward.

In addition to the publication of the National Mitigation Plan (DCCAE, 2017), the government also publishes a Climate Action Plan, i.e. Climate Action Plan 2024 (Government of Ireland, 2024).

The Climate Action Plan outlines the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlines the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The Climate Action Plan also details the required governance arrangements for implementation including an increased level of involvement from local government.

The national policy position for Climate Change establishes a vision for Ireland of low-carbon by 2050 (80% reduction on 1990 emissions) across the electricity generation, built

environment and transport sectors; and in parallel, an approach to carbon neutrality in the agriculture and land use sectors, including forestry.

Regional Policy Objectives

A review of the Cork County Development Plan (2022 – 2028) was carried out to determine the policies and objectives relevant to climate action throughout the region

Applicable policy objectives in relation to climate are found below.

Climate Change Policy Objectives Applicable:

ET 13-1 - Energy

a) Ensure that County Cork fulfils its potential in contributing to the sustainable delivery of a diverse and secure energy supply and to harness the potential of the county to assist in meeting renewable energy targets and managing overall energy demand.

b) During the life of this plan, the Planning Authority will prepare a renewable energy strategy for the county.

ET 13-2 – Renewable Energy

a) Support Ireland's renewable energy commitments as outlined in Government Energy and Climate Change policies by facilitating the development of renewable energy sources such as wind, solar, geothermal, hydro and bio-energy and energy storage at suitable locations within the county where such development has satisfactorily demonstrated that it will not have adverse impacts on the surrounding environment (including water quality), landscape, biodiversity or amenities.

b) Support and facilitate renewable energy proposals that bring about a direct socio-economic benefit to the local community. The Council will engage with local communities and stakeholders in energy and encourage developers to consult with local communities to identify how they can invest in/gain from significant renewable energy development.

c) Support the development of new and emerging renewable energy technologies / fuels for the transport sector.

d) To promote the potential of micro renewables where it can be demonstrated that that it will not have adverse impacts on the surrounding environment (including water quality), landscape, biodiversity or amenities.

ET 1-17 - Bioenergy

a) Encourage the development of commercial bioenergy plants on brownfield sites which are adjacent to industrial areas or on lands which are reserved for industrial uses or on brownfield sites in rural areas. The Council may consider other lands for bioenergy production where the applicant has suitably demonstrated a location specific need for the type and scale of facility proposed and there is no adverse environmental or ecological impact on surrounding land, air, water and properties.

b) Commercial bioenergy plants should be located close to the energy source and the point of demand, where they can be served by public roads with sufficient capacity to absorb increased traffic flows and adjacent to transport corridors.

c) In rural areas, consideration will be given to proposals for bioenergy developments located close to the source material and where the road network in the area has capacity to absorb increased traffic flows. Such plants should, where possible, be located in proximity to existing agricultural buildings.

d) In all cases, visual, noise, odour, and amenity impact on adjacent properties, uses and amenity areas and wider cumulative impacts will be key considerations when assessing any such proposals.

ET 13-24 – Gas Network Infrastructure

Facilitate the sustainable delivery, improvement, and expansion of natural gas infrastructure throughout the County and have regard to the location of existing gas infrastructure in the assessment of planning applications.

ET 13-27 – Carbon Emissions Reduction

a) To reduce carbon emissions in the county by achieving national, regional and any potential county targets to progress the national targets as set out in the Climate Action Plan (2021).

b) To seek to reduce greenhouse gas emissions by promoting energy efficiency and the development of renewable energy sources utilising the natural resources of County Cork in an environmentally sustainable manner consistent with best practice and planning principles.

9.4.3 Future Climate Conditions

An EPA report, High-resolution Climate Projections for Ireland – A Multimodel Ensemble Approach, Report No. 339 details projected future baseline conditions. The report indicates that mid-century mean annual temperatures are predicted to rise by 1.3 – 1.6°C under worse case scenarios and incidences of heatwaves are expected to rise by the middle of the century. The coldest 5% of daily minimum temperatures are projected to rise by 1–2.4°C. Incidences of intense precipitation occurrences are predicted to increase over the year as a whole and in the winter and autumn months, with “likely” predicted increases of 5–19%. The number of extended dry periods (defined as at least 5 consecutive days for which the daily precipitation is less than 1mm) is also projected to increase substantially by the middle of the century over the full year and for all seasons except spring. The projected increases in dry periods are largest for summer.

9.4.4 Methodology for Assessing Impacts on Climate and Regional Air Quality

The quantity of carbon emitted from natural cycles through the earth’s atmosphere, waters, soils and biota is much greater than the quantity added by anthropogenic GHG sources. However, the focus of bodies such as the UNFCCC and the IPCC is on anthropogenic emissions because it is these emissions that have the potential to alter the climate by disrupting the natural balances in carbon’s biogeochemical cycle and altering the atmosphere’s heat-trapping ability.

Construction Phase

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 Proposed 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.

Operational Phase

Ireland's ESR emissions annual limit for 2023 is 40.52 Mt CO_2eq. Ireland's provisional 2023 greenhouse gas ESR emissions are 42.79 Mt CO_2eq, this is 2.27 Mt CO_2eq more than the annual limit for 2023. This value is the national total emissions less emissions generated by stationary combustion, i.e., power plants, cement plants, and domestic aviation operations that are within the EU's emissions trading scheme. Cumulatively from 2021-2023 and after using the ETS flexibility, Ireland is in compliance with the ESR by a net distance to target of 0.15 Mt CO_2eq, although in 2023 there is an exceedance of 0.36 Mt CO_2eq above its Annual Emissions Allocation with the ETS flexibility. Agriculture and Transport accounted for 76.0% of total ESR emissions in 2023.

Biomethane production and use as a fuel is considered CO_2 neutral and therefore does not add GHGs to the atmosphere if efficiently recovered and combusted for heat and/or electricity usage as it replaces the requirement for fossil fuels. The CO_2 component of biomethane is also considered carbon neutral, as the feedstock whether grass or animal waste has drawn the CO_2 from the atmosphere. This contrasts with conventional fossil fuel gases, which release additional CO_2 into the atmosphere from existing carbon sinks. It is also important to note that biomethane can be injected directly into existing gas networks, displacing the need for natural gas.

Given that approximately half of the feedstock for the Proposed Development will be animal waste such as manures and slurries, the methane from this feedstock will be captured, optimised, and utilised instead of being released into the atmosphere during traditional land spreading. The EU commissioned study (Biosurf, 2016) on the GHG emissions related to different methods of producing biomethane from different feedstocks was considered. This study was compared with various common scenarios. One of the scenarios studied compared the production of biogas from the biodegradable fraction of Municipal Solid Waste with landfilling of that same feedstock. This gives us indicative values only as animal manures would not be disposed to landfill. It found that a saving of 3.377 tonnes CO_2eq per ton of feedstock were made compared with landfilling. This included the emissions saved compared with the burning of virgin gas, on-site energy production, any emissions from the process and spreading of digestate as well as emissions avoided by diverting the feedstock from landfill. Given that the Proposed Development will use up to 90,000 tonnes of biodegradable feedstock per year there is a potential GHG emissions saving of 303,930 tonnes of CO_2eq. This equates to approximately 0.5% of Ireland's 60.62 million tonnes CO_2eq GHG emissions in 2023 (1990-2022 EPA Inventory data (updated July 2024).

Due to the production of *ca.* 810-960 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.

The Proposed Development will therefore have a slight positive impact on Ireland's greenhouse gas emissions in line with the Climate Action Plan (Government of Ireland, 2024) and therefore the climate. The SEAI estimates that carbon savings of 0.7 Mt CO_2

equivalent per annum by 2030 could be achieved through the displacement of fossil fuels with biomethane however this will only be achievable if developments such as the Proposed Development are constructed.

9.5 Likely Significant Effects

The assessment focuses on predicted effects in relation to air quality and climate. The assessment relates to effects occurring during both the construction and operational phases of the development.

9.5.1 Do-Nothing Scenario

The Do-Nothing scenario relates to the preservation of the current site with no Proposed Development occurring. In this situation, air quality will continue as per the baseline levels described in **Section 9.4.1** and will alter with respect to changes in the local and wider area (this includes but is not limited to: affects from new potential developments, road layout / traffic patterns, upgrades/developments to vehicle technology etc.). Currently the piggery 215m north of the development is facilitating land spreading in the local area. This gives rise to associated emissions from the land spreading process. As a result of the transport of the agricultural wastes there is high HGV traffic flow from the existing piggery to local farms. Considering this, the do-nothing scenario can be deemed neutral in terms of air quality, odour and climate.

9.5.2 Receptor Sensitivity

Construction

Regarding the construction stage of the Proposed Development the most likely effect on air quality will be from construction dust emissions (nuisance dust and PM_{10}/$PM_{2.5}$ emissions) associated with activities such as excavations, infilling materials, stock piling and movement of vehicles.

The Proposed Development is deemed large in scale and nature and is classified as such with respect to “Potential for Construction Dust Effects (TII, 2011)” therefore there is the potential for significant dust soiling 100m from the construction source (TII 2011) (**Table 9.13**).

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. 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.

Table 9.13: Potential for Construction Dust Effects (TII, 2011)

Source		Potential Distance for Significant Effects (Distance from Source)		
Scale	Description	Soiling	PM_{10}	Vegetation Effects
Major	Large construction sites, with high use of haul roads	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul roads	50m	15m	15m
Minor	Minor construction sites, with limited use of haul roads	25m	10m	10m

IAQM (2024) conditions described in **Appendix 9.1** were also considered, these detail how the estimation of dust emission magnitudes (prior to mitigation) for earthworks, construction and track out actions which are shown in **Table 9.14** were completed.

Table 9.14 Summary of Dust Emissions Magnitudes (Before Mitigation).

Activity	IAQM Criteria	Dust Emission Magnitude
Earthworks	Total site area where earthworks may occur is >10,000m^2 Undeveloped land –soil type may include potentially dusty soil The number of heavy earth moving vehicles active at any one time is estimated to be approximately 5-10 The height of bunds on site will be 4-8m The total material to be moved is estimated to be >20,000 tonnes Earthworks may occur in both wet and dry months.	Large
Construction	Total building volume will approximately be <25,000m^3. Construction materials are expected to be potentially dusty. On-site concrete batching is not expected to be proposed.	Medium
Trackout	Number of heavy vehicles per day out of the site is estimated to be 10-50 Vehicle may travel on unpaved roads 50-100m The surface type of the site has the potential to be dusty	Large

According to IAQM construction dust guidance the following factors are considered with regard to sensitivity of an area:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and
- Site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Human and ecological receptors are assessed against the potential effect from the associated construction of the development and HGV routes which could generate trackout. It is expected that site traffic will access/egress the site via the N73 to the south of the site.

Table 9.15 describes the established sensitivity of the locality with the factors specified that guided the assessment (please refer to **Appendix 9.1** for more information). Construction activities are applicable up to 250m from the Proposed Development site boundary, however trackout actions are only deemed applicable 50m from the periphery of the route, in accordance with IAQM construction dust guidance. Online NPWS (National Parks and

Wildlife Services) databases were used to locate sensitive ecological receptors in the vicinity of the Proposed Development. Human receptors were determined by referring to online satellite imagery (see **Figure 9.2**).

Table 9.15 Sensitivity of the area

Potential Effect		Sensitivity of the surrounding area		
		Earthworks	Construction	Trackout
Dust soiling	Receptor sensitivity	High	High	High
	Number of receptors	1-10	1-10	1-10
	Distance from the source	<250m	<250m	<250m
	Overall Sensitivity of the Area	**Low**	**Low**	**Low**
Human health	Receptor sensitivity	High	High	High
	Number of receptors	1-10	1-10	1-10
	Distance from the source	<250m	<250m	<250m
	Overall Sensitivity of the Area	**Low**	**Low**	**Low**
Ecological	Receptor sensitivity	**NA**		

According to the National Parks and Wildlife Services website (https://www.npws.ie/) there are no ecologically designated sites (Special Protection Areas, Special Areas of Conservation or Natural Heritage Areas) within 50m of the site boundary or potential routes along which track out could arise. Construction relating to the gas pipeline and discharge pipeline also fall into these routes and effects from these will be insignificant compared to the construction dust arising from rest of the site, therefore construction dust would not have an effect on any ecological receptors.

Construction - Risk of Effects

The dust emission magnitude described in **Table 9.14** has been merged with the sensitivity of the area in **Table 9.15** to establish the risk of effects of construction activities before mitigation. These have been assessed considering risk categories of each activity in **Appendix 9.1**.

Dust risk effects from construction activities are classified as low risk, as is shown in **Table 9.16**. Mitigation measures to decrease construction phase effects are defined based on this assessment in **Section 9.6**.

Table 9.16 Summary of Dust Risk from Construction Activities

Potential Impact	Dust Risk Impact		
	Earthworks	Construction	Trackout
Dust soiling	Low risk	Low risk	Low risk
Human health	Low risk	Low risk	Low risk

Operational

Sensitive receptors within 1km of Proposed Development and its access road were selected for inclusion within the odour and air dispersion modelling assessments. The sensitive receptors modelled represent residential and amenity (i.e. schools, churches etc.) within the vicinity of the Proposed Development and were chosen due to their proximity to the Proposed Development. Designated sites up to 15km away were also considered within the evaluation, the model extents were that of a 1km radius for residential and community receptors and 15km radius for designated sites - therefore any points beyond this used representative locations within the scope of the model.

Details of the receptor locations are provided in **Table 9.17, 9.18** and **9.19**. In addition to predicting the worst-case impact beyond the site boundary, the predicted impact at the worst-case sensitive receptor will also be reported for the dispersion modelling results (see **Section 9.5.4**).

Table 9.17 Residential Sensitive Receptors within 1km of Subject Site

Receptor Identity	Receptor Description	X Coordinate (m) UTM	Y Coordinate (m) UTM	Direction from application area	Approx. distance from site boundary (m)
R1	Residential Property	582731	614545	N	149
R2	Residential Property	582765	614318	W	57
R3	Residential Property	583091	614215	SE	63
R4	Residential Property	582656	614099	SW	255
R5	Residential Property	582511	614060	SW	396
R6	Residential Property	583336	614386	E	240
R7	Residential Property	582351	613921	SW	606
R8	Residential Property	582257	613964	SW	665
R9	Residential Property	582085	613914	SW	842
R10	Residential Property	581949	613871	SW	983
R11	Residential Property	581966	613816	SW	992
R12	Residential Property	581984	613781	SW	993
R13	Residential Property	583586	614433	E	488
R14	Residential Property	583524	614903	NE	627
R15	Residential Property	583327	614884	NE	493
R16	Residential Property	583441	615118	NE	753
R17	Residential Property	582619	615294	N	899
R18	Residential Property	582634	614918	N	531
R19	Residential Property	583122	613924	S	320
R20	Residential Property	583285	613843	SE	466
R21	Residential Property	583200	613777	SE	487
R22	Residential Property	583454	613686	SE	693
R23	Residential Property	583488	613532	SE	837
R24	Residential Property	583517	613493	SE	886
R25	Residential Property	583536	613458	SE	927
R26	Residential Property	583553	613423	SE	965

R27	Residential Property	583649	613470	SE	983

Table 9.18 Commercial, Education, Religious, Community Etc. Sensitive Receptors within 1km of Subject Site

Receptor Identity	Receptor Description	X Coordinate (m) UTM	Y Coordinate (m) UTM	Direction from application area	Approx. distance from centre of subject site (m)
C1	Farmyard	582859	614639	N	215
C2	Farmyard	582751	614397	W	51
C3	Farmyard	583166	614180	SE	145
C4	Farmyard	583305	614931	NE	525
C5	Farmyard	583550	614867	NE	620
C6	Farmyard	583619	614412	E	521
C7	Grid Injection Facility	583875	614508	E	782
C8	Mechanic	582944	614044	SE	142
C9	Farmyard	582646	615017	N	623
C10	Farmyard	582739	615049	N	638
C11	Farmyard	582802	615146	N	725
C12	Farmyard	581980	614186	W	850
C13	Farmyard	582297	613901	W	662
C14	Farmyard	582254	614007	W	650
C15	Engineering Company	583220	613719	S	547
C16	Farmyard	583502	613725	S	694

Table 9.19 European Designated Sites within a 15 km Radius of the Subject Site

Receptor Identity	Designated Site	Citation	X Coordinate (m) UTM	Y Coordinate (m) UTM	Direction from application area	Approx. distance from centre of subject site (m)
DS1	Galtee Mountains	SAC	590416	612564	N	7550
DS2	Lower River Suir	SAC	587895	607159	E	8586
DS3	Blackwater River	SAC	585041	620479	SE	6335
DS4	Blackwater Callows	SPA	584211	600557	S	13689
DS5	Carrigeenamronety Hill	SAC	571009	615714	W	11864
DS6	Ballyhoura Mountains	SAC	568344	615539	W	14501

9.5.3 Point Sources - Operational Phase

The information relating to the operational phase impacts of the Proposed Development is drawn from the operation of the AERMOD model. It is important to note that emissions are overestimated where possible in terms of input i.e. emission rates, background concentration, operating hours, location of concentrations, ambient air limit values, worst case locations, modelled years results considered etc.

9.5.4 Receptor Results

Odour

Odour modelling was carried out for each individual year with the results at the nearest sensitive locations presented in **Table 9.20** below. All results are the odour concentration in (ou_E/m^3).

Table 9.20: 98th Percentile of the Max 1-hr odour levels at nearest residential properties

Location	2019	2020	2021	2022	2023	Average
R1	1.50	1.36	1.53	1.59	1.49	1.49
R2	0.99	1.70	1.39	1.23	1.54	1.37
R3	1.80	1.78	1.86	1.86	1.78	1.82
R4	0.34	0.42	0.41	0.62	0.67	0.49
R5	0.15	0.22	0.20	0.29	0.33	0.24
R6	0.65	0.67	0.60	0.61	0.71	0.65
R7	0.08	0.11	0.10	0.16	0.19	0.13
R8	0.04	0.08	0.07	0.09	0.12	0.08
R9	0.03	0.05	0.05	0.06	0.07	0.05
R10	0.03	0.04	0.04	0.04	0.06	0.04
R11	0.02	0.04	0.04	0.05	0.07	0.05
R12	0.03	0.04	0.04	0.06	0.09	0.05
R13	0.31	0.34	0.26	0.27	0.32	0.30
R14	0.20	0.30	0.20	0.22	0.25	0.23
R15	0.36	0.42	0.44	0.48	0.52	0.45
R16	0.21	0.27	0.25	0.30	0.31	0.27
R17	0.24	0.21	0.23	0.20	0.29	0.23
R18	0.34	0.39	0.37	0.36	0.40	0.37
R19	0.55	0.45	0.57	0.46	0.55	0.52
R20	0.62	0.55	0.57	0.70	0.62	0.61
R21	0.39	0.34	0.42	0.36	0.40	0.38

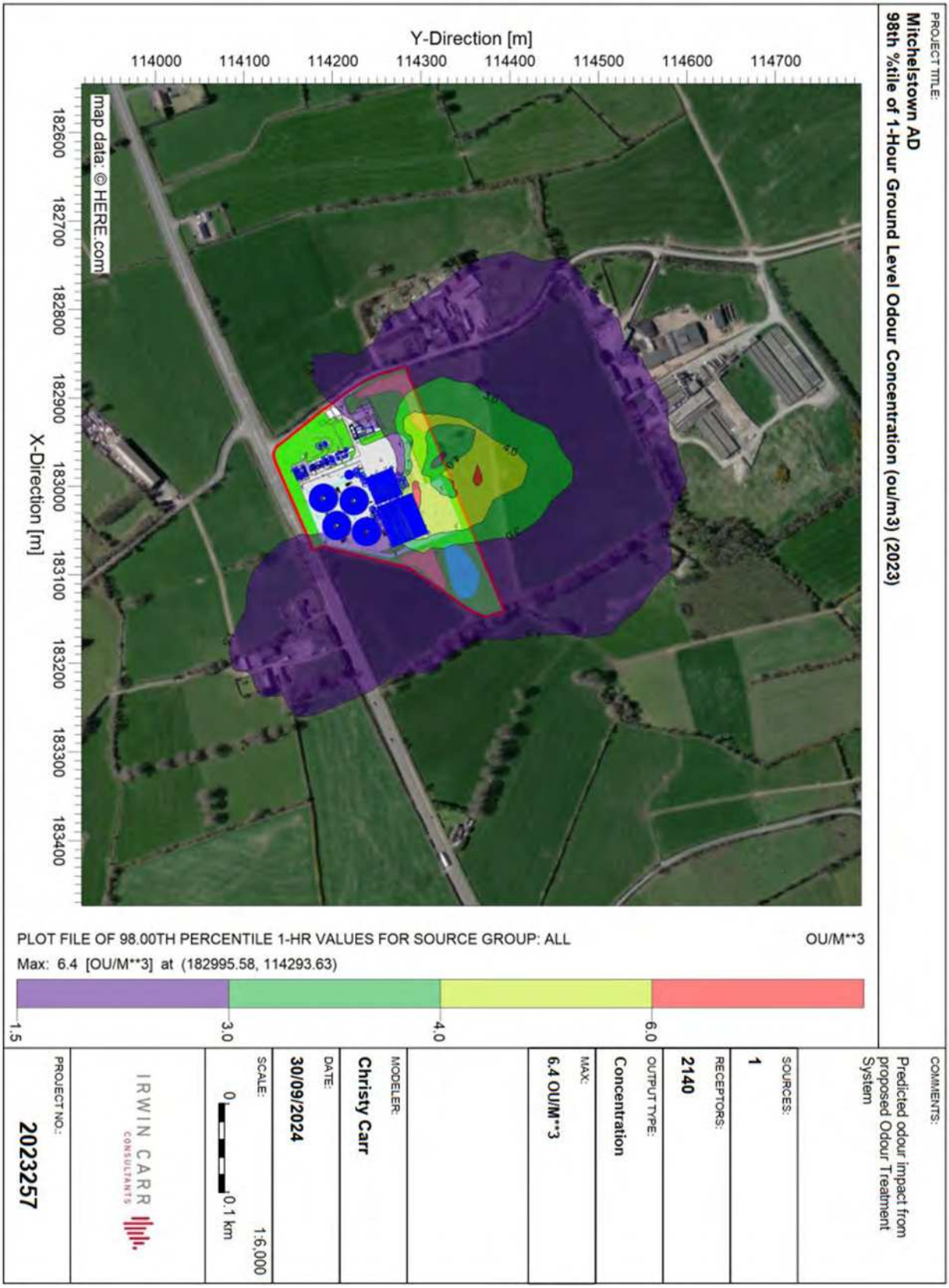
Location	2019	2020	2021	2022	2023	Average
R22	0.48	0.41	0.43	0.53	0.40	0.45
R23	0.30	0.26	0.27	0.35	0.28	0.29
R24	0.28	0.24	0.26	0.33	0.27	0.28
R25	0.27	0.23	0.25	0.30	0.25	0.26
R26	0.24	0.21	0.23	0.28	0.24	0.24
R27	0.34	0.26	0.28	0.37	0.26	0.30
C1	1.40	1.37	1.46	1.30	1.46	1.40
C2	1.99	1.96	2.20	1.97	1.95	2.01
C3	1.60	1.51	1.60	1.58	1.58	1.57
C4	0.34	0.45	0.42	0.46	0.48	0.43
C5	0.16	0.29	0.17	0.20	0.23	0.21
C6	0.31	0.30	0.23	0.27	0.30	0.28
C7	0.14	0.18	0.11	0.12	0.15	0.14
C8	0.34	0.31	0.40	0.34	0.44	0.37
C9	0.27	0.35	0.31	0.28	0.33	0.31
C10	0.34	0.31	0.35	0.28	0.38	0.33
C11	0.32	0.26	0.34	0.30	0.32	0.31
C12	0.04	0.06	0.06	0.04	0.07	0.05
C13	0.07	0.09	0.08	0.15	0.14	0.10
C14	0.04	0.07	0.07	0.08	0.11	0.08
C15	0.32	0.28	0.34	0.29	0.33	0.31
C16	0.54	0.50	0.55	0.60	0.41	0.52

For the proposed site layout, all approved or existing dwellings are below the $1.5ou_E/m^3$ when considered as individual years and as a 5-year average of the 98th percentile.

Receptor ID		Maximum Annual 98th Percentile Hourly Mean Concentration (ou_E/m^3)		Receptor Sensitivity	Impact Descriptor
C2	Farmyard to the W	2.20	2021	High	Slight
C3	Farmyard to the SE	1.60	2021	High	Slight
C4	Farmyard to the NE	0.48	2023	High	Negligible
C5	Farmyard to the NE	0.29	2020	High	Negligible
C6	Farmyard to the E	0.31	2019	High	Negligible
C7	Grid Injection Facility to the E	0.18	2020	Medium	Negligible
C8	Mechanic to the SE	0.44	2023	Medium	Negligible
C9	Farmyard to the N	0.35	2020	High	Negligible
C10	Farmyard to the N	0.38	2023	High	Negligible
C11	Farmyard to the N	0.34	2021	High	Negligible
C12	Farmyard to the W	0.07	2023	High	Negligible
C13	Farmyard to the W	0.15	2022	High	Negligible
C14	Farmyard to the W	0.11	2023	High	Negligible
C15	Engineering Company to the S	0.34	2021	Medium	Negligible
C16	Farmyard to the S	0.60	2022	High	Negligible

As indicated in **Table 9.21**, the significance of odour impacts has been predicted to be no worse than 'Negligible' at most receptors and 'Slight' at R1, R2, R3, C2 and C3.
The AG5 guidance states that only if the impact is greater than slight, the effect is considered significant. As such, the impact at all of the receptors is considered not significant, in accordance with the stated methodology.

Figure 9.5: Modelled 98th Percentile Hourly Ground Level Mean Concentration (ou_E/m^3)



NO_2

For the purposes of this assessment the emissions of oxides of nitrogen have been recorded as nitrogen dioxide in the risk assessment (as nitrogen oxide converts to nitrogen dioxide over time) as follows:

- For short-term PCs and PECs, assume only 50% of emissions of oxides of nitrogen convert to nitrogen dioxide in the environment
- For long-term PCs and PECs, assume all oxides of nitrogen convert to nitrogen dioxide

NO_2 modelling was carried out for each individual year with the results at the nearest sensitive locations presented in **Table 9.22** and **9.23** below. All results are the NO_2 concentration in $\mu g/m^3$.

Table 9.22: Annual Average NO_2 concentrations at nearest residential locations

Location	2019	2020	2021	2022	2023	Average
R1	0.69	0.58	0.66	0.78	0.74	0.69
R2	1.47	1.11	1.33	1.36	1.30	1.31
R3	2.12	2.14	1.67	1.75	2.11	1.96
R4	0.25	0.34	0.31	0.35	0.39	0.33
R5	0.14	0.22	0.18	0.20	0.23	0.19
R6	0.41	0.53	0.28	0.46	0.46	0.43
R7	0.09	0.11	0.12	0.15	0.18	0.13
R8	0.08	0.14	0.12	0.13	0.16	0.12
R9	0.06	0.10	0.08	0.09	0.11	0.09
R10	0.04	0.07	0.06	0.06	0.08	0.06
R11	0.04	0.06	0.06	0.06	0.08	0.06
R12	0.04	0.06	0.06	0.07	0.08	0.06
R13	0.24	0.29	0.17	0.26	0.25	0.24
R14	0.18	0.24	0.23	0.21	0.21	0.21
R15	0.27	0.36	0.32	0.30	0.33	0.31
R16	0.18	0.25	0.21	0.21	0.23	0.22
R17	0.19	0.20	0.19	0.19	0.21	0.19
R18	0.28	0.28	0.28	0.29	0.32	0.29
R19	0.58	0.62	0.63	0.59	0.60	0.60
R20	0.52	0.54	0.61	0.53	0.47	0.54
R21	0.39	0.39	0.41	0.38	0.39	0.39
R22	0.42	0.41	0.49	0.45	0.36	0.43
R23	0.27	0.26	0.29	0.29	0.23	0.27
R24	0.24	0.24	0.27	0.26	0.21	0.25

Location	2019	2020	2021	2022	2023	Average
R25	0.23	0.23	0.25	0.25	0.20	0.23
R26	0.22	0.21	0.23	0.23	0.19	0.22
R27	0.26	0.25	0.30	0.27	0.22	0.26
C1	0.59	0.57	0.63	0.61	0.62	0.60
C2	1.27	0.89	0.97	1.16	1.13	1.08
C3	1.66	1.37	1.42	1.20	1.47	1.42
C4	0.28	0.36	0.30	0.30	0.34	0.32
C5	0.17	0.23	0.21	0.19	0.20	0.20
C6	0.24	0.28	0.18	0.24	0.23	0.24
C7	0.15	0.17	0.10	0.15	0.15	0.14
C8	0.49	0.45	0.57	0.51	0.51	0.51
C9	0.26	0.27	0.25	0.26	0.29	0.27
C10	0.29	0.27	0.28	0.28	0.29	0.28
C11	0.27	0.24	0.26	0.27	0.26	0.26
C12	0.08	0.11	0.10	0.08	0.10	0.09
C13	0.08	0.10	0.10	0.13	0.16	0.12
C14	0.09	0.15	0.12	0.13	0.14	0.13
C15	0.32	0.32	0.34	0.31	0.32	0.32
C16	0.48	0.45	0.56	0.52	0.42	0.49
Limit	**40**	**40**	**40**	**40**	**40**	**40**

Table 9.23 below details the 99.8% of Max 1-Hour NO_2 concentration at each of the sensitive receptors for the MET Data 2019 – 2023.

Table 9.23: Short Term NO_2 concentrations at nearest residential locations

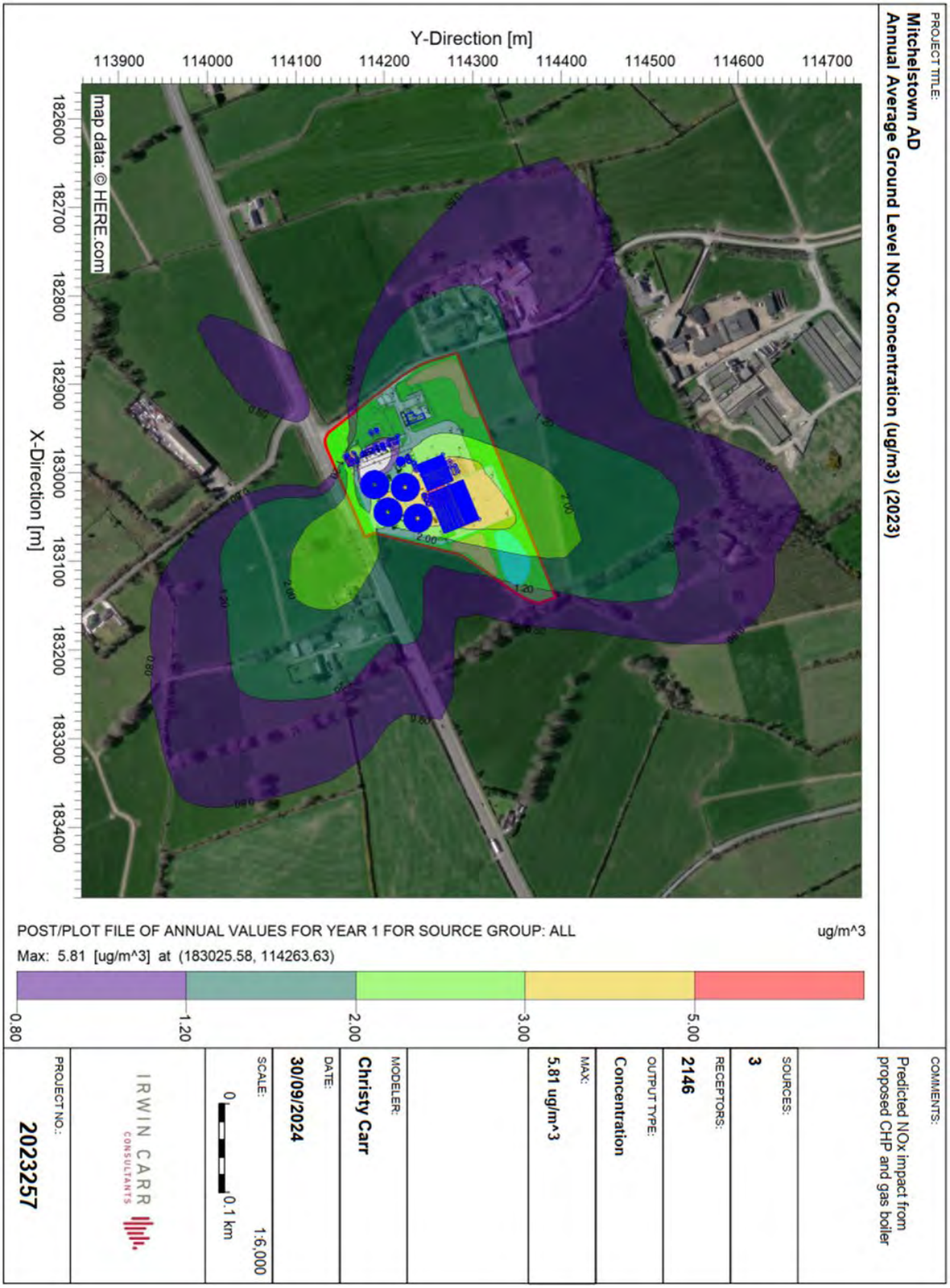
Location	99.8% of Max 1-Hour
R1	9.9
R2	16.9
R3	22.4
R4	13.7
R5	9.2
R6	12.7
R7	5.7
R8	6.1

R9	4.5
R10	3.5
R11	3.3
R12	3.1
R13	6.4
R14	4.4
R15	5.5
R16	4.2
R17	4.7
R18	6.8
R19	8.7
R20	7.3
R21	6.8
R22	6.4
R23	4.9
R24	4.7
R25	4.5
R26	4.4
R27	4.7
C1	8.3
C2	12.6
C3	15.0
C4	6.0
C5	4.4
C6	6.3
C7	4.3
C8	15.8
C9	6.5
C10	6.8
C11	5.9
C12	4.1
C13	5.3
C14	6.2

C15	6.0
C16	7.1
Limit	**200**

The results above have assumed that 50% of short-term emissions of oxides of nitrogen convert to nitrogen dioxide.

Figure 9.6: Modelled Annual Average NOx Concentrations (ug/m^3)



CO

CO modelling was carried out for each individual year with the results at the nearest sensitive location presented in **Table 9.24** below. All results are the CO concentration in µg/m^3.

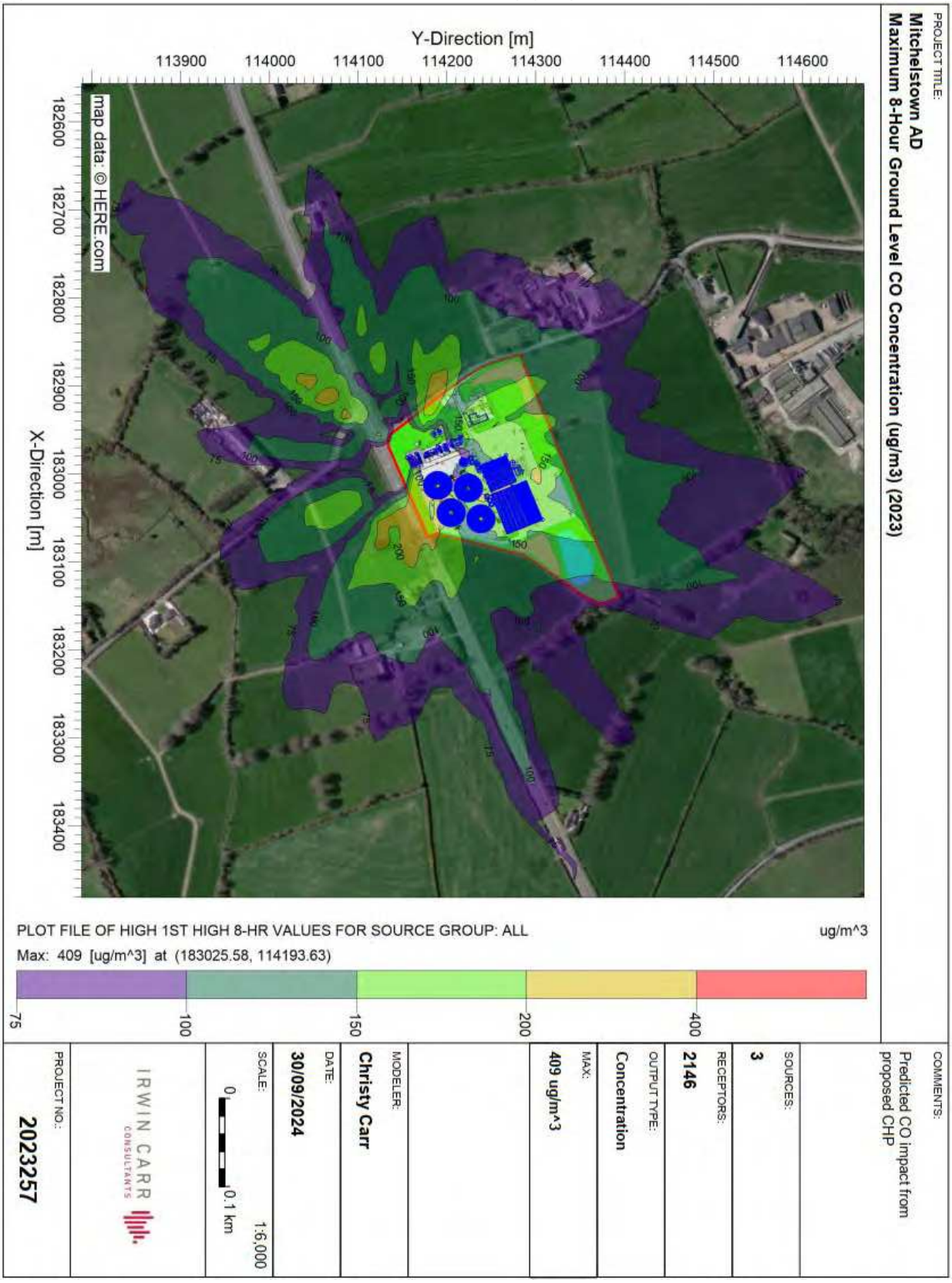
Table 9.24: Maximum Daily 8-Hour Mean CO concentration at nearest residential locations

Year	2019	2020	2021	2022	2023	Average
R1	42.6	41.0	40.0	53.5	55.2	46.4
R2	113.0	127.3	121.9	105.7	96.8	112.9
R3	139.3	153.1	144.6	156.3	167.6	152.2
R4	90.9	50.4	53.2	60.7	79.6	67.0
R5	61.2	47.1	29.9	36.2	59.9	46.9
R6	56.2	66.5	48.4	64.3	71.6	61.4
R7	41.1	23.7	33.6	38.3	29.4	33.2
R8	28.3	40.6	26.4	29.9	66.5	38.3
R9	21.3	27.9	18.6	20.8	47.0	27.1
R10	17.2	16.7	10.9	13.8	24.3	16.6
R11	14.3	15.0	10.7	14.2	19.5	14.7
R12	11.2	12.3	12.8	17.2	17.6	14.2
R13	27.4	44.1	31.6	30.1	45.5	35.7
R14	23.6	24.2	52.2	34.1	22.1	31.3
R15	32.5	42.6	57.0	39.7	47.2	43.8
R16	25.3	27.6	37.0	30.2	33.5	30.7
R17	21.5	16.3	16.6	14.9	21.7	18.2
R18	27.9	27.9	22.7	28.9	30.6	27.6
R19	43.4	52.1	43.3	52.0	48.1	47.8
R20	42.6	51.3	50.7	42.0	30.4	43.4
R21	33.4	37.5	27.5	37.1	30.5	33.2
R22	34.2	35.5	28.9	29.2	29.7	31.5
R23	28.4	22.1	26.1	28.1	18.9	24.7
R24	27.3	21.0	24.1	26.6	17.7	23.3
R25	26.8	19.7	22.2	24.8	16.9	22.1
R26	26.3	18.4	20.7	23.0	16.2	20.9
R27	23.1	23.3	19.1	22.0	19.9	21.5
C1	36.6	42.9	44.8	40.4	34.0	39.8
C2	84.6	75.5	69.0	73.1	77.4	75.9
C3	103.2	96.0	111.0	105.7	97.1	102.6
C4	34.1	34.9	57.1	32.8	35.4	38.9
C5	23.3	40.0	46.2	27.2	25.7	32.5
C6	26.8	42.6	37.0	20.3	31.2	31.6
C7	20.3	27.1	18.1	17.2	27.4	22.0
C8	93.3	81.9	85.2	55.6	73.8	78.0
C9	34.7	36.6	19.2	21.1	24.3	27.2

C10	28.4	29.0	24.6	25.1	31.0	27.6
C11	31.1	18.0	18.6	28.3	24.2	24.0
C12	16.0	21.5	19.5	27.7	28.0	22.5
C13	38.0	18.8	28.9	39.0	26.9	30.3
C14	29.5	63.8	42.9	37.0	42.7	43.2
C15	31.4	31.9	25.9	33.1	25.1	29.5
C16	41.2	31.7	40.7	34.9	30.8	35.9
Limit	**10,000**	**10,000**	**10,000**	**10,000**	**10,000**	**10,000**

The predicted 8-hour ground level CO concentrations in each year, as well as the 5-year average are significantly below the limit values.

Figure 9.7: Modelled Maximum 8-Hour CO Concentrations (ug/m^3)



Receptor Summary

Table 9.25 below compares the highest annual average predicted levels at the residential receptors where:

- 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.
- PC and PEC as a percentage of the objective or guideline.

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 9.25: 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	22.4	37.0	11.2	18.5
	Annual Avg	40	7.3	2.14	9.4	5.3	23.6
Carbon Monoxide (CO)	8-hr mean	10,000	0.3	167.6	167.9	1.7	1.7
Odour	98th %tile of 1-Hour	3	0	2.20	2.20	73.2	73.2

**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.

9.5.5 Critical Levels and Critical Loads for Designated Ecological Sites

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, shown in **Table 9.19**.

Nitrogen Conversion

The Critical Load specifies the annual nitrogen that can be deposited for a given area per year. Below this level, sensitive habitat should not be affected. The dry deposition flux (µg/$m^{2/}$s of NO_2) was calculated using AQTAG06 (Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air), where the predicted ground level of NO_2 (in µg/m^3) was multiplied by the relevant deposition velocity.

The dry deposition was then multiplied by the conversion factor provided in the guidance to convert to the levels of kg.N/ha/yr. The conversion factors are provided in Table 8.1 and 8.2 of the AQTAG06 as presented in the **Table 9.26** below.

Table 9.26: Conversion Factors

Pollutant	NH_3 Deposition Velocity (m/s)	Conversion Factor
NO_2 to N	0.0015 (short vegetation)	95.9

Table 9.27 below converts the highest Process Contribution in µg/m^{-3} to kg.N/ha/yr, using the conversion factors detailed in **Table 9.26** above.

Table 9.27: Conversion of Highest NO_2 Results

Location	Pollutant	Highest PC (µg/m^{-3})*	$N0_2$ Deposition Velocity (m/s)	Conversion Factor	Highest PC (kg.N/ha/yr)
DS1	NO_2 to N	0.022	0.0015 (short vegetation)	95.9	0.0032
DS2		0.021			0.0031
DS3		0.004			0.0006
DS4		0.005			0.0007
DS5		0.001			0.0002
DS6		0.001			0.0002

**The highest PC at all locations is predicted when the volume flow from the facility is at 100%, rather than at 75%. Full details of the assessment undertaken at 75% are included in Appendix 9.5.*

It should be noted that the worst-case results presented in the Table above take account of the additional assessment undertaken, which accounts for the facility at 75% volume flow rather than maximum capacity.

Using similar methodology to the assessment undertaken in **Section 9.5.4** above the PC and PEC can be seen in **Table 9.28** below.

Table 9.28: Nitrogen concentration at designated ecologically sensitive locations.

Location		Critical Load (kg N/ha/yr)	Background (kg N/ha/yr)	Highest PC (kg.N/ha/yr)	PEC (kg N/ha/yr)	PC/ Guideline level (%)	PEC/ Guideline level (%)
DS1	Galtee Mountains SAC	5	8.16	0.0032	8.16	**0.06**	163
DS2	Lower River Suir SAC	5	7.83	0.0031	7.83	**0.06**	157
DS3	Blackwater River SAC	5	8.78	0.0006	8.78	**0.01**	176
DS4	Blackwater Callows SPA	5	7.81	0.0007	7.81	**0.01**	156
DS5	Carrigeenamronety Hill SAC	5	8.50	0.0002	8.50	**0.00**	170
DS6	Ballyhoura Mountains SAC	5	7.86	0.0002	7.86	**0.00**	157

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.

9.5.6 Human Health

Air dispersion modelling was completed to evaluate the potential effects of the Proposed Development regarding EU ambient air quality standards which were established on the grounds of protecting human health. As shown by the models results, projected ambient concentrations including background levels fall within all National and EU ambient air quality limit values and, thus, will not cause a significant impact on human health.

Conservative and robust assumptions were made defining the input data for the air dispersion model, this methodology results in an over-estimation of actual real-world levels that are likely to be generated.

9.5.7 Impact from other Potential Emissions Points

The 1no. flare will operate infrequently therefore it is envisaged that this emission point will have an insignificant effect on local air quality beyond the site boundary. The effect to air quality and climate from the flare is classed as negligible.

The proposed pressure relief valves also have the potential to release emissions to the atmosphere however due to the infrequent extent of these emissions, small scale nature and mitigation features included as part of plant design these emissions are considered not significant as a source for possible impacts to local air quality and odour. A review of

associated mitigation features with regard to process emissions to the atmosphere can be viewed in **Section 9.6.2**.

Another possible source of nuisance emission is fugitive odour emissions from transfer and handling of feedstock arriving to site. A review of intended abatement measures associated with this type of odour emissions can be found in **Section 9.6.2**.

9.5.8 Traffic

The volume of traffic associated with the Proposed Development will not be significant during both operation and construction, quantitative evaluation of ambient air quality and climate impacts was not required under the criteria from the TII guidelines (2011) (see **Section 9.3.2**). During site operation the Proposed Development will cause an extra 16 HGV/day during sites busiest periods to the neighbouring road network and is below the 200HGV level for change in traffic volumes which requires a quantitative assessment. Therefore, the influence from traffic linked to the Proposed Development with regard to climate will be long term and not significant.

9.5.9 Climate

Producing biomethane for use as a fuel source is deemed CO_2 positive and consequently does not add GHGs to the environment as long as efficient recovery and combustion for heat and/or power is used as it substitutes the need for fossil fuels.

The generation of *ca.* 810-960 Nm^3 of biomethane per hour which will be distributed to the gas network for use as an alternative to conventional fossil fuels will also contribute to being CO_2 positive. The outcome of the Proposed Development once in operation will be a slight, positive, long-term effect on climate and regional air quality. Therefore, the Proposed Development will have a slight positive impact on reducing agricultural greenhouse gas emissions in County Cork and national greenhouse gas emissions in accordance with the Climate Action Plan (Government of Ireland, 2024).

The Proposed Development will be self-reliant with regard to heat and power production as the CHP and biomethane boiler onsite will both run on the biomethane generated at the plant.

9.5.10 Decommissioning Phase

The decommissioning stage climate and air quality impacts will be similar to those defined for the construction stage of the Proposed Development.

9.5.11 Risks of Accidents and Disasters

The Proposed Development will be licenced under the Industrial Emissions (IE) Directive; therefore the site will conform with all appropriate legislation and will apply all risk reduction processes as specified within the relevant IE licence in order to avoid off-site impacts. Additionally, the Proposed Development will conform with all appropriate health and safety guidelines and legislation.

A screening evaluation for SEVESO for the Proposed Development has shown that no further assessment is necessary (**see Section 2.3.3, Chapter 2** for further details). With

regard to the construction stage of the development, the contractor will ensure that the construction area is compliant with all relevant health and safety guidelines and legislation.

9.5.12 Installation of Gas Pipeline

The proposed gas pipeline connecting to the existing Gas Networks Ireland pipeline network will be installed underneath the N73 road. A proposed pipeline route can be seen in **Chapter 2, Figure 2.2**. This is an indicative routing of the pipeline to the site and is subject to change pending detailed network modelling and design. The final pipeline will be designed, consented and delivered by Gas Networks Ireland.

Installation of the pipeline will involve temporary excavation work and will result in disturbance of the underlying soil and subsoil. Land stripping / earth-moving works throughout periods of high winds and dry weather conditions can be a significant cause of dust.

9.6 Mitigation Measures and Monitoring

9.6.1 Construction Phase

The continuous management of fugitive dust will help mitigate dust emissions should they occur. The assigned contractor will be responsible for the control and implementation of ongoing monitoring of the dust management plan throughout the entire construction period. The aim of dust management is to safeguard against significant dust nuisance. To achieve a transparent and regulated approach, the following dust management plan has been developed, this is guided by best practice from Ireland, the UK (IAQM 2024, BRE 2003, Scottish Office 1996 and UK ODPM 2002). and the USA (USEPA 1997).

Site Dust Management Plan

The aim is to provide appropriate site supervision by inhibiting dust to develop to unsuitable airborne levels at source. This is to be accomplished by appropriate site strategy and well known/established control procedures.

Throughout the construction planning stage, the location of activities and storage piles will acknowledge and recognise nearby sensitive receptors/locations and existing prevailing winds to inhibit the chance of significant dust nuisance/soiling (see **Figure 9.2** for Windrose for Moore Park Meteorological Station).

The prevailing wind is mainly north-westerly therefore construction compounds and storage piles should be located downwind of sensitive receptors/locations to decrease the likelihood for nuisance dust to affect/occur at sensitive receptors.

Suitable site supervision will involve the capacity to respond to unfavourable weather conditions by restricting construction activities on-site or by immediate effective control measures prior to the likelihood of nuisance incidences.

Throughout periods where rainfall is greater than 0.2mm/day, dust generation is generally suppressed (BRE 2003, UK ODPM 2002). The likelihood of significant dust incidences is also connected to threshold wind speeds greater than 10 m/s (19.4 knots) (at 7m above ground) to displace loose material from storage piles and other exposed materials (USEPA 1986). Due care should be practiced during site works during periods of high wind as these are times where the possibility for significant dust emissions is highest. The prevailing

meteorological conditions in the site locality are favourable for dust suppression on average for the majority of an average meteorological year. However, there will be instances where due diligence will be necessary to ensure dust nuisance events are not experienced. Below details examples of the methods that shall be used during periods of unfavourable meteorological events:

- Contractors shall have good site management procedures throughout the construction works to avoid the creation of airborne dust. Contractors are obliged to guarantee that sufficient preventive measures to limit dust generation are employed through suitable method statements, accounting for the risks and mitigation measures described in the CEMP.
- Throughout working hours, dust control procedures will be assessed as appropriate, subject to the prevailing meteorological conditions.
- The name and contact details of an appropriate person to contact concerning air quality and dust issues shall be exhibited on the site boundary, this notice board should also detail head/regional office contact details.
- It is advisable that community engagement commence before works begin on site describing the nature and duration of the works to local residents and businesses.
- Where complaints are received concerning dust, records will be maintained including likely causes and suitable action taken to alleviate any issues as a result of the construction. Management of any complaints will be done in conjunction with a suitable Complaints Procedure.
- During activities which pose a high probability of dust production and/or during periods of adverse weather conditions the rate of site inspections should be increased.
- Site inspections will be completed frequently to monitor compliance with dust control strategies set out in the CEMP and the results recorded of these inspections, including nil returns.
- The dust reduction strategies should be evaluated at regular intervals during the project to preserve the effectiveness of the techniques employed and to safeguard the minimisation of dust using best practice and procedures. In the event of dust spoiling/nuisance occurring beyond the boundary of the site, site activities will be assessed, and suitable measures utilized to negate the nuisance. Outlined dust mitigation measures to be employed are described below.
- Fully enclose or cover certain operations, where possible, when there is a high possibility for dust generation.
- Prevent site runoff of water or mud.
- Keep site barriers and fencing clean using watering procedures.
- Remove materials that have the capability to produce dust from site as soon as practicable, unless being reused on site.
- Opt for mains or battery powered equipment in preference to diesel or petrol powered generators where practicable.
- Use cutting or grinding equipment fitted with suitable dust suppression techniques such as water sprays or local extraction.
- Make certain an adequate water supply is available on the site for effective dust/particulate matter suppression/mitigation.
- Use enclosed chutes and conveyors and covered skips.
- Reduce drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever possible.

- Make certain equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Strictly no bonfires or burning of waste materials on site.

Site Roads / Haulage Route

Construction HGV/truck activities on site roads (especially unpaved roads) can be a substantial source of fugitive dust if suitable control measures have not been applied. The use of speed restrictions is commonly the most effective way of suppressing dust on unpaved haul roads. Various studies have proven that this method can have an effectiveness varying from 25 to 80% (UK ODPM 2002):

- A speed limit of 15km/hr will be applied as an effective control measure for dust for on-site vehicles utilising unpaved road surfaces.
- Entrance gates should be located at a minimum 10m from local sensitive receptors as much as is reasonably practical/possible.
- Watering of the site will be utilised during periods of prolonged dry weather to ensure unpaved or areas associated with problematic dust are kept moist. Frequency of watering will be dependent on weather conditions, vehicle activity and soil type, dust suppression such as sprinklers, bowsers etc. should be available during the construction phase.
- A road sweeper will be applied as required to control mud and dust on the site access roads.
- All vehicles must switch off engines once stationery i.e. no idling vehicles on site.
- Vehicles entering and leaving sites must be covered to prevent dusty emissions from materials during transport.
- Document all inspections of haul roads and any follow-up action in a site logbook.
- Employ a wheel washing system with rumble grids to remove collected dust and mud prior to leaving the site where reasonable.
- Sand and other aggregates must be stored in bunded areas and are not allowed to dry out and become airborne, unless this is required, in which case ensure that appropriate additional control measures are in place.
- Bulk cement and other fine powder materials must be delivered in covered tankers and stored in silos with suitable control systems to negate escape from material and overfilling during delivery.

Land Stripping / Earth Moving

Land stripping / earth-moving works throughout periods of high winds and dry weather conditions can be a significant cause of dust.

- Throughout dry and windy periods, and when there is a possibility of dust nuisance, watering shall be performed to ensure moisture content of materials being relocated is high enough to increase the stability of the soil and thus suppress dust.
- During times of very high winds (gales), actions likely to generate significant dust emissions should be rescheduled until the gale has receded.
- Revegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable
- Use hessian mulches where it is not possible to revegetate or cover with topsoil, as soon as is practicable

- Only remove covers in small areas during work and not all at once.

Storage Piles

The position and moisture content of storage piles are key factors which determine their capacity for dust emissions. The below measures shall be utilised to minimise fugitive dust formation from storage piles:

- Overburden material shall be shielded from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be positioned downwind of sensitive receptors.
- Adequate watering will take place to ensure the moisture content is high enough to suppress dust. The watering of stockpiles has been found to have an 80% control efficiency (UK ODPM 2002).
- Plan site layout so that machinery and dust causing activities including stockpiling are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary which are at least as high as any stockpiles on site.

Site Traffic on Public Roads

Escape of debris, aggregates and fine material onto public roads should be decreased to a minimum by utilising the following measures:

- Vehicles delivering or collecting material with capacity for dust emissions shall be covered with tarp, to limit the blow-off of dust.
- A wheel wash facility should be installed near the entrance of the construction site, where feasible. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum daily, and cleaned as necessary.

Summary of Dust Mitigation Measures

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 management.
- 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 control 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 cause dust would be restricted and adequate procedures applied to resolve the problem before the recommencement of construction operations.

Climate and Regional Air Quality

Various site-specific mitigation methods can be applied throughout the construction stage of the Proposed Development to support emissions reduction - such as 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.

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.

9.6.2 Operational Phase

Odour Emissions

The stack height of the proposed odour abatement system has been designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with indicative odour standards at all off-site locations. It has been determined that a minimum stack height of 6.0m would provide adequate dispersion to achieve compliance with the odour guideline value at all locations at or beyond the site boundary.

A variety of mitigation technologies has been integrated within the Proposed Development so as to reduce and minimise possible emission odour. Further detail of the variety and scale of proposed technologies can be found in **Chapter 2: Project Description**.

Process management and supervision are key when limiting generation of odour at a source. Emissions to the atmosphere are controlled and managed by end of process mitigation equipment and a stack height that is suitable to disperse the exhausted plume accordingly.

The odour treatment proposed for the plant will consist of an odour abatement system and carbon filters with a high range of efficiency to remove compounds such as hydrogen sulphide, ammonia and siloxanes in the exhaust gas so as to avert odour impacts of significance beyond the site boundary**.**

The planned biogas upgrading plant will include active sensors for CH_4, CO_2, H_2S and the gas will be recirculated back through the scrubbing process in the event that it does not meet the required levels. H_2S will be trapped on activated carbon, water vapour will be emitted to the atmosphere. All CO_2 will be captured and liquified. There will be no CH_4 emissions from the proposed biogas upgrading plant.

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

- 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 designed and constructed to be maintained under negative air pressure.
- All feedstock handling 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 fan 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 6.0m 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 and pasteurised 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 and conditions 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 CHP 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 (as described within this chapter and in Chapter 2), no supplementary abatement measures are planned for the CHP, flare and biomethane boiler stack during the operational stage of the development.

Fugitive Methane Losses

The applicant is committed to minimising methane emissions from the biomethane facility and associated operations by implementing the following mitigation measures during

operation:

- **Best Available Techniques (BAT)**: The facility will adhere to BAT principles in both its design and operational phases to enhance environmental performance.
- **Gas-Tight Digestion Tanks**: All anaerobic digestion (AD) tanks will be sealed, fitted with covers, and connected to an integrated biogas collection system to prevent methane escape.
- **Controlled Feedstock Management**: All feedstocks will be managed within a dedicated Feedstock Reception Building equipped with air handling and odour treatment systems, minimising potential emissions.
- **Biogas Storage Management**: Biogas storage membranes will typically be maintained at 50% capacity to provide a storage buffer under standard operating conditions.
- **Automated Monitoring and Control**: The facility will operate under a SCADA system, ensuring continuous 24/7 monitoring and control of all critical processes.
- **Optimised Hydraulic Retention Time (HRT)**: To reduce residual biomethane content in digestate, the AD system will maximise hydraulic retention time, maintaining a standard HRT of 60 days.
- **Digestate Pasteurisation**: All digestate will undergo pasteurisation prior to dispatch, effectively neutralising anaerobic bacteria. This treatment ensures any subsequent breakdown of organic material is aerobic, producing CO_2 rather than methane.
- **Methane Detection Surveys**:

  Commissioning Survey: A comprehensive methane detection survey will be conducted during commissioning to identify and address any potential leaks before full operations commence.

  Annual Surveys: Methane detection surveys will be performed annually to locate any emissions. Any identified leaks will be prioritised for immediate repair.
- **Lifecycle Maintenance for Gas Domes**: The applicant's lifecycle maintenance budget will include provisions for the replacement of gas domes on a 7-10 year cycle to maintain integrity.
- **Maintenance of Emergency Flares and Pressure Relief Valves (PRVs)**: Emergency flare and PRVs will be included in the facility's routine Planned Preventative Maintenance (PPM) Plan to ensure reliable and efficient operation.
- **Best Practices for Fertiliser Application**: Biobased fertiliser applications will follow best practices to minimise atmospheric nitrogen emissions, contributing to environmental protection.
- **Biogenic CO_2 Capture**: When market conditions allow, the applicant will begin capturing and marketing biogenic CO_2 emissions, enhancing the facility's carbon management strategy.

9.7 Cumulative Effects

9.7.1 Construction Phase

There is potential for cumulative dust effects at adjacent site receptors should the construction stage of the Proposed 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 Proposed 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 Proposed Development are considered short-term and not significant.

9.7.2 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.

9.7.3 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 slurry/chicken manure 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 fertilizer 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.

9.8 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.

9.8.1 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**.

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.

9.8.2 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**.

There is a slight positive long term impact at national scale in terms of climate due to the development being self-reliant and giving the grid an alternative to conventional fossil fuels. 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.

Table 9.29: Summary of predicted construction phase impacts, mitigation measures and residual impact

Potential Source	Environmental Receptor	Effect Description	Quality	Significance	Duration	Mitigation	Residual Effect
Fuel Storage	Site personnel/local environment/ local receptors	Fumes released to the environment	Negative	Slight	Temporary	• Temporary Fuels used during construction will be stored in sealed containers.	Negative, Imperceptible, Temporary
Stockpiling	Site personnel/local environment/ local receptors	Dust from stockpile leaving site boundary into nearby properties/amenities or local roads	Negative	Significant	Temporary	• At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance. • During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust	Negative Slight, Temporary
Use of heavy plant / multiple plant use	Site personnel, air pollution, local receptors	Air emissions	Negative	Slight	Temporary	• The Contractor must monitor performance of plant and machinery to ensure that the proposed mitigation measures are implemented, and that dust effects and nuisance are minimised. • The prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.	Neutral, Not significant Temporary
Topsoil stripping	Site personnel/local environment/ local receptors	Dust leaving site boundary into nearby local receptors/amenities	Negative	Significant	Temporary	• During working hours, dust control methods will be monitored as appropriate, depending on the • prevailing meteorological conditions. During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided. • Overburden material shall be protected from exposure to wind by storing the material in sheltered regions of the site.	Negative, Moderate, Temporary

Potential Source	Environmental Receptor	Effect Description	Quality	Significance	Duration	Mitigation	Residual Effect
						Where possible storage piles should be located downwind of sensitive receptors. • Sufficient watering will take place to ensure the moisture content is high enough to suppress dust.	
Construction and operation of compound buildings and amenities	Site personnel/local environment/ local receptors	Dust leaving site boundary into nearby local receptors/amenities	Negative	Slight	Temporary	• Implementation of Construction Environmental Management Plan. • The specification of a site policy on dust and the identification of the site management responsibilities for dust issues. • The development of a documented system for managing site practices with regard to dust control. • The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed. • The specification of effective measures to deal with any complaints received. • The name and contact details of a person to contact regarding environmental issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details site. • A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out. • At all times, the procedures put in place will be strictly monitored and assessed. • The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures.	Negative, Not significant Temporary

Potential Source	Environmental Receptor	Effect Description	Quality	Significance	Duration	Mitigation	Residual Effect
						• Record any exceptional incidents that cause dust and/or air emissions, either on or off site and the action taken to resolve the situation in a dedicated logbook.	

Potential Source	Environmental Receptor	Effect Description	Quality	Significance	Duration	Mitigation	Residual Effect
Constructing and operating site access roads	Local receptors, roads and environment	Site and delivery vehicles travelling on unsealed roads	Negative	Moderate	Temporary	• A speed restriction of 15 km/hr will be applied as an effective control measure for dust for onsite vehicles using unpaved site roads. • Access gates to the site shall be located at least 10m from sensitive receptors, where possible • Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. • Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only. • Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust. • A wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. • Public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.	Negative, Slight Temporary

Table 9.30: Summary of predicted Operational phase impacts, mitigation measures and residual impact

Potential Source	Environmental Receptor	Effect Description	Quality	Significance	Duration	Mitigation	Residual Effect
Biogas Release	Local receptors, Environment	Air Emissions	Negative	Moderate	Temporary	• The flare stack will have an operational capacity of 110% of the expected maximum hourly biogas production and will ensure the safe and complete combustion of the biogas where necessary.	Neutral, Imperceptible, Long-term
Odour Release (Various)	Local receptors, Environment	Odour Emissions	Negative	Moderate	Long-term	• The odour abatement proposed for the facility will consist of odour treatment system and carbon filters with a high level of efficiency to remove impurities such as hydrogen sulphide, ammonia, bioaerosols, siloxanes etc. in the exhaust gas to prevent odour impacts of significance beyond the site boundary. • H2S will be trapped on activated carbon; CO2 and water vapour will be emitted to the atmosphere. • The reception hall has been designed to allow for 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 building 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 carbon filtration and / or UV methodologies to remove odorous compounds. • The building will operate under negative pressure with up to 2 air changes per hour. Ventilation pipe work installed in the headspace of the building will be	Neutral, Imperceptible, Long-term

Potential Source	Environmental Receptor	Effect Description	Quality	Significance	Duration	Mitigation	Residual Effect
						connected to an industrial centrifugal fan 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 6.0m 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. • All feedstocks will be delivered in covered or sealed containers. • Feedstock delivery times will be controlled in order to minimise truck waiting times outside of the reception building and therefore minimising fugitive odour emissions on-site. • Digestate will be stabilised before storage and removal from the site in order to minimise odour generation. • As part of the company ISO14001 standard EMS, 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	

Potential Source	Environmental Receptor	Effect Description	Quality	Significance	Duration	Mitigation	Residual Effect
						plan will also outline a procedure for addressing any odour complaints.	
Combustion Process (Various)	Local receptors, Environment	Air quality	Negative	Moderate	Long-term	• The proposed biogas upgrading plant will include in line sensors for CH4, CO2, H_2S and the gas will be recirculated back through the scrubbing process if it does not meet the required levels. • The stack height proposed for the CHP emission point emission point has been designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with the EU ambient air quality standards at all off-site locations (including background concentrations for air pollutants).	Negative, Imperceptible, Long-Term
Dust Nuisance	Local receptors, Environment	Air quality/dust nuisance	Negative	Moderate	Long-Term	• Vehicles exiting the reception hall will be subjected to cleaning procedures in accordance with the DAFM Conditions Document in a designated cleaning area.	Negative, Imperceptible, Long-Term
Fugitive Methane Emissions	Local receptors, Environment	Air Emissions	Negative	Moderate	Long-Term	• The facility will adhere to BAT principles in both its design and operational phases to enhance environmental performance. • All anaerobic digestion (AD) tanks will be sealed, fitted with covers, and connected to an integrated biogas collection system to prevent methane escape. • All feedstocks will be managed within a dedicated Feedstock Reception Building equipped with air handling and odour treatment systems, minimising potential emissions. • Biogas storage membranes will typically be maintained at 50% capacity to	

Potential Source	Environmental Receptor	Effect Description	Quality	Significance	Duration	Mitigation	Residual Effect
						provide a storage buffer under standard operating conditions. • The facility will operate under a SCADA system, ensuring continuous 24/7 monitoring and control of all critical processes. • To reduce residual biomethane content in digestate, the AD system will maximise hydraulic retention time, maintaining a standard HRT of 60 days. • All digestate will undergo pasteurisation prior to dispatch, effectively neutralising anaerobic bacteria. This treatment ensures any subsequent breakdown of organic material is aerobic, producing CO_2 rather than methane. • Methane Detection Surveys: Commissioning Survey: A comprehensive methane detection survey will be conducted during commissioning to identify and address any potential leaks before full operations commence. Annual Surveys: Methane detection surveys will be performed annually to locate any emissions. Any identified leaks will be prioritised for immediate repair. • The applicant's lifecycle maintenance budget will include provisions for the replacement of gas domes on a 7-10 year cycle to maintain integrity. • Emergency flare and PRVs will be included in the facility's routine Planned Preventative Maintenance (PPM) Plan to ensure reliable and efficient operation. • Biobased fertiliser applications will follow best practices to minimise	

Potential Source	Environmental Receptor	Effect Description	Quality	Significance	Duration	Mitigation	Residual Effect
						atmospheric nitrogen emissions, contributing to environmental protection. • When market conditions allow, the applicant will begin capturing and marketing biogenic CO_2 emissions, enhancing the facility's carbon management strategy.	

9.9 Monitoring

Construction Phase

Dust deposition monitoring will be carried out at selected areas along the extent of the site boundary during the construction stage of the Proposed Development. As much as reasonably practical/possible monitoring should begin a minimum of 1 month prior to any site work begins in order to capture baseline dust levels. The siting of dust monitoring locations will be considered based on representative monitoring with respect to sensitive receptors and prevailing wind direction. The German Standard VDI 2119 (Bergerhoff Method) will be employed where dust gauges consisting of a collection vessel and dust stand will be positioned at representatively important dust locations.

The collection vessel is fixed to the stand with the opening of the collection vessel located approximately 2m above ground level. The applicable limit value is the TA Luft limit value of 350 mg/m^2/day for a monitoring period of between 28 - 32 days.

Operational Phase

The Proposed Development will be a licenced facility under the Industrial Emissions Directive and will therefore be required to conduct “sniff surveys” in accordance with AG5 at regular intervals to demonstrate that mitigation measures are sufficient to prevent odour nuisance at sensitive off-site locations. Stack monitoring of the odour abatement system exhaust may also be required at regular intervals under the conditions of the IE Licence.

Emissions monitoring of selected point sources will also be carried out in accordance with the conditions of the future IE license. Typically, this monitoring would be carried out for the CHP and odour abatement stack due to their continuous operation.

9.10 Summary of Significant Impacts

The receptors for this assessment are considered to be local residences, amenities and designated sites. Whilst the development proposals have the potential to cause effects to the sensitive receptors identified, the recommended mitigation measures will ensure that the risk of potential impacts are reduced to negligible.

9.11 Statement of Significance

A worst-case assessment was utilised throughout the air quality impact study in order to assess any risk associated with the proposed operation of the plant. The scheduled emission points for the proposed anaerobic digester plant will be controlled through the EPA licensing process. The air quality impact assessment has demonstrated that the emissions will result in an acceptable air quality impact in accordance with the air quality standard regulations 2011 (S.I. No. 180 of 2011).

Typical ambient air emission targets, based on EPA Environment Agency criteria relevant to negating potentially high offensive odours and nuisance pollutants will be achieved at the surrounding sensitive receptors. The dispersion modelling indicates that, based on worst case emission concentrations the existing dispersion experienced in the vicinity of the site allows for the sites emissions to fall within the stringent ambient air target values.

Where a potential impact has been identified, mitigation measures have been provided which when implemented reduces the impact of significance to ***' negligible'.*** The mitigation steps are presented in Section 9.7.

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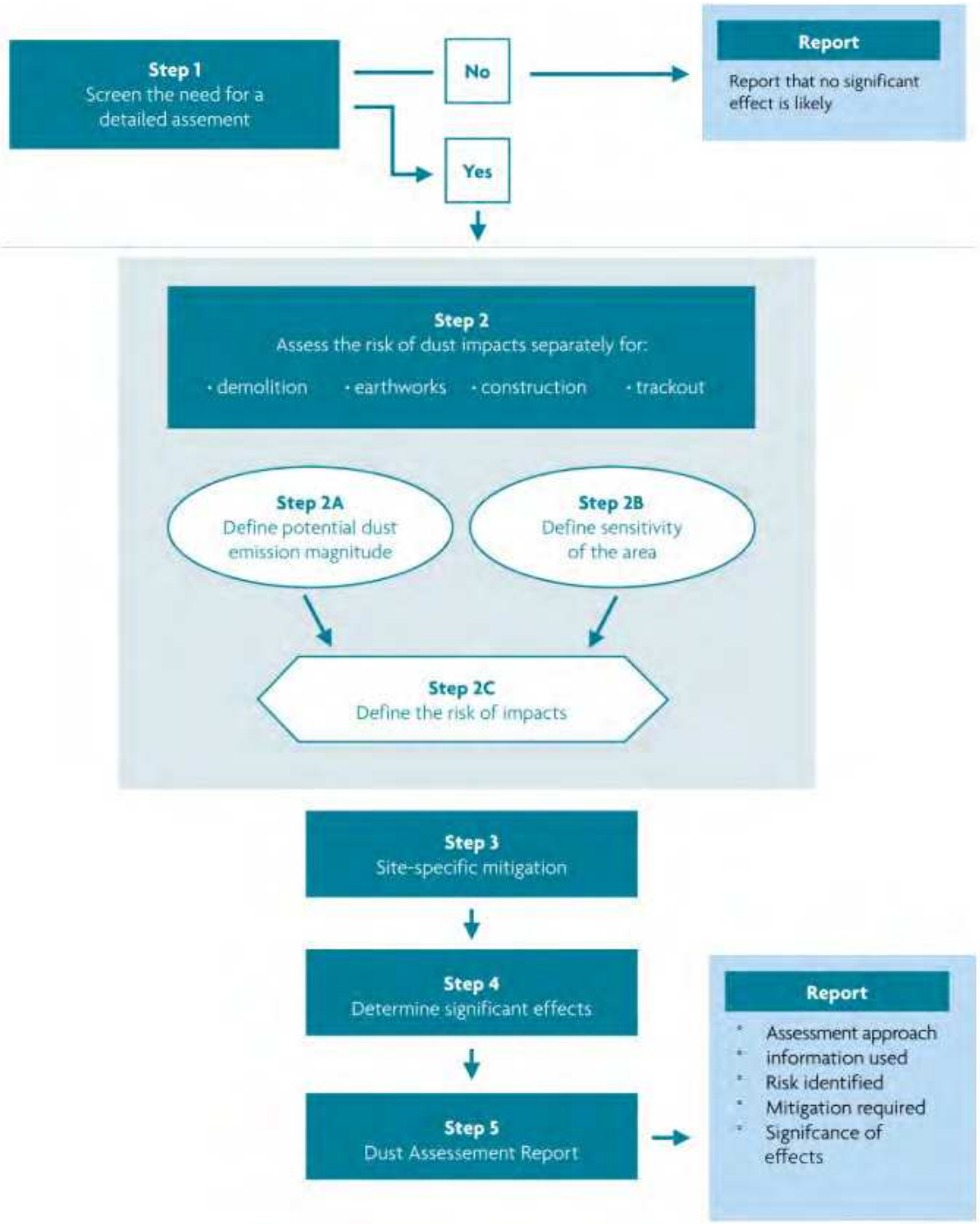
Appendix 9.1 Methodology for Construction Dust Assessment

Methodology for construction dust assessment to evaluate the potential impacts, construction activities are divided into demolition, earthworks, construction and track out. The factors are based upon the IAQM construction dust guidance. The assessment follows the steps proposed in the guidance as per **Appendix Figure 9.1.1** below.

Appendix Figure 9.1.1: Steps to Perform a Dust Assessment (IAQM, 2024)



Step 1 and Step 2 methods from the IAQM construction dust guidance are defined below to assign dust risk categories for each of the different construction actions.

Step 1: Screen the requirement for assessment

Step 1 is to screen out the necessity for construction dust assessment at all, this is usually a somewhat conservative level of screening. An assessment is usually necessary where there is;

A human receptor within;

- 250 m of the boundary of the site or
- 50m of the route used by construction vehicles on the public highway, up to 250 m from the site entrances.

An ecological receptor;

- 50m off the site boundary
- 50m of the roots used by construction vehicles on the public highway, up to 250 m from the site entrances.

Step 2A: Defining the potential dust emission magnitude

Demolition

The dust emission magnitude classification for demolition is different for each site in terms of timing, building type, time period and size. Examples of the potential dust emission classes are provided in the guidance are as follows;

Large: total building volume > 75,000 m^3, potentially dusty construction material, on-site crushing and screening, demolition activities > 12m above ground level;.

Medium: total building volume 12,000 m^3 to 75,000 m^3, potentially dust creating construction material, demolition activities 6m to 12m above ground level

Small: total building volume < 12,000 m^3, construction material with low potential for dust release, demolition activities less than 6 meters above ground, demolition during wetter months.

Earthworks

The dust emission magnitude classification for earthworks is different for each site in terms of timing, geology, topography and time-scale. Examples of the potential dust emission classes are provided in the guidance as follows;

Large: total site area > 110,000m^2, potentially dusty soil type e.g. clay, greater than 10 heavy earth moving vehicles active at any one time, formation of bunds greater than 6m in height.

Medium: total site area 18,000 to 110,000 m², moderately dusty soil type e.g. silt, 5 to 10 heavy earth moving vehicles active at any one time, formation of bunds 3 to 6m in height.

Small: total sight area less than 18,000 m², soil type with large grain size e.g. sand, less than five heavy earth moving vehicles active at any one time, formation of bunds < 3 meters in height.

Construction

The dust emission magnitude classification for construction is varied for each site in terms of timing, building type, duration, and scale. Examples of the potential dust emissions classes are provided in the guidance as follows:

Large: total building volume > 75,000 m³, piling, on site concrete batching, sandblasting;

Medium: Total building volume 12,000 to 75,000 m³, potentially dusty construction material e.g. on site concrete batching;

Small: total building volume less than 12,000 m³, construction material with low potential for dust release e.g. metal cladding or timber.

Track out

Considerations which determine the dust emission magnitude class of trackout activities are vehicle size, vehicle speed, vehicle number, geology and duration. Examples of the potential dust emissions classes are provided in the guidance as follows;

Large: >50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m;

Medium: 20-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m; and

Small: <20 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

Step 2B; Defining the sensitivity of the area

The sensitivity of the area is specified for dust soiling, human health and ecosystems. The sensitivity of the area takes into account the following considerations;

- the specific sensitivities of receptors in the area
- the proximity and number of those receptors
- in the case of PM_{10}, the local background concentration; and
- site specific factors, such as weather there are natural shelters such as trees, to reduce the risk of windblown dust.

Appendix Table 9.1.1 has been used to describe the sensitivity of varying types of receptors, dust soiling, health effects and ecological effects.

Appendix Table 9.1.1: Sensitivity of the Locality

Sensitivity	Dust Soiling	Human Receptors	Ecological Receptors
High	• Users can reasonably expect enjoyment of a high level of amenity; or • the appearance, aesthetics or value of their property would be diminished by soiling; and • the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.	• locations where members of the public are exposed over a period relevant to the air quality objective for PM10 (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	• locations with an international or national designation and the designated features may be affected by dust soiling; or • locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. • indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	• users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • the appearance, aesthetics or value of their property could be diminished by soiling; or • the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • indicative examples include parks and places of work.	• locations where the people exposed are workers, and exposure is over a time relevant to the air quality • objective for PM10 (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM10, as protection is covered by Health and Safety at Work legislation.	• locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or • locations with a national designation where the features may be affected by dust deposition. • indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	• the enjoyment of amenity would not reasonably be expecteda; or • property would not reasonably be expecteda to be diminished in appearance, aesthetics or value by soiling; or • there is transient	• locations where human exposure is transient. • indicative examples include public footpaths, playing fields, parks and shopping streets.	• locations with a local designation where the features may be affected by dust deposition. • indicative example is a local Nature Reserve with dust sensitive features.

	exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parksb and roads.		

Regarding the sensitivities assigned of the different types of receptors surrounding the site and numbers of receptors within certain distances of the site, a sensitivity classification for the area can be defined for each. **Appendix Table 9.1.2** to **Appendix Table 9.1.4** indicate the method used to determine the sensitivity of the area for dust soiling, human health and ecological impacts, respectively.

For trackout, as per the guidance, it is only considered necessary consider trackout impacts up to 50m from the edge of the road.

Appendix Table 9.1.2: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<250
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Appendix Table 9.1.3: IAQM 2024 Sensitivity of the area to Human Health

Receptor Sensitivity	Annual Mean PM10 concentration	Number of Receptors	Distance from the Source (m)			
			<20	<50	<100	<250
High	>32 µg/m3 (>18 µg/m3 in Scotland)	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32 µg/m3 (16-18 µg/m3 in Scotland)	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28 µg/m3 (14-16 µg/m3 in Scotland)	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m3 (<14 µg/m3 in Scotland)	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32 µg/m3 (>18 µg/m3 in Scotland)	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28-32 µg/m3 (16-18 µg/m3 in Scotland)	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28 µg/m3 (14-16 µg/m3 in Scotland)	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 µg/m3 (<14 µg/m3 in Scotland)	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low

Appendix Table 9.1.4: IAQM 2024 Sensitivity of the area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

The final step is to use both the dust emission magnitude classification with the sensitivity of the area, to establish a potential risk of effects for each construction activity, before the use of mitigation. **Appendix Table 9.1.5** shows the method used to assign the level of risk for each construction activity.

Appendix Table 9.1.5: IAQM 2024 Risk of Dust Impacts from Earthworks/Construction/Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

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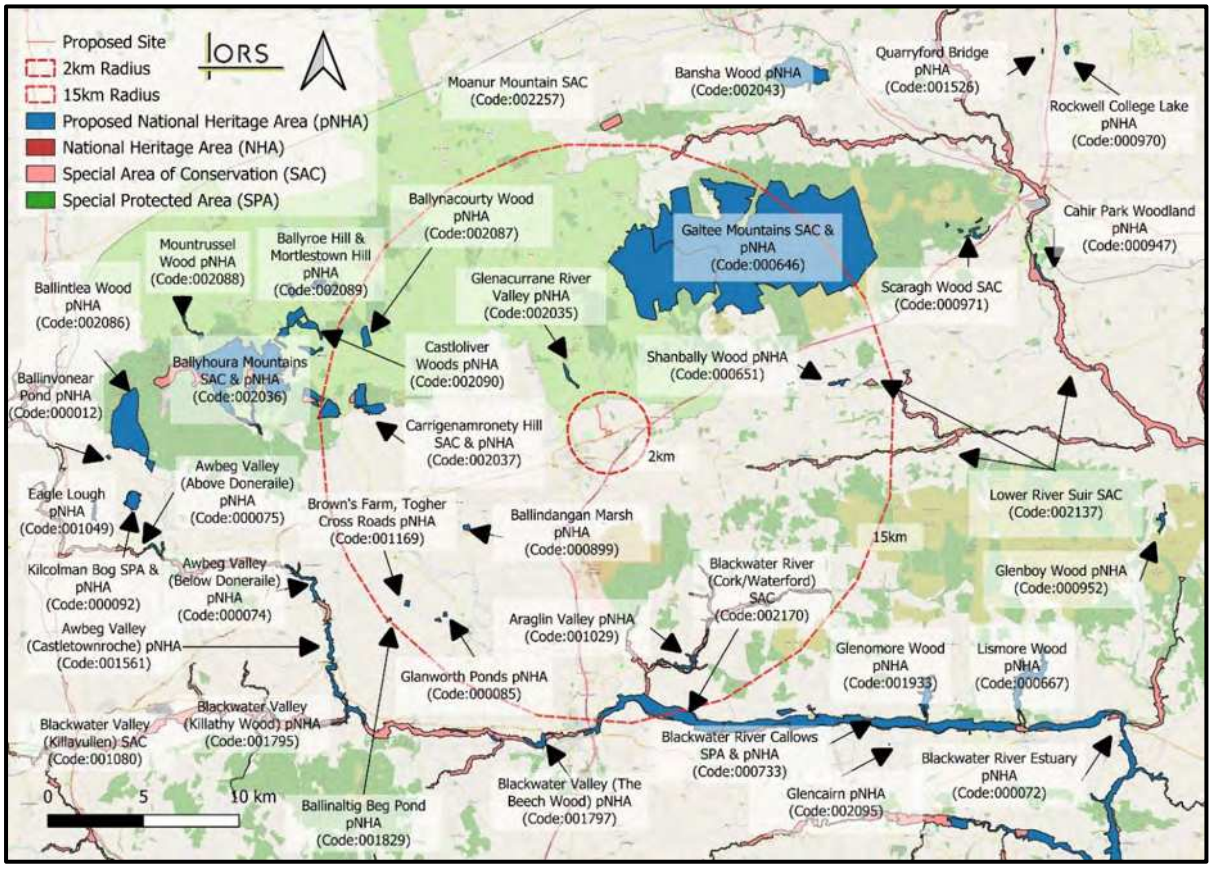
Appendix 9.2 Site Features

Appendix Figure 9.3.1: Receptor and AQMS Locations

Appendix Figure 9.3.2: Designated Site Locations



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Appendix 9.3 Onsite Monitoring

Appendix Table 9.3.1: Onsite Monitoring Gaseous Compounds

AQMS Location Reference	Location Description	Grid Reference (ITM)	NO (µg/m³)	NO_2 (µg/m³)	NOx (µg/m³)	H2S (µg/m³)	NH3 (µg/m³)	SO2 (µg/m³)	CO (mg/m³)	Dust (mg/m2/day)	PM10 (µg/m³)	PM/2.5 (µg/m³)
AM01	Western boundary	521897, 766622	1.20	2.25	2.25	0.11	7.22	1.64	-	41	-	-
AM02	Northern boundary road	521765, 766714	1.78	2.39	4.17	0.11	5.91	1.64	-	58	-	-
AM03	Eastern boundary road	521737, 766608	1.20	2.97	2.97	0.11	5.03	1.64	-	39	-	-
AM04	Field South of site	521535, 766739	1.61	3.48	5.09	0.13	3.33	1.64	-	167	-	-
Birr Monitoring Station	Birr	606121, 704883	-	-	-	-	-	-	0.57		-	-
Tipperary Town Monitoring Station	Tipperary Town	589335, 636442	-	-	-	-	-	-	-		18.28	14.81
		Average	**1.45**	**2.77**	**3.62**	**0.12**	**5.37**	**1.64**	**0.57**	**76.25**	**18.28**	**14.81**
Values at LOD												

Appendix Table 9.3.2: Onsite Sniff Test

Location	Odour Intensity	Odour Persistence	Location Sensitivity	Odour Descriptor
Day 1 Sniff Survey – 21/12/2023				
1	0	0	0	No detectable odour
2	0	0	0	No detectable odour
3	0	0	0	No detectable odour
4	0	0	0	No detectable odour
Day 2 Sniff Survey – 17/01/2024				
1	0	0	0	No detectable odour
2	0	0	0	No detectable odour
3	0	0	0	No detectable odour
4	0	0	0	No detectable odour

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Appendix 9.4 Odour Details

Defining & Describing Odour

Odours are sensations resulting from the reception of a stimulus by the olfactory sensory system, which consists of two separate subsystems: the olfactory epithelium and the trigeminal nerve. The olfactory epithelium, located in the nose, is capable of detecting and discriminating between many thousands of different odours and can detect some of them in concentrations lower than those detectable by currently available analytical instruments (Water Environment Federation, 1995). The function of the trigeminal nerve is to trigger a reflex action that produces a painful sensation. It can initiate protective reflexes such as sneezing to interrupt inhalation. The olfactory system is extremely complex and peoples' responses to odours can be variable. This variability is the result of differences in the ability to detect odour; subjective acceptance or rejection of an odour due to past experience; circumstances under which the odour is detected; and the age, health and attitudes of the human receptor.

Odour Intensity & Threshold

The measure of strength of an odour sensation is called odour intensity and is linked to the odour concentration. The minimum concentration of an odorous substance that causes an olfactory sensation is the odour threshold. Odour thresholds are usually defined by an odour panel. Odour threshold is not a precisely defined value as it depends on the odour panellists involved and the method & means of introducing the odour sensation to the panel. Odour detection concerns the minimum odorous substance concentration necessary to observe the presence of the stimulus however an odour recognition threshold concerns the minimum odorous substance concentration necessary to recognise the nature of the stimulus. Typically, the recognition threshold exceeds the detection threshold by a factor of 2 to 10 (Water Environment Federation, 1995).

Odour Character

The nature of an odour characterizes it from another odour of equal intensity. Odours are identified based on odour descriptor terms (e.g. earthy, chemical etc.). Odour character is assessed by contrast with other odours.

Hedonic Tone

Hedonic tone of an odour concerns its pleasantness or unpleasantness. When an odour is assessed in a test house for its hedonic tone in the neutral context of an olfactometric presentation, the panel is exposed to a stimulus of controlled intensity and duration. The degree of pleasantness or unpleasantness is determined by each panel member's experience and associations. The responses among panel members may differ depending on odour nature; an odour pleasant to some may be found highly unpleasant by others.

Relevant Odour Standards

Exposure of the public to a specific odour comprises of two factors; the concentration & the duration that the public may perceive the odour. The recognition threshold is generally 5 OUE/m3 and the ambient concentration at which the odour may be deemed a nuisance is between 5 and 10 OUE/m3 based on hydrogen sulphide (H2S) (Warren Spring Laboratory, 1980).

The recognition threshold is generally about five times this concentration (5 OUE/m^3) and the ambient concentration at which the odour may be considered a nuisance is between 5 and 10 OUE/m^3 based on hydrogen sulphide (H_2S) (Warren Spring Laboratory, 1980). Clarkson and Misslebrook (1991) proposed that a “faint odour” was an acceptable threshold criteria for the assessment of odour as a nuisance. Historically, it has been generally accepted that ambient odour concentrations of between 5 and 10 OUE/m^3 would give rise to a faint odour only, and that only a distinct odour (ambient concentration of >10 OUE/m^3) could give rise to a nuisance (McGovern & Clarkson, 1994). However, this criteria has generally been based on waste water treatment plants where the source of the odour is generally hydrogen sulphide. In 1990, a survey of the populations surrounding 200 industrial odour sources in the Netherlands showed that there were no justifiable complaints when 98%ile compliance with an odour exposure standard of a “faint odour” (5 - 10 OUE/m^3) was achieved (McGovern & Clarkson, 1994).

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Appendix 9.5 Receptor Results 75% Scenario

Receptor Results – 75% Scenario

In line with the EPA AG4 Guidance, an additional assessment was undertaken to account for the stacks operating at 75% volume flow.

Input Parameters

Table 9.5.1 details the normalised volume flow (Nm^3/s) for each of the emission points associated with the proposed site, based on the emissions.

Table 9.5.1: Normalised Flow Rates from Stacks

Stack	Actual Volume Flow (m^3/hr)	Normalised Volume Flow (Nm^3/hr)*	Normalised Volume Flow (Nm^3/s)
CHP	5,817	3,506	0.97
Boiler	274	183	0.05

Table 9.5.2 below relates to the emission concentrations values through the flues associated with the CHP unit and gas boiler on the proposed site, based on the expected emission levels detailed in the Table above.

Table 9.5.2: Emission Concentrations

Pollutant	CHP Emission Concentration Values (mg/Nm^3)	Boiler Emission Concentration Values (mg/Nm^3)	Stack Emissions (g/s)	
			CHP Engine (0.97 Nm^3/s)	Boiler (0.05 Nm^3/s)
Oxides of Nitrogen (NOx)	250	93	**0.243**	**0.005**
Carbon Monoxide (CO)	1,000	N/A	**0.974**	**N/A**

Residential Receptor Results

NO_2

NO_2 modelling was carried out for each individual year with the results at the nearest sensitive locations presented in **Table 9.5.3** and **9.5.4** below.

All results are the NO_2 concentration in $\mu g/m^3$.

Table 9.5.3: Annual Average NO_2 concentrations at nearest residential locations (75% Volume Flow)

Location	2019	2020	2021	2022	2023	Average
R1	0.61	0.53	0.59	0.67	0.66	0.61
R2	1.35	1.04	1.23	1.26	1.21	1.22
R3	1.92	1.92	1.49	1.57	1.91	1.76
R4	0.22	0.31	0.28	0.31	0.36	0.30
R5	0.13	0.20	0.17	0.18	0.21	0.18
R6	0.35	0.44	0.24	0.38	0.39	0.36
R7	0.08	0.10	0.11	0.13	0.16	0.12
R8	0.07	0.12	0.11	0.11	0.14	0.11
R9	0.05	0.09	0.07	0.08	0.09	0.08
R10	0.04	0.06	0.05	0.05	0.07	0.05
R11	0.04	0.06	0.05	0.05	0.07	0.05
R12	0.04	0.05	0.05	0.06	0.07	0.05
R13	0.20	0.23	0.15	0.22	0.21	0.20
R14	0.16	0.21	0.18	0.18	0.19	0.18
R15	0.22	0.30	0.27	0.26	0.27	0.26
R16	0.15	0.21	0.18	0.18	0.19	0.18
R17	0.16	0.16	0.16	0.16	0.18	0.16
R18	0.22	0.22	0.21	0.22	0.25	0.22
R19	0.51	0.53	0.55	0.50	0.52	0.52
R20	0.47	0.48	0.55	0.49	0.42	0.48
R21	0.33	0.33	0.36	0.32	0.33	0.34
R22	0.38	0.37	0.43	0.42	0.33	0.39
R23	0.24	0.23	0.26	0.26	0.21	0.24
R24	0.22	0.21	0.24	0.24	0.19	0.22
R25	0.21	0.20	0.22	0.22	0.18	0.21

Location	2019	2020	2021	2022	2023	Average
R26	0.20	0.18	0.21	0.21	0.17	0.19
R27	0.23	0.23	0.27	0.25	0.20	0.24
C1	0.52	0.49	0.55	0.53	0.54	0.53
C2	1.15	0.82	0.90	1.07	1.04	1.00
C3	1.42	1.19	1.22	1.03	1.26	1.22
C4	0.23	0.31	0.25	0.25	0.29	0.27
C5	0.15	0.20	0.17	0.16	0.18	0.17
C6	0.21	0.23	0.16	0.20	0.19	0.20
C7	0.13	0.14	0.09	0.13	0.12	0.12
C8	0.43	0.41	0.52	0.46	0.47	0.46
C9	0.21	0.22	0.20	0.20	0.23	0.21
C10	0.23	0.21	0.23	0.22	0.24	0.23
C11	0.22	0.20	0.22	0.22	0.22	0.22
C12	0.07	0.10	0.08	0.07	0.09	0.08
C13	0.07	0.09	0.10	0.12	0.15	0.10
C14	0.08	0.14	0.11	0.12	0.12	0.11
C15	0.28	0.27	0.30	0.26	0.28	0.28
C16	0.44	0.41	0.50	0.47	0.38	0.44
Limit	**40**	**40**	**40**	**40**	**40**	**40**

Table 9.5.4 below details the 99.8% of Max 1-Hour NO_2 concentration at each of the sensitive receptors for the MET Data 2019 – 2023.

Table 1: Short Term NO_2 concentrations at nearest residential locations (75% Volume Flow)

Location	99.8% of Max 1-Hour
R1	9.6
R2	14.2
R3	19.5
R4	13.0
R5	8.7
R6	11.4
R7	5.4
R8	5.7

R9	4.2
R10	3.1
R11	3.0
R12	3.0
R13	5.9
R14	4.1
R15	5.0
R16	3.9
R17	4.4
R18	5.4
R19	7.5
R20	6.7
R21	6.1
R22	6.6
R23	4.8
R24	4.5
R25	4.5
R26	4.4
R27	4.7
C1	8.0
C2	11.5
C3	12.4
C4	5.4
C5	4.1
C6	5.8
C7	4.0
C8	14.7
C9	5.2
C10	5.4
C11	5.2
C12	3.8
C13	5.1
C14	5.7

C15	5.5
C16	7.1
Limit	**200**

The results above have assumed that 50% of short term emissions of oxides of nitrogen convert to nitrogen dioxide.

CO

CO modelling was carried out for each individual year with the results at the nearest sensitive location presented in **Table 9.5.5** below. All results are the CO concentration in $\mu g/m^3$.

Table 2: Max Daily 8-Hour Mean CO concentration at nearest residential locations (75% Volume Flow)

Location	2019	2020	2021	2022	2023	Average
R1	38.0	40.1	34.8	50.3	43.1	41.3
R2	96.1	106.4	95.3	91.3	80.6	93.9
R3	124.5	129.3	126.7	130.3	134.4	129.0
R4	76.0	46.6	52.8	57.9	78.0	62.3
R5	48.8	45.0	30.7	34.6	56.2	43.1
R6	45.6	46.5	43.3	55.6	63.5	50.9
R7	42.1	21.8	30.1	39.6	29.5	32.6
R8	21.8	35.6	25.6	26.8	59.2	33.8
R9	16.3	24.7	17.9	18.7	42.3	24.0
R10	13.1	15.4	10.8	13.4	22.6	15.1
R11	10.9	14.4	11.3	13.9	17.8	13.7
R12	12.3	11.7	13.4	14.2	14.8	13.3
R13	24.1	31.7	27.3	27.6	36.2	29.4
R14	20.8	36.5	40.5	23.2	22.0	28.6
R15	27.5	36.8	67.1	32.0	43.0	41.3
R16	20.7	24.4	45.6	27.5	36.8	31.0
R17	17.5	14.2	13.6	12.4	19.4	15.4
R18	21.2	19.6	17.5	23.4	18.0	19.9
R19	37.7	43.8	35.6	42.8	40.2	40.0
R20	37.3	44.5	42.2	40.0	27.0	38.2
R21	34.2	29.8	25.7	30.1	24.0	28.8

Location	2019	2020	2021	2022	2023	Average
R22	30.7	29.3	22.7	26.8	31.3	28.2
R23	26.1	20.1	20.3	23.9	15.0	21.1
R24	25.0	19.0	19.4	22.5	13.9	20.0
R25	24.3	17.6	18.8	20.8	13.3	19.0
R26	23.6	16.3	18.0	19.1	12.7	17.9
R27	22.4	20.3	14.5	18.8	21.2	19.4
C1	38.2	34.8	35.7	33.3	31.2	34.6
C2	71.7	81.6	60.4	66.2	65.4	69.1
C3	85.4	81.6	91.9	87.7	82.8	85.9
C4	29.2	26.5	40.2	32.1	42.7	34.1
C5	20.8	24.0	30.1	22.3	27.3	24.9
C6	26.8	36.7	31.8	17.7	28.1	28.2
C7	18.6	22.4	16.3	14.4	24.6	19.3
C8	78.5	66.7	78.2	52.7	69.4	69.1
C9	20.7	21.1	15.0	22.5	17.8	19.4
C10	20.5	25.3	16.4	24.9	21.9	21.8
C11	27.9	18.4	17.5	22.7	17.8	20.9
C12	15.5	20.1	16.8	26.8	27.9	21.4
C13	38.7	16.9	26.0	38.7	24.7	29.0
C14	22.7	59.4	40.8	33.6	36.7	38.6
C15	31.1	25.1	27.7	26.7	20.7	26.3
C16	35.9	30.8	38.3	36.8	29.7	34.3
Limit	**10,000**	**10,000**	**10,000**	**10,000**	**10,000**	**10,000**

The predicted ground level CO concentrations in each year, as well as the 5-year average are significantly below the limit values.

ECOLOGICAL RESULTS

Modelling was undertaken to confirm the emissions from the site layout, the results of which are provided in the Table below.

Table 9.5.6: Annual Average NO_x Concentrations at Ecologically Sensitive Locations (75% Volume Flow)

Location	2019	2020	2021	2022	2023	Average
E1	0.017	0.014	0.016	0.012	0.015	0.015
E2	0.015	0.011	0.012	0.016	0.011	0.013
E3	0.003	0.003	0.003	0.003	0.003	0.003
E4	0.002	0.003	0.003	0.004	0.002	0.003
E5	0.001	0.001	0.001	0.001	0.001	0.001
E6	0.001	0.001	0.001	0.001	0.001	0.001

All of the predicted Ground Level Concentrations of NO_x detailed in the Tables above are significantly below the limit values as provided in **Table 9.1** in relation to the protection of vegetation.

10 Noise and Vibration

10.1 Introduction

Enfonic Ltd. have been commissioned by ORS Consulting Engineers to conduct a noise impact assessment in relation to the proposed Anaerobic Digestion Facility at Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork (the Proposed Development).

The noise and vibration impact during the construction and operational phases are considered in addition to taking account of mitigation measures to reduce or eliminate any residual impacts on the environment within the study area.

This assessment was prepared in accordance with the EIA Directive 2014/52/EC, current EPA guidelines and best practice.

10.2 Fundamentals of Noise

The audible range of sounds can be expressed in terms of Sound Pressure Levels (SPL) and ranges from 0dB (for the threshold of hearing) to 140dB (for the threshold of pain). It should be noted that a doubling in sound energy (such as may be caused by a doubling of traffic flows) increases the SPL by 3dB.

The frequency of sound is the rate at which a sound wave oscillates and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. For example, hearing sensitivity is most sensitive to the frequency range of language (300Hz-3,000Hz) and decreases substantially as frequency falls.

It is necessary to adjust the measured noise level by an instrument to reflect the sensitivity response of human hearing and the 'A-weighting' system has been defined in the international standard ISO 226:2003 Acoustics. A SPL measured using 'A-weighting' is expressed in terms of dBA.

An indication of the level of some common sounds on the dBA scale is as follows:

Table 10.1. Common sounds and dBA scale

Source	Decibel Level (dBA)
Threshold of Hearing	0
Rustling Leaves	10
Whisper	20
Quiet Rural Setting	30
Quiet Living Room	40
Suburban Neighbourhood	50
Normal Conversation	60
Busy Street Traffic	70
Vacuum Cleaner	80
Heavy Truck	90
Jackhammer	100
Front Row of Rock Concert	110
Threshold of Pain	130

A glossary of acoustic terminology used in this report is provided in **Appendix 10.1.**

10.3 Methodology

The assessment of impact effects has been undertaken with reference to the guidance documents relating to noise and vibration for the construction and operational phase of the Proposed Development, which are set out within the relevant sections of this chapter.

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).

10.4 Guidance Documents and Assessment Criteria

10.4.1 Significance of Impact

The criteria for determining the significance of impacts and the effects used in this report are in line with the EPA's Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022).

The EPA guidelines do not quantify the impacts in decibel terms. In absence of such information, reference is made to Guidelines for Environmental Noise Impact Assessment (2014) from the Institute of Environmental Management and Assessment (IEMA).

Table 10.2. Degree of Effect Matrix (IMEA, 2014) presents the degree of effect matrix from the IEMA guidelines and **Table 10.3**: Effect Descriptions (IMEA, 2014) presents the effect descriptions.

Table 10.2. Degree of Effect Matrix (IMEA, 2014)

Magnitude / Scale of Change	Sensitivity of Receptor			
	High	**Medium**	**Low**	**Negligible**
Large	Very Substantial	Substantial	Moderate	None
Medium	Substantial	Substantial	Moderate	None
Small	Moderate	Moderate	Slight	None
Negligible	None	None	None	None

Table 10.3: Effect Descriptions (IMEA, 2014)

Effect	Description
Very Substantial	Greater than 10 dB change in sound level perceived at a receptor of great sensitive to noise
Substantial	Greater than 5 dB change in sound level at a noise-sensitive receptor, or to a 5 to 9.9 dB change in sound level at a receptor of great sensitivity to noise
Moderate	A 3 to 4.9 dB change in sound level at a sensitive or highly sensitive noise receptor, or a greater than 5 dB change in sound level at a receptor of some sensitivity
Slight	A 3 to 4.9 dB change in sound level at a receptor of some sensitivity
None/Not Significant	Less than 2.9dB change in sound level and/or all receptors are of negligible sensitivity to noise or marginal to the zone of influence of the proposals.

For this assessment, it has been assumed that dwellings have high sensitivity. **Table 10.4.** Effects Descriptions (IMEA-2014 and EPA-2012) presents the impact scale adopted in this assessment as well as the corresponding significance of impact based on definitions presented in the Revised EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

Table 10.4. Effects Descriptions (IMEA-2014 and EPA-2012)

Noise Level change dB	IEMA Guidelines	EPAs Significance of Effects
Less than 2.9	None/Not significant	Imperceptible
		Not Significant
3.0 – 4.9	Slight	Slight Effects
	Moderate	Moderate Effects
5.0 – 9.9	Substantial	Significant Effects
Greater than 10.0 dB	Very Substantial	Very Significant
		Profound Effects

10.4.2 Construction Phase (Noise)

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities normally control construction activities by imposing limits on the hours of construction works and may consider noise limits at their discretion.

10.4.2.1 BS 5228-1:2009+A1:2014

In the absence of specific noise limits, appropriate construction limits adopted in this

assessment make reference to BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise. This provides information on the prediction and measurements of noise from construction sites and operations such as mines and quarries. It also includes a large database of source noise levels for commonly used equipment and activities on construction sites.

The standard provides guidance on the 'threshold of significant effect' in respect of noise impact at dwellings. One suggested method for determining threshold noise levels is known as the 'ABC method'. This involves measuring existing ambient noise levels at noise sensitive locations and categorising them A, B or C accordingly, with the relevant threshold level derived from the categories as set out in **Table 10.5.**

Table 10.5: BS 5228 - Example of significant effect at dwellings.

Assessment category and threshold value period (LAeq)	Threshold value, in decibels (dB)		
	Category A [A)]	Category B [B)]	Category C [C)]
Night-time (23.00−07.00)	45	50	55
Evenings and weekends [D)]	55	60	65
Daytime (07.00−19.00) and Saturdays (07.00−13.00)	65	70	75
NOTE 1 A significant effect has been deemed to occur if the total LAeq noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level. *NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total LAeq noise level for the period increases by more than 3 dB due to construction activity.* *NOTE 3 Applied to residential receptors only.*			

A)	Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.
B)	Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.
C)	Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category B values.
D)	Category D: 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

In general, the noise impact due to the construction phase will be from the specific items of plant used, the duration and phasing of the construction methods, the time of day that each plant will be used and their location.

For the appropriate period (e.g. daytime) the ambient noise level is determined and rounded to the nearest 5dB. At some properties, particularly those located close to busy roads, the ambient noise levels may be relatively high. However, given the rural nature of the site in general, reference has been made to the quietest properties near the Proposed Development which have ambient noise levels in the range of 45 to 55dB LAeq.T. Therefore, for the purposes of this assessment, as a worst case, all properties will be afforded a Category A designation.

10.4.3 Construction Phase (Vibration)

Vibration emissions are limited to the construction phase of the Proposed Development and the grid connection route. The gas grid connection will be carried out by Gas Networks Ireland, but is considered in as far as practicably possible within this EIAR. There are no significant adverse vibration impacts expected from the Proposed Development once operational.

To prevent structural damage to buildings, suitable criteria can be found in the following guidance:

- BS 7385 – Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground-borne vibration (1993); and
- BS 5228 – Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (2009+A1:2014).

The relevant criteria used for building protection is expressed in terms of Peak Particle Velocity (PPV) in mm/s. These standards provide different criteria in for the prevention of cosmetic damage as set out in **Table 10.6.**

Table 10.6: Summary of British Standard Vibration Criteria.

Standard	Freq. Range 1 / Limit	Freq. Range 2 / Limit	Freq. Range 3 / Limit
BS 7385	<10Hz 8mm/s	10-50Hz 12.5mm/s	>50Hz 20mm/s
BS 5228	<15Hz 15mm/s	>15Hz 20mm/s	N/A

10.4.3.1 TII Good Practice Guidance

The Transport Infrastructure Ireland (TII) (formally National Roads Authority) offers a beneficial summary of the above criteria in their Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA, 2004) given in **Table 10.7**.

Table 10.7: Summary of Applicable TII Vibration Criteria.

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:		
<10Hz	**10-50Hz**	**>50-100Hz**
8mm/s	12.5mm/s	20mm/s

10.4.4 Operational Phase

Two separate assessments are appropriate for the Proposed Development as follows:

1. Once operational, the emission licence for the Proposed Development will fall within the remit of the Environmental Protection Agency (EPA) who will set noise emission criteria.
2. For the purposes of planning, noise emissions are assessed relative to the receiving environment.

Assessment in relation to both is included herein.

10.4.5 EPA Noise Guidance

The Environmental Protection Agency (EPA) (2016), Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) provides noise guidance to operators' subject to IPPC, IE, or waste licences.

Typically noise emissions limits are set at Noise Sensitive Locations (NSLs) or at the site boundary as follows:

- Daytime: 55dB L_{Aeq}
- Evening: 50dB L_{Aeq}

- Night-time: 45dB L_{Aeq}

Quiet Area Screening of the Development Location

The location of the Proposed Development should be screened in order to determine if it is to be located in or near an area that could be considered a 'Quiet Area' in open country according to the Agency publication Environmental Quality Objectives - Noise in Quiet Areas.

This involves determining if the following criteria are all satisfied:

- At least 3 km from urban areas with a population >1,000 people; No
- At least 10 km from any urban areas with a population >5,000 people;
- At least 15 km from any urban areas with a population >10,000 people;
- At least 3 km from any local industry; No
- At least 10 km from any major industry centre; No
- At least 5 km from any National Primary Route, and; No
- At least 7.5 km from any Motorway or Dual Carriageway.

The site does not meet these criteria and is not considered to be a quiet area as per the Agency definition.

10.4.6 BS4142:2014

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound described a method for assessing the impact of a proposed or existing industrial or commercial sound source. Its principal uses are to assess noise from new or changed industrial or commercial premises, to accompany a planning application, or to assess noise which may be giving rise to complaints.

In the simplest terms, the procedure rates the noise levels from an operation (the 'Specific' noise) and compares it with the 'Background' noise levels in the absence of the noise source(s) under investigation. The level difference is an indication of the impact that the operation might have.

Community response to noise can vary differently among sound sources that are observed to have the same acoustic levels. BS 4142 (and ISO 1996) describes adjustments for sounds that have different characteristics. The term Rating Level (LAr) is used to describe physical sound predictions or measurements to which one or more adjustments have been added. These characteristics include tonal components to the noise and noise of an impulsive nature.

After any necessary adjustment for Ambient and Residual noise levels, the Rating Level (LAr) is compared to the Background Level (LA90) to determine the likelihood of an adverse impact.

The 'context' of the development and its environs e.g. time of day, nature of the neighbourhood, local attitudes to the development, etc ought also to be considered. There is also a degree of uncertainty applicable to the results e.g. for weather, instrumentation, measurement duration, calculation errors etc which ought to be considered.

10.4.7 BS 8233:2014 Guidance on sound insulation and noise reduction for Buildings

BS 8233 provides guidance on how to design buildings and address noise issues to achieve

acceptable indoor noise levels and acoustic comfort. The standard covers various aspects related to sound insulation and noise reduction in buildings. Specifically, it sets recommended levels for indoor ambient noise in residential dwellings as summarised in **Table 10.8.**

Table 10.8: Summary of BS8233 Internal Noise Criteria

Location	$L_{Aeq, 16hr}$ (07:00-23:00 hrs)*	$L_{Aeq, 8hr}$ (23:00-07:00 hrs)
Living Rooms	35 dB	-
Dining Rooms	40 dB	-
Bedrooms	35 dB	30 dB

Additionally, it provides the following guidance in relation to suitable external (amenity space) noise levels:

"*it is desirable that the steady state noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ …it is also recognized that these guideline values are not achievable in all circumstances."*

10.4.8 ISO 9613-2:1996

ISO 9613-2:1996 Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation describes a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level under meteorological conditions.

10.4.9 Additional Vehicular Activity on Public Roads

There are no specific guidelines or limits relating to traffic related sources along the local or surrounding roads. Given that traffic from the development will make use of existing roads already carrying traffic volumes, it is appropriate to assess the calculated increase in traffic noise levels that will arise because of vehicular movements associated with the development.

The most appropriate criteria for assessing disturbance or annoyance from noise arising from the site is related to the significance of perceived changes in noise levels.

The Institute of Environmental Management and Assessment's (IEMA) 'Guidelines for Noise Impact Assessment' gives appropriate impacts which have been summarised with relevant guidance in **Table 10.9.**

Table 10.9: Summary of impact for changes in traffic noise levels

Change in Noise Level (dB)	Subjective Reaction	Magnitude of Impact	EPA Glossary of Effects
0	No change	None	Imperceptible
0.1 to 2.9	Barely perceptible	Minor	Not Significant - Slight
3.0 to 4.9	Noticeable	Moderate	Moderate
5.0 to 9.9	Up to a doubling of loudness	Substantial	Significant
10+	More than a doubling of loudness	Major	Very Significant - Profound

A change in traffic noise of less than 2dBA is generally not noticeable to the human ear whilst a change of 3dBA is generally considered to be just perceptible. Changes in noise levels of 3 to 5 dBA would be noticeable, in excess of 6dBA would be clearly noticeable, and depending on the final noise level, the impact may be moderate or significant.

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that a change in noise level of 1dB LA10,18h is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3dB LA10,18h is equivalent to a 100% increase or a 50% decrease in traffic flow.

10.4.10 Local Guidance

Regional guidance and planning policy for the Cork City and County administrative area comes primarily from the following:

10.4.10.1 Cork Agglomeration – Noise Action Plan 2024-2028

The Noise Action Plan 2024-2028 (NAP) is prepared as a requirement of Environmental Noise Regulations 2018. It is primarily concerned with road traffic noise but includes some useful guidance for other noise sources. The NAP is underpinned by a set of overarching noise policy principles outlined in the Noise Policy Statement as follows:

NOISE POLICY STATEMENT

Cork City Council and Cork County Council will adopt a strategic approach to managing environmental noise from road traffic, rail traffic, airports and industrial activity sites, including ports, within its functional area, and will aim to:

- **Prevention** – manage the risk of additional members of the community being exposed to undesirable noise levels where it is likely to have significant adverse impact on health and quality of life.
- **Protection** - protect areas which are desirably quiet, or which offer a sense of tranquillity through a process of identification and validation followed by formal designation of 'Quiet Areas'.
- **Mitigation** – identify and prioritise appropriate mitigation measures to reduce noise levels where they are potentially harmful.

Additionally, the results of the strategic noise mapping have been used to identify areas within the Agglomeration to be considered for preservation for environmental noise quality. These are referred to as Candidate Quiet Areas (CQAs) and 66no. potential CQAs have been identified within Cork City Council area of the Agglomeration and none in Cork County Council's.

10.4.10.2 Cork County Development Plan 2022-2028

In relation to noise, the County Development Plan states:

"Seek the minimisation and control of noise pollution associated with activities or development, having regard to relevant standards, published guidance and the receiving environment."

10.5 Receiving Environment

10.5.1 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."

10.5.2 Study Area

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 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 shown in Figure 10.1 below.

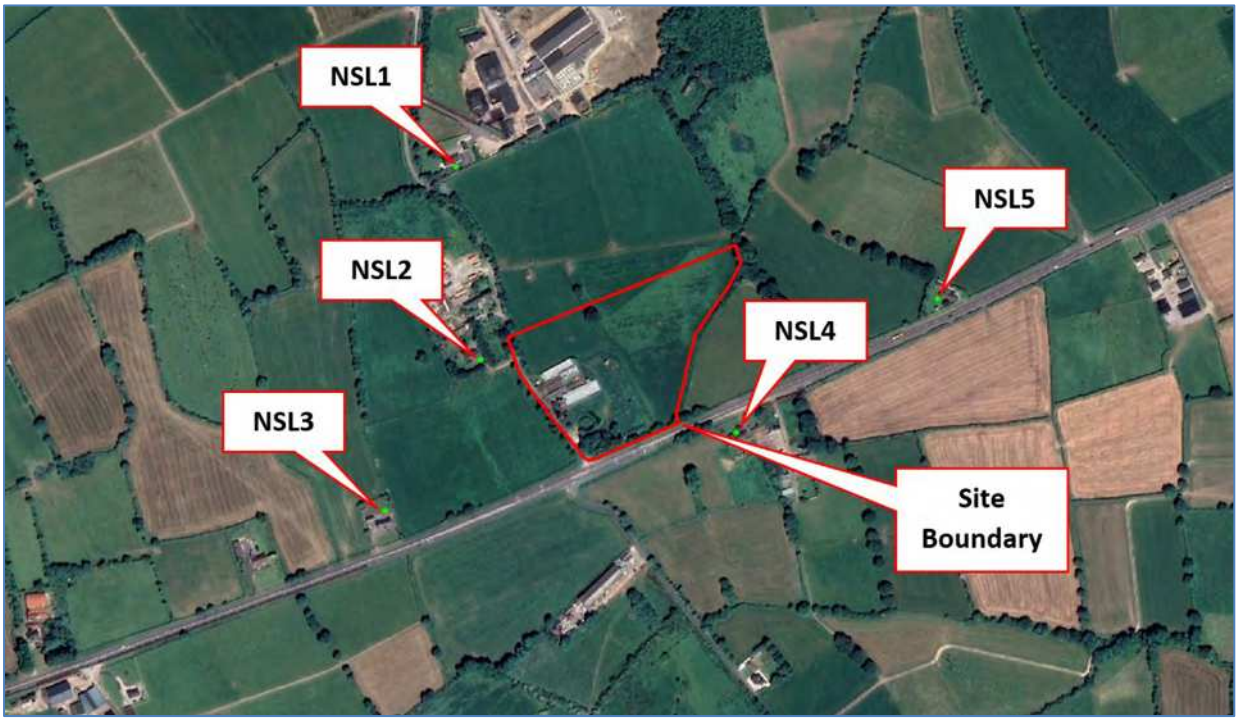


Figure 10.1: Study Area and nearest Noise Sensitive Locations (NSL) considered in this assessment.

10.5.3 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.

10.5.3.1 Noise Monitoring Locations

Four Noise Measurement Locations (NMLs) were selected to represent the ambient noise conditions at the locations shown in **Figure 10.2**

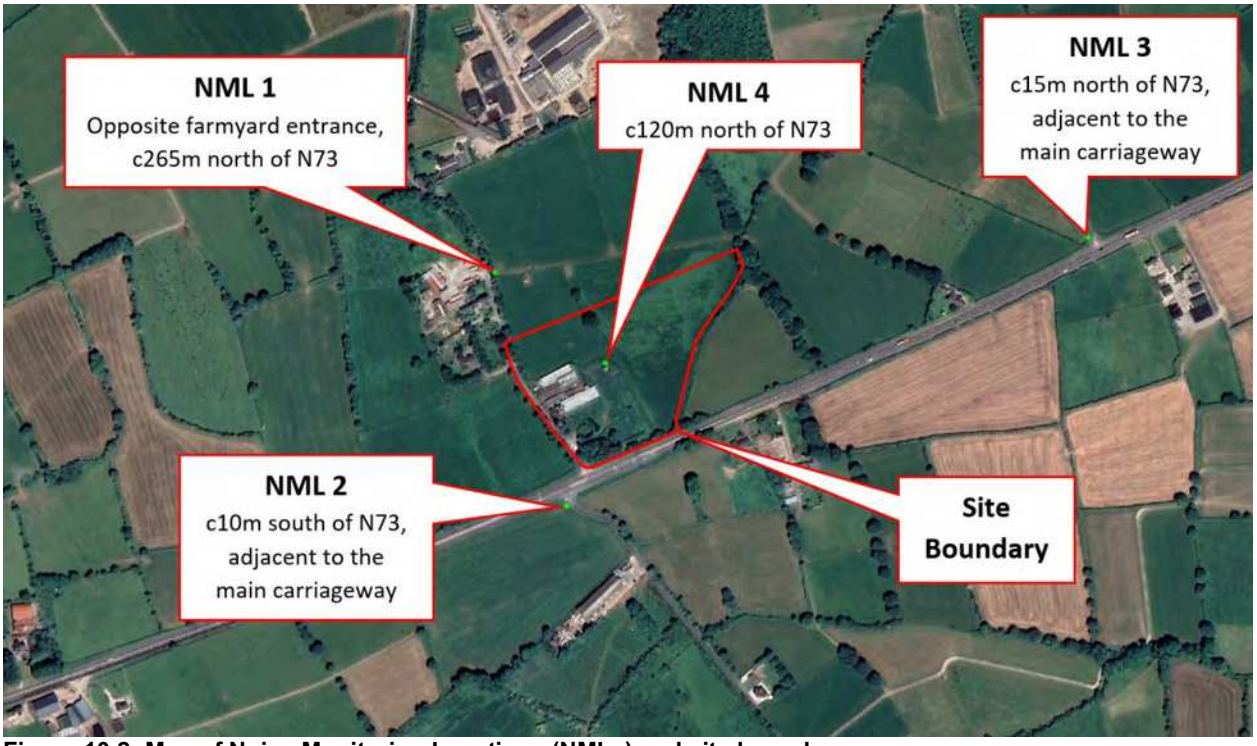


Figure 10.2: Map of Noise Monitoring Locations (NMLs) and site boundary

Attended noise measurements were taken at NML1, NML2, NML3 to establish the daytime noise levels. Unattended noise monitoring at NML4 over several days was used to establish the 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 calm and dry throughout the survey.

Measurements took place between 12:00 – 13:00 on 16-04-2024 and monitoring took place between 16-04-2024 and 19-04-2024. Images of the installations are provided in **Appendix 10.2**.

10.5.4 Survey Results

Day-time Levels

Two rounds of non-consecutive 15min measurements were taken at the attended locations and the average of the results are used to set the prevailing Background (L_{A90}) Daytime noise levels. The results are presented in **Table 10.10**.

Table 10.10. Summary of Baseline Survey Results

Location	Start Time	Elapsed Time	L_{Aeq}	L_{A90}	Noise source description
NML1	13:02:29	00:15:00	61.3	40.3	RTN N73, Occasional local RTN on L90813, Bird Song, Agricultural noise distant
	11:24:25	00:15:00	47.9	41.1	RTN N73, Occasional local RTN on L90813, Bird Song, Agricultural noise distant
	11:43:56	00:15:00	46.3	39.5	RTN N73, Occasional local RTN on L90813, Bird Song, Agricultural noise distant
Arithmetic Average:			51.8	40.3	
NML2	12:11:29	00:15:00	67.0	47.8	RTN N73, bird song, occasional local RTN on L5637, livestock nearby
	11:07:25	00:15:00	70.9	54.1	RTN N73, bird song, occasional local RTN on L5637, livestock nearby
	11:26:26	00:15:00	71.5	52.3	RTN N73, bird song, occasional local RTN on L5637, livestock nearby
Arithmetic Average:			69.8	51.4	
NML3	12:32:13	00:15:00	70.8	46.4	RTN N73, bird song, occasional local RTN on L5635
	11:31:21	00:15:00	71.3	44.2	RTN N73, bird song, occasional local RTN on L5635
	11:46:30	00:15:00	69.9	43.3	RTN N73, bird song
Arithmetic Average:			70.6	44.6	
Overall Average:			64.1	45.4	
RTN=Road Traffic Noise.					

The average typical Daytime Background (L_{A90}) noise level was 45dB (rounded).

Night-time Levels

Night-time noise levels were derived from the unattended noise monitor at the NML4 and a time-history plot of the average Night-time noise levels from here is given in **Appendix 10.4**.

The average typical Night-time Background (L_{A90}) noise level was 33dB (rounded).

Quiet Area Criteria

The measured levels do not satisfy Candidate Quiet Areas criteria as set out in Section 10.4.10.

10.6 Impact Assessment

In general, noise impact is a result of the emissions from the various noise sources operating at the Proposed Development, the distance from the sources to receivers (NSLs), 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.

10.6.1 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 associated increase in noise level.

10.6.2 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.

Subject to agreement with the Cork County Council, it is anticipated that the following times will constitute the standard working hours on the construction site:

- Monday to Friday 07:00 to 19:00
- Saturdays 08:00 to 16:00

Typical construction phases and timeframe is set as follows:

- Site Preparation / Clearance: 6-8 weeks
- Civil / Structural Works: 6 months
- Mechanical and Electrical Installation: 3 months
- Commissioning and testing: 2 months

The Site Preparation/Clearance and Civil/Structural works represent the noisiest phases of construction and are assessed herein.

10.6.3 Construction Noise Limits

Following a review of the baseline noise survey results in Table 10.5 the appropriate BS5228 construction noise category is A i.e. 65dB L_{Aeq}.

10.6.4 Construction Noise

An outline CEMP has been submitted in relation to the Proposed Development to include all mitigation measures outlined in this chapter. As a working initial hypothesis, the impact of assumed typical construction phases of work has been assessed.

Table 10.11 outlines typical plant items associated with each relevant phase, their noise levels and assumed operational times. Noise levels have been taken from BS 5228:2009+A1:2014 and table references included.

Table 10.11: Summary of predicted noise levels from construction plant

Description	Item of Plant (BS5228 Table Ref.)	L_{Aeq} Noise Level @10m	Percentage on-time %[1]
Phase 1a –	Tracked Excavator – 25t (C2.19)	77	50
	Tracked Excavator – 21t (D10.9)	75	50

Description	Item of Plant (BS5228 Table Ref.)	L_{Aeq} Noise Level @10m	Percentage on-time %[1]
Site Preparation / Clearance	Dozer - 239kW (D3.27)	81	80
	Articulated Dump Truck (2no.) (C2.33)	81	50
	Tipper Lorry - 75kW (D3.112)	85	50
Phase 1b – Road Development for Construction Access	Tracked Excavator – 25t (C2.19)	77	80
	Excavator (C10.9)	75	50
	Articulated Dump Truck (C2.33)	81	50
	Excavator (C4.67)	74	80
	Dump Truck (C2.30)	79	50
	Roller (C5.27)	67	80
Phase 2a – Instate Finished Road Surface	Dump Truck (C2.30)	79	50
	Roller (C5.27)	67	80
	Asphalt Paver + Tipper Lorry (C5.31)	77	80
	Lorry (C11.9)	82	50
	Road Roller (C5.19)	80	80
Phase 2b – Civil / Structural works	Tracked Excavator (C2.19) (3no.)	82	50
	Tracked Excavator – 21t (D10.9)	75	50
	Dozer - 239kW (D3.27)	81	80
	Articulated Dump Truck (2no.) (C2.33)	81	50
	Tipper Lorry - 75kW (D3.112)	85	30
	Concrete mixer truck etc (C4.32)	78	80
	Telescopic Handler (C4.54)	79	80
	Angle grinder (C4.93)	80	50
[1]Best-practice assumptions.			

As a worst-case assessment, construction noise levels at the closest NSL (NSL2) which is approximately 70m west of the site boundary is considered, with NSLs further away receiving a commensurate reduction in noise level. A suitably constructed hoarding around the construction perimeter has been assumed.

The predicted noise levels for each construction phase and comparison with the criteria are given in **Table 10.12.**

Table 10.12: Summary of Predicted Construction Noise at the closest NSL.

Phase	Predicted Noise Level $L_{Aeq, 1hr}$ @70m	Construction Noise Criteria	Criteria Exceeded?
Phase 1a - Site Preparation / Clearance	63dB	65dB	No
Phase 1b – Road Development for Construction Access	60dB	65dB	No
Phase 2a – Instate Finished Road Surface	61dB	65dB	No
Phase 2b – Civil / Structural works	64dB	65dB	No

Construction related noise levels are expected to be below the criteria for all phases. Nevertheless, mitigation measures set out in Section 10.7 will further reduce any adverse impact.

10.6.5 Construction Traffic

Access for the main construction phase of the site will be via the site access road off the L90813. The most significant sources of construction traffic are Heavy Good Vehicles (HGVs)

accessing the site, and to assess the associated impact it is necessary to estimate the number of vehicles. It has been estimated that during the course of an average day during construction, that up to 10no. HGVs will access the site to deliver materials i.e. 20no. movements per day.

Additional light goods and contractor related vehicles would be expected in the morning and evening peak periods. The impact from these vehicle movements is expected to be negligible.

The closest identified property has been identified as NSL2, approximately 70m west of the site access road. Using formula F.2.5 from BS 5228-1:2009+A1:2014 the noise level associated with the HGV movements has been calculated as $L_{Aeq,\ 1hr}$ = 50dB at this location. Combined with the other construction works set out in Table 10.12, the construction noise criteria is not expected to be exceeded.

10.6.6 Construction Vibration

Empirical data provided in BS5228-2:2009 demonstrates that ground borne vibration waves are attenuated rapidly as they propagate from a source through the substrate. The magnitude of source vibration levels, ground attenuation and distance to the nearest NSL are such that no signification vibration impact will occur.

10.6.7 Extension of the Gas Network Pipeline

It is proposed to extend the existing medium pressure gas network out to the Proposed Development to allow on-site direct injection into the gas network.

The connection route and method will be determined by Gas Network Ireland (GNI) and all works are carried out in accordance with the following standard *I.S. 328 2021 Gas transmission — Pipelines and pipeline installations*. The new gas pipework to be constructed by GNI will be laid along the route of the N73 national road.

It is planned that the gas pipe will be laid in a mix of grass verge and road and the pipe will be laid by open cut method.

The closest NSL to the works is NSL2 approximately 70m to the west. The typical plant required and associated noise levels are presented in **Table 10.13** and the predicted noise levels in **Table 10.14** below.

Table 10.13. Summary of Noise Levels for Gas Network Extension Works.

Item of Plant (BS5228 Table Ref.)	L_{Aeq} Noise Level @10m	Percentage on-time %[2]
Road Sweeper – 70kW (C4.90)[1]	76	50
Mini Excavator w/ Hydraulic Breaker (C5.2) [1]	83	50
Vibrator Roller – 3t (C5.27)	77	50
Hand-held Circular Saw (petrol (C5.36) [1]	87	50
Dump Truck (C2.30)	79	50
Vibratory Plate (petrol) (C2.41)	80	50

[1]In the case of works along the grass verge, these sources will not be required.
[2]Best-practice assumption.

Table 10.14: Summary of Predicted Noise levels for Gas Network Extension Networks.

Phase	Predicted Noise Level $L_{Aeq, 1hr}$ @70m (dB)	Construction Noise Criteria (dB)	Criteria Exceeded?
Gas Network Extension Works	70	65	Yes

There is potential for brief periods where noise levels will be elevated at the dwelling closest to the works. The noise levels presented are predicted maximum expected levels and are expected to occur for only short periods of time as the works will likely only be in the closest position for one or two days.

In addition to the noise mitigation measures discussed in Section 10.7., residents affected will be notified by GNI via a letter drop before the works are due to start with disruption kept to a minimum and access to properties will be maintained.

10.6.8 Description of Effects – Summary

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 10.15**.

Table 10.15:Summary of Description of Effects (Construction Phase).

Aspect	Quality	Significance	Duration
Construction Phase	Negative	Slight	Temporary
Construction Traffic	Negative	Not Significant	Temporary
Gas Pipe Extension Works	Negative	Significant	Temporary

10.6.9 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 (L_{A90}) noise levels compared with the Daytime period.

10.6.10 Noise Sources

Each of the potential operational noise sources were identified and reference sound power data assigned. The data has been sourced from manufacturers datasheets, noise source databases, and BS 5228-1:2009+A1:2014 standard.

Several noise sources will be installed inside enclosures and estimates of the acoustic performance of these structures to attenuate the noise within, based on manufacturers datasheets and published data, have been included.

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 10.16** below.

Table 10.16: Summary of Significant Noise Sources.

Grouping	Item	#	Location Details	Run Time
Digester (Primary)	Agitator motor	12	Digester (Primary) Tank	Continuous
Digester (Secondary)	Agitator motor	4	Digester (Secondary) Tank	Continuous
Digestate Storage	Agitator motor	2	Digestate Storage Tank	Continuous
Pasteurisation Units	Agitator motor	3	External	2/24 hrs
	Pasteuriser Outlet Pump	1	Sound Proofed Container	30min/hr - 4/24 hrs
	Pasteuriser Inlet Pump	1	Sound Proofed Container	30min/hr - 4/24 hrs
Biogas Upgrading System	Biogas Blower	1	Sound Proofed Container	Continuous
	Biogas Blower	2	External	Continuous
	Cooling Fan	1	External	Continuous
	Gas Chiller	1	Sound Proofed Container	Continuous
Digestate Treatment System	Digestate Transfer Pump	2	Within Building	8/24 hrs
	Internal Pump	1	Within Building	8/24 hrs
	Reverse Osmosis System	1	Within Building	8/24 hrs
	Nanofiltration	1	Within Building	8/24 hrs
Screw Press Separator	Digestate Transfer Pump	2	Sound Proofed Container within Building	8/24 hrs
	Screw Press Separator	1	Sound Proofed Container within Building	8/24 hrs
CO2 Liquefaction System	Biogas Compressor	1	Sound Proofed Container	Continuous
	Plate Heat Exchanger	1	Sound Proofed Container	Continuous
	Reboiler	1	Sound Proofed Container	Continuous
	Condenser	1	Sound Proofed Container	Continuous
	Biogas Blower	1	Sound Proofed Container	Continuous
	Cooling Fan	4	Roof mounted	Continuous
Biogas Flare	Biogas Blower	1	Sound Proofed Cover	Emergency 2% pa
	Flare Stack	1	External - Enclosed by stainless steel stack	Emergency 2% pa
CHP	Biogas Blower	1	External motor	Continuous
	Exhaust Stack	1	External	Continuous
Odour Abatement	Extract Fans	1	External	Continuous

10.6.11 Noise Prediction

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.

10.6.12 Noise Prediction Software

The proprietary software used, Brüel & Kjær Type 7810-C Predictor, calculates noise levels in accordance with *ISO 9613:1996 Acoustics – Attenuation of sound during propagation outdoors*. The resultant noise levels are calculated considering a range of factors affecting the propagation of the sound, including:

- The magnitude of the noise source in terms sound power levels;
- The distance between the source and the receiver;
- The presence of obstacles such as screens or barriers in the propagation path;
- The presence of reflecting surfaces;
- The acoustic property of the ground between the source and receiver;
- Attenuation due to atmospheric absorption

10.6.13 Input Data

Octave band sound power levels (L_W) as provided by the manufacturers or from empirical measurements used in the noise model are presented in **Table 10.17.**

Table 10.17: Summary of Noise Source Sound Power Data.

Grouping	Item	Octave Band (Hz) Sound Power Levels L_w (dB)								Weighting
		63	125	250	500	1k	2k	4k	8k	
Digester (Primary)	Agitator motor	44	58	65	73	77	77	73	58	A
Digester (Secondary)	Agitator motor	44	58	65	73	77	77	73	58	A
Digestate Storage	Agitator motor	44	58	65	73	77	77	73	58	A
Pasteurisation Unit	Agitator motor	85	78	77	76	82	80	73	66	Z
Biogas Upgrading System	Biogas Blower	65	73	83	86	80	78	77	55	A
CHP	Biogas Blower	65	73	83	86	80	78	77	55	A
CHP	Exhaust Stack	76	70	79	84	92	86	83	77	A
CO2 Liq. System	Biogas Blower	65	73	83	86	80	78	77	55	A
Odour Abatement	Fans	85	78	77	76	82	80	73	66	A

In addition, HGV movements associated with Feedstock Intake, Biobased Fertiliser and CO_2 Export were modelled along the site access road. The associated traffic flows are given in Table 10.18**.**

Table 10.18: Operational Traffic Flows

Feedstock in	Delivery Periods	Mean Deliveries/Day (30T Load)	Route	Total In/Out Movements (on public roads)
Cattle Slurry	Monday - Saturday	1	N73	
Cattle Manure		1	N73	
Pig Slurry*		2*	Locally	
Poultry Litter		2	N73, west	
Food Production Residues		1	N73, east	
Drinks Production Residues		1	N73, west	
		1	N73, west	
Dairy Production Residues		1	N73, west	
Grass Silage		1	N73	
Whole Crop Silage		1	N73, east	
		2	N73, east	
Subtotal		**14**		**28 (24)**

Fertiliser Out	HGV/Trailer/day	Total in/out Movements
Digestate Liquid Concentrate	1.8	4
Digestate Fibre	0.9	2
Subtotal	**2.7**	**6 (5.4)**

Product	HGV/Trailer/day	Total in/out Movements
CO_2	1.07	**2**

The HGV details have been included in the noise sources operating during the Daytime period.

10.6.14 Results

The predicted Specific L_{Aeq} noise levels at the NSLs, the measured Background (L_{A90}) levels and the EPA Significance of Effect categories are presented for the Daytime and Night-time periods in **Table 10.19** and **Table 10.20** respectively.

Table 10.19: Summary of Noise Impact – Daytime Period

Location	Measured Background L_{A90} (dB)	Predicted Specific L_{Aeq} Noise Level (dB)	BS4142 Impact	EPA Significance of Effects
NSL01	45	32	-13	Imperceptible/Not Significant
NSL02		42	-3	Imperceptible/Not Significant
NSL03		36	-9	Imperceptible/Not Significant
NSL04		41	-4	Imperceptible/Not Significant
NSL05		27	-18	Imperceptible/Not Significant

Table 10.20: Summary of Noise Impact – Night-time Period.

Location	Measured Background L_{A90} (dB)	Predicted Specific L_{Aeq} Noise Level (dB)	BS4142 Impact	EPA Significance of Effects
NSL01	40	31	-9	Imperceptible/Not Significant
NSL02		39	-1	Imperceptible/Not Significant
NSL03		34	-6	Imperceptible/Not Significant
NSL04		40	0	Imperceptible/Not Significant
NSL05		27	-13	Imperceptible/Not Significant

A colour noise contour plot of the noise emissions is provided in **Appendix 10.4**.

The assessment criteria can be summarised as follows:

- **BS4142 (Daytime)**

There is likely to be no adverse impact during the Daytime period as the predicted levels are below the existing Background (L_{A90}) noise levels at all NSLs.

- **BS4142 (Night-time)**

There is likely to be no adverse impact during the Night-time period as the predicted levels are below the existing Background (L_{A90}) noise levels at all NSLs.

- **EPA IE licence**

Operation noise emission levels will satisfy the criteria as set out in the Environmental Protection Agency (EPA) (2016) *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4) which should be referenced in the site's IE licence.

10.6.15 Acoustic Characteristics

There are no tonal or impulsive or other characteristics associated with the noise sources considered. There are therefore no applicable rating penalties.

10.6.16 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 10.21** in the absence of mitigation.

Table 10.21. Summary of Description of Effects.

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

10.7 Mitigation & Monitoring

The following mitigation measures may be considered to minimise the noise impact to nearby noise sensitive locations.

10.7.1 Operational Phase

The impact assessment herein adopts a worst-case with all noise sources operating simultaneously and continuously. In reality the noise levels and the impact will be less.

Therefore, there are no mitigation measures required to minimise the impact of the operational phase with the exception of planned maintenance. If applicable, replacement plant may be required to be assessed in the future.

10.7.2 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.

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.

10.7.3 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.

10.7.4 Monitoring

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.

10.8 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 work there may be occasions where there are residual effects. It is therefore considered that the residual impact will be slight and for a brief period.

During the operational phase, there is likely to be no adverse impact during the Night-time period as the predicted noise levels are below the existing Background (LA90) noise levels at all NSLs. Mitigation measures are prescribed as applicable. A new noise source will be introduced into the environment however the noise levels for all NSLs are insignificant.

Appendix 10.1

Glossary of Terms:

Terminology	Description
Acoustic Character	One or more distinctive features of a sound (e.g. tones, whines, whistles, impulses) that set it apart from the background noise against which it is being judged, possibly leading to a greater subjective effect than the level of the sound alone might suggest
Ambient Noise	Encompassing sound, at a given place. Usually a composite of sounds from many sources near and far.
Attenuation	The reduction in level of a sound between the source and a receiver due to any combination of effects including distance, atmospheric absorption, acoustic screening, the presence of a building façade, etc.
A-weighting	Frequency weighting scale to account for non-linear response of the human ear. Used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. Denoted by suffix A in parameters such as LAeq, LAF10, etc.
Background Noise	A-weighted noise level of exceeded for 90% of the measurement time. Denoted LAF90. Often classed according to daytime, evening, or nighttime periods.
dB	Abbreviation for 'decibel'
dB(A)	Abbreviation for the decibel level of a sound that has been A-weighted
Decibel	The unit normally employed to measure the magnitude of sound
Directivity	The property of a sound source that causes more sound to be radiated in one direction than another
$L_{Aeq, T}$	Equivalent continuous A-weighted sound pressure level. The value of the sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time
L_{AF}	The RMS (root mean square) of the instantaneous sound pressure over a given period of time (T). T is usually Fast (0.125sec) or Slow (1sec)
L_{A10}	The noise level just exceeded for 10% of the measurement period, A-weighted and calculated by Statistical Analysis.
L_{A90}	The noise level exceeded for 90% of the measurement period, A-weighted and calculated by Statistical Analysis.
$L_{Ar,T}$	The Rated noise levels. The A-weighted, Leq, Sound Pressure Level of an industrial noise during a specified time period, adjusted for Tonal, Impulsiveness and other characteristics.
External Noise	The noise level, in decibels, measured outside a building
Ground Effects	The modification of sound at a receiver location due to the interaction of the sound wave with the ground along its propagation path from source to receiver
Hertz	The unit normally employed to measure the frequency of a sound, equal to cycles per second of acoustic pressure fluctuations about the atmospheric mean pressure
Impulsive Sound	A sound having all its energy concentrated in a very short time period

Appendix 10.2

Noise Monitoring Locations

NML1	
	
	

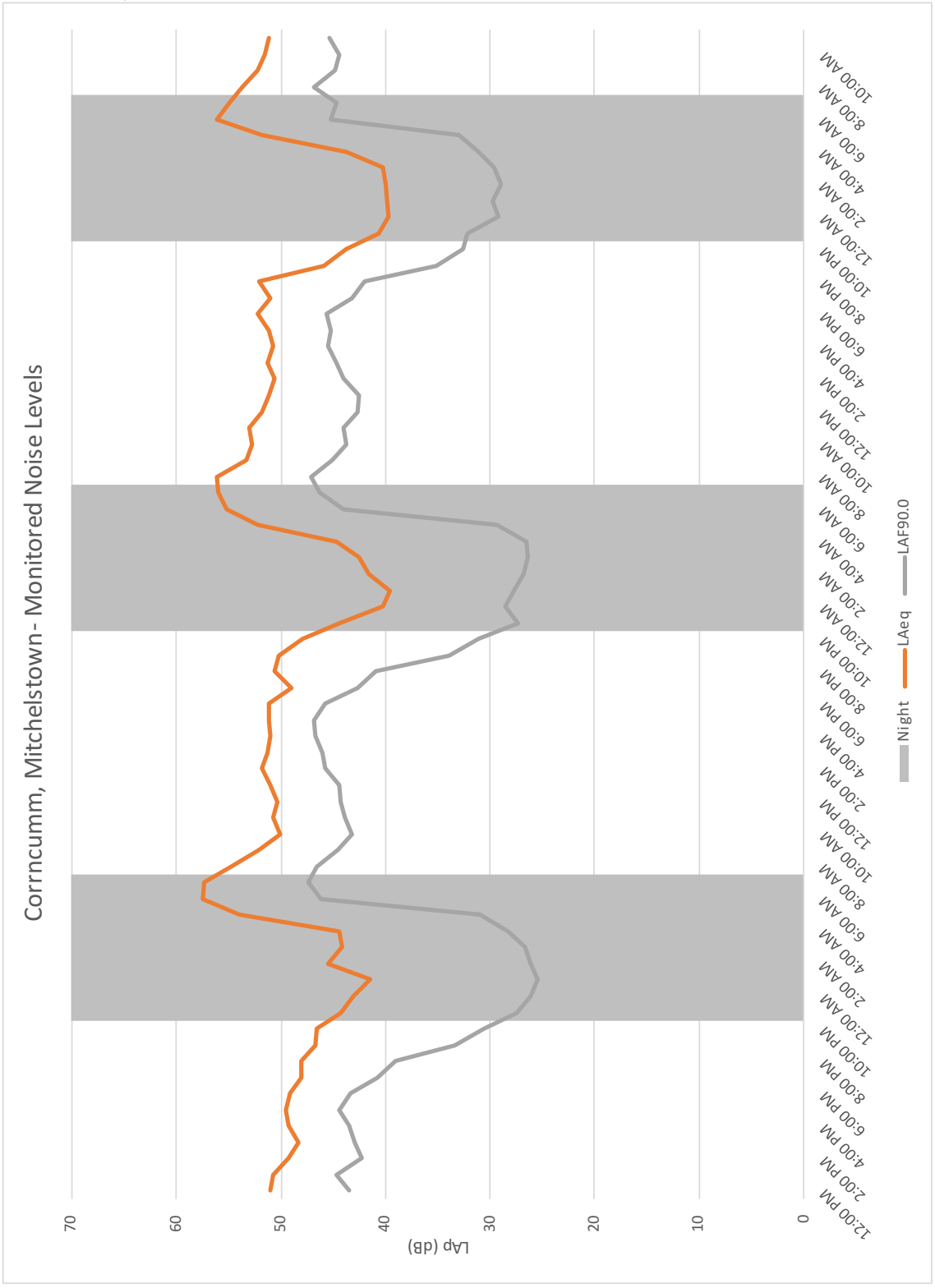
NML2	
	
	

NML3	
	
	

NML4	
	
	

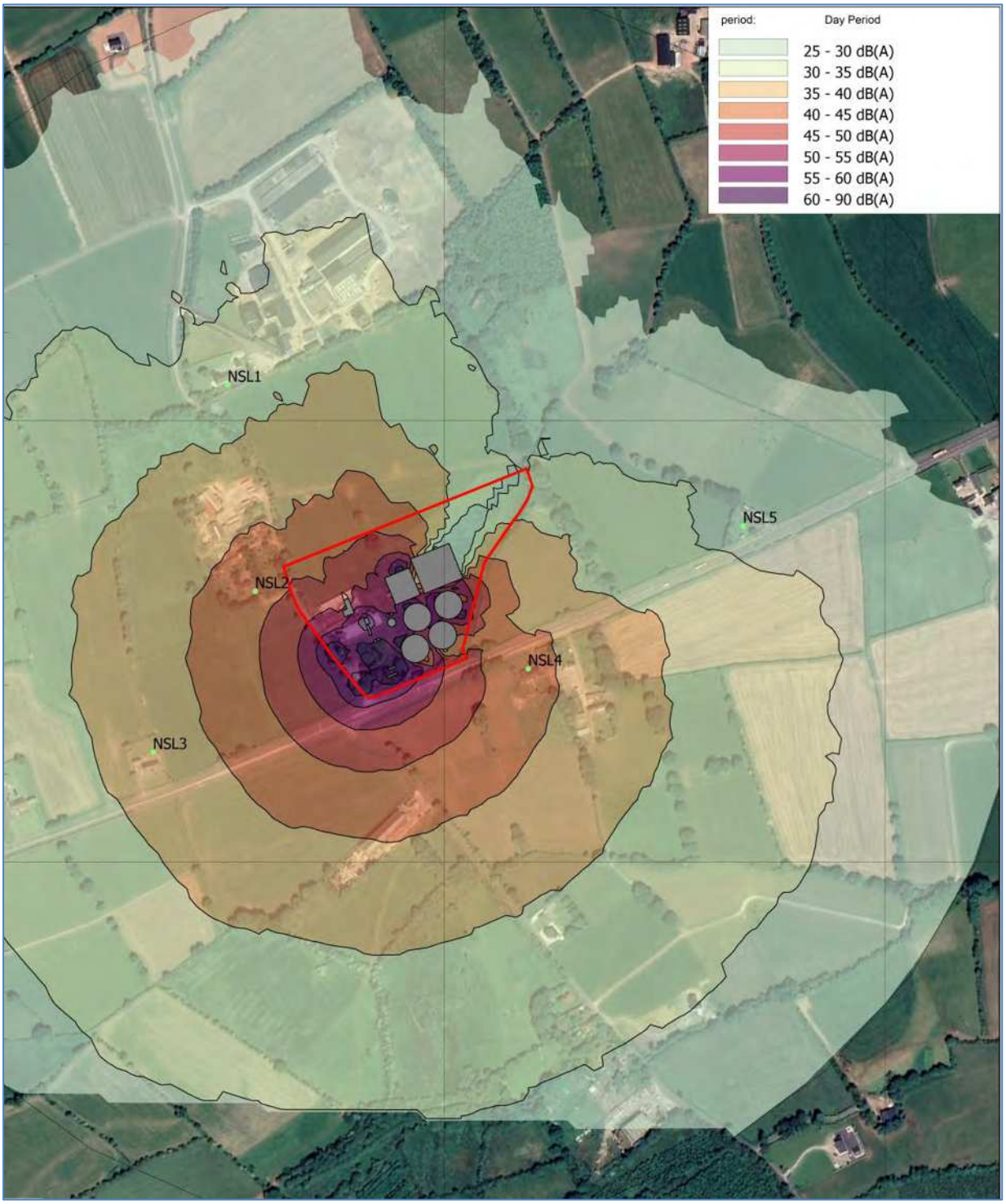
Appendix 10.3

Time-history plot of monitored noise levels.

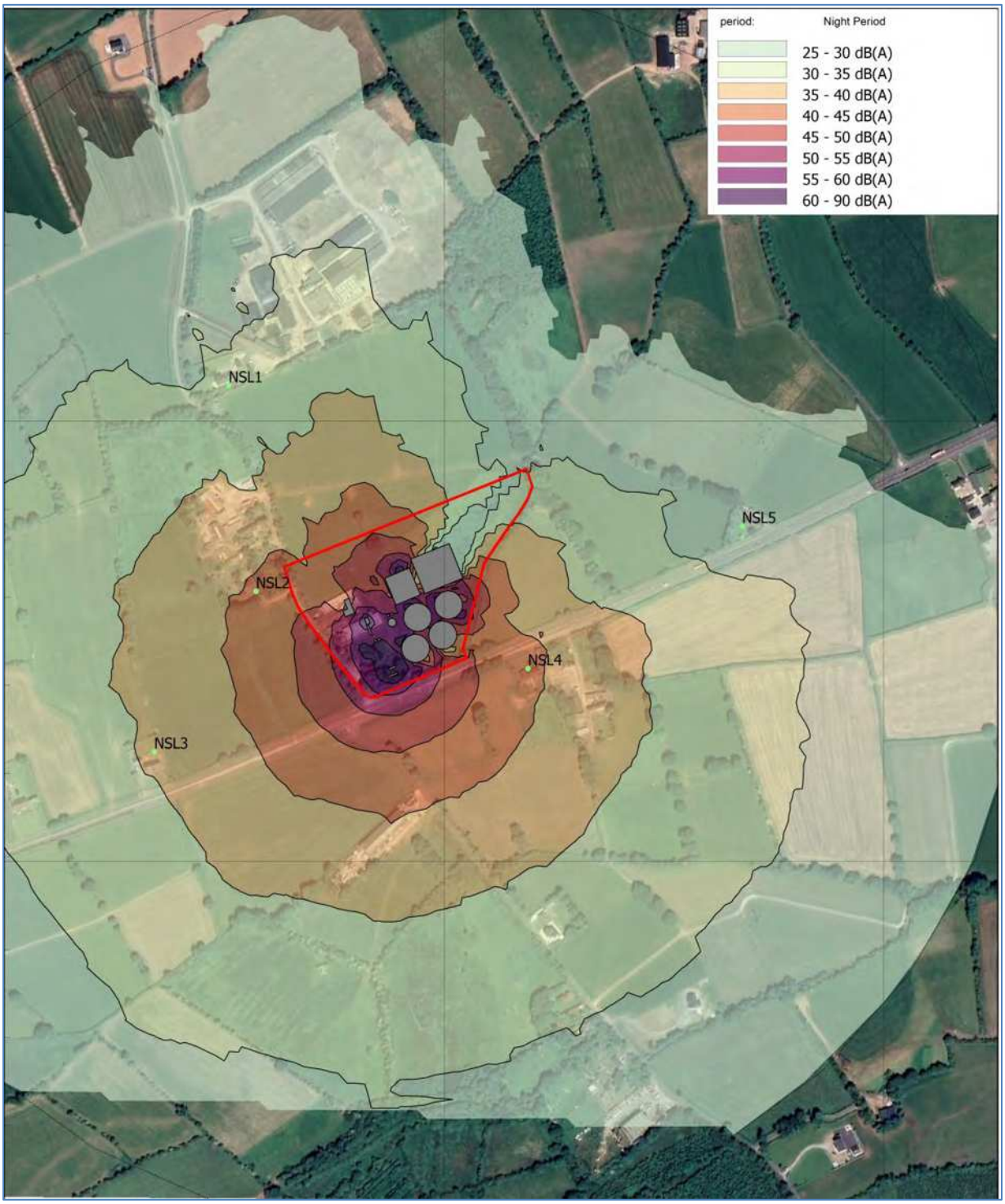


Appendix 10.4

Noise Contour Plot – Day Period



Noise Contour Plot – Night Period



11 Landscape and Visual

11.1 Introduction

This Landscape and Visual Impact Assessment was written by Geraldine Hayes of Hayes Ryan, Landscape Architects. The assessment is based on a desktop study and a field survey of the site and receiving environment. These assessments were conducted on the 18th and 19th of January 2024 and on the 12th of July 2024. Visibility was excellent in January for the time of year and deciduous trees were dormant. In July, deciduous trees and vegetation were in full leaf.

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 draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports[1], 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.

The EPA sample guidelines analyse landscape from the visual and amenity perspective. Visual effects examine context, character of the view, significance and sensitivity with amenity regarding, public access, public amenities, recreation, and tourism. Landscape is studied under the headings; Landscape Appearance and Character, Landscape Context, Views, and Prospects (in the landscape character area and related areas), and Historical Landscapes. GLVIA guidelines examine landscape and visual effects in a necessarily interconnected manner. However, they are studied as separate study components.

This report is to be read with the accompanying set of verified view photomontages prepared by 3Dimensional.

11.1.1 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. According to the Guidelines for Landscape Visual Impact Assessment (GLVIA)[2], 'Landscape' results from the interplay between the physical, natural, and cultural components of our surroundings. Different combinations and spatial distribution of these elements create variations in landscape character. 'Landscape Character Assessment' is how landscape is described. It is the means by which we understand the effects of development on the landscape as a resource.

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

[1] https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf
[2] Landscape Institute and the Institute of Environmental Management and Assessment, 2013 Guidelines for Landscape and Visual Impact Assessment 3rd Edition (GLVIA)

change to landscape character.

11.1.2 Visual

The visual assessment aims to assess the extent of visibility of a development, define the sensitivity of receptors and set out the likely perception of viewers and visually sensitive receptors. This is largely to do with views and visual amenity. ‘Visual’ addresses the effects on specific viewpoints of the Proposed Development as it is experienced by general viewers and those inhabiting the local area. The effect on the views and general visual amenity is assessed. In short, 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.

11.2 Methodology

11.2.1 Baseline Information

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.

Landscape Character Assessment and the character of the relevant views are described and checked against the local conditions. The distinguishing characteristics of the landscape/view are examined.

The significance of the landscape or the view is assessed against current designations, significance of the landscape/view locally nationally or internationally. The quality of the landscape or the view is examined as are any legislative protections. The landscape/view is examined for its rarity, its ability to renew itself, uniqueness, and scenic qualities. The landscape/view is considered for its quality, value, designation, and any legislative protections connected to the landscape. The rarity/unique status and condition of the landscape is noted as is its ability to renew itself. Sensitivity relates to the sensitivity of the landscape or view to change.

Landscape assessment of potential landscape effects, involves assessing and classifying the sensitivity of the landscape as a resource and then describing and classifying the magnitude of landscape change which would result from the development. The combination of sensitivity and magnitude of change gives a classification for the significance of the landscape effects. The 'impact' of the development is the action which results in landscape and visual changes. 'Effect' refers to the changes brought about by such an impact. The effect may result in the alteration of the landscape character of the area. 'Effect' is defined as the change or changes resulting from those actions, e.g., a change in landscape character, or changes to the composition, character and quality of views in the receiving environment. This report focusses on these effects. The study considers the area from which the development will be seen and the landscape it is set in. As per the GLVIA the emphasis is on a "reasonable approach which is proportional to the scale and nature of the Proposed Development."[3]

11.2.2 Thresholds of Magnitude of Change

A set of viewpoints were studied for the visual section of the report and a general landscape photographic study was conducted to examine and confirm the landscape character, its form and pattern around the Proposed Development.

A large number of viewpoints were initially examined and from this field study a specific set of viewpoints were selected for the visual aspect of the study. Professional judgement as recommended by the GLVIA and establishing a proportionate examination of the area relative to the size of the project has allowed for a thorough visual study.

Various tools, techniques and criteria are used to judge landscape capacity and sensitivity. Thresholds of magnitude of change are established by using such tools. In addition to examining local Landscape Character Assessments (LCA), the field study was conducted to

[3] Landscape Institute and Institute of Environmental Management and Assessment, 2013 Guidelines for Landscape and Visual Impact Assessment p 98

establish the magnitude of change to the landscape and views.

Assessment of “significance of landscape effects” requires a review of Landscape Character Assessments at local level, establishing sensitivity against which any predicted change can then be measured. This involves a desk study review of published landscape characterisation studies and assessment of sensitivities for the case in hand.

Field observations are used to confirm decisions to assess landscape character and confirm landscape character against the desk top study. It is also used to assess the appropriateness of the landscape character type for this landscape.

Subjective information on less tangible characteristics is also recorded to inform the impressions or perceptions of the landscape and landscape value.

Ordnance Survey and other published information such as historical maps are also useful in examining the landscape, landscape history and its capacity for change.

The character, quality, scale, and value of the landscape is assessed according to the criteria below.

11.2.3 Landscape Quality

Landscape quality is primarily a matter of how clearly the distinctive character of a landscape is expressed in an area, and of the state of repair or condition of landscape elements and the integrity and intactness of the landscape. There are three categories of quality ranging from high to medium to low.

High – landscapes strong in character or distinctive character, in good condition and very few or no incongruous features. Excellent example of a landscape type.

Medium – moderate strength of character and retain many key characteristics. Such a landscape will typically have suffered some decline and is marked by the occasional incongruous feature.

Low – landscapes with weak strengths of character, fragmented and/or featuring significant atypical, incongruous, or discordant features.

11.2.4 Value

The value of a landscape reflects its value to society and in estimating this, the report sets out to establish levels of importance of the potentially affected landscape, aspects of the landscapes that are valued, to whom and for what reason. It refers to the relative value we attach to different landscapes and is the basis for designating or recognising certain highly valued landscapes. The reasons a landscape is valued are many and varied. It can include a landscapes’ scenic quality, its tranquillity, or its wilderness attributes. It may be highly valued at a national or local level due to conservation reasons or cultural associations.

Landscape value is categorised from high to medium to low.

‘**High**’ value landscapes covered by a national designation for landscape value and display a high number of locally valued features present or are very highly valued as a landscape for other reasons.

‘**Medium**’ value landscapes are landscapes not covered by designation for landscape value. These landscapes may have a moderate number of locally valued features present, or they are moderately valued as a landscape for other reasons.

‘**Low**’ value landscapes are those not covered by a local or national designation for landscape with very few locally valued features present and not locally valued as a landscape for any other reason. A landscape with a low value may be degraded, display numerous incongruous features and have no obvious local association.

Landscape can also be seen to be valued at community level or for intangible reasons can be perceived to be valuable to a particular community. It may be valued for the elements that remain of a finely articulated landscape, with all its associations and connections over time.

11.2.5 Landscape Sensitivity

Landscape sensitivity refers to the degree to which a landscape can accommodate change without adverse effects on the landscape or its character. It has regard for the value placed on the landscape at all levels, how it is used, the patterns of the landscape, its sense of enclosure or openness and all of its visual receptors.

The nature and scale of development also reflects on sensitivity. Five categories are used to classify sensitivity.

Sensitivity Descriptions

Very High Areas; Where the landscape exhibits very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The landscape character is such that its capacity to accommodate change in the form of development is very low. Because of their very high sensitivity these landscapes are subject to protection by designation either nationally or internationally. The priority for such landscapes is the protection of their existing characters from change.

High Areas; Where the landscape exhibits strong, positive character with valued elements, features and characteristics. The landscape character has a limited or low capacity to accommodate change in the form of development. Such landscapes are recognised in landscape policy or designations as being of national, regional or county value. The principal objective for the area is the conservation of existing landscape character.

Medium Areas; Where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong, or has evidence of alteration, degradation or erosion of elements and characteristics. The landscape character is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principal management objective may be to consolidate landscape character or facilitate appropriate, necessary change.

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 unrecognised in policy and the principal management objective may be to facilitate change through development, repair, restoration or enhancement.

Negligible Areas: Where the landscape exhibits negative character, with no valued elements, features, or characteristics. The landscape character is such that its capacity to accommodate change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands or extraction sites, as well as sites or areas that are designated for a particular type of development. The principal management objective for the area is to facilitate change in the landscape through development, repair, or restoration.

Cork County Development Plan has included definitions of landscape sensitivity according to the County Cork Draft Landscape Strategy.

"**Low sensitivity** landscapes are robust landscapes, which are tolerant to change, and which have the ability to accommodate development pressure.

Medium sensitivity landscapes can accommodate development pressure but with limitations in the scale and magnitude. In this rank of sensitivity, landscape elements can accept some changes while others are more vulnerable to change.

High sensitivity landscapes are vulnerable landscapes with the ability to accommodate limited development pressure. In this rank landscape quality is at a high level, landscape elements are highly sensitive to certain types of change. If pressure for development exceeds the landscape's limitations the character of the landscape may change.

Very high sensitivity landscapes are extra vulnerable landscapes (e.g. seascape area with national importance) which are likely to be fragile and susceptible to change."[4]

Sensitivity of the landscape and susceptibility to change are interlinked. This is the ability of the landscape receptor (overall landscape character, landscape quality, condition of the landscape area etc.) to accommodate the Proposed Development without undue consequences for the baseline situation and /or the achievement of landscape policies and strategies. [5]

Existing assessments are very useful and largely deal with intrinsic or inherent sensitivity. This occurs without reference to a particular type of development. According to the GLVIA, "These cannot reliably inform assessment of the susceptibility to change since they are carried out without reference to any particular type of development and so do not relate to the specific development proposed."[6] Therefore susceptibility must be related to the project.

Relevant to this project, the site of the Proposed Development is sited in a **high** sensitivity landscape. Regarding the definitions of high sensitivity as listed above, the landscape is designated in policy of county (local) value with the principal objective; to protect its landscape character and ensure that pressure for or from development will not exceed the landscapes capacity to conserve its character.

[4] CCDP 2022-2028 Vol 1 p329 Main Policy Material
[5] GLVIA 3RD Ed., Landscape Institute and Institute of Environmental Management and Assessment 2013 p 89.
[6] GLVIA 3RD Ed., Landscape Institute and Institute of Environmental Management and Assessment 2013 p 89

11.2.6 Geographical Extent

Having regard to the geographical extent of landscape effects, it is important to iterate the effects which may have an influence on differing scales at landscape level.

The effect at (a) site level will refer to the effect within the site itself and at (b) the level of the immediate setting of the site and (c) at the scale of the landscape type or character area. Some effects may have a geographical extent (d) ranging over several landscape character areas.

11.2.7 Loss/No Loss of Landscape Elements

In addition to effects which result in the loss of landscape elements, it is possible to have effects which cause no loss of landscape elements and no removal of existing components but there is an introduction of new elements e.g. buildings which alter the skyline or arise over the tree line. In such a case, scale can be seen to alter the landscape character and quality of visual amenity.

11.2.8 Magnitude of Landscape Change

Magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape by a development, with reference to its key elements, features and characteristics ('landscape receptors'). Five categories are used to classify magnitude of change.

Description of the Categories of Landscape Change Magnitude

Very High: Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the landscape and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change to the character of the landscape with a loss of landscape quality and perceived value.

High Change: Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the landscape and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the landscape.

Medium Change: Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape but not necessarily reduction in landscape quality and perceived value.

Low Change: Change that is moderate or limited in scale, resulting in minor alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape and no reduction in landscape quality and perceived value.

Negligible Change: Change that is limited in scale, resulting in no alteration to key elements features or characteristics of the landscape, and/or introduction of elements that are characteristic of the context. Such development results in no change to the landscape character, its quality or perceived value.

11.2.9 Probability of Effects

Likely or probable effects can be described as those which are planned to take place and those which can be reasonably foreseen to be inevitable consequences of the normal construction and operation of the project.

Thus, the probability of the effects is defined as likely and unlikely.

Likely Effects; The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.

Unlikely Effects; The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

11.2.10 Significance of Effects

To classify the significance of effects, the magnitude of change is measured against the sensitivity of the landscape using the guide in Table 11.1 below. The matrix is only a guide. The assessor also uses professional judgement informed by their expertise and experience to arrive at a classification of significance that is reasonable and justifiable.

Table 11.1: Guide to Classification of Significance of Landscape and Visual Effects

		Sensitivity : Landscape/View				
		Very High	High	Medium	Low	Negligible
Magnitude of Change : Landscape/View	Very High	Profound	Profound to Very Significant	Very Significant to Significant	Moderate	Slight
	High	Profound to Very Significant	Very Significant	Significant	Moderate to Slight	Slight to Not Significant
	Medium	Very Significant to Significant	Significant	Moderate	Slight	Not Significant
	Low	Moderate	Moderate to Slight	Slight	Not Significant	Imperceptible
	Negligible	Slight	Slight to Not Significant	Not Significant	Imperceptible	Imperceptible

According to EPA guidelines the description of the likely significant effects on both the landscape and visual receptors should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project.'

11.2.11 Duration of Effects

The duration of effect is categorised in this report according to the EPA guidelines[7].

- Momentary Effects: Effects lasting from seconds to minutes.
- Brief Effects: Effects lasting less than a day.

[7] Environmental Protection Agency, 2022 Guidelines on the Information to be contained in Environmental Impact Assessment Reports

- Temporary Effects: Effects lasting less than a year.
- 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.
- Reversible Effects: Effects that can be undone, for example through remediation or restoration.
- Frequency of Effects: Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).

11.2.12 Environmental Protection Agency Guidelines

The EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, May 2022, describes the significance classifications as follows:

Imperceptible: An effect capable of measurement but without significant consequences.

Not significant: An effect which causes noticeable changes in the character of the environment but without significant consequences.

Slight: An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.

Moderate: An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.

Significant: An effect which, by its character, magnitude, duration, or intensity alters a sensitive aspect of the environment.

Very Significant: An effect which, by its character, magnitude, duration, or intensity significantly alters most of a sensitive aspect of the environment.

Profound: An effect which obliterates sensitive characteristics.

11.2.13 Methodology for Visual Effects Assessment

Assessment of visual effects involves identifying a number of key/representative viewpoints in the site's receiving environment, and for each one of these classifying the viewpoint sensitivity and the magnitude of change which would result in the view. These factors are combined to arrive at a classification of significance of the effects on each viewpoint.

11.2.13.1 Susceptibility of the Visual Receptor to Change

This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention is focussed on the views or visual amenity they experience at that location. Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g. trail users), and visitors to heritage or other attractions and places of community congregation where the setting contributes to the experience. Visual receptors less sensitive to change include travellers on

road, rail and other transport routes (unless on recognised scenic routes), people engaged in outdoor recreation or sports where the surrounding landscape does not influence the experience, and people in their place of work or shopping where the setting does not influence their experience.

11.2.13.2 Value attached to the view

This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g. scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g. by appearing in arts). Five categories are used to classify a viewpoint's sensitivity.

11.2.13.3 Categories of Viewpoint Sensitivity

Very High: (views towards or from a landscape feature or area) that are recognised in policy or otherwise designated as being of national value. The composition, character and quality of the view are such that its capacity for change is very low. The principal management objective for the view is its protection from change.

High: Viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or tourist-based views focused on the landscape). The composition, character and quality of the view may be such that its capacity for accommodating change may or may not be low. The principal management objective for the view is its protection from change that reduces visual amenity.

Medium: Views that may not have features or characteristics that are of particular value, but have no major detracting elements, and which thus provide some visual amenity. These views may have capacity for appropriate change and the principal management objective is to facilitate change to the composition that does not detract from visual amenity, or which enhances it. Such views can be judged to have some scenic quality, which demonstrates some sense of naturalness, tranquillity, or some rare element in the view.

Low: Views that have no valued feature or characteristic, and where the composition and character are such that there is capacity for change. This category also includes views experienced by people involved in activities with no particular focus on the landscape (e.g. shopping or they are on heavily trafficked routes). The view may make for an attractive backdrop but is not an important element for these activities. For such views the principal management objective is to facilitate change that does not detract from visual amenity or enhances it.

Negligible: Views that have no valued feature or characteristic, or in which the composition may be unsightly (e.g. in derelict landscapes). For such views the principal management objective is to facilitate change that repairs, restores or enhances visual amenity. Such viewpoints reflect users whose activity has no focus on the landscape or where the view has no relevance to their activity. Such a view may be of poor quality.

11.2.14 Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e.

its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral view, or in glimpses). It also takes into account the geographical extent of the change, as well as the duration and reversibility of the visual effects. Five categories are used to classify magnitude of change to a view:

Categories of Visual Change - Magnitude of Change Description

Very High: Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes dominant in the composition and defines the character of the view and the visual amenity.

High: Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.

Medium: Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity. Low Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.

Low: Minor intrusion of the development into the view or introduction of elements that are uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change in visual amenity.

Negligible: Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

11.2.15 Significance of Visual Effects

As for landscape effects, to classify the significance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint, using the guide in Table 11.1 above.

11.2.16 Mitigation Measures

Mitigation Measures for both landscape and visual effects are categorised as;

- **Mitigation by Avoidance**
- **Mitigation by Prevention** e.g. Prevention measures are put in place to prevent the effects of accidental events from giving rise to significant adverse effects.
- **Mitigation by Reduction**; seeks to limit the exposure of the receptor.
- **Reducing the Effect**; This strategy is used for effects which occur over an extensive and undefined area of land view or landscape. The mitigation is often achieved by installing screening between the likely receptors and the source of the effects.

- **Offsetting**; This is a strategy used for dealing with significant adverse effects which cannot be avoided, prevented or reduced. It includes measures to compensate for adverse effects. e.g. planting of new vegetation elsewhere to replace unavoidable loss of similar vegetation.

11.3 Baseline Conditions

11.3.1 Ordnance Survey Ireland Historical Maps

The following historical maps from Ordnance Survey Ireland; the OSI historical six inch black and white and coloured (first editions) and twenty five inch black and white maps (**Figure 11.1-11.4**) were studied to identify the evolution of the landscape in and around the proposed site and to examine it in the context of the landscape and landscape character area as we find it today.

The OS historical six inch black and white and coloured (first editions) and twenty-five inch black and white maps indicate a similarity of field and settlement pattern. There is, however, a progressive enlargement of the field sizes which has altered the spatial arrangement generated by field boundaries. Some of the original boundaries have remained. The proposals will retain the northern and western boundaries and generate a new hedgerow along a drain on the eastern side. There may be some disturbance to the western boundary due to the creation of a lay-by, but this will be replaced by the wide margin of planting on the western side. The eastern boundary with the road will be reinforced with tall tree planting. The strengthening of the western boundary with tree planting is consistent with the hedgerow character found in the wider landscape.

Figure11.1: OSI Historic Map 6 inch black and white

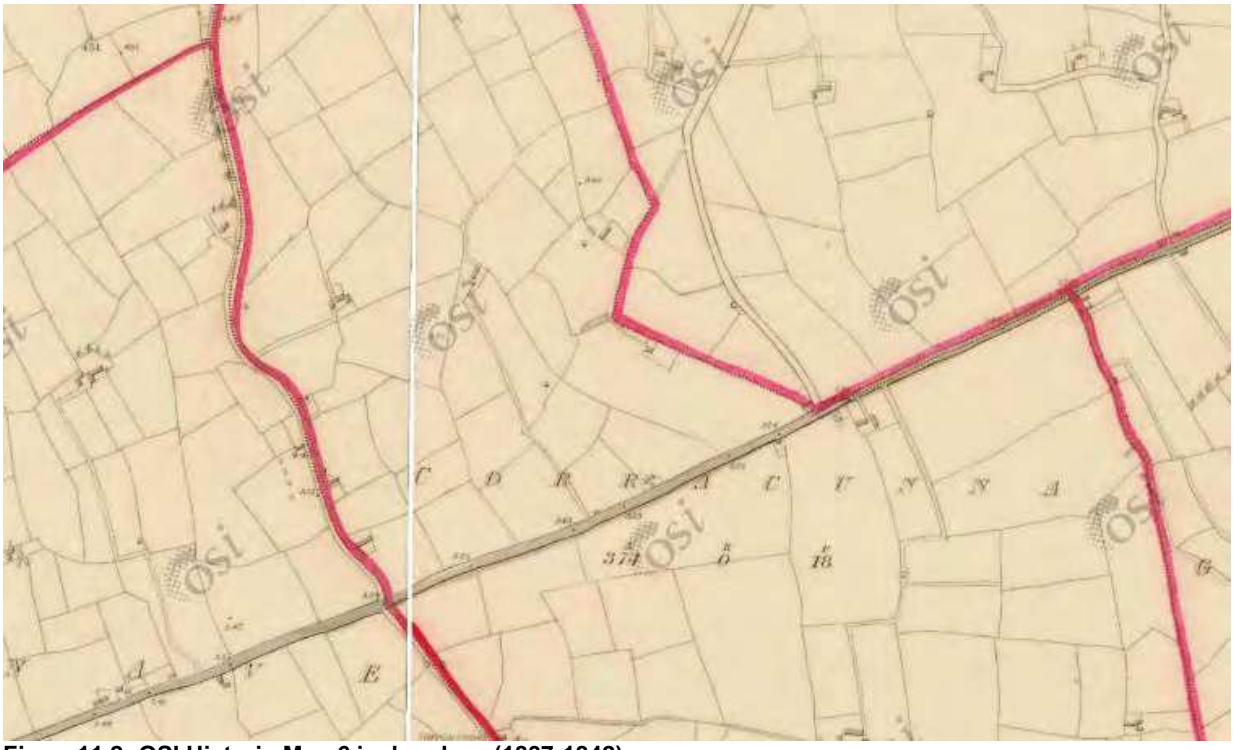


Figure11.2: OSI Historic Map 6 inch colour (1837-1842)

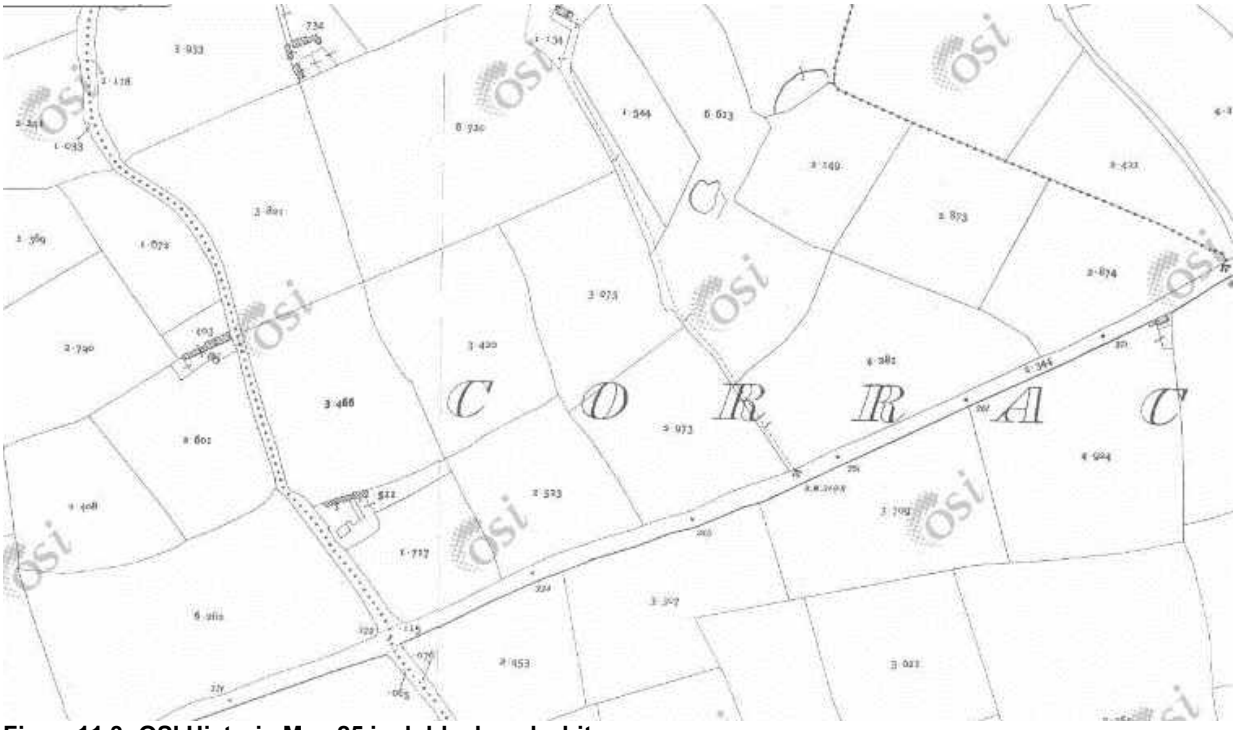


Figure11.3: OSI Historic Map 25 inch black and white

Figure11.4: OSI Aerial 2013

11.3.2 Landscape Associations

Associations of the landscape with arts / literary / historical / mythical figures or architecture etc. were examined. Corracunna appears in historical documents as Corrach an Chonnaidh, the wet marsh/bogland of the firewood. [8] There are no obvious associations available from local information connecting the area to literary, historical, or artistic figures.

11.3.3 Cork City and County Development Plan LCA

Cork County Council commissioned a Landscape Character Assessment (LCA) in 2007[9] which is included in the Cork County Development Plan 2022-2028 until a national Landscape Character Assessment is available. The details of the Landscape Character Assessment are discussed here below. Landscape character areas influence the description of landscape typology at the site of the Proposed Development. The landscape character area appropriate for the Proposed Development is categorised as Type 5: Fertile Plain with Moorland Ridge. The landscape value assigned in 2007 was 'Very High' with a landscape sensitivity also categorised as 'Very High'. The landscape importance is designated as 'County.' The policy objectives for this landscape character type are discussed below.

[8] https://www.logainm.ie/ga/12856
[9] Co Cork Draft Landscape Strategy 2007

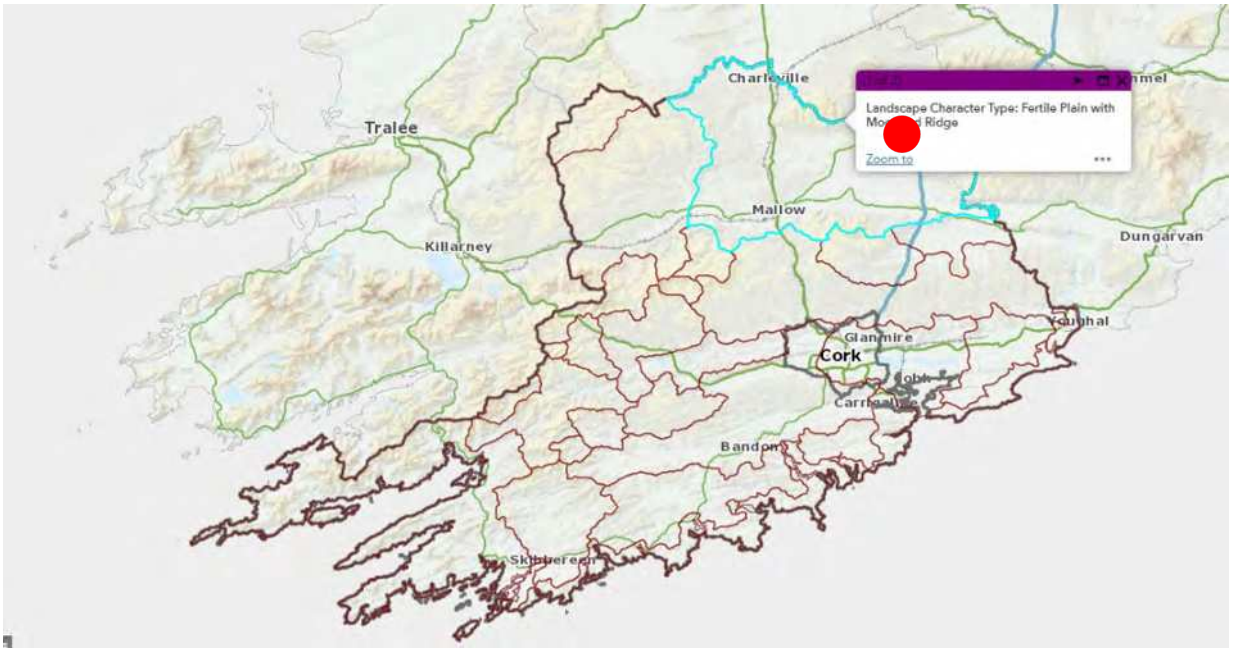


Figure 11.5: Cork Landscape Character Types

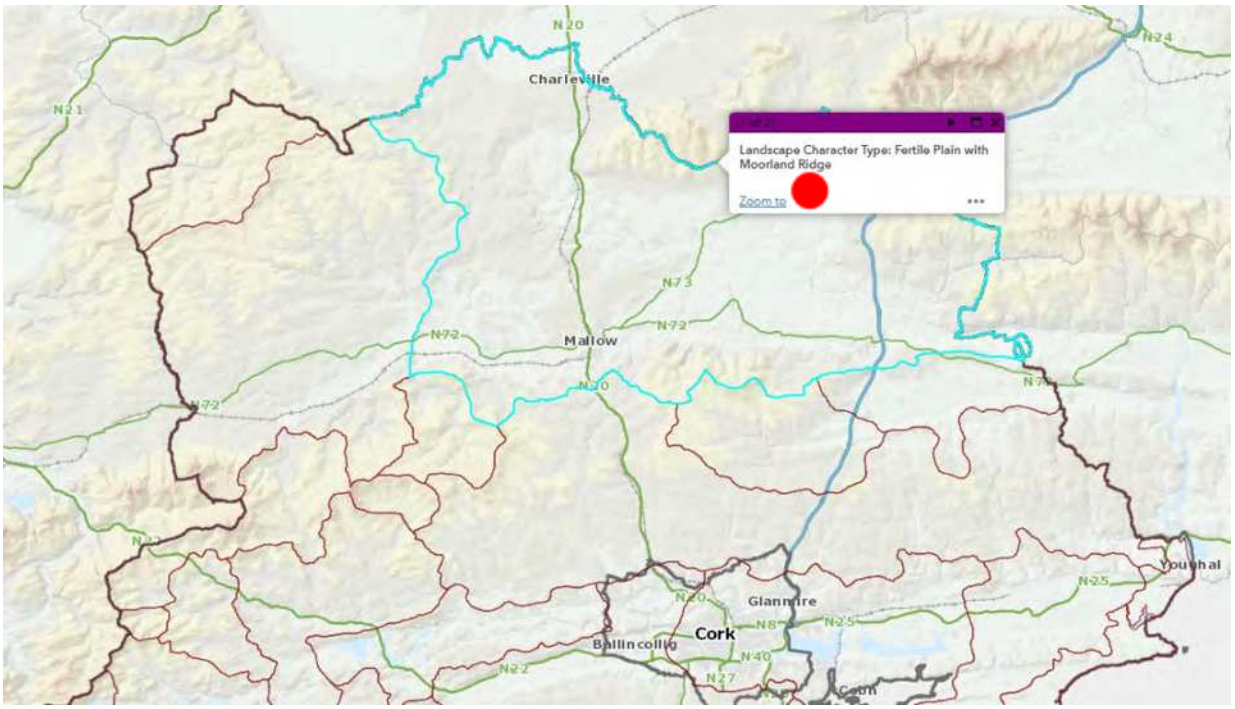


Figure 11.6: Cork Landscape Character Type; Fertile Plain and Moorland Ridge

The definition of landscape quality as outlined in the methodology above refers to high quality landscapes as those that exhibit strong or distinctive landscape character with few or no incongruous features. Medium quality landscapes retain many key characteristics and are marked by the occasional incongruous feature. In the context of the site of the Proposed Development, at a local landscape scale, the presence of the defunct pig unit on the site itself and a large operation to the north of the site with considerably large agricultural yards to the west and east of the proposed site, it cannot be said there are few incongruous features present. In this respect the landscape quality is closer to a **medium** than high in quality rating.

The sensitivity ratings to be considered for the landscape are those outlined in the general methodology above and those included in CCDP 2022-2028. In the general methodology as outlined above very high sensitivity areas are subject to protection by designation either nationally or internationally. This is not the case for the landscape in question but the views and prospects towards the landscape do have county level protection. Very high sensitivity landscapes are defined in the CCDP as "extra vulnerable landscapes (e.g. seascape area with national importance) which are likely to be fragile and susceptible to change."[10]

With medium landscape quality and likely county level protection, the latter definition of a high sensitivity landscape as included in the methodology, describes more closely the landscape around Corracunna than the former;

High sensitivity landscapes are vulnerable landscapes with the ability to accommodate limited development pressure. In this rank, landscape quality is at a high level, landscape elements are highly sensitive to certain types of change. If pressure for development exceeds the landscape's limitations the character of the landscape may change.

High Areas; Where the landscape exhibits strong, positive character with valued elements, features and characteristics. The landscape character has a limited or low capacity to accommodate change in the form of development. Such landscapes are recognised in landscape policy or designations as being of national, regional or county value. The principal objective for the area is the conservation of existing landscape character.

11.3.4 Landscape Character Type

The description of the 'Fertile Plain with Moorland Ridge' in the LCA is typical of the "'Golden Vale' and occupies a substantial proportion of northeast Cork. This is a low-lying landscape, which comprises an extensive area of predominantly flat or gently undulating topography along the River Blackwater, and which is contained in its periphery by low ridges. The latter include the southern slopes of the Ballyhoura and Galtee Mountains to the north, the northern slopes of the Nagles to the south and the western ridges of the Knockmealdown Mountains. The bedrock of the plain comprises mostly of limestone while sandstone typically forms the underlying geology of the peripheral ridges. Lower ground comprises brown earths and the occasional gley while brown podzols are located at slightly higher levels. These physical conditions create a fertile and verdant landscape well suited to intensive farming. It is this activity and the planar landform, which give the landscape its characteristic rectilinear mosaic of large sized fields. This mosaic is articulated by the field boundaries comprising mostly mature broadleaf hedgerows but also scrub species such as gorse. Articulation also results from the variation in colour arising from alternative use, whether dairying or arable. Occasional small blocks of coniferous plantations introduce a patchy landcover pattern to hills and ridge tops. The landscape is also characterised by many old demesnes comprising, for example, high stone walls, broadleaf avenues, and open parkland."[11]

The findings of the field survey (See Appendix 11.2) concur with this description. Near the site of the Proposed Development there is no real influence from eighteenth century demesne style landscapes.

[10] CCDP 2022-2028 Vol 1 p329 Main Policy Material
[11] Type 5 Landscape Character Area Description Co Cork Draft Landscape Strategy 2007

Nearby Mitchelstown has ‘developed on the basis of the high agricultural productivity of the surrounding countryside.’ The findings at a local level also concur with the description of farmsteads ‘scattered throughout the landscape, comprising large houses, traditional barns, barrel shaped metal roofed sheds and slatted sheds with A-shaped roofs. Such building complexes are typically partially screened by the mature hedgerows. The landscape is one of high fertility and, thus, productivity. It is a “working” landscape, manifesting the human bond with the land through agricultural activity.’ At the site level the landscape could not be described as flat and from higher ground in the distance an ‘even and vast extent can best be perceived from an elevated location’. The landscape character found at local survey level also agrees that ‘views are otherwise curtailed by the prevalent tall hedgerows when viewed on the plain.’

11.3.5 Landscape Character Unit

The sub set landscape unit or landscape character area of this landscape character type is described as “62 - The Golden Vale (Moorland Ridge and Broad Undulating Patchwork Middle Valley)” with the “human influence on this landscape (is) more keenly felt than in the other two landscape character areas and it provides a mastering of nature through the ordered and formal layout of field patterns.” This aligns with the findings of the field survey as do the findings of the key characteristics of land use, field, boundaries, and trees with moorland ridges to the north and south. This is a highly intensive dairying and tillage region. Mature broadleaf hedgerows on plain with patches of coniferous forestry on higher ground correlate with findings of the landscape as surveyed at site visitation.

11.3.6 Landscape Character Assessment Policy Objectives and CCDP Policy Objectives

The Landscape Character Assessment included in the current Cork County Development Plan 2022-2028 is accompanied by the following policy objectives.

At landscape type level, the landscape character area policy objective iterates the significance of protecting the Blackwater River valley. The Proposed Development will have no effect on this river valley.

Other recommendations recognise that “much of this landscape type forms part of the rich agricultural area of the “golden vale” and is farmed relatively intensively. The promotion of agriculture as the major land use in this LCT will help maintain the existing features of the landscape while also supporting the local economy and rural diversification.”
The recommendations from the original 2007 Landscape Character Assessment recognise that the ‘lowlands are made up of a variety of working landscapes that are critical resources for sustaining the economic and social wellbeing of the county.’ The most relevant recommendations from an agro-industrial perspective also outline that new ‘farm buildings must be designed to integrate within the landscape considering factors such as materials and colouring.’

Further the recommendations iterate the need to;
“reflect existing vegetation species and patterns in new planting schemes in this LCT” and encourage “further planting of deciduous trees as they are a dominant feature in this landscape and their continuation is important in retaining the character of this landscape.

Minimise disturbance of hedgerows in rural areas. Encourage appropriate landscaping and screen planting of Proposed Developments by using predominately indigenous/local species

and groupings."

These latter recommendations are addressed in the landscape masterplan and planting recommendations which accompany the Proposed Development. There is a generous plantation strip of eighteen metres wide proposed opposite the western boundary. This will strengthen landscape character in the area from a tree planting perspective as there is very little evidence of recent broad leaf tree planting in the area which is an essential element of the landscape character. Further there is evidence in the local tree stands that ash die back is likely to have a significant impact on the landscape character in the years to come. It is likely that most of the mature ash in the hedgerows will die out or decline in the years ahead. Planning ahead and having new trees to replace them will ensure around the development at least, climax species like oak and beech will be around for a period around 100 years. Hedges are generally retained and a new hedgerow along the existing drainage will connect this habitat back to the hedgerow network. The selected species are native/naturalised with an appropriate selection of broad-leafed varieties which will match local species. An eastern band of trees protects landscape character by enveloping the mass of the development in a reinforced tree boundary along the N73. This is in keeping with the landscape character as described. The plan to plant this boundary prior to construction will lessen the impact of construction on the landscape and views.

The County Cork Development Plan Volume 1 (14.8.8) states that landscape character types 'which have a very high or high landscape value and high or very high landscape sensitivity and are of county or national importance are considered to be our most valuable landscapes and therefore are designated as High Value Landscapes (HVL).'

Figure 11.7: High Value Landscapes

The current Cork County Development Plan 2022-2028 also outlines the considerations;

14.8.9 Within these High Value Landscapes considerable care will be needed to successfully locate large scale developments without them becoming unduly obtrusive. Therefore, the location, siting and design of large-scale developments within these areas will need careful consideration and any such developments should generally be supported by an assessment including a visual impact assessment which would involve an evaluation of visibility and prominence of the Proposed Development in its immediate environs and in the wider landscape. This LVIA addresses this requirement.

14.8.10 The key role of the Draft Landscape Strategy of Cork County is to assist in the achievement of sustainable development, by promoting an approach to landscape planning and management, which links objectives and recommendations for landscape character to existing planning policies. To recognise that the landscapes are dynamic and continuously evolving, the objectives do not attempt to prevent new uses or changes but to manage the change ensuring that the past remains visible for future generations. The landscape proposals accompanying this application address this objective.

14.8.11 The capacity of each landscape character type to absorb new development will largely depend on the sensitivity of the landscape type. Developments which are likely to create a significant environmental and particularly visual impact will best be absorbed in areas where the landscape is robust, i.e. has the capacity to absorb development without significantly changing its character. All developments should be assessed on a site-by-site basis to avoid, minimise or mitigate any potential environmental or visual impact."

The landscape masterplan and planting plans which accompany the Proposed Development sets out to largely absorb the scale and change of the development in the landscape. The existing landscape pattern is respected with field boundaries being protected as much as possible. The new hedgerows proposed and new deciduous trees are in line with landscape characteristics found at a local level. This will ensure there is a developing stand of young deciduous trees appropriate to the landscape which will continue to grow and develop permanently. The existing stand of trees on the western side of the Proposed Development are to be retained and it is reinforced with understory and younger trees. The setting of the Proposed Development into the contours ensures the skyline is generally unbroken by the proposals.The proposals to reinforece the western boundary with a further margin of trees and to plant a band on the eastern side of the development prior to constuctionas iterated will significantly increase the landscape capacity to absorb the new development.

11.3.7 General Landscape Policies and Objectives CCDP

The County Development Plan Objectives relating to landscape for County Cork are included in Volume 1 of the Plan.

GI 14-9: Landscape a) Protect the visual and scenic amenities of County Cork's built and natural environment.
b) Landscape issues will be an important factor in all land-use proposals, ensuring that a pro-active view of development is undertaken while protecting the environment and heritage generally in line with the principle of sustainability.
c) Ensure that new development meets high standards of siting and design.
d) Protect skylines and ridgelines from development.
e) Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments.

Objective GI 14-10: Draft Landscape Strategy Ensure that the management of development throughout the County will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Cork County Draft Landscape Strategy and its recommendations, in order to minimize the visual and environmental impact of development, particularly in areas designated as High Value Landscapes where higher development standards (layout, design, landscaping, materials used) will be required.

Objective GI 14-11: Draft Landscape Strategy, Land Use Plans and Policy Guidance Have regard to the Draft Cork County Landscape Strategy (2007) in the preparation of plans and other policy guidance being prepared during the lifetime of the Plan. Review and update the Draft Cork County Landscape Strategy as soon as is practicable following the publication of a National Landscape Character Assessment as well as taking into account any associated guidelines. Whilst advocating the protection of such scenic resources the Plan also recognises the fact that all landscapes are living and changing, and therefore in principle it is not proposed that this should give rise to the prohibition of development along these routes, but development, where permitted, should not hinder or obstruct these views and prospects and should be designed and located to minimise their impact. This principle will encourage appropriate landscaping and screen planting of developments along scenic routes.

The landscape proposals ensure that within the footprint of the Proposed Development the landscape and scenic route is protected as far as possible. The proposals viewed from the scenic route does not break the skyline and a new tree line will mature over time adding a new welcome landscape element to the countryside.

11.3.8 Landscape Character Area

As iterated, Landscape Character Assessment has been carried out for County Cork. This Landscape Character Assessment has made a typological classification of the landscapes in the county. For the site of the Proposed Development the classification for landscape type was ‘Fertile Plain with Moorland Ridge.’ The subunit of landscape character area was described as the Golden Vale, i.e.

“Moorland Ridge and Broad Undulating Patchwork Middle Valley (where) the human influence on this landscape is” keenly felt and it “provides a mastering of nature through the ordered and formal layout of field patterns.”

This is how we still find this landscape today. It is heavily influenced by agricultural practices and its relationship to the slopes ascending to its mountainous backdrop. The River Funshion runs along a valley north of the site and there is a rise, and drop is elevation as the landscape encounters the river. The river has no obvious effect on the landscape character at the site of the Proposed Development.

There are no archaeological influences on landscape character at the site of the Proposed Development.

The hedgerow segments in the existing landscape pattern around the area features mature deciduous trees. There are some trees which appear singularly or in small groups in fields which are more akin to parkland trees. The field boundary on the western side is defined by a mature hedgerow and on the eastern side by a small stream / drain which is quite open. Opposite the eastern boundary of the site of the Proposed Development there is a hedgerow featuring quite an excellent stand of mature deciduous trees.

The Proposed Development is within the western boundary of the pattern of field boundaries and the layout is realigned with the small stream/drain on the eastern boundary. A bund on the eastern side of the old piggery will be removed and a new hedgerow with hedgerow trees will follow the stream alignment. Although the field pattern will be changed it will not adversely affect the landscape character from this perspective. The replacement of the pig units with the new development will not result in a loss of valuable landscape elements and one vernacular building is to be retained in its current position. It will be refurbished to allow for possible local bat populations. A small building is seen in this position on the historical six inch and twenty-five inch maps.

Tranquillity is not a strong feature of landscape character at or near the site of the Proposed Development due to its' position adjacent to the busy N73/R639 Mallow to Dublin Road. The location of the landscape character area with the Galtee Mountains lying to the north and views towards the Knockmealdowns and other peaks to the southeast with the rich mosaic of agricultural land between, gives the area its particular definition.

The Galtees, provide a dramatic landform and scenic views. The extensive natural area and remoteness (moorland and peatland on the upper slopes and crests), contribute to the area's aesthetic amenity. The recreational amenity this provides is dependent on this landscape. The integrity and unity of the traditional landscape pattern and scale (moorland, field patterns and hedgerow vegetation) is generally intact though peppered in places with forestry blocks, large agrucultural units and modern single housing.The sense of remoteness does not occur near the site of the Proposed Development but rather significantly further up the slopes.

11.3.9 Landscape Value

The landscape objectives as outlined above which relate to HLV'S (high value landscapes) are included in Volume 1 Chapter 14 Green Infrastructure and Recreation of the CCDP 2022-2028.GI 14.9 -11 (see above) as outlined in the CCDP deals with high value landscapes. The site of the Proposed Development as iterated lies within a **high value landscape.**

Other values which are associated with landscape are considered below. In addition, given the proximity of the site of the Proposed Development to the county boundaries of Limerick and Tipperary the effect of the development is examined in relation to nearby valued landscapes in these counties.

11.3.9.1 Valued Landscapes Co.'s Tipperary and Limerick

The Galtee mountain range form a range of landscape character areas in neighbouring counties that are valued and designated as sensitive landscapes. In Tipperary, this is described as LCA 21 Galtee Mountains Mosaic Extent. In County Limerick the relevant Landscape Character Area is the Galtee Uplands. In both cases the relevant valued landscapes are at too great a distance to be affected in any way by the Proposed Development.

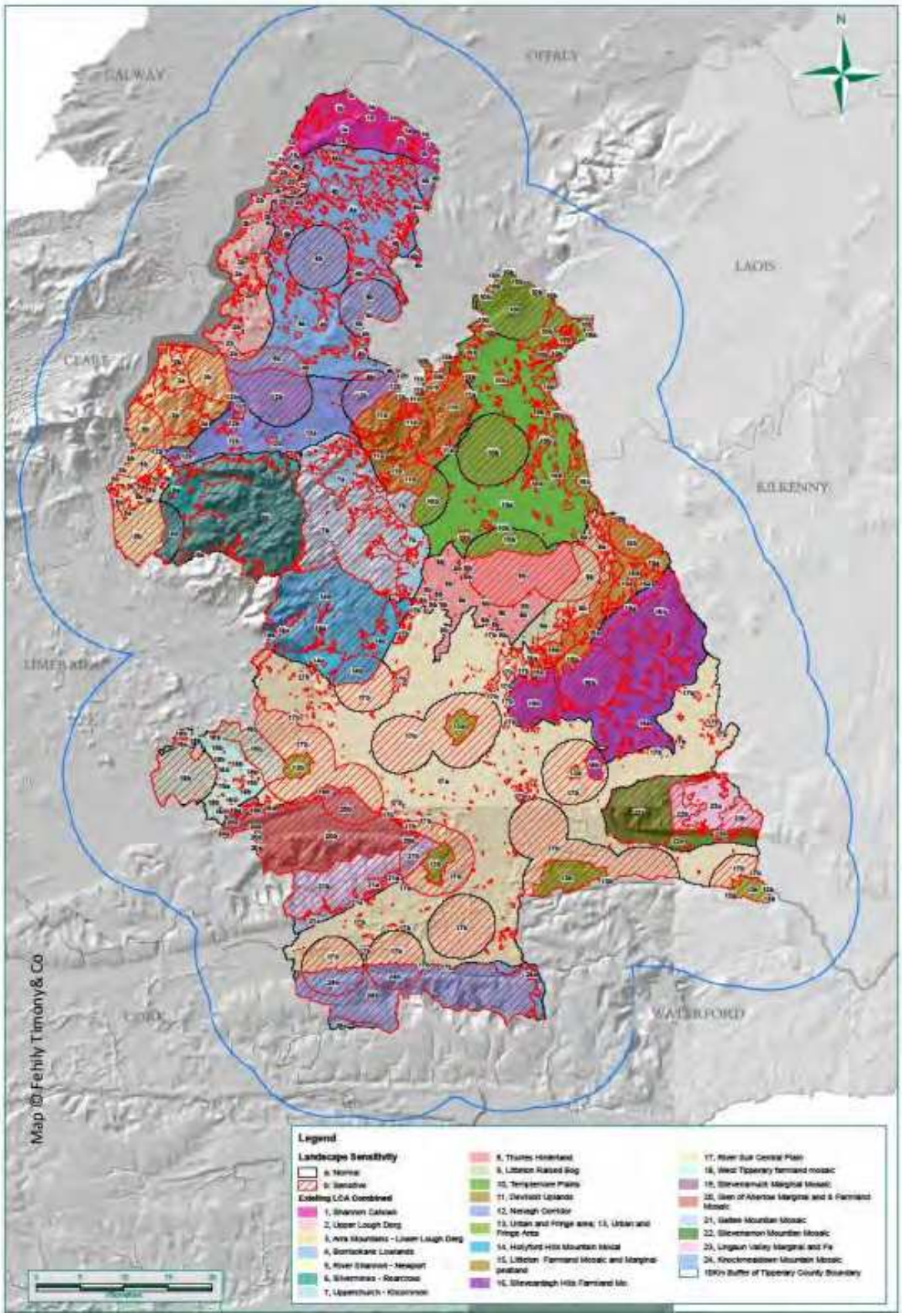


Figure 11.8: Galtee Mountain Mosaic; A Listed Sensitive Landscape Co. Tipperary

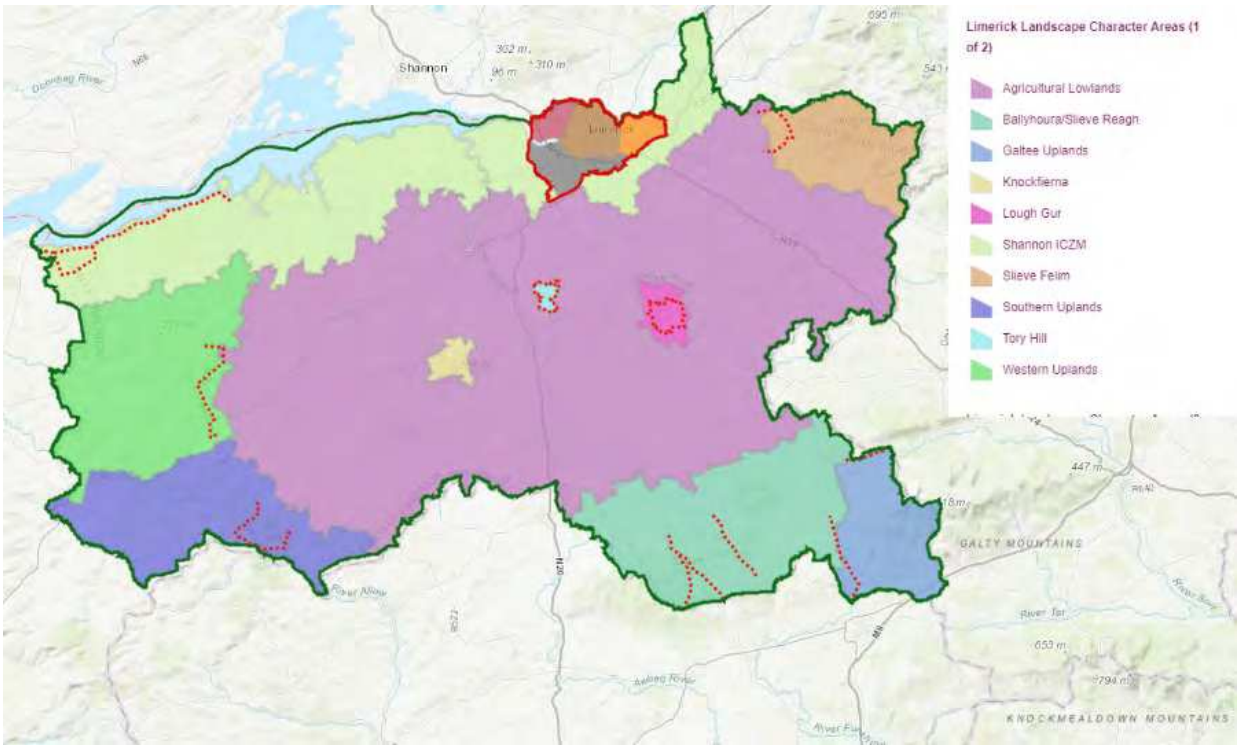


Figure 11.9: Galtee Uplands LCA County Limerick

11.3.10 Geological Heritage

There are no sites of geological importance relating to the site of the Proposed Development.

11.3.11 Recreation and Tourism

Across the border in County Limerick and County Tipperary the peaks provide popular hikes. The peaks are approached from north and south but the most relevant in relation to the site of the Proposed Development are approached from nearby Kilbehenny. King's Yard is a popular starting point for Galtymore.

Along with Galtymore other peaks along the ridge of the Galty mountains are; Galtybeg, Mullaghan, Knockcrogh, Cushnabinnia, Carrignabinnia, Lyracappul, Knockaterriff, Knockaterriffbeg, Monabrack, Templehill, Paradise Hill and Benard.
South of the development Skeheen Mountain, Curraghaleigh Mountain, Knockavardren and Lyrafune Hill are visible in the distance.

The intervisibility of trail heads was checked on site and against the ZTV (Appendix 11.1).

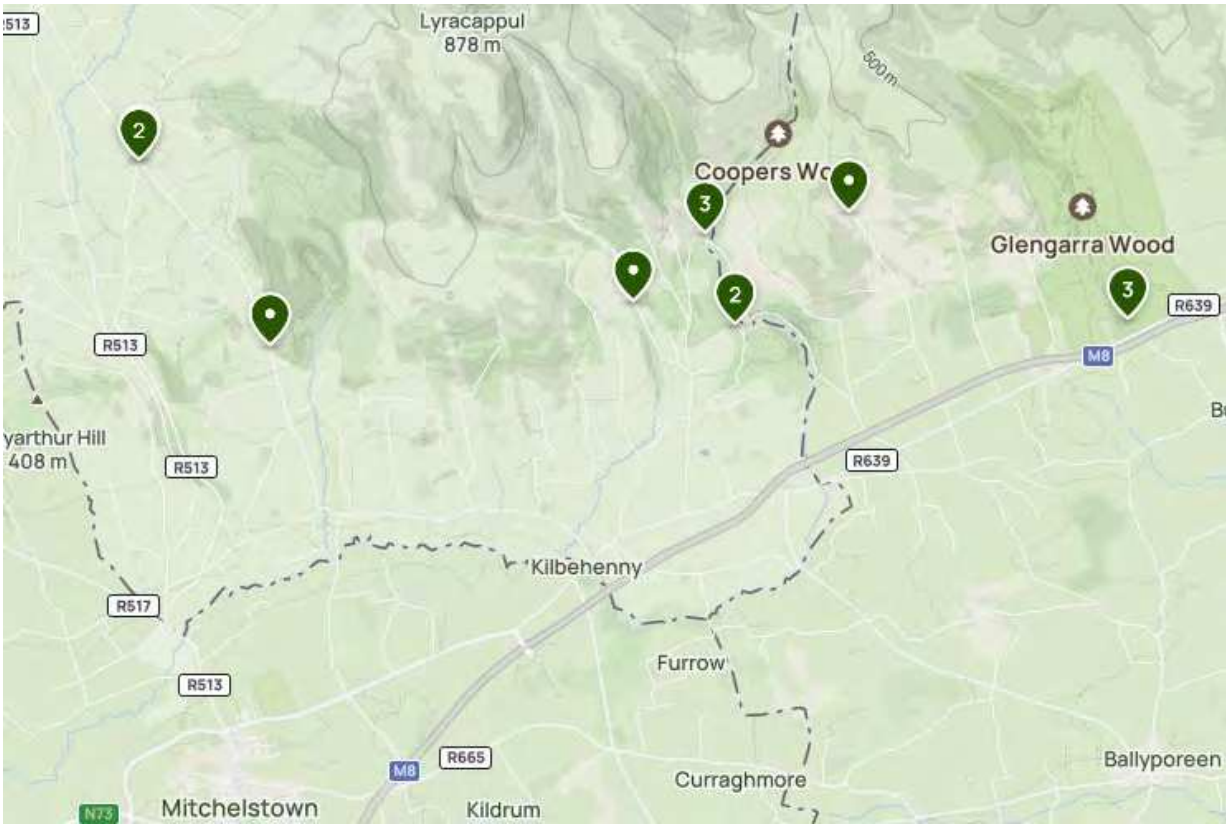


Figure 11.10: Trail locations

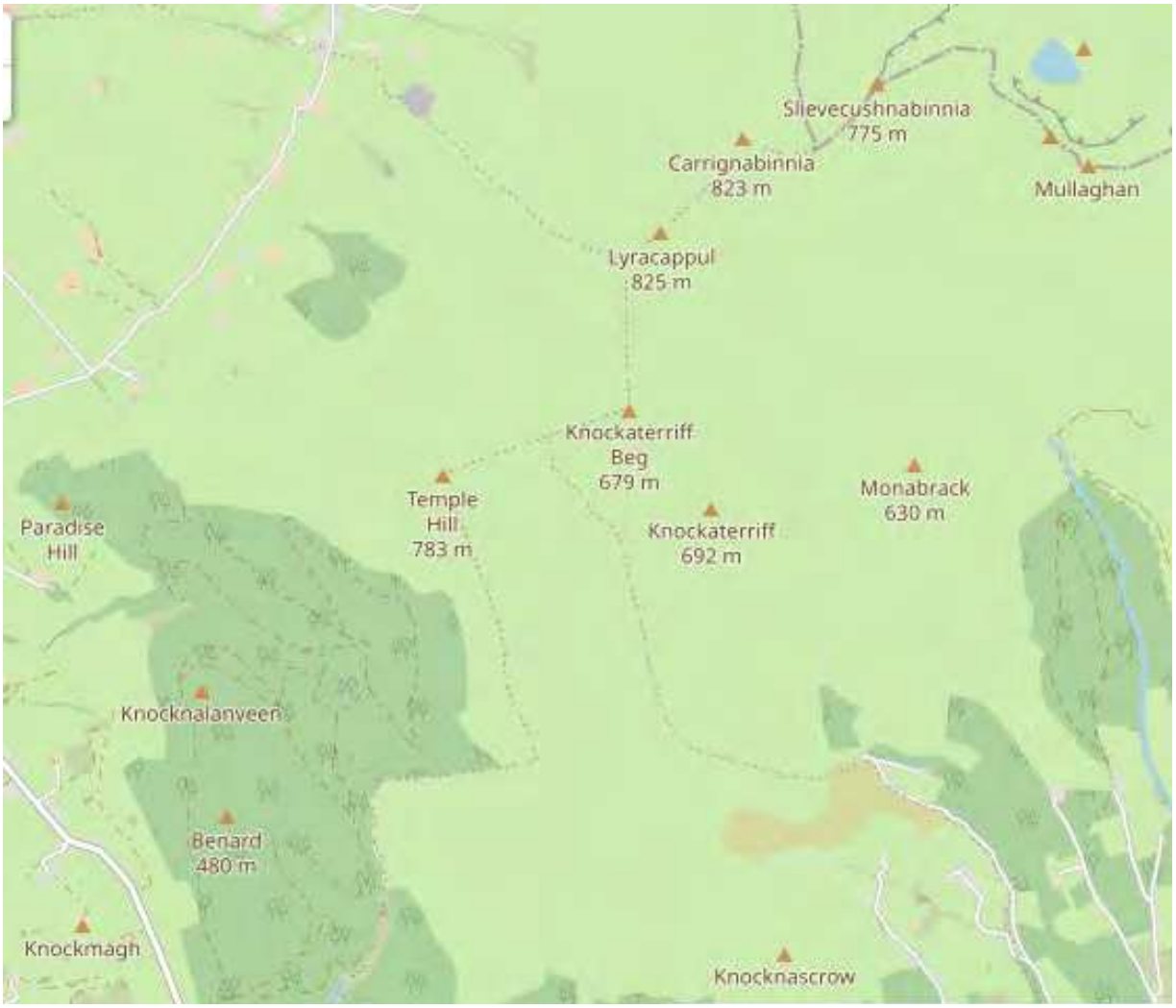


Figure 11.11: North western peaks

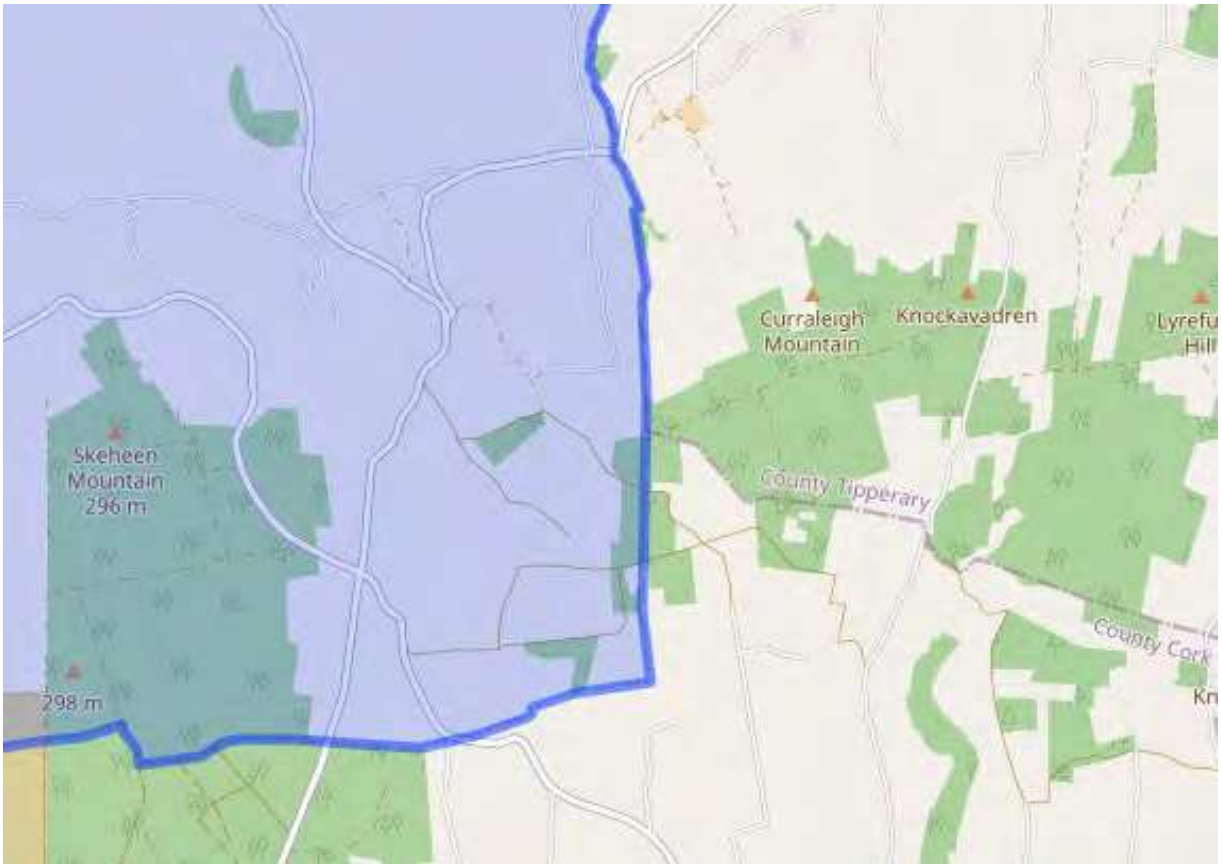


Figure 11.12: Skehan Mountain and southern peaks in relation to the Brigown parish boundary.

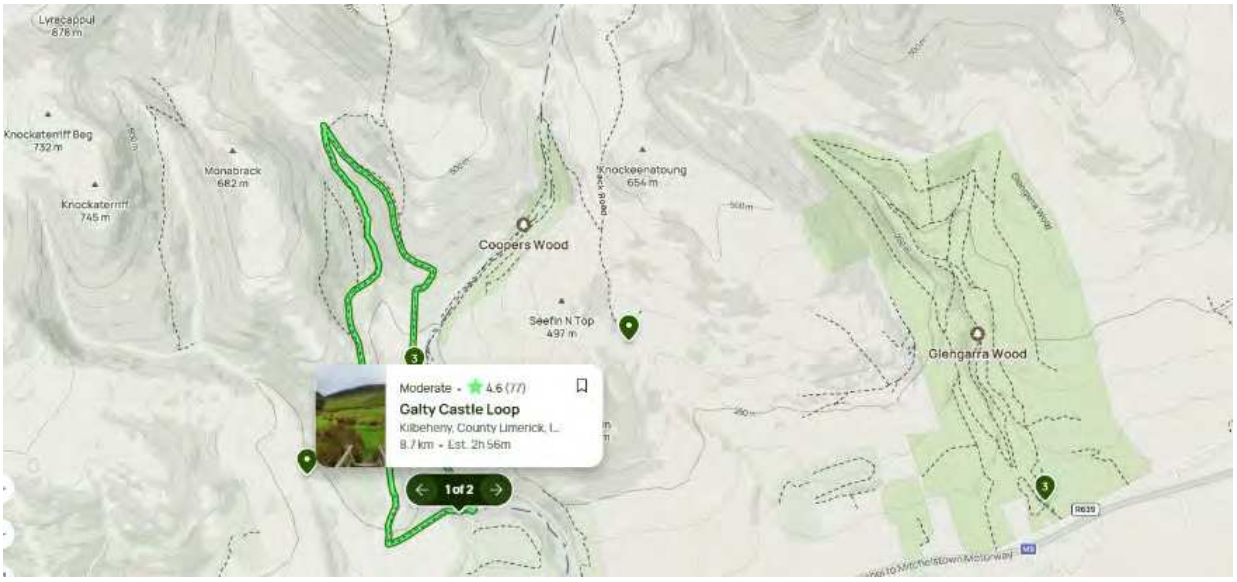


Figure 11.11: North eastern peaks with trail head close to or commencing at King's Yard.

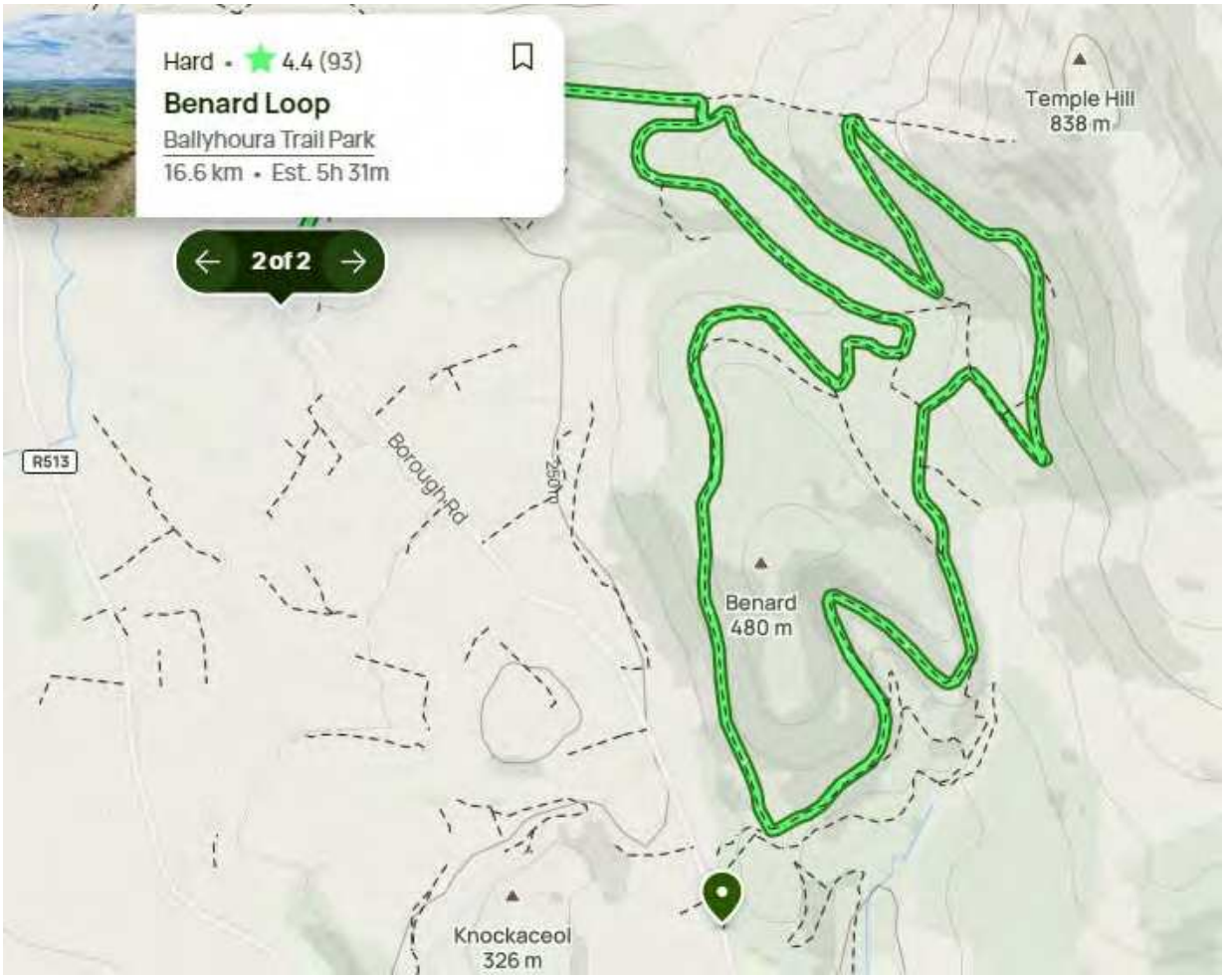


Figure 11.12: Trail heads commencing from the northwest.

The main tourism interest which lies close to the site of the Proposed Development relates to touring and trails. Hiking is the main attraction on the Galtee mountains, and the mountains are

also approached as iterated from the neighbouring counties of Limerick and Tipperary as well as from the Mitchelstown side. The lower reaches of the trails and the trail heads are well protected by substantial trees stands in the hedgerows. The distance of the uppermost slopes from the site of the Proposed Development is too far to have any implications when overlooked. The nearby village of Kilbehenny orientates many trail users to the upper slopes. Many hikers commence trails from here or Kings Yard further north. There is no intervisibility between these trail heads and the site of the Proposed Development. Ballyhoura Trail park orientates trail users from Co. Limerick to Benard and Paradise Hill from Ballylanders, Co. Limerick. Distance is too great a factor for intervisibility to be a concern.

The views from the driving route which passes the site of the Proposed Development along the N73, is popular for touring and a connection to other popular touring destinations in the neighbouring counties and towns. Tourism accommodation at Ballinwillin House is considered as part of the visual assessment with the scenic route approaching from Mitchelstown is examined in the visual assessment.

The possibility of a loss in visual amenity is examined in detail under the visual section of this report.

11.3.12 Natural Heritage

Natural heritage is examined in this report as it can contribute to landscape value.

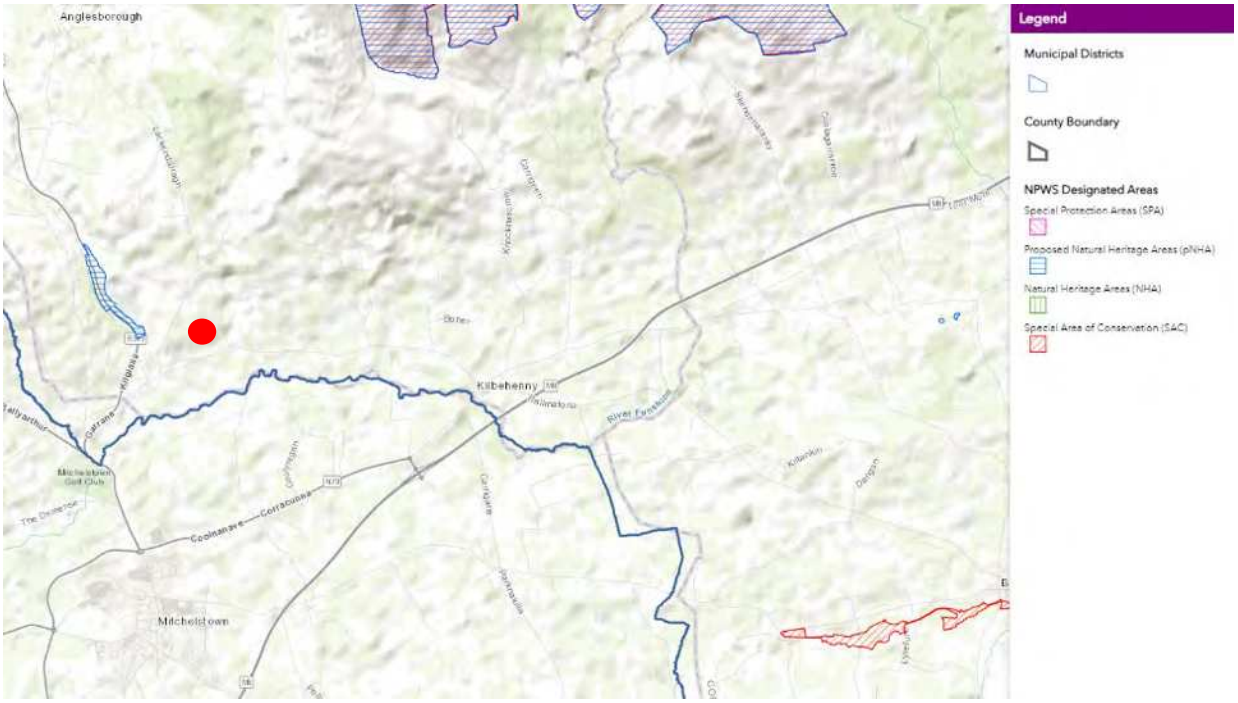


Figure 11.13: Natura Designations

None of the listed Natura sites (National Parks and Wildlife Service designations) are within the site of the Proposed Development. All the designated areas are at some distance from the Proposed Development and due to distance, intervisibility is also not a concern for these proposals.

There are no (SPA,SAC,NHA or pNHA) within the boundaries or close to the Proposed

Development.

Monuments and Protected Structures

The National Inventory of Architecture and the local Record of Protected structures are also considered as part of this report. The interaction of archaeology and landscape is also considered in this report as an element of landscape.

Figure 11.13: Record of Protected Structures

The RPS listed Woodview and Ballinwillin Houses to the west of the site of the Proposed Development will not be affected by the Proposed Development.

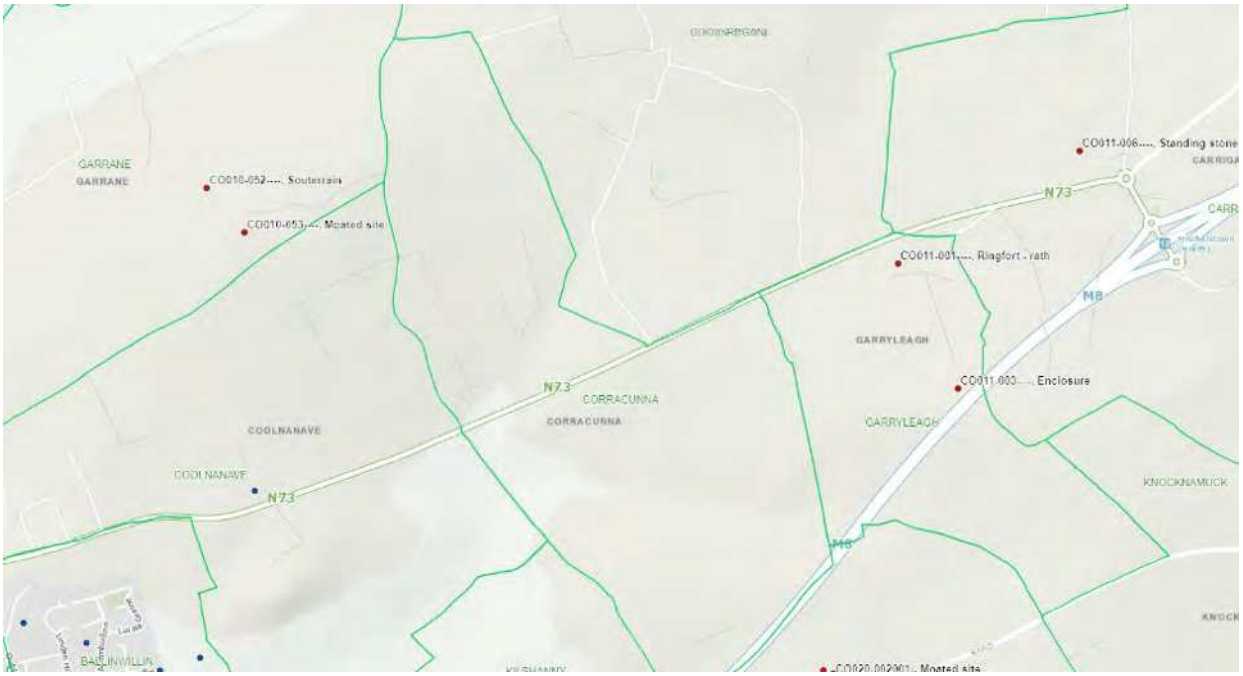


Figure 11.14: National Monuments Record

There are no monuments within the site or surrounding that have influenced the landscape form or will be affected by the development.

11.3.13 Designated Amenity Views and Prospects in County Cork

The scenic viewpoints as listed in the CCDP were examined in relation to the Proposed Development. Scenic route S1 as listed in the development plan is the main route affected. This travels along the R639 and the N73 to just north of Ballinwillin near Mitchelstown through a high value landscape character area as discussed above. The landscape along the route is described as pastoral to the county boundary between Mitchelstown and Kilbeheney. It is regarded as the gateway to the 'Golden Vale' with views of the Galtee mountains. The key land uses are regarded as agricultural, industrial, and residential. The rural character is regarded as 'not prevalent' on the route however near the site of the Proposed Development the route does pass along a predominantly rural landscape. The Knockmealdown Mountains are visible to the south and southeast.

This is a highly scenic route with views into a high value landscape. The main views to Galtymore and Galtybeg are east of the site of the Proposed Development. These views travelling from or towards the east will not be affected. The view near the site, descending the hill approaching Mitchelstown is examined in detail in the visual section of this report.

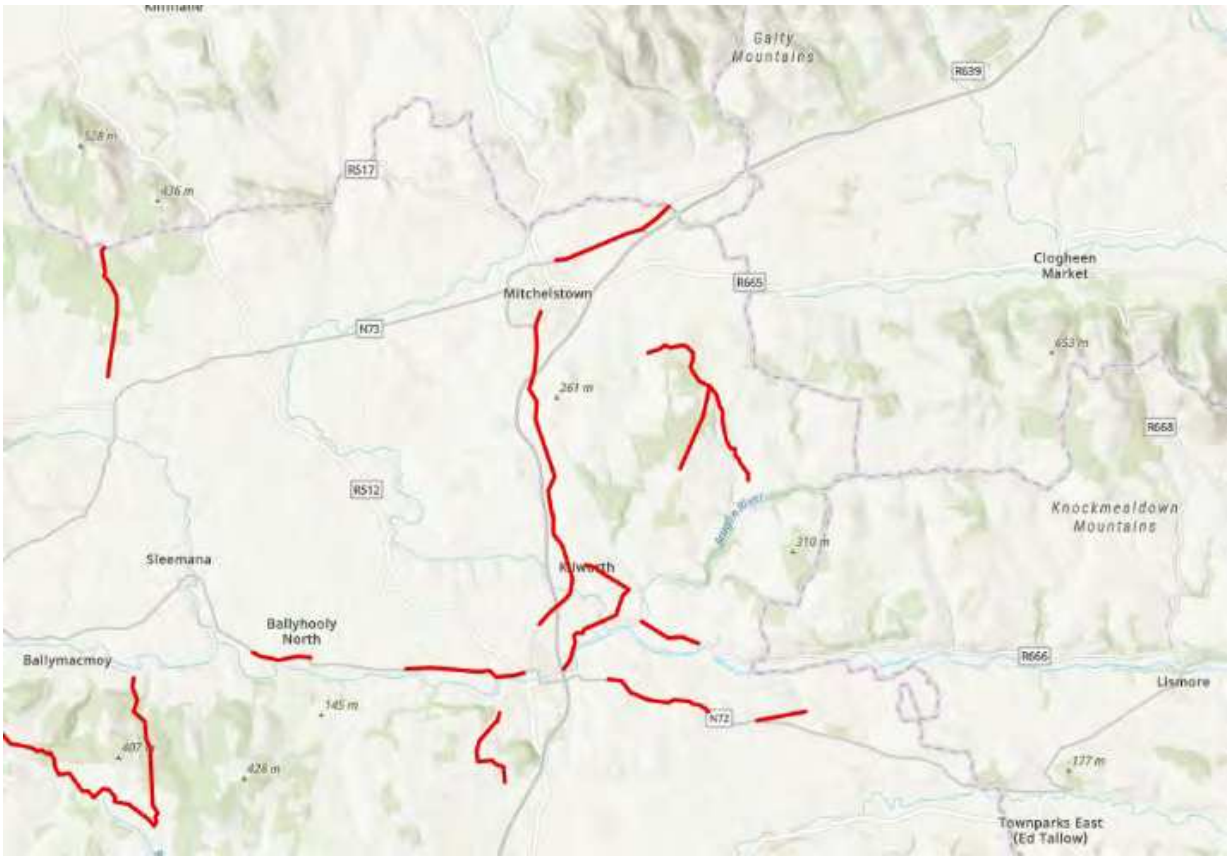


Figure 11.15 Listed Scenic Routes CCDP 2022-2027

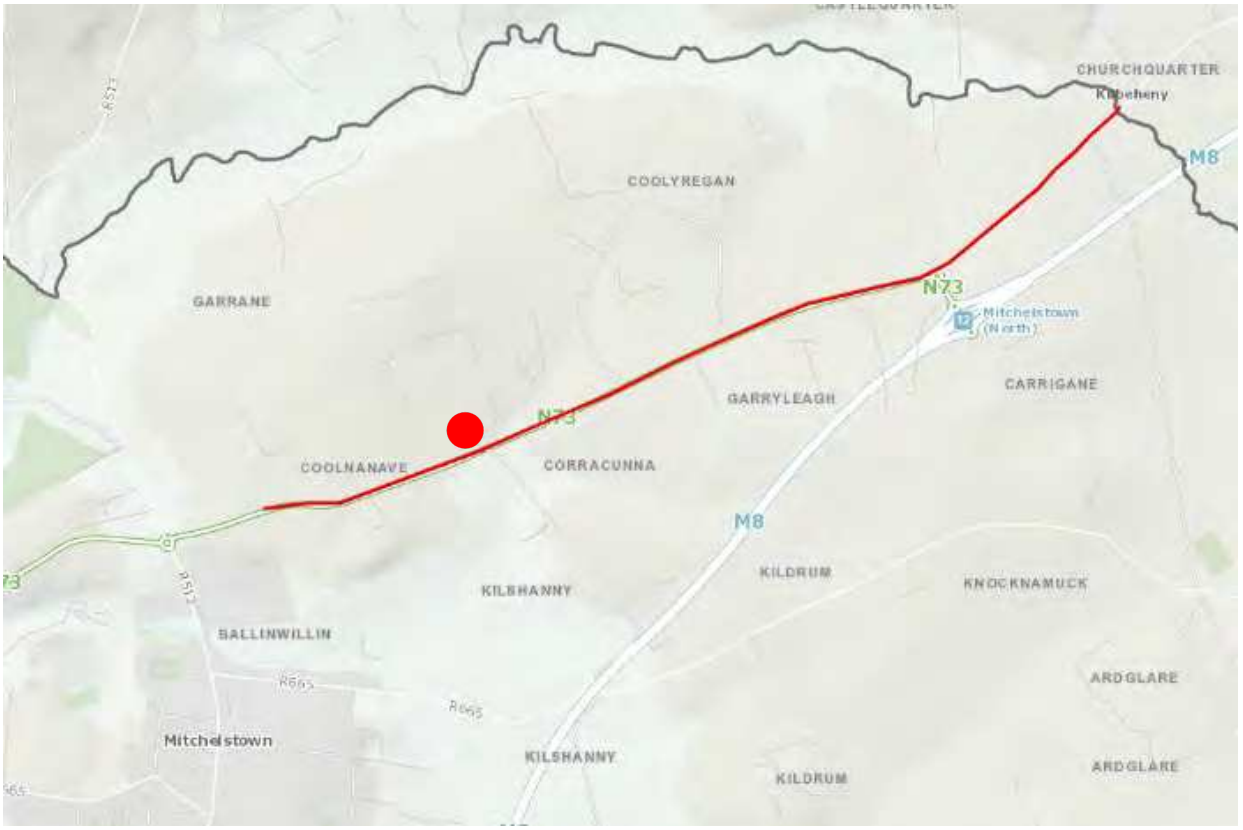


Figure 11.16: Scenic route, S1, in relation to the Proposed Development along the N73 and the R369

The overall planning policies relating to landscape in County Cork are set out in Volume One Chapter 14 Green Infrastructure and Recreation of the Plan. The specific policies relating to general views and prospects/scenic routes are set out in Section 14.9 and include objectives GI 14-12 “General Views and Prospects”, GI 14-13 “Scenic Routes” GI 14-14 Development along Scenic Route” and GI 14-15 “Development on Approaches to Towns and Villages”. The profile of scenic routes for the county is set out in this chapter.

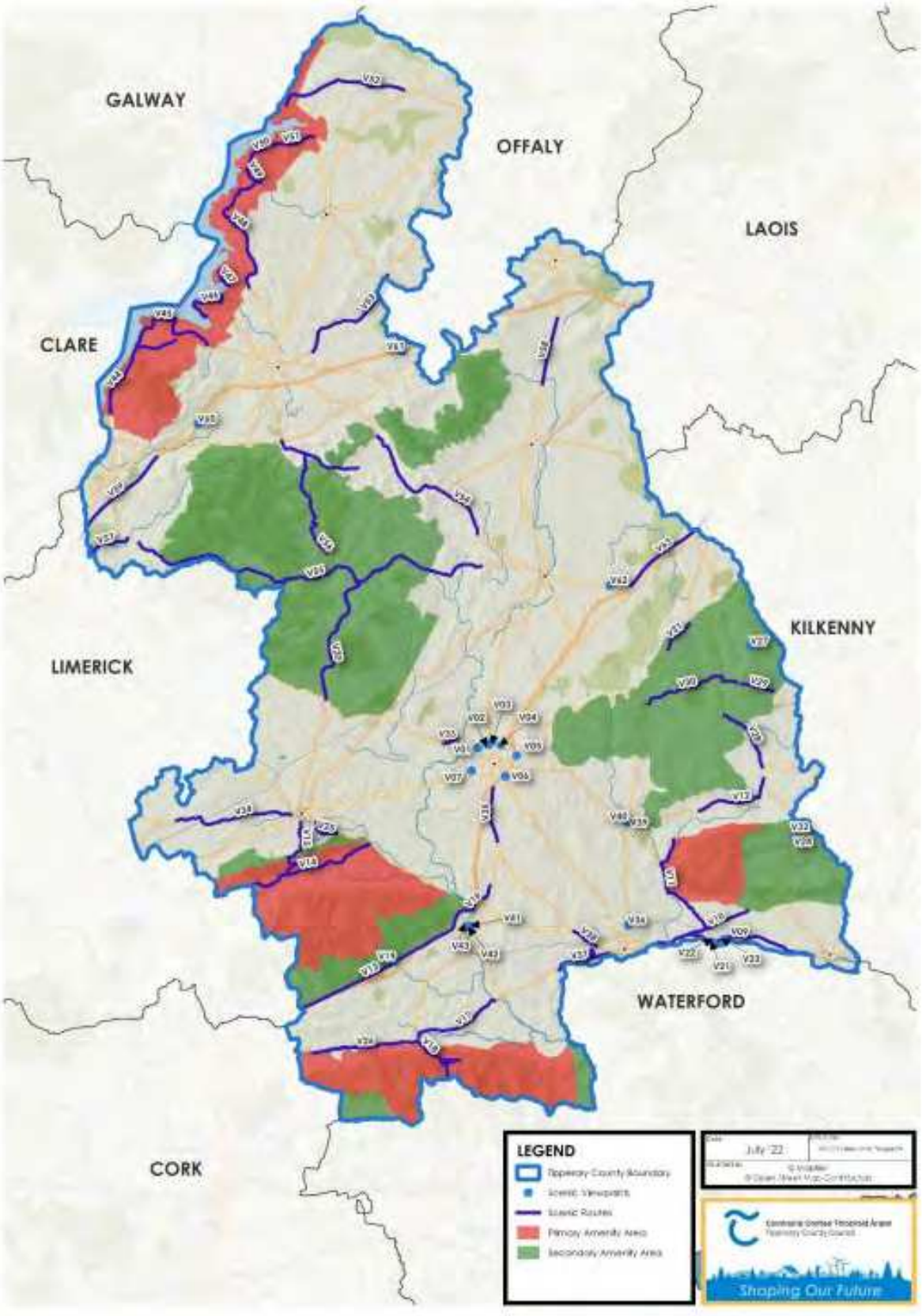


Figure 11.17: Scenic routes, extending into Co.Tipperary

The designated scenic routes in neighbouring Co. Tiperary, (Tipperary County Development Plan,(V13 Views to Galtees along Cahir-Kilbehenny Road (N8) V19 Views south to Knockmealdown Mountains from Kilcoran) above and in Co. Limerick, below, will not be affected by the Proposed Development.

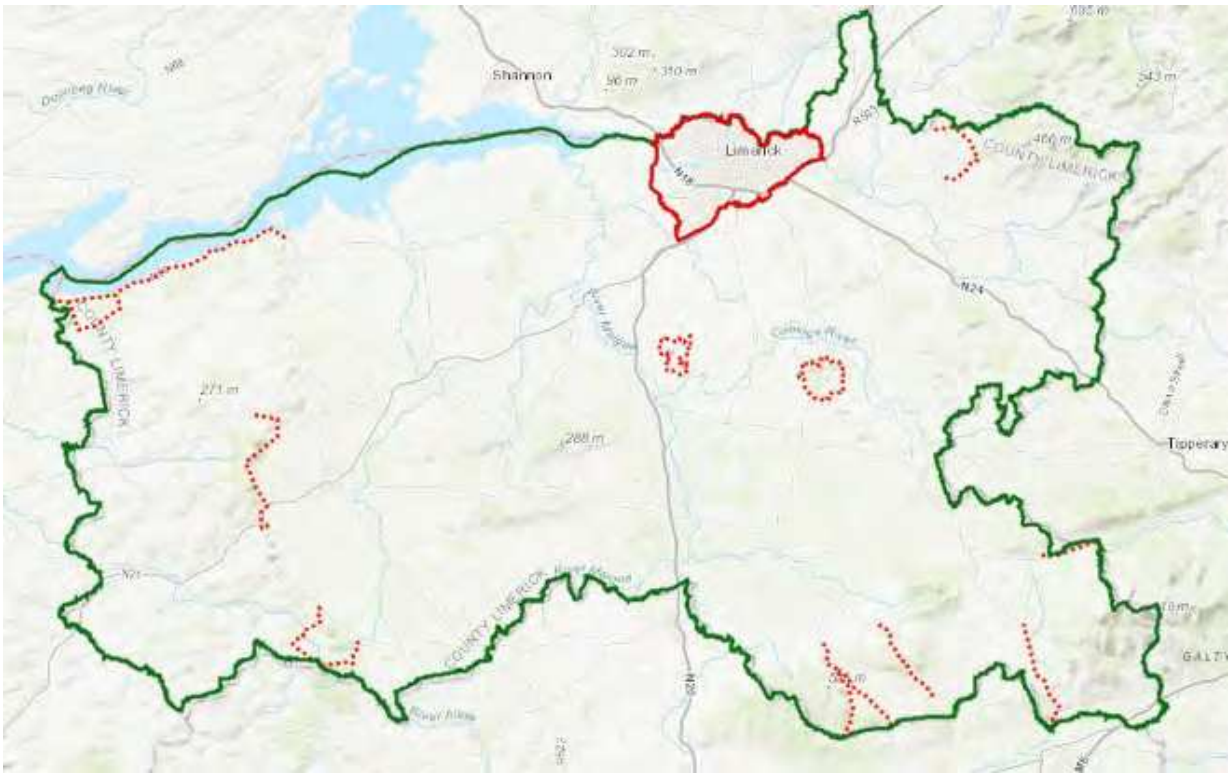


Figure 11.18: Scenic routes, from the North in Co. Limerick

Combining highly scenic routes and sensitive landscapes there will be no effect on neighbouring counties because of the Proposed Development.

11.3.14 Cycling, Walking and Driving Routes

There are no other looped trails, long distance walking cycling or touring routes affected by the Proposed Development other than those discussed above.

11.3.15 Green Infrastructure

Green infrastructure policies are contained along with landscape policies in the same chapter of the CCDP 2022-2028. The following policies and objectives are examined from the landscape and visual perspective.

Objective GI 14-3: Green Infrastructure and Development

a) Require new development and redevelopment proposals, to contribute to the protection, management, and enhancement of the existing green and blue infrastructure of the local area in terms of the design, layout and landscaping of development proposals.

The landscape proposals for this Proposed Development are submitted in the accompanying landscape masterplan.

b) Require all development to submit a green infrastructure statement outlining how the proposal contributes to green and blue infrastructure both within its environs as well as within the wider settlement or rural area. Larger developments (multiple residential developments including Part 8 applications, retail, industrial, mineral extraction, etc.) will be expected to prepare a Landscape/ Green (and Blue) Infrastructure Plan including a Landscape Design Rationale. This Plan should identify environmental assets and include proposals which protect, manage, and develop green infrastructure resources in a sustainable manner.

A landscape masterplan and design statement accompany this submission.

c) Over the lifetime of the Plan the Council will prepare a guidance note/update on best practice in integrating green and blue infrastructure/biodiversity within development proposals.

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 replacement of an earthen bund with hedgerow and the proposed increase in the number of hedgerow trees will increase the potential for habitat development and connection along the existing drainage system and within the hedgerow network. The wider landscape ecology is well considered and there will be a gain in connectivity and biodiversity in the wider landscape.

11.3.16 Landscape Character Type

As outlined above in Landscape Character Assessment for County Cork, the site of the Proposed Development lies within the typological classification 'Fertile Plain with Moorland Ridge.' The relevant subunit of landscape character area was described as the Golden Vale, i.e. Moorland Ridge and Broad Undulating Patchwork Middle Valley (where) the human influence on this landscape is" keenly felt and it "provides a mastering of nature through the ordered and formal layout of field patterns." . This assessment concurs with that description. The main incongruous features which deviate from this are, the large intensive agricultural units in the area, the disused pig unit on the site of the Proposed Development and the busy Mallow to Dublin Road. At the site of the Proposed Development the topography falls across the site from the North West to the South East. Tall broad leafed trees are a feature of the local hedgerow system.

11.3.17 Potential Capacity

Landscape capacity is regarded as the ability of a landscape to visually absorb change and accommodate diverse types of development. Topography ensures there is good capacity for the area to ensure enclosure will absorb the potential development. With the topography falling across the site the Proposed Development is unelevated and will not be visible over a wide area. The soil is rich and can easily support excellent tree growth. This along with generous stands of hedgerows and hedgerow trees means there is good capacity to screen development and allow it to be absorbed into the wider landscape. This development comes in the context of a former pig unit and similar large units nearby. There is more capacity to absorb this development in this context than if there had never been any development in the landscape prior to this application.

11.4 Characteristics of the Proposed Development

The development will consist of the following:

- Demolition of existing single storey disused agricultural buildings, silos, and tank within the western portion of the site (total demolition gross floor area (GFA) of c. 1,781 sq.m). One single storey agricultural building (with a GFA of 87.8 sq.m) will be stabilised and retained as a biodiversity building.
- Construction of 3 no. digesters (c. 15.5m in height), 2 no. digestate storage structures (c. 15.5m and 11m in height), 2 no. liquid storage tanks (c. 12.2m in height), and a liquid feed tank (c. 8m in height) located in the southeast portion of the site.
- 3 no. pasteurisation tanks (each c. 6m in height), a post pasteurisation cooling tank (c. 12.2m in height) and pre fertiliser manufacturing tank (c. 12.2m in height) located in the centre of the site.
- A part single-storey and part two-storey reception hall (with a GFA of c. 2,112.6 sq.m and an overall height of c. 15.5m) to accommodate a laboratory, panel room, tool store, workshop, and storage areas, with a liquid feed intake adjacent to the reception hall, located in the central portion of the site, to the north of the digesters.
- A single-storey solid digestate storage and nutrient recovery building (with a GFA of c. 879.9 sq.m and an overall height of c. 12.4m in height) located to the west of the reception hall, in the central portion of the site.
- Odour abatement plant (c. 6m in height) and equipment, a digestate offtake area, and a fuel tank (c. 1.6m in height) will be provided to the north of the solid digestate storage and nutrient recovery building.
- Construction of an ESB substation (c. 3.4m in height), 2 no. CO_2 tanks (c. 14.5m in height), along with associated plant structures including a CO_2 loading pump, CO_2 auxiliaries, CO_2 liqueufactor, a CO_2 compressor (c. 6.7m in height), and a CO_2 pre-treatment skid, located in the southwest portion of the site.
- Construction of a biogas treatment skid, a biogas compression system, a biogas upgrading module (with an overall height of c. 5.1m) and a grid injection unit within a fenced compound (c. 2.8m in height), located within the southwestern portion of the site.
- Construction of an emergency biogas flare (c. 11.3m in height) and 2 no. propane tanks (c. 1.3m in height) located further to the west of the site.
- Construction of an O2 generation unit (c. 2.6m in height), a biomethane boiler (c. 5.6m to top of flue stack) a combined heat and power (CHP) unit and panel room (with a maximum height of c. 6m to top of flue), 2 no. pump houses (c. 2.6m in height, each with a GFA of c. 29 sq.m) located in the southwestern portion of the site.
- Construction of a two-storey ancillary office and administration building (with an overall height of c. 8.6m and a GFA of c. 271.5 sq.m) located within the western portion of the site, adjacent to the main site entrance.
- A discharge pipe route extending to the northwest of the main anaerobic digestion facility site, crossing the L90831 and through agricultural lands to the River Funshion.
- Alterations to the adjacent local road (L90831), to allow for improved access and safety, including provision of a passing bay and setting back of boundaries alongside the site entrance.
- Provision of landscaping and tree planting, including the provision of an extensive treeline alongside the N73 to the southeast of the main site area, along with additional landscaping and planting on lands to the west of the L90831.
- Associated and ancillary works including parking (16 no., including 3 no. EV and 1 no. accessible parking spaces), and bike storage (10 no. spaces), access arrangements (including new access points to the site from the L90831 to the west), internal roads,

bunds, a weighbridge, wastewater treatment equipment, attenuation pond, boundary treatments, lighting, services, lightning protection masts, drainage, and all associated and ancillary works.

11.4.1 Site Location

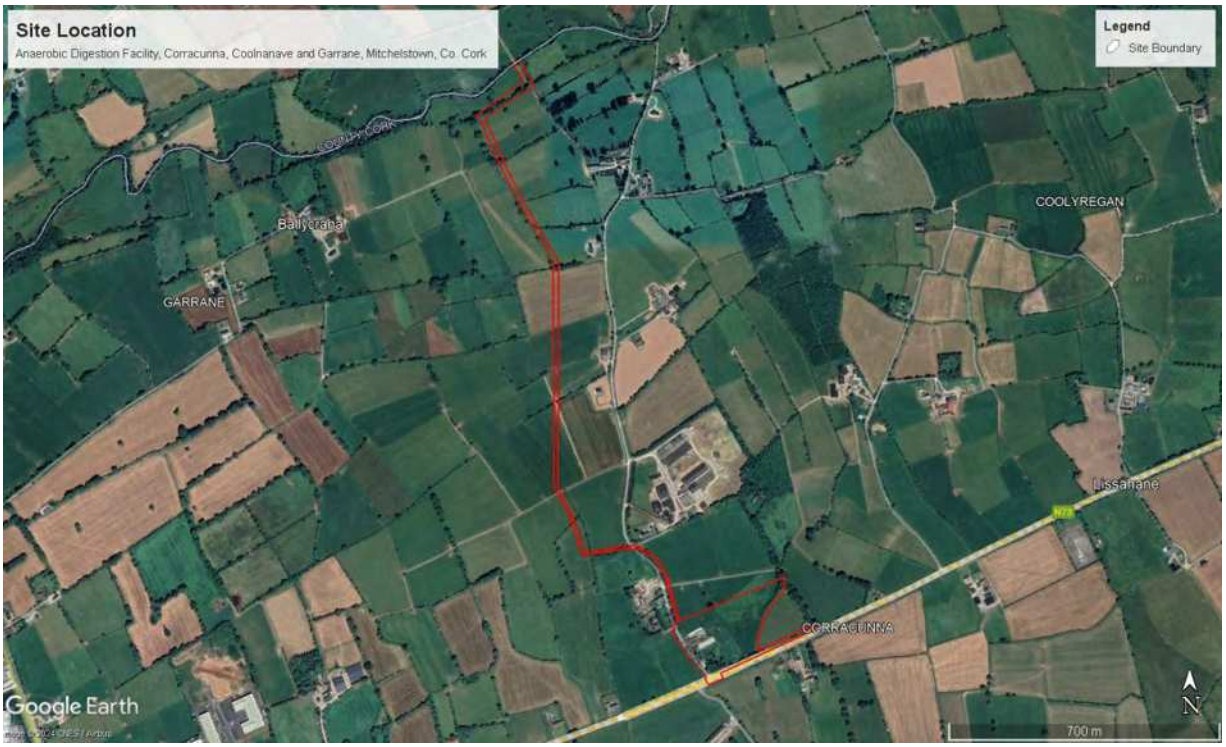


Figure 11.19: Site Location

The site is located in the townlands of Corracunna, Coolnanave and Garrane, east of Mitchelstown, Co. Cork. The site of the Proposed Development is partially parallel to the N73 and is accessed by a local road, the L90813.

11.4.2 Landscape Character and Sensitivity

Landscape character as discussed above is a significant aspect of the landscape receptors susceptibility to change. The effect on landscape character and its ability to accommodate the Proposed Development, maintain the baseline and achieve landscape planning policies is considered. The elements which contribute to positive landscape character at or near the site of the Proposed Development are the mountainous backdrops and slopes, the characteristic 'Golden Vale' network of field mosaics comprised of large rectangular fields bounded in hedgerows and tall deciduous trees. The unused pig unit, the busy road and the large intensive agricultural units that abound, contribute less positively to landscape character at a local level. Considering the nature of the Proposed Development, the intrinsic and inherent values attributed to the landscape character area, the value attached to the landscape and the landscape planning policies pertaining to the LCA, a '**high'** sensitivity rating has been assessed as appropriate for this landscape.

11.5 Predicted Impacts

11.5.1 Landscape Construction Phase

The changes to the landscape will occur during the construction stage. There will be some change to the field pattern but no substantial 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. Although this is a high value, sensitive landscape, around the site of the Proposed Development, the landscape exhibits a reasonable capacity for change.

The soils and topographical adjustment will work with the existing topography in the area. Any soil disturbance or overload is to be utilised onsite as far as practicable. The proposals are accompanied by a landscape masterplan indicating how the development is to be integrated into the surrounding landscape and pasture lands. This will protect and strengthen the existing landscape character. The good local fertile soils will support the tall vegetation selected in the landscape masterplan which will screen the development in time. A plan to plant the eastern side of the Proposed Development along the N73 in advance of construction will help integrate the scale of the development into the landscape. The remainder of the planting will also benefit the landscape positively once mature.

11.5.1.1 Magnitude of Change

During the construction phase there will be activity at the site of the Proposed Development. Machinery travelling to and from the site, site compounds and storage facilities as well as lighting and other construction aids will have an impact on the landscape in the short term.

During the construction process hedgerows will need to be cut back but the overall field pattern will remain intact except for internal site divisions so there is a low loss of landscape elements. The construction of new field boundaries and planting new hedgerows will add some new elements to the landscape pattern which will benefit it positively. Although this is a change it will not have any significant effect on the overall landscape pattern or the landscape character at a local level. The old pig unit buildings will be removed, and a small vernacular building retained and restored as an outhouse conservation structure.

This development will be in place for more than 15 years which constitutes a long-term change (15 to 60 years as per the EPA guidelines).

Landscape character will be affected by the change in land use resulting from construction on the site of the Proposed Development. The change experienced to the landscape will be due to the introduction and scale of the components of the proposed facility. The geographical extent will be confined to the fields surrounding the development.

The scale of change will be due to the digestion tanks and their contrast in form to other agricultural buildings and its difference from the agricultural character of surrounding fields. The size of the Proposed Development is greater in scale than experienced hitherto fore at a local level.

The scale and form of the Proposed Development will have a noticeable influence on the landscape within and near the site and incongruity will result directly following construction. However, this will be mitigated to a good degree by the advance planting proposed of the tree bands on the western and eastern side of the Proposed Development.

There will be no effect on the greater landscape character area or landscape unit type and the magnitude of change will not affect the landscape in its geographical extent. Because the area is typified more by deciduous trees in the field boundaries and tall hedges it will absorb the bulk of the structures quite well on the western side. It will be more exposed on the eastern side. The proposals as discussed include a plan to plant a 9m wide tree band and new hedgerow on the eastern side prior to construction. This will help absorb the bulk and scale of the development during construction. The plantation is clear of the construction site and is unlikely to be damaged during construction. The reversibility of the development is not considered for the construction phase. The development along with the existing pig farm will result in an increase in the extent of the agro-industrial landscape. The development will result in a new element in the landscape not previously experienced though some of the structures with their familiar colours will resemble large agricultural buildings.

The overall magnitude of change will be **'medium.'** This is in line with the description of medium landscape change which is moderate in extent with the introduction of elements that may be prominent but "not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape but not necessarily reduction in landscape quality and perceived value."

11.5.1.2 Significance of Effects

Setting a **medium** magnitude of change against **high** landscape sensitivity gives a significance of effects that is categorised as **'Significant'** according to the matrix in Table 1, above. High sensitivity landscapes are vulnerable landscapes with the ability to accommodate limited development pressure. 'In this rank landscape quality is at a high level, landscape elements are highly sensitive to certain types of change. If pressure for development exceeds the landscape's limitations the character of the landscape may change.' Although there is a change in the landscape at a local level, it will not affect the overall character at the scale of the landscape character area. The more tree planting that surrounds the Proposed Development the less likely local landscape character will be affected, and the magnitude of change will be reduced.

Significant as a category describing the significance of effects is an "effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment" as described by the EPA guidelines.

The effect will be adverse and short term until the development is fully absorbed by maturing trees.

11.5.2 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 wrapping around the proposed facility.

This will 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. The 9m band of trees along the Middleton Kilbehenny Road will develop into an absorptive stand in line with the local

landscape character of tall trees in the field hedgerows and boundaries. The 18m band running parallel to the access road to the west will appear as a small woodland copse as it grows.

In this way, the operational phase of the development presents an opportunity to make a positive contribution to landscape pattern. The landscape sensitivity is not changed from the construction phase, but the magnitude of change will be lower as the landscape proposals start to establish and grow. In the short to medium term the positive landscape impact of the trees and understory development will reduce the magnitude of change experienced at landscape level from medium to low.

Landscape Sensitivity: **High**

Magnitude of Change: **Low**

Setting a **high** landscape sensitivity against a **low** magnitude of change gives a 'moderate to slight' rating for significance of effects at the operational phase of the proposed facility. Given the scale of the development, a significance of effects rating of '**moderate'** is appropriate.
Significance of effects: **Moderate**

The effect will be moderate and long term but the tree planting and general landscape proposals will be positive and the benefits to the landscape will be permanent with many of the species listed in the planting schedule capable of living for more than 100 years.

11.5.3 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. Initially a zone of theoretical visibility (Appendix 11.1) influenced the areas being considered for intervisibility. A ZTV is computer generated and presents the worst case scenario and examines intervisibility without the effect of natural land cover, forests, woodlands, trees, buildings and vegetation. The area was visited and the most likely visual receptors identified. 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

As described in Table 11.1 above, the magnitude of change is judged according to a set of criteria with results ranging from very high to negligible. Judgements are made based on the size of the proposed works and the geographical extent of the viewpoints. Consideration is also given to duration of effects as outlined above. In choosing the viewpoints to be assessed the scale at which the Proposed Development will have influence was considered and this is considered within the magnitude of change as assessed. The sensitivity of each view is adjudged taking into consideration other factors apart from value and recognised designations.

These include the susceptibility of the viewers, panoramas, frequency of visits, features and rarity of the view and the intact nature of the landscape being viewed. Sensory experiences of place, tranquillity, history, nature and awe also factor into viewpoint sensitivity. A comprehensive assessment was made of potential viewpoints. These were then distilled down to a set of viewpoints which are the subject of the verified photomontage study. The accompanying verified photomontage booklet is to be read in conjunction with this report. In making these assessments, topography, site location, hedgerows systems, woodlands, and residences were considered as well as designated sensitivities and landscape as a resource for visual amenity, recreation, culture, and tourism.

11.5.4 Visual Impact – Construction Phase

The selected viewpoints were assessed, and this is summarised as outlined in Table 11.2 below. The sensitivity at each viewpoint is set against the magnitude of change to arrive at a significance of effects as outlined in Table 11.1 above. Again, the sensitivity of each viewpoint is set against the magnitude of change to that view to arrive at a significance of effects at each viewpoint. The matrix is not over relied on and where appropriate, professional judgement and experience is exercised.

11.5.4.1 Initial Field Study

The area around Corracunna was visited on 18th and 19th January 2024 and again on 12th July for assessment and viewpoint appraisal. The area was visited on 9th August 2024 for photography for verified photomontage production. The visual impact assessment is to be read with the 3Dimensional, verified photomontage booklet which accompanies this report. The site location and its hinterland were examined. Taking topography and vegetative cover into consideration, an inventory of viewpoints were selected. Upon establishing the location of likely viewpoint receptors each was visited and an assessment with respect to viewpoint sensitivity and the likely magnitude of change to this view due to the Proposed Development was made. The verified photomontages of these views examine the extent of any visual impact or loss of visual amenity at these viewpoints.

On the occasion of these initial field studies, conditions were good for the time of year. Weather was clear and crisp in January with trees in full leaf at the visit in July.
These views, VP 1-5, are assessed in detail at the construction stage and at the operational phase. The accompanying verified photomontage booklet prepared by 3Dimensional, gives a clear indication of the magnitude of change at each of these viewpoints. All viewpoints were taken from publicly accessible areas. All have been accorded '**high**' receptor sensitivity which as iterated in the methodology above ; is defined for viewpoints "that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or tourist based views focused on the landscape). The composition, character and quality of the view may be such that its capacity for accommodating change may or may not be low. The principal management objective for the view is its protection from change that reduces visual amenity."

At the construction phase, the placing of the structures into the topography helps partially absorb them into the landscape. The objectives of the landscape plan to protect the landscape and views from change that reduces visual amenity cannot be realised fully at the construction phase. The plan to establish a hedgerow and tree band to the east of the proposed site with some semi mature species will reduce the visual effects in this direction to a degree. The full effect of the tree planting will be more apparent during the operational phase when the plant

material starts to establish and mature.

11.5.4.2 Visual Impact - Construction Phase

Table 11.2: Predicted Visual Impacts on Selected Viewpoints Assessed – Construction Phase

Viewpoint No.	Location	Sensitivity	Magnitude of Change	Significance of Effects	Nature of effects
VP1	Garryleagh	High	Negligible	Slight to Not Significant	Adverse
VP2	Corracunna	High	High	Very Significant	Adverse
VP3	Corracunna	High	High	Very Significant	Adverse
VP4	Coolnanave	High	Low	Slight	Adverse
VP5	Corracunna	High	Negligible	Not Significant	Neutral

View Point 1

This viewpoint represents road users, local residences and tourists using scenic route S1 which depends on the view for visual amenity. This is a listed view in the Cork County Development Plan 2022-2028. Normally the visual impact of a similarly Proposed Development would be short lived and fleeting on road users but because the scenic route is designated and has a high value with receptors depending on the view for visual amenity, on this occasion the sensitivity of the group is high. Local residential receptors are also accorded a '**high**' viewpoint sensitivity.

The Proposed Development will not be seen clearly from this viewpoint at the construction stage due to the mature tree stand in the hedgerow and the undulating topography. The magnitude of change at this viewpoint is **'negligible'**. Setting a **'negligible'** magnitude of change against **'high'** viewpoint sensitivity as set out in Table 1 above, gives a significance of effects that is rated as '**Slight to not Significant'.**

View Point 2

This viewpoint represents road users, local residences and tourists using scenic route S1 which depends on the view for visual amenity. This is a listed view in the Cork County Development Plan 2022-2028. Normally the visual impact on of a similarly Proposed Development would be short lived and fleeting on road users but because the scenic route is designated and has a high value with receptors depending on the view for visual amenity, on this occasion the sensitivity of the group is high. Local residential receptors are also accorded a '**high**' viewpoint sensitivity.

The Proposed Development will be seen during the construction stage at this viewpoint. The expected magnitude of change at this viewpoint is **'high'**. This is mitigated to some degree by the plan to plant a band of trees and hedgerows which will have a considerable effect in filling

tan open section of hedgerow along the N73. It will also reduce the time required for tree planting to provide an effective screen. Setting a **'high'** magnitude of change against **'high'** viewpoint sensitivity as set out in Table 1 above, gives a significance of effects that is rated as '**Very Significant'.** This effect will be **short term** and will reduce year on year as trees fill out and eventually screen the Proposed Development.

View Point 3

This viewpoint represents residential receptors and local road users. There are no designations attached to this view or vistas panoramas or important routes. Given the presence of local residential receptors, this view has been accorded a '**high**' viewpoint sensitivity. Road users, pedestrians, cyclists, and motorists have a low viewer sensitivity as this view will only be experienced in a fleeting manner. There will be no loss of elements in this view, but the form shape and scale of the proposals will be apparent at the construction stage. The intact nature of the landscape with its matrix of fields and stands of mature trees as seen in the view will not change but there will be a loss of a sense of place and a change to the view focus in the short to medium term. This will reverse over time as screening trees and young hedgerows establish themselves in the landscape. The magnitude of change to this view will be '**high'** at the construction stage. The impact of the landscape proposals is not considered for the construction stage as growth will not be effective until the Proposed Development is at the operational phase. Setting a '**high**' viewpoint sensitivity against a '**high'** magnitude of change to the viewpoint, results in a significance of effects that is rated as **'very significant'** as outlined in Table 1 above. The duration of the effects will be **short term** and the nature of the effects will be adverse. During the operational phase this will reduce and the positive attributes of tree establishment in the landscape will be apparent in the view.

View Point 4

This viewpoint represents residential receptors and tourists using the scenic S1 route. The route is designated with the views and prospects along the route accorded county level significance. There are views towards the Galtees as one approaches the site of the Proposed Development. The view has been accorded a '**high'** viewer sensitivity because of the significance of the scenic route which depends on the view of the landscape for its amenity value and due to the presence of residential receptors. Local topography and the mature stands of trees and hedgerows will absorb the development at the construction phase in this view. The view of the mountains and upper slopes will remain untouched. There is a generous band of tree planting which will provide a positive addition to this view in time.
The magnitude of change to this view will be '**low'.** Setting a '**high**' viewpoint sensitivity against a '**low'** magnitude of change to the viewpoint, results in a significance of effects that is rated as 'moderate to slight' as outlined in Table 1 above. '**Slight**' is the more appropriate rating for the significance of effects. The impact will be **short term** and will reverse to a positive effect during the operational phase.

View Point 5

This viewpoint represents pedestrians, road users and local residences. The landscape being viewed from this viewpoint is intact and displays to beneficial effect, the role tall hedgerows and deciduous trees make in defining the landscape character of the area. The view focuses on hill tops enclosing the valley in the middle of the view. Pedestrians, motorists, and cyclists have a low viewer sensitivity at this viewpoint as their experience is brief and glimpsed. However, residential receptors are accorded a '**high**' viewer sensitivity. The Proposed Development will not be seen during construction. Therefore, the magnitude of change attributed to this view is

'**negligible**'. Setting a '**high**' viewpoint sensitivity against a '**negligible'** magnitude of change to the viewpoint, results in a significance of effects that is rated as 'slight to not significant' as outlined in Table 1 above. Having regard for the verified photomontage for viewpoint five '**not significant**' is the appropriate rating. The nature of the effects will be neutral.

11.5.5 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.

As part of the landscape and mitigation measures long term changes to the landscape are taken into consideration over the life of the project. The ability of the landscape proposals to not only mitigate but improve the quality of the views in line with landscape character over time is factored in at the operational stage of the Proposed Development. The landscape measures are important during the operational phase of the project when tree growth will make a considerable contribution to protecting visual amenity. The species, plant specifications optimum growth rates and establishment time is considered. The development and growth of plant material in the short to medium term is considered for the screening effect of tree and hedgerow growth.

The selected viewpoints were assessed as for the construction phase above, and this is summarised as outlined in Table 11.3 below. The sensitivity at each viewpoint is set against the magnitude of change to arrive at a significance of effects as outlined in Table 11.1 above. The matrix is not over relied on and professional judgement and experience is employed to rate the viewpoints.

The operational phase of the project gives an opportunity to the developer to future proof the visual amenity afforded by trees and hedgerows.

The operational period will coincide with the establishment of the screen trees which will buffer the key areas around the structures. It is estimated that there will be effective screening in the short to medium term approximately seven to ten years with the ameliorating effect of the landscape proposals increasing each year. Many of the selected species will live for more than 100 years having a permanent positive impact on the views. There is good evidence from the surrounding tree lines and individual trees onsite that at a local level the environment and soils will support excellent tree growth and plant development.

All the plant material as well as the trees specified to be sourced and propagated as locally as possible. This material is to be disease free and well maintained irrigated appropriately and allowed to establish optimally to achieve the best possible growth outcomes.

Table 11.2: Predicted Visual Impacts on Selected Viewpoints Assessed – Operational Phase

Viewpoint No.	Location	Sensitivity	Magnitude of Change	Significance of Effects	Nature of effects
VP1	Garryleagh	High	Negligible	Slight to Not Significant	Adverse
VP2	Corracunna	High	Low	Moderate to Slight	Adverse
VP3	Corracunna	High	Low	Moderate	Adverse
VP4	Coolnanave	High	Low	Slight	Positive
VP5	Corracunna	High	Negligible	Not Significant	Neutral

View Point 1

This viewpoint represents road users, local residences and tourists using scenic route S1, which depends on the view for visual amenity. This is a listed view in the Cork County Development Plan 2022-2028. Normally the visual impact of a similarly Proposed Development would be short lived and fleeting on road users but because the scenic route is designated and has a high value (with receptors depending on the view for visual amenity), on this occasion the sensitivity of this group is high. Local residential receptors are also accorded a '**high**' viewpoint sensitivity.

The Proposed Development will not be seen from this viewpoint at the operational stage due to the mature tree stand in the hedgerow and the undulating topography. The maturing trees and hedgerows planted prior to and subsequent to the construction stage will further absorb the Proposed Development into the view effectively screening and increasing the depth of trees in the view. On examination of the verified photomontage for this view the magnitude of change at this viewpoint is **'negligible'**. Setting a **'negligible'** magnitude of change against **'high'** viewpoint sensitivity as set out in Table 11.1 above, gives a significance of effects that is rated as '**Slight to not Significant'.**

View Point 2

This viewpoint represents road users, local residences and tourists using scenic route S1, which depends on the view for visual amenity. This is a listed view in the Cork County Development Plan 2022-2028. Normally the visual impact of a similarly Proposed Development would be short lived and fleeting on road users but because the scenic route is designated and has a high value on this occasion the sensitivity of the group is high. Local residential receptors are also accorded a '**high**' viewpoint sensitivity.

The Proposed Development will be screened in this viewpoint in the short to medium term. It will be significantly screened as compared to the construction stage. The expected magnitude of change at this viewpoint will be **'low'** once the proposed band of roadside trees and hedgerow starts to mature. Setting a **'high'** magnitude of change against a **'low'** viewpoint

sensitivity as set out in Table 11.1 above, gives a significance of effects that is rated as **'Moderate to Slight'.** The advance planting of the roadside hedgerow and tree band in this view with appropriate species of broadleaf's, rapidly establishing screen trees and native Scots Pine will greatly reduce the visual impact in a timely fashion. At each subsequent year, the effect on the viewpoint will continue to diminish as trees mature. Once the screening specimens have completed their task, the climax species will establish in the view with a positive effect on visual amenity lasting permanently. The significance of effects will reduce to slight over time.

View Point 3

This viewpoint represents residential receptors and local road users. There are no designations attached to this view or vistas panoramas or important routes. Given the presence of local residential receptors, this view has been accorded a '**high**' viewpoint sensitivity. Road users, pedestrians, cyclists, and motorists have a low viewer sensitivity as this view will only be experienced in a fleeting manner. There will be no loss of elements in this view but the form shape and scale of the proposals will be apparent at the construction stage. The intact nature of the landscape with its matrix of fields and stands of mature trees as seen in the view will not change but the trees and hedgerows planted prior to and at the construction stage will start to mature and screen in the Proposed Development in the short to medium term. The magnitude of change to this view during the operational phase will therefore be '**low'.** Setting a '**high**' viewpoint sensitivity against a '**low'** magnitude of change to the viewpoint, results in a significance of effects that is rated as 'moderate to slight' as outlined in Table 11.1 above. The significance of the effects is likely to be '**moderate'** and adverse at the short to medium term, but the positive effects of the tree and hedgerow planting will increase each year with much of the tree planting increasing visual amenity for up to 100 years once established.

View Point 4
This viewpoint represents residential receptors and tourists using the scenic S1 route. The route is designated with the views and prospects along the route accorded county level significance. There are views towards the Galtees as one approaches the site of the Proposed Development. The view has been accorded a '**high'** viewer sensitivity because of the significance of the scenic route which depends on the view of the landscape for its amenity value. Local topography and the mature stands of trees and hedgerows will absorb the development at the construction phase in this view. The view of the mountains and upper slopes will remain untouched. The western tree band will have started to establish at this point and add a copse like effect to the view. This will be a positive introduction to the view during the operational phase.

The magnitude of change to this view will be '**low'.** Setting a '**high**' viewpoint sensitivity against a '**low'** magnitude of change to the viewpoint, results in a significance of effects that is rated as 'moderate to slight' as outlined in Table 11.1 above. '**Slight**' is the more appropriate rating for the significance of effects. This effect will be **positive.**

View Point 5
This viewpoint represents pedestrians, road users and local residences. The landscape being viewed from this viewpoint is intact and displays to beneficial effect the role tall hedgerows and deciduous trees make in defining the landscape character of the area. The view focuses on hill tops enclosing the valley in the middle of the view. Pedestrians, motorists and cyclists have a low viewer sensitivity at this viewpoint as their experience is brief and glimpsed. However, residential receptors are accorded a '**high**' viewer sensitivity. The Proposed Development will not be seen at the operational phase. Therefore, the magnitude of change attributed to this

view is '**negligible**'. Setting a '**high**' viewpoint sensitivity against a '**negligible'** magnitude of change to the viewpoint, results in a significance of effects that is rated as 'slight to not significant' as outlined in Table 11.1 above. Having regard for the verified photomontage for viewpoint five '**not significant**' is the appropriate rating. The nature of the effects will be neutral.

11.5.6 'Do Nothing' Scenario

The dilapidated pig unit will further disintegrate, and the structures will become an eyesore unless removed. Trends in the existing environment will indicate that field size may increase over the coming years. It is unlikely there will be any further tree or hedgerow planting at the site of the Proposed Development. Ash in or near the adjacent site will continue to decline and without incentivisation is unlikely to be replaced by any new tree planting in the coming years. This will affect visual amenity and landscape character.

11.5.7 Cumulative Impact

There is an anaerobic digestion development which was applied for by Dairygold Cooperative Society at Castle Farm Mitchelstown to the west of the town. There will be no intervisibility between the sites and no interrelated landscape effects with the Proposed Development. The cumulative impact of the Proposed Development with the preexisting pig unit to the north of the Proposed Development and accompanying infrastructure will be absorbed by the maturing trees and hedgerows. 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. The landscape sensitivity is still rated as **high** whilst the magnitude of change will be **low.** The significance of effects for the cumulative impact of the Proposed Development will be **moderate** as assessed according to the matrix as set out in Table 11.1 above. The duration of the impact will be long term with the mitigating effect of the landscape proposals reducing the effect year on year.

11.6 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.
- An irrigation plan to be put in place to allow for establishment of plantings with 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 may be used.

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 by retaining the bunds and sloping the access into the site of the Proposed Development has prevented the structures breaking the skyline at specific viewpoints and reduced its impact. Other measures

include;

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 where used in tree planting shall conform to BS 5236. Standards for plant establishment to conform to at a minimum BS 8545:2014 Trees: from nursery to independence in the landscape.

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.

- Palisade fencing is to be screened with hedging and trees.

- All hedgerows and hedgerow trees to be protected during the construction process with a root protection zone established according to the arboriculture report, 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.

- 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, irrigated 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.

Failure of Mitigation Measures

The landscape proposals can be regarded as mitigation measures in this context. A good diversity and mix of species sizes and varieties along with the landscape management proposals as outlined above will ensure there is little chance of complete failure of the planting. In the unlikely event that this is the case the screening potential of trees will be lost and the

ability of the landscape to absorb the development will be diminished. The potential visual amenity that maturing trees lend to a landscape will also be lost. The long term and permanent benefit of trees will also be lost if there is a failure of planting as a mitigation measure. Should failure occur, the entire planting proposals will have to be reinstated upon detailed examination as to why they were not successful in the first instance. Competent and qualified horticulturist to be employed to plant, establish and manage the landscape and trees once they are growing effectively.

11.7 Interactions and Cumulative Impact

Other environmental impacts which will interact with landscape and visual impacts in the case of this Proposed Development are biodiversity related and generally positive and beneficial.

11.7.1 Biodiversity and Carbon Absorption

Biodiversity, floral, faunal, and microbial will benefit from tree planting and tree maintenance and the use of native and naturalised species as prescribed in the planting mix. There will also be a pollinator benefit from the hedgerow specifications, increasing the habitats for bees and other pollinating insects. Adding native and naturalised trees to the landscape has a generalised effect of increasing habitat size and habitat connectivity in the area. It adds to the corridors which connect hedgerows, woodlands, and habitats to each other. Managing the adjacent meadow as a species rich sward or semi natural grassland will also have excellent benefits to local biodiversity.

The avoidance of *Fraxinus excelsior*, in the planting plan species mix 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. Avoiding infectious plant diseases in plant selection will also prevent spreading disease to local tree stands.

The emphasis on disease resistant, resilient screening trees of native and naturalised provenance which will incorporate alternative climax species to ash will ensure a good addition to the local biodiversity. The requirement to use locally sourced and propagated, native and naturalised plant material will decrease the chances of introducing disease to the system. Planning to add climax trees like oak to the planting specification ensures the schedule of planting is maximising its capacity as a carbon absorptive sink. This service will continue permanently i.e. for a period of greater than 60 years. The plantation of a generous band of native and naturalised trees opposite the western boundary and a generous plantation to the east and around the proposed facility will also ensure that in the future as ash trees decline in the landscape, in this area, there will be a replacement in place. Maturing oak, beech and other climax trees will ensure there are species present to replace ash in the ecosystem. These species can absorb carbon in increasing quantities each year until maturity. Maturity is expected to be greater than 100 years.

11.7.2 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 generous plantation of trees will be an addition to the landscape. Year on year the development of taller trees will continue to absorb the Proposed Development at viewpoint 3 and 2. Apart from the impacts as outlined in the assessment above no further residual impacts are expected.

References

Environmental Protection Agency, 2022. Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

Landscape Institute and the Institute of Environmental Management and Assessment, 2013 Guidelines for Landscape and Visual Impact Assessment 3rd Edition (GLVIA)

Cork County Council Draft Landscape Character Assessment 2007

Cork County Council County Development Plan 2022-2028

Teagasc and Cranfield University ISIS – Irish Soil Information System

https://www.townlands.ie

https://www.logainm.ie

https://www.alltrails.com/ireland

https://www.sportireland.ie/outdoors

Appendix 11.1: Zone of Theoretical Visibility ZTV, Viewpoint Locations, Townland and Greenbelt Boundaries, Soil Type Map

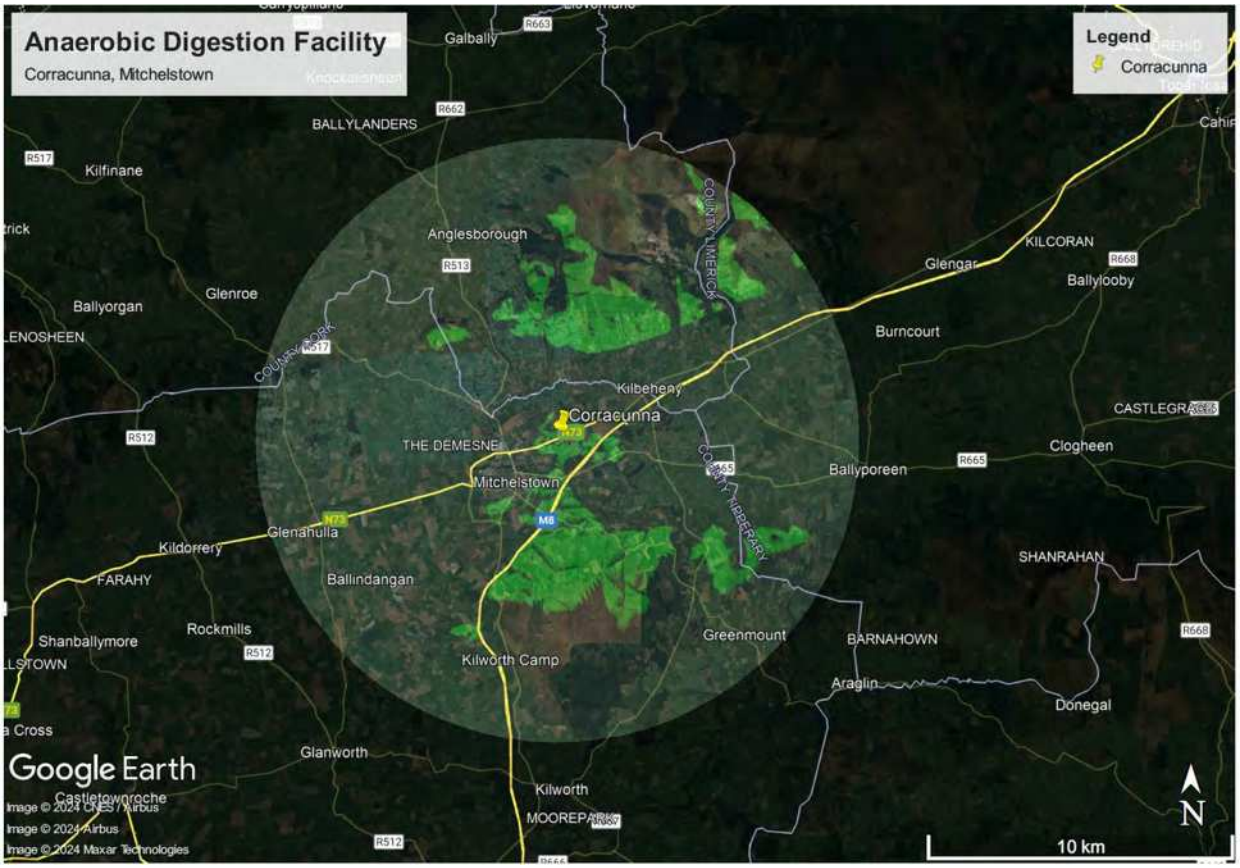


Figure 11.19: Zone of Theoretical Visibility (viewshed analysis).

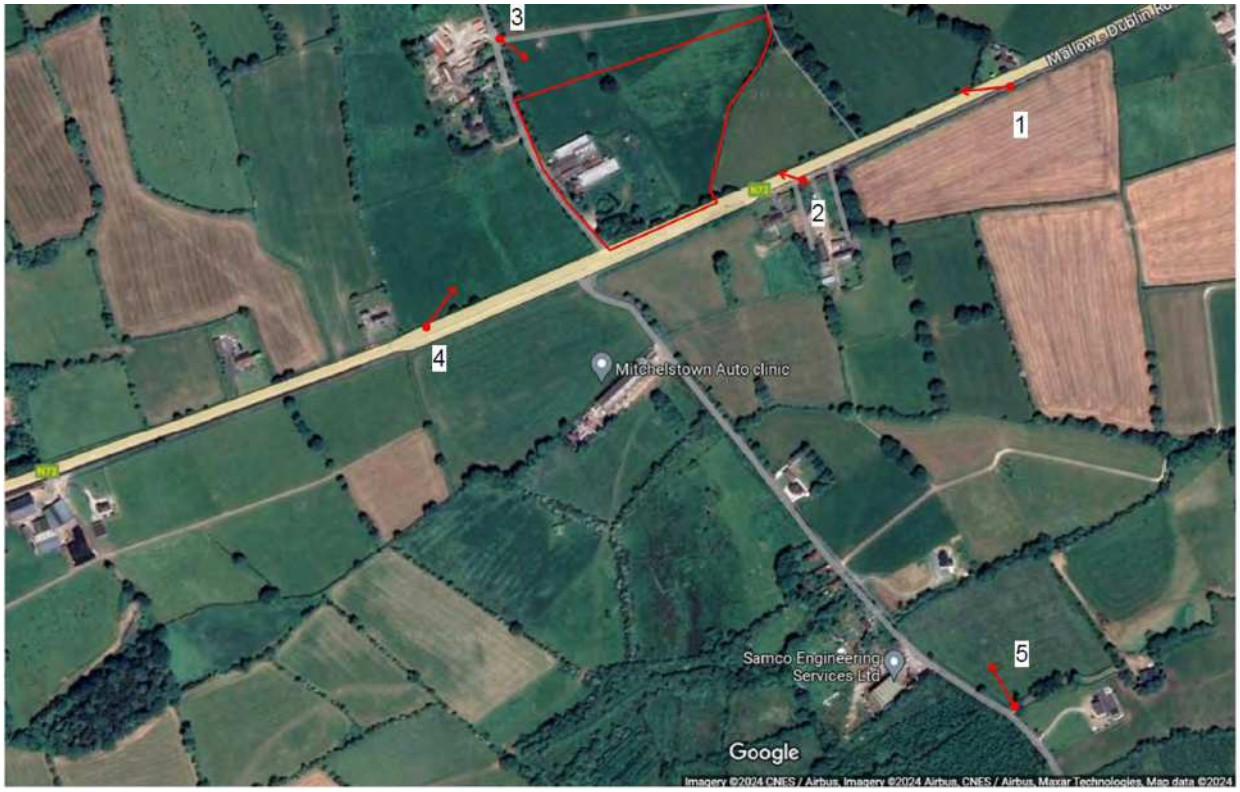


Figure 11.2: Verified photomontage viewpoint locations.

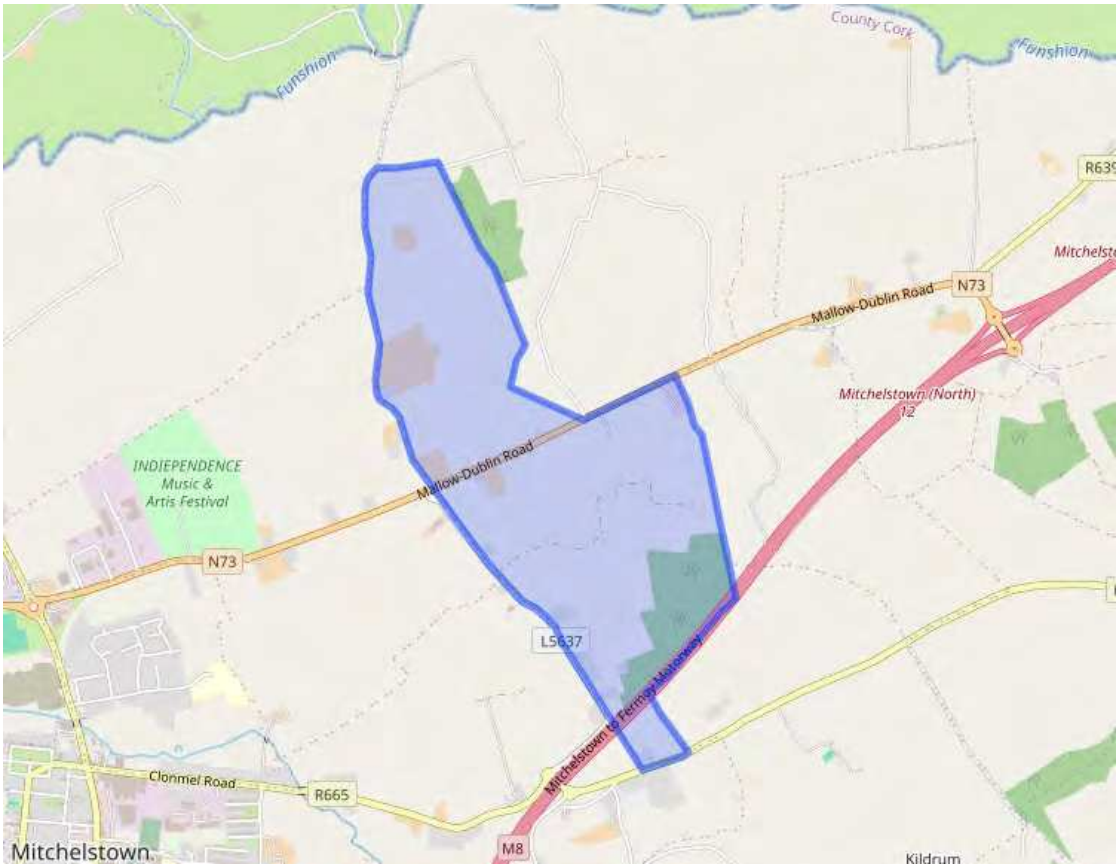


Figure 11.21: Corracunna, Townland Boundary

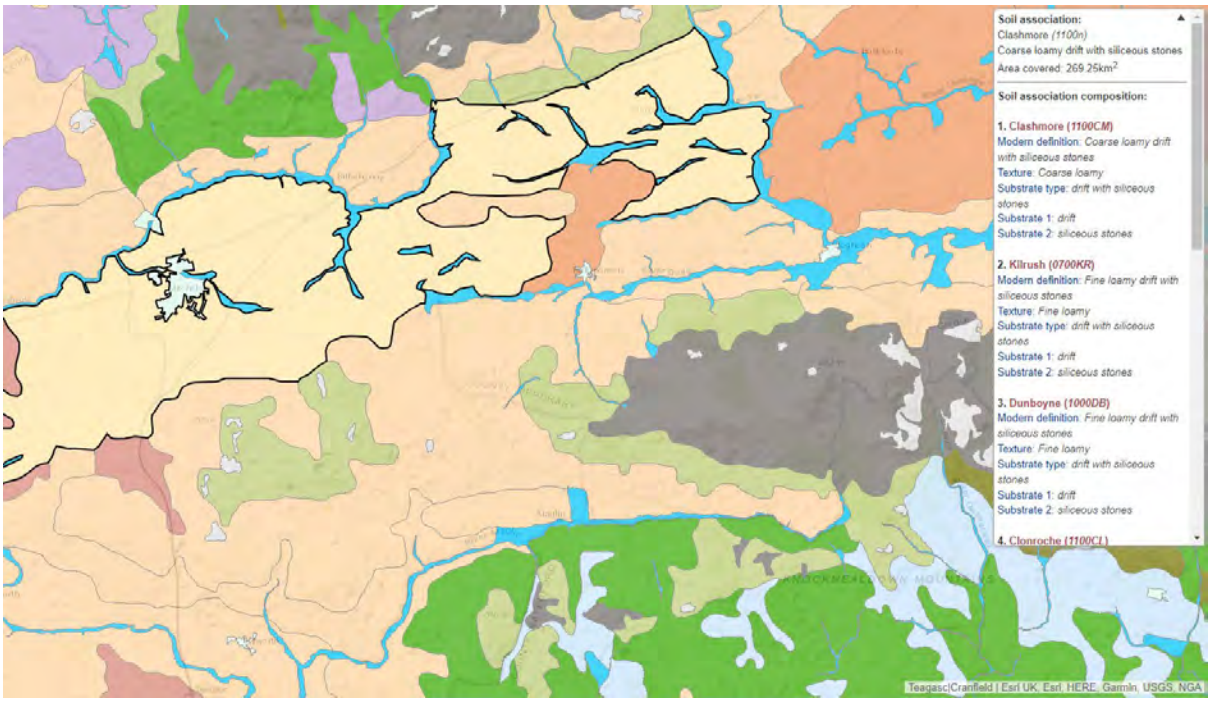


Figure 11.22: Soil Association; Clashmore. This is a sandy loam brown earth with a typical pH of 5.6.

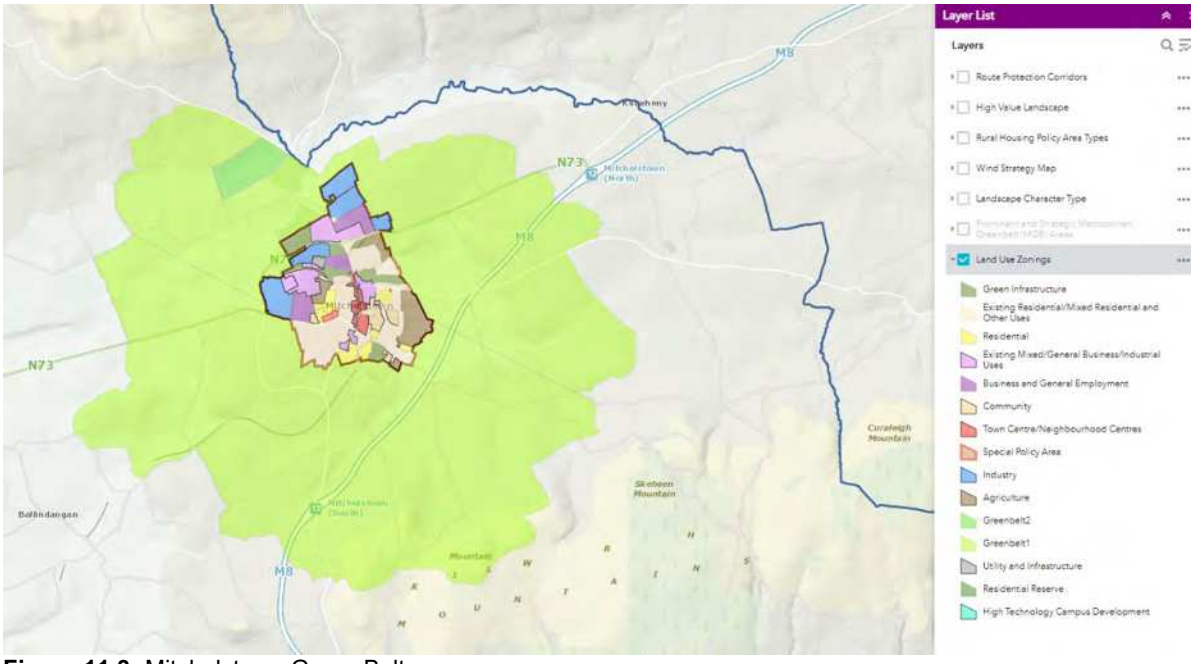


Figure 11.3: Mitchelstown Green Belt

Appendix 11.2: Field Survey Photoset

Figure 11.4: The view towards the Galtee Mountains from the N73 indicates, at this point on the road travelling towards Mitchelstown, why this landscape is designated as a High Value Landscape

Figure 11.25: Hedgerows and the field mosaic define the landscape as it reaches the upper slopes of the mountains.

Figure 11.26: The view is optimal at the brow of the hill near the junction of the L5635 and the N73. Moving downhill from this point on the hill the view focus changes from the high mountain scene.

Figure 11.5: Hedgerows are of high quality for the most part and the landscape is articulated in this way with field boundaries being defined by the hedgerow system from the valley to the slopes.

Figure 11.6: Farmsteads ae scattered over the landscape with forestry on higher slopes.

Figure 11.7: Agro-industrial units, car repair units and one off housing are incongruent features of the landscape, closer to the site of the proposed development.

Figure 11.8: The busy N73 and local single residences near the site of the proposed development.

Figure 11.9: Existing tall trees provide screening at the site of the proposed development.

Figure 11.10: Typical of the landscape character area, the ‘Golden Vale’, tall broad leaf trees dominate the boundaries of large rectangular fields.

Figure 11.11: Gently undulating topography falls across the site of the proposed development to a small drain with the landscape in the foreground rising towards the N73.

Figure 11.12: Excellent quality field hedgerows with tall trees in a well-articulated large field mosaic typifies high quality landscape in the landscape character area.

Figure 11.13: Looking along the N73 towards Mitchelstown, hedgerows and hedgerow trees with broad leafed trees play an important role in defining the areas landscape character. The western boundary of the proposed site has good height as seen below.

Figure 11.14: The landscape within the site itself has incongruous elements (above and below) due to the presence of the abandoned piggery.

Figure 11.15: The view along the N37 approaching the proposed site. Large intensive agricultural units are absorbed into the overall landscape by tree height and hedgerow

quality.

Figure 11.38: The incongruity of a large pig unit is reduced in its landscape setting by broad leafed trees and hedgerow quality.

Figure 11.16: The landscape and views towards the peaks to the south is not as dramatic as towards the north but are very typical of the landscape character area.

Figure 11.170: The landscape character to the south west is gently undulating towards slopes in the distance.

Figure 11.181: The landscape approaching Mitchelstown. A small copse on the hill top demonstrates its addition to the landscape character.

Figure 11.192: The landscape along the N73 to the east.

Figure 11.43: Landscape incongruity reduced by tall broad leafed trees.

Figure 11.20: Landscape incongruity reduced by tall broad leafed trees.

Figure 11.215: Broad leafed trees marrying the landscape to the mountains behind.

Figure 11.22: Approaching the Galtymore trail head from Kilbehenny. There won't be any intervisibility to the site of the proposed development on these approaches due to the topography.

Figure 11.237: The trail head at Kings Yard for Galtymore is secluded by the topography to the west. There will be no intervisibility from the trail head to the site of the proposed development. Distance to the site of the Proposed Development and the quality of hedgerows and tall trees ensures there will be no visibility impact on high slopes.

Figure 11.24: The approach to trail heads within wooded river valleys near Galtee Castle is secluded and completely unaffected by the proposed development.

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Appendix 11.2 Field Survey Photoset

Appendix 11.2: Field Survey Photoset

Figure 11.1: The view towards the Galtee Mountains from the N73 indicates, at this point on the road travelling towards Mitchellstown, why this landscape is designated as a High Value Landscape

Figure 11.25: Hedgerows and the field mosaic define the landscape as it reaches the upper slopes of the mountains.

Figure 11.26: The view is optimal at the brow of the hill near the junction of the L5635 and the N73. Moving down hill from this point on the hill the view focus changes from the high mountain scene.

Figure 11.2: Hedgerows are of high quality for the most part and the landscape is articulated in this way with field boundaries being defined by the hedgerow system from the valley to the slopes.

Figure 11.3: Farmsteads ae scattered over the landscape with forestry on higher slopes.

Figure 11.4: Agro-industrial units, car repair units and one off housing are incongruent features of the landscape, closer to the site of the proposed development.

Figure 11.5: The busy N73 and local single residences near the site of the proposed development.

Figure 11.6: Existing tall trees provide screening at the site of the proposed development.

Figure 11.7: Typical of the landscape character area, the ‘Golden Vale’, tall broad leaf trees dominate the boundaries of large rectangular fields.

Figure 11.8: Gently undulating topography falls across the site of the proposed development to a small drain with the landscape in the foreground rising towards the N73.

Figure 11.9: Excellent quality field hedgerows with tall trees in a well-articulated large field mosaic typifies high quality landscape in the landscape character area.

Figure 11.10: Looking along the N73 towards Mitchellstown, hedgerows and hedgerow trees with broad leafed trees play an important role in defining the areas landscape character. The western boundary of the proposed site has good height as seen below.

Figure 11.11: The landscape within the site itself has incongruous elements (above and below) due to the presence of the abandoned piggery.

Figure 11.12: The view along the N37 approaching the proposed site. Large intensive agricultural units are absorbed into the overall landscape by tree height and hedgerow quality.

Figure 11.38: The incongruity of a large pig unit is reduced in its landscape setting by broad leafed trees and hedgerow quality.

Figure 11.13: The landscape and views towards the peaks to the south is not as dramatic as towards the north but are very typical of the landscape character area.

Figure 11.140: The landscape character to the south west is gently undulating towards slopes in the distance.

Figure 11.151: The landscape approaching Mitchellstown. A small copse on the hill top demonstrates its addition to the landscape character.

Figure 11.162: The landscape along the N73 to the east.

Figure 11.43: Landscape incongruity reduced by tall broad leafed trees.

Figure 11.17: Landscape incongruity reduced by tall broad leafed trees.

Figure 11.185: Broad leafed trees marrying the landscape to the mountains behind.

Figure 11.19: Approaching the Galtymore trail head from Kilbehenny. There won't be any intervisibility to the site of the proposed development on these approaches due to the topography.

Figure 11.207: The trail head at Kings Yard for Galtymore is secluded by the topography to the west. There will be no intervisibility from the trail head to the site of the proposed development. Distance to the site of the Proposed Development and the quality of hedgerows and tall trees ensures there will be no visibility impact on high slopes.

Figure 11.21: The approach to trail heads within wooded river valleys near Galtee Castle is secluded and completely unaffected by the proposed development.

12 Traffic & Transport

12.1 Introduction

The purpose of this chapter of the EIAR is to address the transport related issues that may arise in relation to the proposed Anaerobic Digestion Facility (herein referred to as the Proposed Development) during construction and operation and how the proposal will integrate with the existing traffic flows in the vicinity of the site.

Recommendations contained in this report are based on site observations, recorded traffic survey data, interpretation of collected data and information and consultation with relevant Authorities and interested parties.

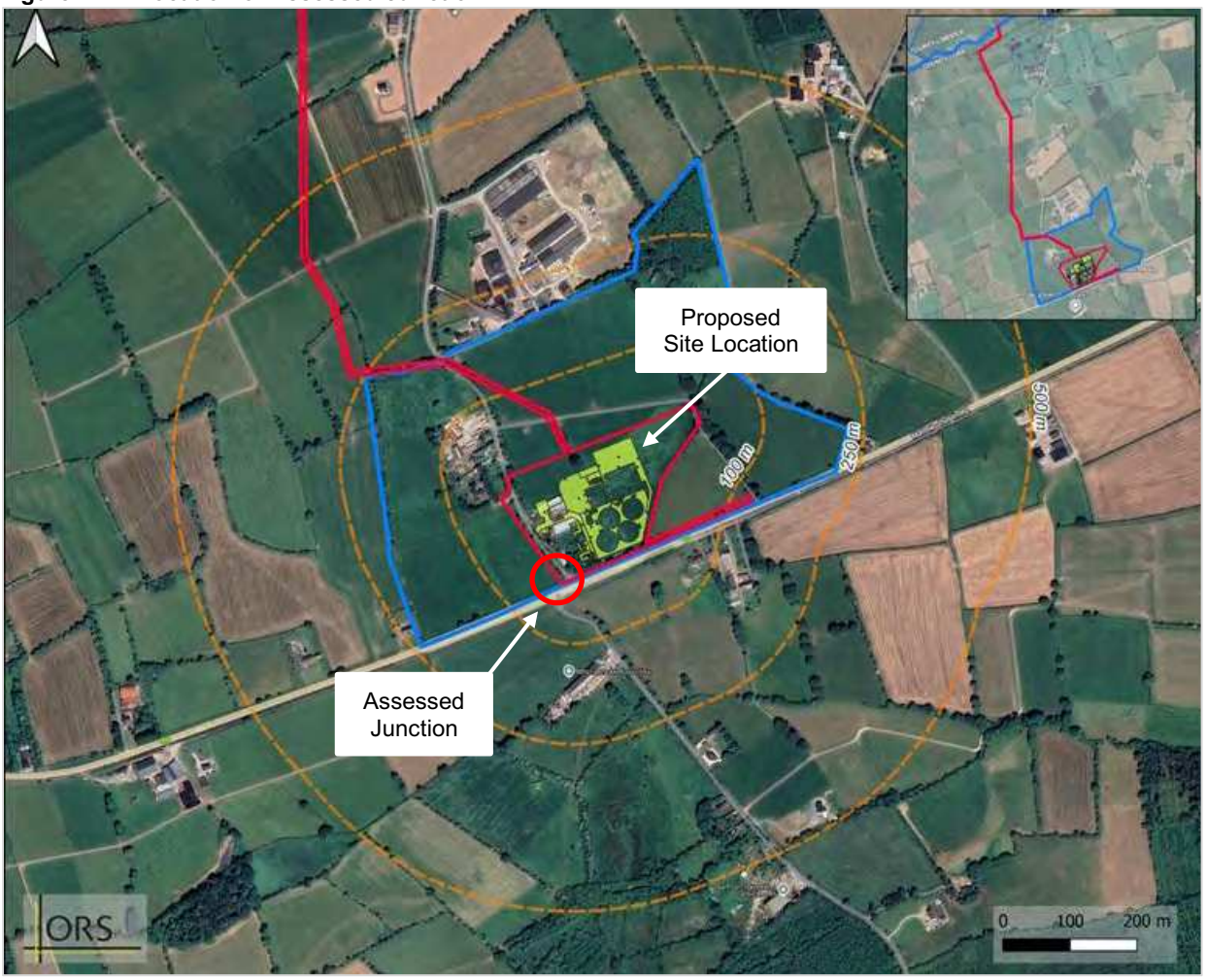
The objectives of this report are to assess the impact the Proposed Development will have on the surrounding road network, with the assessment focusing primarily on the priority junction off the National Road N73 and L90813, in the vicinity of the proposed site, shown in **Figure 12.1.** The report is produced to demonstrate how the Proposed Development will integrate with the existing traffic flows in the vicinity of the site and how the proposed traffic flows accessing the site will affect the existing road network.

ORS liaised with Cork County Council to scope the requirements for the Transportation Section of the EIAR. It was agreed that this section would assess the traffic volumes produced by the development and review the effects the proposal will generate along the road network in the vicinity of the site.

Therefore, in summary, the objectives of this report 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.

Figure 12.1: Location of Assessed Junction



12.2 Consultation

ORS have been commissioned to assess the potential impacts of the Proposed Development in terms of Traffic and Transportation during the construction and operational phases.

The principal members of the ORS EIA team involved in this assessment include the following persons:

- **Project Scientist & Co-Author:**

  Angeliki Kalatha – M.Sc. (Civil Engineering – Transport and Project Management), M.Sc. (Engineering Project Management). Current Role: Senior Transportation Engineer. Experience ca. 8 years

- **Project Scientist & Reviewer:**

  Luke Martin – B.A. (MOD) (Natural Sciences), M.Sc. (Sustainable Energy and Green Technology), CEnv, MIEnvSc. Current Role: Senior Environmental Consultant. Experience ca. 13 years.

- **Project Coordinator & Reviewer:**

  Oisín Doherty – B.Sc. (Geography with Environmental Science), MSc. (Environmental Management), CEnv, MIEnvSc. Current Role: Senior Environmental Consultant. Experience ca. 15 years.

Consultation between ORS and other members of the planning/design team was made in order to obtain information required to assess the potential construction and operational phase impacts on traffic and transport.

12.3 Assessment Methodology & Significance Criteria

This report will follow the principles set out in the Transport Infrastructure Ireland (TII) Publication PE-PDV-02045 'Traffic and Transport Assessment Guidelines' and will assess the impact the Proposed Development, and the associated traffic flows, will have on the public road network in the vicinity of the site.

Reference was made to the following documents when preparing this report:

- Cork County Development Plan 2022 – 2028;
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, published in May 2022;
- TII Publication PE-PAG-02017 Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections, published in October 2021;
- TII Publication PE-PAG-02039 Project Appraisal Guidelines for National Roads Unit 16.1 – Expansion Factors for Short Period Traffic Counts;
- Traffic Management Guidelines, published in 2003; and
- Design Manual for Urban Roads and Streets, published in 2013.

12.3.1 Traffic and Transport Assessment Guidelines – PE-PDV-02045

The Transport Infrastructure Ireland (TII) Publication PE-PDV-02045, published in May 2014 sets the methodology to be followed in any given Traffic and Transport Assessment. The methodology that will be used in this assessment follows the guidelines set in this document and can be outlined as follows:

- Manual junction turning counts (JTC) were carried out on Thursday 30th May 2024 at the priority T-junction formed by the N73 National Road, and the L90813 Local Road by ORS. The traffic counts were carried out during a 3-hour period from 08:00-9:30 AM and from 17:00-18:30 PM and encompass all movements at the junction.
- Details on the expected traffic generated by the Proposed Development during construction and operation, as well as the haulage routes, were obtained from Nephin Renewable Gas - Corracunna Limited.
- The impact of the change in traffic conditions following the opening of the development has then been determined and the operational performance of the existing junction on the adjacent network was analysed. This has therefore enabled the parameters of the existing

junction to be tested and to ensure that it can accommodate the resultant flows and movements.

- The effect the Proposed Development will have on the road network was assessed against the TII threshold and it was found that the junction does not exceed the threshold of 10% increase in traffic, therefore, a complete Traffic and Transport Assessment (TTA) is not required.
- The junction was subjected to analysis as the majority of the traffic generated by the site will be composed of HGVs. The modelling showed that the junction will function well below its theoretical capacity for all future design years with no queues or delays.
- Parking requirements were assessed against parking standards set in Section 12.24 - *Parking Standards* of the Cork County Development Plan 2022 – 2028.

12.4 Description of Receiving Environment

12.4.1 Site Location

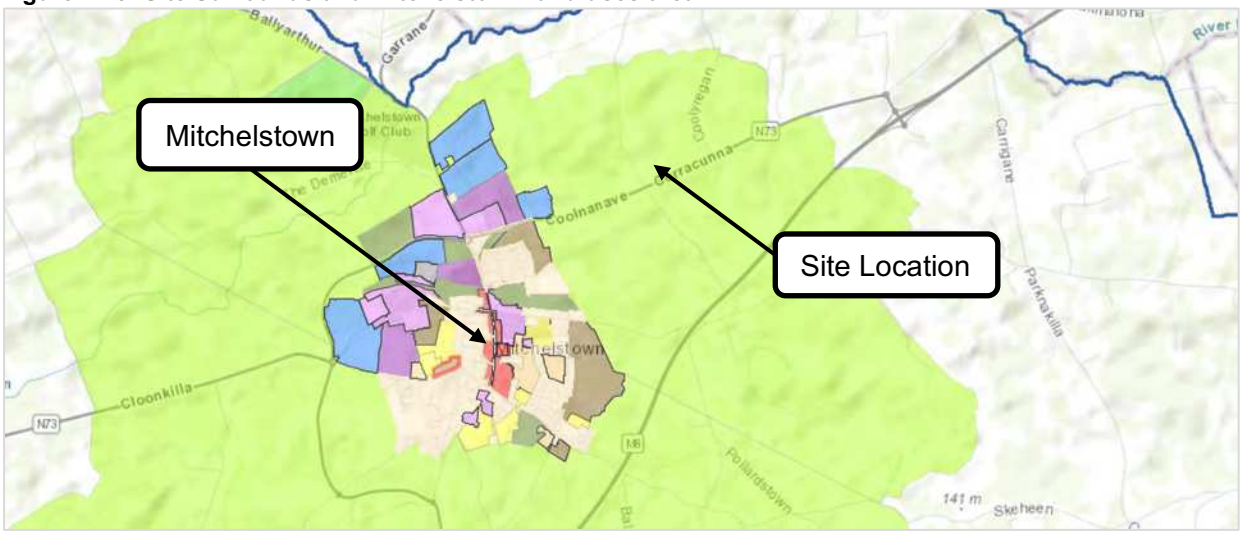
The Proposed Development site is located in the townlands of Corracunna, Coolnanave and Garrane, approximately 2km northeast of the town of Mitchelstown and 43km north of Cork City, Co. Cork. The site area, shown in red, is *ca.* 5.61 ha, as shown in **Figure 12.2** below. The site is partially brownfield and contains a former piggery and disused agricultural buildings. It is currently used as agricultural pastureland in part and bounded to the north, south, east, and west by further agricultural pastureland. The operational piggery is located ca. 300m to the north. The site is adjacent to the N73 National Road located directly to the south. The L90813 local road is located immediately to the west and provides access to the site.

Figure 12.2: Site Location

12.4.2 Existing Premises and Land Use

Cork County Development Plan 2022 – 2028 was consulted to determine the zoning within and around the Proposed Development. The site is situated on land zoned as part of a Greenbelt surrounding Mitchelstown approximately 2.7km northeast of the town, in a rural area with limited transport infrastructure in place. The surrounds are shown in **Figure 12.3**.

Figure 12.3: Site Surrounds and Mitchelstown land uses area



12.4.3 Proposed Development

The Proposed Development is described in Section 2.1.1 in Chapter 2, with **Figure 12.4** overleaf indicating the site layout.

The Proposed Development will be capable of processing up to 90,000 tonnes of predominantly locally sourced agricultural manures, slurries, food processing residues and crop-based feedstock for the production of high quality biomethane (CH_4) to supply the existing gas network via the Grid Injection Unit (GIU), and renewable carbon dioxide (CO_2). In addition, the process will recycle locally sourced organic feedstocks to produce a nutrient rich biobased fertiliser which can be used as a direct replacement for chemical/mineral fertilisers. Digestate liquid and fibre will, on the whole, be returned to lands associated with feedstock supplies of crop and/or slurry, thereby promoting a local circular bioeconomy. The feedstock will be transported to the facility via the public road network and access the site through the National Road N73 and the Local Road L90813.

Up to 90,000 tonnes of organic feedstock will be required to generate biogas at the proposed AD facility, and a biobased fertiliser will be created. It is anticipated that the volume of this biobased fertiliser will be approximately 25,000 tonnes per annum, approximately 28% of the total volume of feedstock accepted at the facility. The biobased fertiliser can be in liquid form or fibre form and will be used on agricultural lands as a direct replacement for chemical/mineral fertilisers.

The biogas collected from the digesters will be passed through a biogas upgrading unit. This includes scrubbing and drying of the biogas for the production of a high-quality biomethane (CH_4) to supply the national gas network and renewable carbon dioxide (CO_2).

A detailed description of the Proposed Development is provided in **Chapter 2 – Project Description** of the Environmental Impact Assessment Report (EIAR).

Figure 12.4: Proposed Site Layout. Cropped.

12.4.4 Site Access

The site access is located around 100m off the N73 National Road and vehicles travelling between the proposed site access and the N73 will make use of the L90813 local road. Vehicular access to the site is through a new proposed priority T-junction off the L90813 to the west of the site. 1No. passing bay will be created along this road stretch, from the junction off the N73 and northwards up to the site access, to facilitate the simultaneous passage of two large vehicles. 16No. car parking bays are provided to the northwest of the office area, while two circulation areas (concrete apron) close to the digestate storage and to the north of the reception hall will be used for articulated lorry turning and reversing. An internal asphalt road that will provide access to the Energy Hub to the southeast.

Figure 12.5 shows the proposed access junction layout off the L90813 road (site entrance).

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.

The proposed site access road is a single lane carriageway, 8m wide. The Swept Path analysis for the site is shown on drawing Ref. **24055-DR-0504**.

Figure 12.5: Proposed Access Junction to the Site. Cropped

12.4.5 Car Parking

There is no parking guidance set out in the Cork County Development Plan for this specific type of development. The client has put forward peak staffing figures and parking provision has been assigned based on the specific needs of the development.

The site will have between 3No. to 5No. staff members on site at the same time. The number of parking spaces provided for staff and visitors of the development is 16No. spaces, located adjacent to the office building, with 1No. accessible parking space and 3No. dedicated EV charging points. The parking spaces provided are considered sufficient for the expected levels of traffic associated with the site.

The guidance stated in the development plan regarding accessible parking is that spaces shall be provided at a ratio of 5% of the parking numbers in new developments. The number of disabled parking spaces represents 6% of the spaces within this development, therefore, the requirements are met within the proposal.

Moreover, regarding electric vehicles, the document specifies in Objective TM 12-12 that for *non-residential development with more than 10 parking spaces, or applications for substantial renovation of a building with more than 10 associated parking spaces, are to provide for the installation of at least one EV recharging point* (or as required by national policy should such requirement specify a higher provision).

The Proposed Development aims to install 3No. EV charging points, in order to promote sustainable transportation. Therefore, the proposed parking arrangement adheres to the

guidelines outlined in the County Cork Development Plan, ensuring compliance with electric vehicle charging standards.

12.4.6 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 N73 and no dedicated means of accessing the site by bicycle other than by the proposed access point off the L90813.

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

12.4.7 Existing Road Network

The Proposed Development plans include providing vehicular access from L90813 to the west of the site. This access will primarily be via the National Road N73, located south of the site, and will utilise the L90813/N73 junction. This T-junction is a 3-arm priority junction and the traffic associated with the site is expected to use this junction for both arrivals and departures.

The L90813 is a single lane carriageway of approximately 4m wide that gains access to the N73 National Road to the south, with an increasing width towards the priority junction formed by the L90813 and the N73. At this junction, the road lacks road markings, which are essential for guiding vehicle drivers effectively. Currently, only a 'STOP' sign is present, which may not provide sufficient guidance for vehicles travelling down the local road. The alignment of the L90813 road in the area surrounding the application site is relatively straight, with only minor curves.

Additionally, the L90813 road does not feature footpaths or cycle lanes along either side of the carriageway. Furthermore, there are no streetlights installed in the vicinity of the application site.

The subject site is located adjacent to the N73, a key route within the national road network. This two-way single carriageway, approximately 13 metres wide along the site's frontage, runs to the south of the site. The road features a dedicated right-turn lane for the L90813 and a left-turn lane for the nearby L5637 road. Additionally, it includes a hatched median and directional arrow road markings, serving as a vital link between the M8 near Carrigane to the east and Mitchelstown to the west. The posted speed limit on the N73 is 100 km/h.

There are no footpaths or cycle lanes provided along the N73 road, in the vicinity of the site access.

For visual details, please refer to **Figures 12.6** to **12.9** below.

Figure 12.6: Overview of the Road Network in the Vicinity of the Development

Figure 12.7: View of the L90813 in the Vicinity of the Proposed Site Access (Source: ORS)

Figure 12.8: View of the L90813 at the junction with the N73 (Source: ORS)

Figure 12.9: View of the N73/L90813 Junction (Source: ORS)

12.4.8 Proposed Road Network Improvements

At present, Cork City and County Council have no road improvement schemes on the N73 or the L90813 that would affect the Proposed Development.

12.4.9 Existing Traffic Flows

Manual junction turning counts (JTC) have been undertaken at the junction on Thursday 30th May 2024 by ORS team members. The traffic counts were carried out during a 3-hour period from 08:00-9:30 AM and from 17:00-18:30 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 of traffic: pedal cycles, cars, buses, LGVs and HGVs. The final number of traffic is presented in Passenger Car Unit (PCU). PCU is the impact that a mode of transport has on traffic compared to a single car, e.g., a private car represents 1 PCU whereas an HGV represents 2.3 PCUs.

From the data obtained, it could be observed that, there were 598 PCUs recorded during the AM peak hour and 631 PCUs during the PM peak.

The traffic counts show that more than half of the vehicles on the N73 Mallow-Dublin Road travel northeast towards Carrigane, with 58% in the morning and 52% in the evening. In contrast, very few vehicles use the N73 to access the L90813, accounting for less than 1% of traffic during both the AM and PM periods.

Nearly all traffic exiting the L90813 and entering the N73 turns left towards the northeast during the AM peak. However, in the PM period, this pattern shifts, with 40% of vehicles turning left and 60% turning right towards Mitchelstown.

Table 12.1 summarises the AM and PM peak traffic flows.

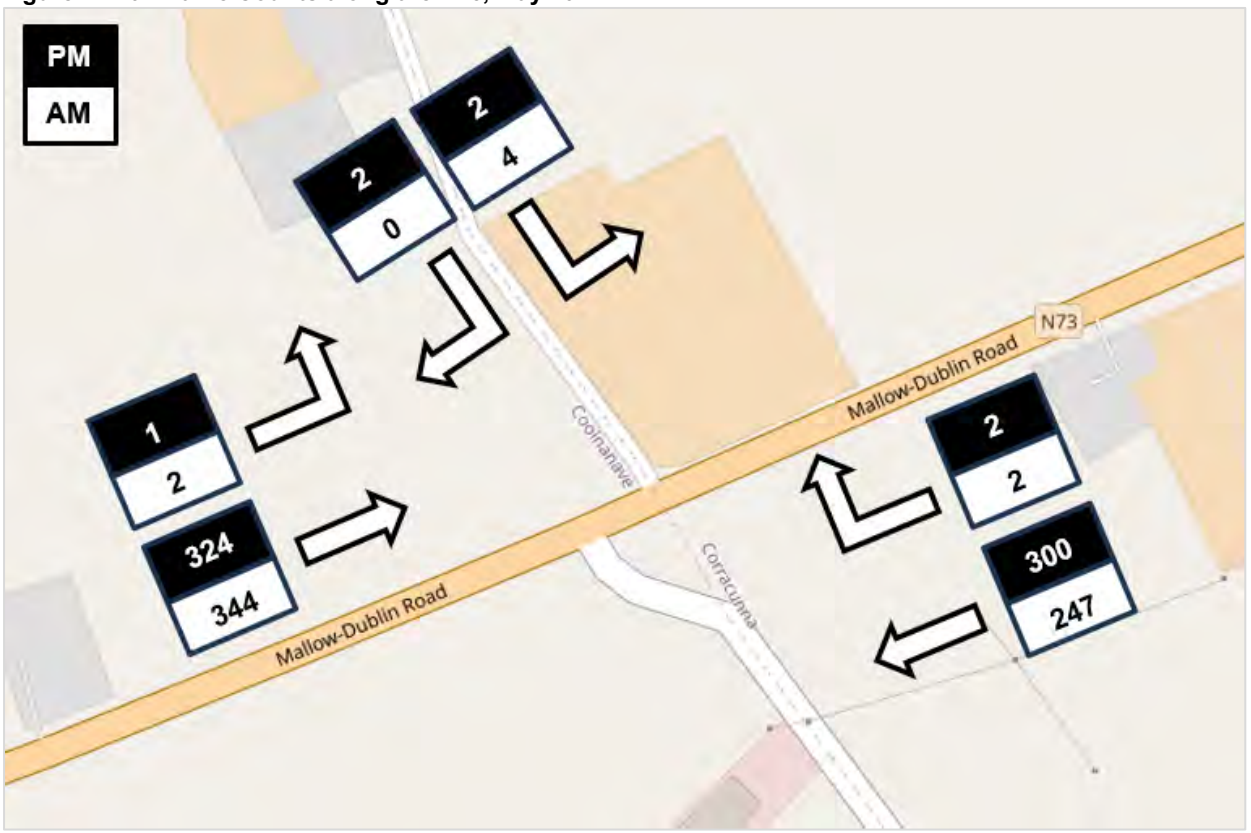
HGV movements along the N73 accounted for 16% of the eastbound traffic during the morning peak, with the same percentage observed for westbound traffic. In the evening period, HGVs made up 11% of eastbound traffic and 7% of westbound traffic. These figures highlight the significant presence of heavy goods vehicles on this route, particularly during morning hours.

Table 12.1: May 2024 Traffic Counts

Junction	AM Peak (PCU)	PM Peak (PCU)
1 – N73/L90813 Junction	598	631

Figure 12.10 below shows the recorded traffic flows during the morning and evening period along the N73 National Road.

Figure 12.10: Traffic Counts along the N73, May 2024



Based on the TII Publication Project Appraisal Guidelines for National Roads Unit 16.1 – Expansion Factors for Short Period Traffic Counts, the Annual Average Daily Traffic (AADT) could be calculated using the traffic counts obtained at the existing junction. The AADT is accounted to be 7,440 vehicles/day along the N73 ang the junction with the L90813, in the vicinity of the site. The morning and evening peak periods correspond to *ca*. 19% of the traffic along the road.

12.4.10 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 Cork County Council planning website was consulted to include all committed developments in the area.

As per the records available on the Cork County Council planning website, there is an application to northwest (PA 23/4963) that was granted permission on the 9th of April 2024, and one application to the northeast of the site (PA 19/6089) that was granted permission by An Bord Pleanála on the 21st of December 2020, that will utilise the road network in the vicinity of the Proposed Development.

Planning application with Ref. No. 23/4963 consists of the construction of 1 No. business unit of 819sq.m. with external hard standing for storage of materials, 4 No. business units of 294/5sq.m. and 56 No. surface car parking spaces. Planning application with Ref. No. 19/6089

consists of the construction of a Central Gas Injection Facility within a site area of *ca*. 1.8ha and 1No. new site entrance from the N73 road. Information on traffic generation for both developments was found on the documents available on the planning application public folder.

12.4.11 Future Year Traffic Growth

Transport Infrastructure Ireland (TII) issues a range of forecasts: low growth, central growth and high growth. The implementation of policies relating to the National Sustainable Mobility Policy will act as a deterrent to high growth in car-based travel. Low growth factors are however likely to be equally unrealistic at present, therefore, this assessment has used central growth factors, which was extracted from the TII Publication PE-PAG-02017 Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections, published in October 2021, outlined in **Tables 12.2** to **12.4** below.

The data used is for County Cork from 2016 to 2050 and is for Light Goods Vehicles (LGVs) and Heavy Goods Vehicles (HGVs).

Table 12.2: Development Location Information

Development Location Information	
Location of Development	Cork
Sensitivity Area	Central
Year of Traffic Counts	2024
Year of Assessment	2024
Year of Development Construction	2026

Table 12.3: TII Annual Growth Rates (Central Growth) For Co. Cork

TII Annual Growth Rates (Central Growth) For Co. Cork		
	LGV	**HGV**
2016 – 2030	1.0189	1.0377
2030 – 2040	1.0087	1.0160
2040 – 2050	1.0078	1.0200

Table 12.4: Growth Factors for Future Design Years

Growth Factors for Future Design Years				
	Counts	**Opening**	**Opening +5**	**Opening +15**
Year	2024	2026	2031	2041
LGV	1.000	1.038	1.129	1.230
HGV	1.000	1.077	1.269	1.493

The traffic growth factors presented above have been used to predict the increase in the background traffic that will occur in future design years. The Proposed Development is expected to be fully constructed and operational in 2026.

Table 12.5 shows the predicted traffic flows along the site access for the year of the development conclusion, 5-year, 10-year and 15-year after the development conclusion.

Table 12.5: Traffic Flows in Future Design Years without the inclusion of committed developments (PCUs)

Design Year		N73 Towards Mitchelstown	N73 Towards Carrigane	L90813 towards the N73	Total Movements
2024	AM	247	348	3	598
	PM	302	326	3	631
2026	AM	256	361	3	621
	PM	314	338	3	655
2031	AM	279	393	3	675
	PM	341	368	3	712
2041	AM	304	428	4	735
	PM	372	401	4	776

12.5 Likely Significant Effects

12.5.1 Construction Phase

During the construction phase, deliveries and construction personnel will access the site on a daily basis. The arrivals and departures are expected to be spread out throughout the day; however, it is expected that they will be arranged in a manner to avoid traffic peak hours in the surrounding road network.

The construction will operate within Cork County Council's recommended hours, which are from 08:00 to 18:00 from Monday to Friday and between 08:00 to 14:00 on Saturdays. No works shall be carried out on Sundays and public holidays or outside the aforementioned hours. Construction traffic associated with the Proposed Development will include:

- Construction personnel accessing the site by private vehicles and vans
- 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 8No. to 10No. construction personnel to be at the site at the same time and the deliveries to be arranged during off-peak hours.

Haul routes for construction traffic are to be agreed upon with Cork County Council during the preparation of the Construction Traffic Management Plan (CTMP).

Table 12.6 below shows the expected generated traffic during construction phase.

Table 12.6: Expected Traffic During Construction Phase

Construction Traffic			
Time Range	**Arrivals**	**Departures**	**Total**
08:00-09:00	10	0	**10**

17:00-18:00	0	10	**10**

12.5.2 Operational Phase

The operation of an Anaerobic Digestion Facility involves producing renewable biogas through the decomposition of organic feedstock. The site will be operational 24 hours a day for 7 days a week with staff onsite during normal working hours from 6 AM to 8 PM. Outside of these hours, the process is monitored remotely. There are no shifts, and it is expected that between 3 and 5 staff members will be present at the premises during normal working hours. The Proposed 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'.

The solid materials will arrive at the site by HGV/Walking Floor and the liquid form feedstock will arrive in bulk tankers. The average tonnes per load are assumed to be 30 tonnes. It is expected that traffic will be spread out throughout the day in order to minimise traffic issues in the road network. **Table 12.7** shows the expected feedstock accepted in the facility.

Table 12.7: Feedstock Intake Data

Feedstock in	Tonnes/year (312 days)	Tonnes/day	Average Load (T)	HGV-Tanker/day	Route	Total in/out Movements
Cattle Slurry	7,580	24	30	1	From N73	2
Cattle Manure	1,197	4		1	From N73	2
Pig Slurry *	11,570	37		2*	Locally*	4*
Poultry Litter	16,225	52		2	From N73, West	4
Food Production Residues	6,782	22		1	From N73, East	2
Drinks Production Residues	14,762	56		2	From N73, West	4
Dairy Production Residues	9,309	30		1	From N73, West	2
Grass Silage	3,823	12		1	From N73	2
Whole Crop Silage	18,752	60		3	From N73, East	6
Subtotal	**90,000**	**288**		**14**		**28**
On public Road				**12**		**24**

*It is important to note that the pig slurry will be transported off the neighbouring piggery, eliminating traffic movements from public roads.

The feedstock will go through a digestion process and will produce a product named 'biobased fertiliser', which will be in form of fibre and liquid. Biobased fertiliser will be supplied for use on agricultural lands as a direct replacement for chemical/mineral fertilisers. It is proposed to provide biobased fertiliser to agricultural operators in the locality, particularly those who are providing crop-based feedstocks, thereby promoting a local circular bioeconomy.

Biobased fertiliser can be land spread during the spring, summer, and early autumn, but cannot be spread during the land spreading close period. During this winter period, will be stored on site. The number of transport movements will, therefore, generally remain the same throughout

the year and reduce slightly during October-January.

Table 12.8 shows the expected tonnes of biobased fertiliser produced by the facility.

Table 12.8: Biobased Fertiliser Transport Data

Product	Tonnes/year	Tonnes/day (312 days)	Average Load (T)	HGV/Trailer/day	Total in/out Movements
Digestate Liquid Concentrate	17,000	55	30	1.83	4
Digestate Fibre	8,000	26		0.87	2
Subtotal	**25,000**	**71**		**2.70**	**6 (5.40)**

It is important to note that part of the outgoing trips will not occur on public roads, meaning that output traffic will be partially kept away from the N73 National Road. One additional trip per day will be necessary for the export of CO_2. Annually, 10,000 tonnes will be transported, equating to approximately 500 loads per year at an average weight of 20 tonnes per load. This will result in one outbound and one inbound HGV/tanker trip per day, as detailed in **Table 12.9**.

Table 12.9: CO_2 Export

Product	Tonnes/year	Tonnes/day (312 days)	Average Load (T)	HGV/Trailer/day	Total in/out Movements
CO_2	**10,000**	32	20	1.07	**2**

As already mentioned, the Proposed Development will employ approximately 5No. full time staff to operate the Anaerobic Digestion Facility. The traffic generated by the staff will consist of 5No. daily incoming trips and 5No. daily outgoing journeys.

Table 12.10 contains the trip generation associated with staff.

Table 12.10: Staff Traffic Generation

	AM	PM
Arrivals	5	0
Departure	0	5
Total staff movements	**5**	**5**

Table 12.11 summarises the expected traffic volumes and volumes of material generated by the feedstock input to the Proposed Development and the export of biobased fertiliser. The anticipated total traffic flows in and out of the site amount to an **average of 21No. vehicles** per day (42No. trips in and out in total), including approximately 16No. HGVs/Walking Floor/Tankers per day associated with the input of material and the export of biobased fertiliser.

These estimates are based on the maximum amount of organic feedstock the development can process, the maximum amount of biobased fertiliser removal from the Proposed Development, and the predicted staffing levels required to operate the facility.

Table 12.11: Total Movements In and Out of the Site on National Roads

	HGV/Walking Floor/Tankers/day	HGV/Walking Floor/Tankers/day in/out	Staff (in/out)	Total in/out Movements

Total Movements	16	32	5 (10)	42

The site will be operational 24 hours a day, 7 days a week, however, delivery of feedstock and export of fertiliser will be limited to occur only between 07:00 and 19:00 Monday to Friday and 07:00 to 16:00 on Saturday. As can be noted from the traffic generation profile shown above, there is no particular peak of traffic generated by the development, save for the times when staff arrive and depart from work. However, it has been assumed that in a worst-case scenario the projected delivery and export of material will take place during morning and evening peak hours, with an even spread of traffic for both periods.

Table 12.12 illustrates the expected AM and PM traffic flows associated with the Development.

Table 12.12: Expected AM and PM Traffic Flows

	Arrivals	Departures	Total
AM	14	9	23
PM	7	12	19
Average movements			**42**

In summary, 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 4% of the N73 capacity, in the vicinity of the site. The figures derived from the first principles analysis are very robust, as a 'worst case scenario', the total daily trips expected from the development are 42.

Regarding the HGV numbers generated from the site, of the 42No. trips associated with the site, 32No. will be composed of heavy vehicles. Traffic counts reveal that during the morning peak, 16% of the traffic on the N73 consisted of HGVs, with no heavy vehicles turning onto L90813. 25% of the traffic exiting from the L90813 onto the N73 eastbound was composed of heavy vehicles. During the PM peak, an average 9% of the traffic on the N73 consisted of HGV traffic turned from the N73 onto L90813.

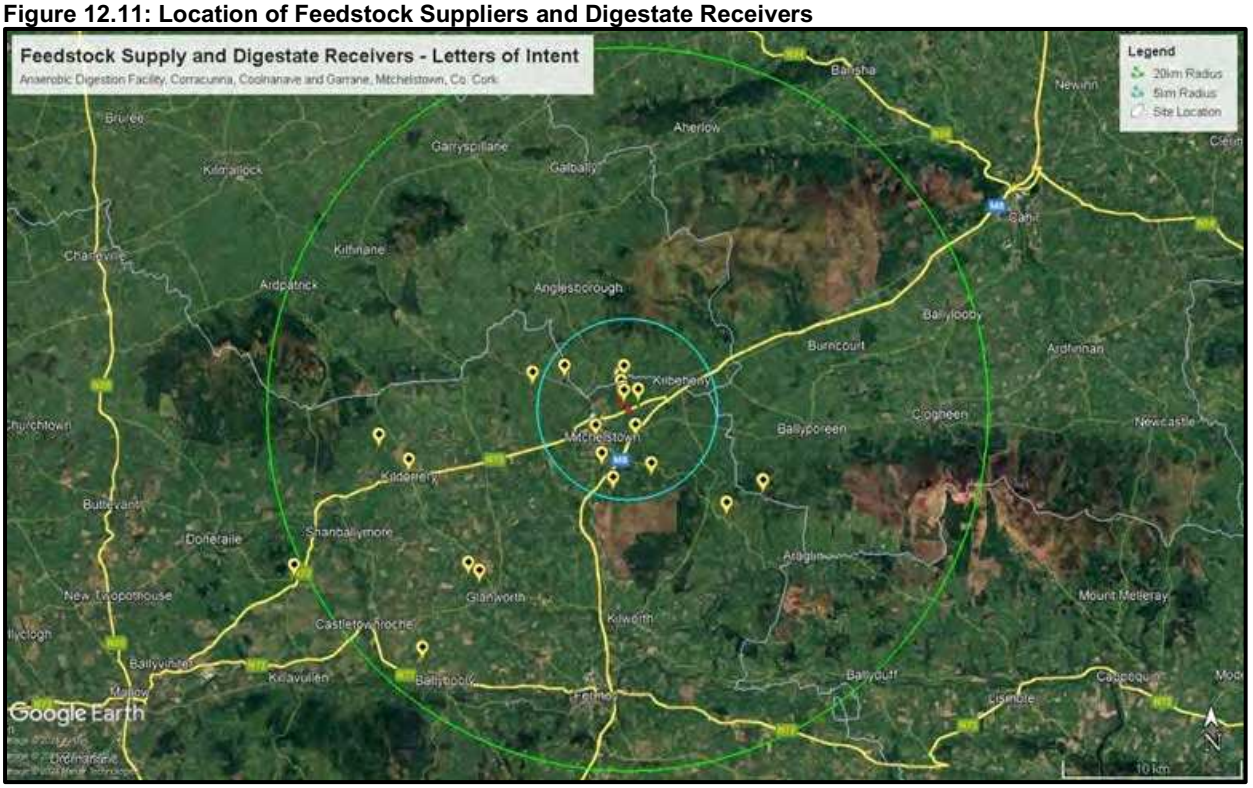
Consequently, the additional HGV movements from the site are projected to increase HGV volumes on the N73 by *ca*. 2%.

Traffic Distribution

The agricultural manures, slurries and crop-based feedstocks will be sourced from 23 agricultural operators in the area in the vicinity of the site. The geographical spread of feedstock suppliers is shown in **Figure 12.11**, with 100% (23) of these sources located within a 20km radius of the site.

As can be seen from the map, the deliveries to and from the site will travel through the extensive road network in the vicinity of the site, composed of the Motorway M8, the National Road N73, the Regional Roads R512, R513, R517, R639 and R6665 and the local roads L1406, L1408, L1409, L1413, L5635, L5637 and L90813. The roads are suitable to cater for the expected traffic volumes associated with the site.

Figure 12.11: Location of Feedstock Suppliers and Digestate Receivers



Traffic Impact Assessment

The Cork County Council Development Plan 2022 – 2028 requires that Traffic and Transport Assessments (TTA) shall be carried out on all proposed major developments with significant potential to generate traffic or which could create a significant hazard or safety performance impact on a major road. The TTA shall be prepared in accordance with the 'Traffic Management Guidelines' and the 'Design Manual for Urban Roads and Streets' (DMURS).

The document states thresholds to be used as guidance when preparing a TTA, which are in accordance with the TII publication PE-PDV-02045 'Traffic and Transport Assessment Guidelines, published in May 2014.

During the operational phase, the site is projected to generate a total of 42No. vehicle trips per day. In a worst-case scenario, these trips are expected to distribute almost evenly between the AM and PM peak periods, with *ca*. 23No. vehicles during the morning peak, and *ca*. 19No. out of the 42No, during the evening peak. This results in a 4% increase in overall traffic flow during the AM peak and a 3% increase during the PM peak—both of which will not exceed the 10% threshold typically necessitating a Traffic and Transport Assessment (TTA).

The results of the TTA assessment are summarised in **Table 12.13**.

Table 12.13: Traffic Management Guidelines Thresholds for Transport Assessments (TII)

Applicable	Threshold for transport Assessment
No	Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road.
N/A	Traffic to and from the development exceeds 5% of the traffic flow on the adjoining road where congestion exists, or the location is sensitive
N/A	Residential development in excess of 200 dwellings
N/A	Office, education and hospital development in excess of 2,500m^2
N/A	Retail and leisure development in excess of 1,000m^2
N/A	Industrial development in excess of 5,000m^2
N/A	Distribution and warehousing in excess of 10,000m^2

Based on the traffic levels anticipated at the under-evaluation junction, the impact the operational phase of the proposed anaerobic digestion biogas plant will have on the road network could be calculated, as shown in **Table 12.14**. As can be seen, the Proposed Development will generate approximately 23No. trips in the morning and approximately 19No. trips in the evening period, which is accounted to represent an increase of a maximum of 4% in the expected traffic flows in the road network in 2026, the assumed year of the development conclusion.

Table 12.14: Traffic Impact on the Neighbouring Junctions

Junction	2026 Projected Traffic plus committed developments		Traffic from Development to junction		Increase in Traffic		Threshold of 10% Increase	
	AM	PM	AM	PM	AM	PM	AM	PM
N73/L90813 Junction	567	636	23	19	4%	3%	Below	Below

Consequently, the traffic generated by the Proposed Development does not meet the criteria for producing a full Traffic and Transport Assessment, as it will only add up to 23No. additional trips to the wider road network during the morning peak - a 4% increase, driven primarily by the area's relatively 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.

Table 12.15 overleaf shows the anticipated average increase in HGV movements resulting from the operations of the Proposed Development.

Table 12.15: Impact the Proposed Development will have at the N73/L90813 Junction

	Do-nothing		Do-something	
Assessment Year	**HGV % ***	**Total Traffic (Vehicles)**	**HGV % ***	**Total Traffic (Vehicles)**

	AM	PM	AM	PM	AM	PM	AM	PM
2026, year of development conclusion	16.8%	8.9%	509	584	19.1%	11%	567	636
2031, 5 years after conclusion	18.1%	9.7%	546	622	20.2%	11.6%	604	674
2041, 15 years after conclusion	20%	10.8%	575	647	21.8%	12.6%	633	699

Assessment of the N73/ L90813 Junction

Traffic simulation was undertaken at the proposed junction in order to obtain the Ratio of Flow to Capacity (RFC) and the queue levels to determine if the existing junction will cater for the predicted level of traffic by the AD development when it becomes operational.

The Ratio of Flow to Capacity (RFC) describes the capacity of each approach to the junction and determines if the junction will cater for the predicted level of traffic. An RFC below 0.85 (85%) implies that an approach road is operating satisfactorily well within capacity; between 0.85 to 1.0 RFC means the approach operates well within capacity but at less optimal efficiency; and an RFC above 1.0 means that demand and capacity are equal and no further traffic can progress through the junction.

The queue levels are presented in Passenger Car Unit (PCU) and quantify the total number of vehicles queueing on each arm.

Central Sensitivity traffic growth rates for Co. Cork, specified in the TII's Publication PE-PAG-02017 of October 2021, were applied to the existing background traffic and were not applied to the Proposed Development, as the development is limited by size.

The capacity assessments were modelled for three different scenarios:

- Base-year: 2024 traffic flows modelled according to traffic counts obtained in May 2024
- Do-nothing: modelled without the intervention of the Proposed Development. For this analysis, the traffic counts were factored up using TII's Central Growth Factor for the design years 2026, 2031 and 2041, the year of development conclusion, 5 and 15 years after conclusion, respectively
- Do-something: the impact of the traffic generated by the Proposed Development was added to the design years 2026, 2031 and 2041. This analysis will enable the comparison with the 'Do-nothing' scenario.

The junction was modelled using the TII approved TRL Software *PICADY* for priority junctions for the base year, the proposed year of development conclusion, 5 and 15 years after the development is fully concluded. The results are shown in **Table 12.16**.

Table 12.16: *PICADY* Results for Piquet's Crossroad Junction

		AM		PM	
Analysis	**Stream**	**Queue (PCU)**	**Ratio of Flow to Capacity (RFC)**	**Queue (PCU)**	**Ratio of Flow to Capacity (RFC)**
1 – 2024, base year	B-AC	0	0.00	0	0.00
	C-AB	0	0.00	0	0.00
2 – 2026, do-nothing	B-AC	0	0.00	0	0.00
	C-AB	0	0.00	0	0.00
3 – 2026, do-something	B-AC	0.1	0.03	0.1	0.04
	C-AB	0	0.02	0	0.01
4 – 2031, do-nothing	B-AC	0	0.00	0	0.00
	C-AB	0	0.00	0	0.01
5 – 2031, do-something	B-AC	0.1	0.03	0.1	0.04
	C-AB	0	0.02	0	0.01
6 – 2041, do-nothing	B-AC	0	0.00	0	0.00
	C-AB	0	0.01	0	0.01
7 – 2041, do-something	B-AC	0.1	0.03	0.1	0.04
	C-AB	0	0.02	0	0.02

As can be seen from **Table 12.16**, the Proposed Development will have a negligible effect on the assessed junction, with a maximum Ratio of Flow to Capacity (RFC) of 0.4 (4%) in stream B (L90813) to AC (N73 northeast and southwest) in the morning peak, which is well below the theoretical capacity of 0.85 RFC.

Therefore, it can be considered that the junction will function comfortably below capacity for all design years with the inclusion of the Proposed Development.

12.6 Mitigation Measures

This section will outline the proposed mitigation measures to reduce, minimise or eliminate the impact generated by the Proposed Development.

12.6.1 Construction

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.

12.6.2 Operation

The operational phase of the development will generate a maximum of 42No. vehicle movements day, where 32No. are HGVs and 10No. are private vehicles and vans. The additional vehicles will represent a maximum of 4% increase in traffic and will not generate increased queues and delays along the road network in the vicinity of the site, therefore, no mitigation measures are proposed for the operational phase of the development.

12.7 Cumulative Effects

Within the European Commission - Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, dated May 1999, cumulative effects are described as "*impacts that result from incremental changes caused by other development, plans or projects together with the Proposed Development or developments*".

As discussed, the development will result in a relatively low increase in overall traffic flow in and around the proposed facility with an average increase in HGV volumes in the road network of 2%, as indicated in Table **12.15** above. HGV's have a heavy bearing on road networks and inflict the highest damage/ wear to road infrastructure. An increase in HGV's transporting feedstock and digestate through-out the local and regional road network will increase wear and tear on networks not designed to facilitate consistent heavy capacities.

12.8 Residual Impacts

As mentioned in previous sections, the proposed construction and operational phase of the development will generate a minimal impact on the road network in the vicinity of the site. The proposed mitigation measures proposed in **Section 12.6** will also help reduce or eliminate any potential impact associated with the proposal. The proposal, off the L90813 Local Road, close to the N73 National Road, is located in an 100km/h speed limit zone and the narrow road width of the L90813 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 L90813 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.

12.9 Monitoring

The Construction Environmental Management Plan (CEMP) and Environmental Operating Plan (EOP) will include provision for the monitoring of construction and operational related traffic flows.

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12.10 Summary of Significant Effects

This Traffic and Transport Assessment report was conducted to accompany the planning application for the proposed Anaerobic Digestion (AD) facility in the townlands of Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork.

The internal road network has been designed to provide a safe and efficient circulatory system that reduces the potential for conflicting movements within the site. The internal layout will ensure that employee traffic and delivery traffic must be segregated as much as possible. All signage and safety measures possible will be implemented to ensure maximum safety on the site.

The methodology applied in this assessment have been agreed upon with Cork County Council. The existing priority junction that will be utilised for accessing or leaving the site was then subjected to capacity analysis to examine the potential effect the Proposed Development will have on the existing road network. Manual junction turning counts (JTC) were carried out on Thursday 30th May 2024 at the aforementioned junction formed by the N73 National Road, and the L90813, in the vicinity of the proposed site to obtain current traffic levels on the road network. It was observed that a total Annual Average Daily Traffic (AADT) is 7,440 vehicles/day in the vicinity of the site, at the under-assessment T-Junction.

The Proposed Development is expected to generate a maximum of 42No. vehicles a day during the operational phase, associated with the delivery of feedstock, the export of digestate and from private cars, therefore, it will increase to a maximum of 4% of the existing traffic along the N73 during AM and PM peak periods, which is below the threshold set in Cork County Development Plan to produce a detailed Traffic and Transport Assessment (TTA). It also should be noted that this represents a very conservative scenario.

However, since the majority of the traffic associated with the site will be composed of Heavy Goods Vehicles (HGV), the junction was modelled in detail, using the TII approved software *PICADY* (Priority Intersection Capacity and Delay) for the AM and PM peak periods.

It is summarised that the development will have a ***neutral, slight*** and ***long-term effect***.

12.11 Statement of Significance

From a transportation planning perspective, the Proposed Development will not adversely impact the functionality of the N73 National Road and the L90813 Local Road in the vicinity of the proposed site and the junction will function well below capacity for all future design years. There will be no queues or delays formed along both roads due to the Proposed Development, therefore, it can be concluded that the Proposed Development will not result in a detrimental effect on the existing road network in the vicinity of the site.

Where potential effects have been identified, mitigation measures have been provided which if implemented reduce the effect of significance***.*** The mitigation steps are presented in **Section 12.6**.

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

13 Archaeology & Cultural Heritage

13.1 Introduction

Moore Group was commissioned to complete an Archaeological and Cultural Heritage assessment of the potential impact of a proposed biogas facility at Corracunna, Coolnanave and Garrane, to the northeast of Mitchelstown, Co. Cork.

The total site area measures ca. 5.62ha. The site is partially brownfield and contains a former piggery and disused agricultural buildings. The site is currently used as agricultural pastureland in part and bounded to the north, south, east, and west by further agricultural pastureland. An operational piggery is located ca. 300m to the north.

The site is adjacent to the N73 national road located directly to the south. The L90813 local road is located immediately to the west and provides access to the site.

There are no monuments recorded by the National Monuments Service within the boundary of the subject site. The nearest monument, a moated site (CO010-053----) is located *ca*. 700m to the northwest of the site. There are two roadside memorials at the southwest of the subject site. There are no other features of cultural heritage significance in the vicinity.

13.2 Scope of Work

This study aims to assess, as far as reasonably possible from existing records, the archaeological and cultural heritage environment (hereafter referred to as cultural heritage environment or cultural heritage resource), to evaluate the potential or likely impacts that the Proposed Development will have on this environment and, where appropriate, to suggest mitigation measures to ameliorate potential impacts, in accordance with the policies of:

- Department of Housing, Local Government and Heritage.
- The National Monuments Acts (1930-2005).
- Cork County Development Plan 2022 – 2028.
- Best practice guidelines.

Following on from this, the residual impact that the proposed scheme will have on the baseline environment is identified and evaluated.

13.3 Terms & Definitions

13.3.1 Cultural Heritage

The phrase ‘cultural heritage’ is a generic term used to identify a multitude of cultural, archaeological, and architectural sites and monuments. The term ‘cultural heritage’, in Environmental Impact Statement compliance with Section 2(1) of the Heritage Act (1995), is used throughout this report in relation to archaeological objects, features, monuments and landscapes as well as all structures and buildings which are considered to have historical, archaeological, artistic, engineering, scientific, social, or technical significance/merit. For the purposes of this report the definition of “cultural heritage” is taken broadly from the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972, which considers the following to be “cultural heritage”:

- Tangible cultural heritage.
- Movable cultural heritage (artefacts).
- Immovable cultural heritage (monuments, archaeological sites, etc).
- Underwater cultural heritage (shipwrecks, underwater ruins, and cities); and
- Intangible cultural heritage (oral traditions, folklore etc).

Cultural heritage comprises archaeology, architectural heritage, folklore, and history. Archaeology is the study of past societies through surviving structures, artefacts, and environmental data, and is concerned with known archaeological sites and monuments, areas of archaeological potential and underwater archaeology.

Architectural heritage comprises structures, buildings, traditional and designed, and groups of buildings including streetscapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social, or technical interest, together with their setting, attendant grounds, fixtures, fittings, and contents.

Architectural heritage and archaeology together form ‘built heritage’ or ‘tangible heritage’. Folklore and history are aspects of ‘intangible heritage’, which also includes language, musical traditions, traditional crafts and skills, townland names, poetry and so on. These forms of cultural heritage are “non-moveable, non-material and largely non environmental although by their associations with certain sites and places, add to the character of an area”.

13.3.2 World Heritage Sites

Although not formally recognised in Irish legislation, impacts on World Heritage Sites will nonetheless be a material consideration for developments in their wider vicinity. To be included on the World Heritage List, sites must be of outstanding universal value and meet at least one out of ten selection criteria.

A World Heritage Site is a landmark or area with legal protection by an international convention administered by the United Nations Educational, Scientific and Cultural Organization (UNESCO). World Heritage Sites are designated by UNESCO for having cultural, historical, scientific, or other form of significance. The sites are judged to contain "cultural and natural heritage around the world considered to be of outstanding value to humanity".

13.3.3 National Monuments

On a national level, the highest degree of protection granted to archaeological monuments are those afforded National Monument status, which are protected under the National Monuments Act of 1930 and its various amendments. These are the pre-eminent archaeological sites in Ireland and fall into several categories including:

- Sites that are in the ownership or guardianship of the state.
- Monuments that are the subject of Preservation Orders.
- Monuments in the ownership of a local authority; and
- Walled towns.

Generally National Monuments in state care are numbered amongst the best preserved and most impressive monuments in the country.

13.3.4 Record of Monuments and Places/Archaeological Survey Database

The legislation that affords protection to the archaeology of Ireland has seen several amendments since the first National Monuments Act of 1930 and there is a legacy of several different registers and associated terminology.

A feature recorded in the 'Record of Monuments and Places' (RMP) refers to a recorded archaeological site that is granted statutory protection under the National Monuments Act 1930-2004. The RMP is the most widely applying provision of the National Monuments Acts. It comprises a list of recorded monuments and places (resulting from the Archaeological Survey of Ireland [ASI]) and accompanying maps on which such monuments and places are shown for each county. The information contained within the RMP is derived from the earlier non-statutory Sites and Monuments Record (SMR). However, some entries were not transferred to the statutory record as they refer to features that on inspection by the Archaeological Survey were found not to merit inclusion in that record or could not be located with sufficient accuracy to be included. Such sites however remain part of the SMR. The record is a dynamic one and is updated to take account of on-going research.

The most up-to-date record of archaeological monuments, the Archaeological Survey Database (ASD), is available for viewing and download on the www.archaeology.ie website. This record is continually revised and indicates several additional sites that do not feature in the RMP. The National Monuments Service also makes available SMR Zones of Notification on the website.

13.3.5 Sites and Monuments Record

The Sites and Monuments Record (SMR) is an inventory of the known archaeological monuments in the State. There are more than 150,800 records in the database and over 138,800 of these relate to archaeological monuments.

An 'area of archaeological potential' refers to an area of ground that is deemed to constitute one where archaeological sites, features or objects may be present in consequence of location, association with identified/recorded archaeological sites and/or identifiable characteristics.

13.3.6 Register of Historic Monuments

Section 5 of the 1987 National Monuments Act states that the Minister is required to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded in the Register without the permission of the Minister is illegal, and two months' notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. This list was largely replaced by the Record of Monuments and Places following the 1994 Amendment Act. No registered Historic Monuments were identified.

13.3.7 Architectural Conservation Areas

The Planning and Development Act 2000, as amended, provides that all Development Plans must now include objectives for preserving the character of Architectural Conservation Areas (ACAs). An ACA is a place, area, group of structures or townscape of special architectural, historical, archaeological, artistic, cultural, scientific, social, or technical interest, or which contribute to the appreciation of protected structures.

In these areas, the protection of the architectural heritage is best achieved by controlling and guiding change on a wider scale than the individual structure, to retain the overall architectural or historic character of an area.

13.3.8 Record of Protected Structures/National Inventory of Architectural Heritage

The importance of our built heritage is enshrined in the Planning and Development Act, 2000 (Part II, Section 10) which places a statutory obligation on local authorities to include in their Development Plans objectives for the protection of structures, or parts of structures, which are of special interest. The principal mechanism for the protection of these structures is through their inclusion on the Record of Protected Structures (RPS). This list provides recognition of the importance of a structure, protection from adverse impacts and potential access to grant aid for conservation works.

The record of Protected Structures is an ongoing process and can be reviewed and added to. In considering additions to the Record of Protected Structures local authorities have recourse to the National Inventory of Architectural Heritage (NIAH) which provides a source of guidance on the significance of buildings in their respective areas.

13.3.9 Designed Landscapes-Demesnes, Historic Gardens & Country Estates

The Architectural Section of the DHLGH is in the process of a multi-phase study looking at Designed Landscapes and Historic Gardens that appear as shaded areas on the First Edition Ordnance Survey Maps, circa. 1830.

The objective of this survey is to begin a process of understanding of the extent of Ireland's historic gardens and designed landscape. Sites were identified using the 1st edition Ordnance Survey maps. These were compared with current aerial photography to assess the level of survival and change.

13.4 Methodology

13.4.1 Introduction

In this assessment, tangible cultural heritage resources are captured under the relevant sections of archaeology and architectural/built heritage., while non-tangible associations with these sites and the wider study area (i.e., history and folklore) are assessed, where known, in the archaeological and historical background section of this report, with further information presented in relevant sections.

Evaluation of the potential impacts of the Proposed Development upon the archaeological, architectural, and cultural heritage resource is based on a desktop study of written, graphic, photographic, cartographic, and electronic information sources followed by a field survey. Considering, amongst other aspects, the legislative protection afforded to the cultural heritage resource, this report evaluates the archaeological, architectural, cultural, and historical importance of the subject area and examines the potential impacts of the Proposed Development and the effects on that resource.

The methodology used in the preparation of this assessment is broadly based on guidance provided in the National Roads Authority's (NRA) Guidelines for the Assessment of Archaeological Heritage Impacts on National Road Schemes (NRA 2005a), and Guidelines for the Assessment of Architectural Heritage Impacts on National Road Schemes (NRA 2005b) (the 'NRA Guidelines'), the EPA's Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA 2023) and other relevant guidelines.

13.4.2 Desktop Assessment

Known cultural heritage sites were mapped in the Open-Source Geographic Information System (GIS) software QGIS (Version 3.34.1). The following information sources, where relevant, were used for this report:

- UNESCO World Heritage Sites including the tentative list of candidate sites.
- National Monuments, be they in the ownership or guardianship of the State, in the ownership of a local authority or monuments under preservation orders.
- Potential National Monuments in the ownership of a local authority.
- Walled Towns.
- Archaeological Monuments that are the subject of both Preservation Orders and Temporary Preservation Orders.
- The Register of Historic Monuments.
- Archaeological Survey Database (ASD) from www.archaeology.ie (Sites and Monuments Record available through the Historic Environment Viewer).
- Record of Monuments & Places (RMP) for County Cork.
- National Monuments Service (NMS) Sites and Monuments Record (SMR) Zones of Notification.
- Lists contained in the Report of the Commissioners or Church Temporalities of Ireland (1879) which contain lists of Churches, School Houses and Graveyards that were vested in the Representative Church Body and the Burial Boards under The Irish Church Act, 1869. These sites which have the potential to be in the ownership of the Local Authorities were highlighted as potential National Monuments.

Architectural Heritage

- Architectural Conservation Areas from the Cork County Development Plan 2022 – 2028.
- Protected Structures from the Cork County Development Plan 2022 – 2028.
- National Inventory of Architectural Heritage (NIAH) and NIAH Garden Survey, and
- Designed Landscapes indicated on the OSI First Edition Mapping.

The Cork County Development Plan 2022 – 2028 was reviewed to obtain a comprehensive understanding of the cultural heritage of the area. The development plan contains lists of cultural heritage sites including national monuments, recorded monuments, architectural conservation areas, protected structures, and protected views as well as baseline assessments of the landscape character of the county.

The plans also outline the county's heritage policies and objectives that aim to protect and promote the archaeological, architectural, and cultural heritage of the region. This evaluation was carried out with due regard to these policies and other relevant information contained within the plans.

To assess the potential impact of the proposed works the following sources were also consulted or reviewed:

- **Excavations Bulletin**: The Excavation Bulletin is both a published directory and an online database that provides summary accounts of all the excavations carried out in Ireland and Northern Ireland from 1970 to 2012. The database gives access to over 15,000 reports and can be browsed or searched using multiple fields, including Year, County, Site Name, Site Type, Grid Reference, Licence No., Sites and Monuments Record No. and Author.
- **Topographical files of the National Museum of Ireland:** The topographical files of the NMI identify all recorded finds held in the NMI archive that have been donated to the state in accordance with national monuments legislation. The files sometimes include reports on excavations undertaken by NMI archaeologists in the early 20th century. Valuable information that can be gleaned might include the exact location, ground type, depth below ground level and condition when found, of each find. However, the amount and the usefulness of the information available on each find can vary considerably. The topographical files are listed by county and townland and/or street name.
- **Cartographic Sources:** Analysis of historic mapping shows how the landscape has changed over time. The comparison of editions of historic maps can show how some landscape features have been created, altered, or removed over a period. Sometimes features that appear on these early maps are found to be of potential archaeological significance during fieldwork.
- **Toponyms:** Townland names are a rich source of information for the land use, history, archaeology, and folklore of an area. The placename can have a variety of language origins such as, Irish, Viking, Anglo-Norman and English. The names can provide information on families, topographical features, and historical incidents. In terms of the built environment many names reference churches, fords, castles, raths, graveyards, roads and passes etc. In compiling the following data, several resources were consulted including the Placenames Database of Ireland www.logainm.ie and Irish Names of Places by P.W. Joyce (Joyce, 1913). The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions. However, the term townland was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to

the modern word ‘town’ but like the Irish word *baile* refers to a place. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully ‘laid downe’ on paper at a scale of forty perches to one inch.

- **Aerial photographs**: The usefulness of aerial photography is that it allows for a different perspective - ‘the distant view’. Archaeological sites may show up on the ground surface, depending on their state of preservation, by light and shadow contrasts (shadow marks), tonal differences in the soil (soil marks) or differences in height and colour of the cultivated cereal (crop marks). It is also a useful aid in pinpointing existing features and can assist in ascertaining their extent and degree of preservation.
- **Lidar:** The Geological Survey Ireland Open Topographic Data Viewer was consulted for available 1m/2m DTM Lidar data of the PDA .
- **Published archaeological inventories**; and
- **Documentary Sources:** several literary references were consulted.

13.4.3 Field Inspection

In addition to documentary and archival research and analysis, a detailed surface-based inspection of the area of the Planned Development Area (PDA) was undertaken by the author. This involved uploading GIS mapping with cultural heritage constraints onto a mobile device and visiting selected accessible monuments to appraise the possible effects that the Proposed Development would have on the receiving archaeological, architectural, and cultural heritage environment as well as to determine sites’ current extent and condition. Field inspection is necessary to determine the extent and nature of archaeological, architectural, and historical remains and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information.

13.5 Difficulties Encountered

No difficulties were encountered during the completion of this assessment. The assessment is based upon currently available information at the time of writing.

13.6 Description of Project

The Applicant, Nephin Renewable Gas - Corracunna Limited, proposes to develop an Anaerobic Digestion Facility on a site located in the townlands Corracunna, Coolnanave and Garrane , Mitchelstown, Co. Cork.

The development will consist of the following:

- Demolition of existing single storey disused agricultural buildings, silos, and tank within the western portion of the site (total demolition gross floor area (GFA) of c. 1,781 sq.m). One single storey agricultural building (with a GFA of 87.8 sq.m) will be stabilised and retained as a biodiversity building.
- Construction of 3 no. digesters (c. 15.5m in height), 2 no. digestate storage structures (c. 15.5m and 11m in height), 2 no. liquid storage tanks (c. 12.2m in height), and a liquid feed tank (c. 8m in height) located in the southeast portion of the site.
- 3 no. pasteurisation tanks (each c. 6m in height), a post pasteurisation cooling tank (c. 12.2m in height) and pre fertiliser manufacturing tank (c. 12.2m in height) located in the centre of the site.
- A part single-storey and part two-storey reception hall (with a GFA of c. 2,112.6 sq.m and an overall height of c. 15.5m) to accommodate a laboratory, panel room, tool store, workshop, and storage areas, with a liquid feed intake adjacent to the reception hall, located in the central portion of the site, to the north of the digesters.
- A single-storey solid digestate storage and nutrient recovery building (with a GFA of c. 879.9 sq.m and an overall height of c. 12.4m in height) located to the west of the reception hall, in the central portion of the site.
- Odour abatement plant (c. 6m in height) and equipment, a digestate offtake area, and a fuel tank (c. 1.6m in height) will be provided to the north of the solid digestate storage and nutrient recovery building.
- Construction of an ESB substation (c. 3.4m in height), 2 no. CO_2 tanks (c. 14.5m in height), along with associated plant structures including a CO_2 loading pump, CO_2 auxiliaries, CO_2 liqueufactor, a CO_2 compressor (c. 6.7m in height), and a CO_2 pre-treatment skid, located in the southwest portion of the site.
- Construction of a biogas treatment skid, a biogas compression system, a biogas upgrading module (with an overall height of c. 5.1m) and a grid injection unit within a fenced compound (c. 2.8m in height), located within the southwestern portion of the site.
- Construction of an emergency biogas flare (c. 11.3m in height) and 2 no. propane tanks (c. 1.3m in height) located further to the west of the site.
- Construction of an O2 generation unit (c. 2.6m in height), a biomethane boiler (c. 5.6m to top of flue stack) a combined heat and power (CHP) unit and panel room (with a maximum height of c. 6m to top of flue), 2 no. pump houses (c. 2.6m in height, each with a GFA of c. 29 sq.m) located in the southwestern portion of the site.
- Construction of a two-storey ancillary office and administration building (with an overall height of c. 8.6m and a GFA of c. 271.5 sq.m) located within the western portion of the site, adjacent to the main site entrance.
- A discharge pipe route extending to the northwest of the main anaerobic digestion facility site, crossing the L90831 and through agricultural lands to the River Funshion.
- Alterations to the adjacent local road (L90831), to allow for improved access and safety, including provision of a passing bay and setting back of boundaries alongside the site entrance.

- Provision of landscaping and tree planting, including the provision of an extensive treeline alongside the N73 to the southeast of the main site area, along with additional landscaping and planting on lands to the west of the L90831.
- Associated and ancillary works including parking (16 no., including 3 no. EV and 1 no. accessible parking spaces), and bike storage (10 no. spaces), access arrangements (including new access points to the site from the L90831 to the west), internal roads, bunds, a weighbridge, wastewater treatment equipment, attenuation pond, boundary treatments, lighting, services, lightning protection masts, drainage, and all associated and ancillary works.

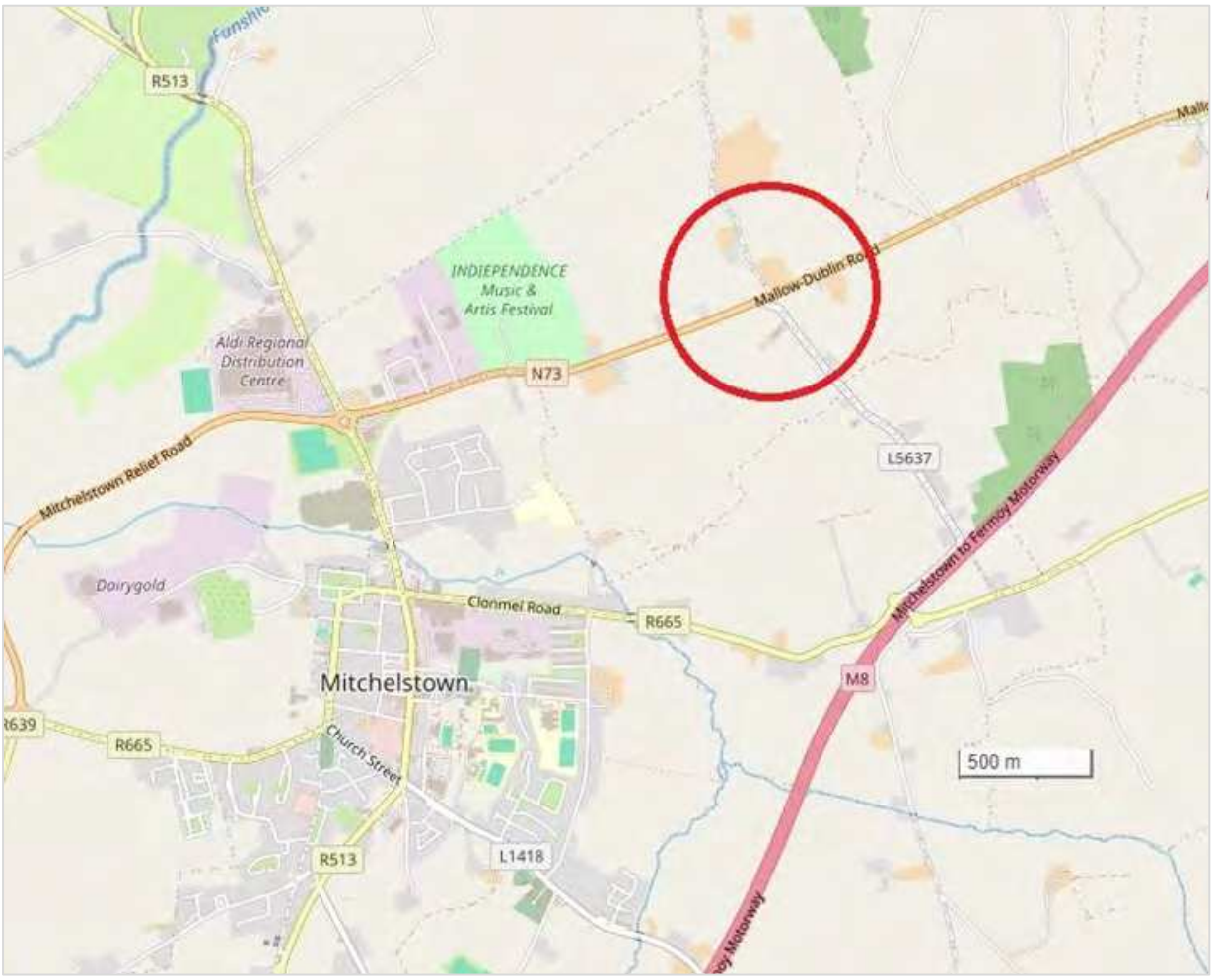

Figure 13.1: Location of Proposed Development Area (source: ©OpenStreetMapContributors)

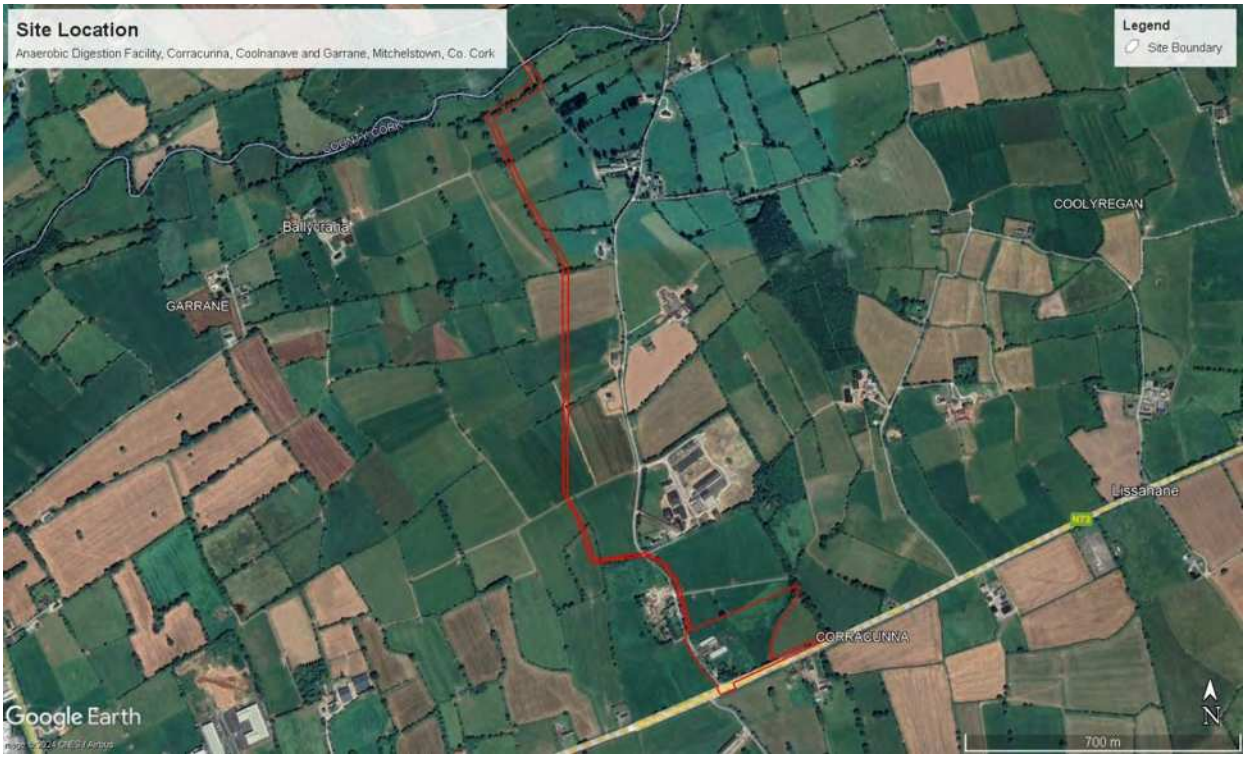

Figure 13.2: Aerial image showing outline of PDA site (source: Google Maps)

Figure 13.3: Proposed Site Layout

13.7 Existing Environment

13.7.1 Location Details

County and Town	Cork
Barony	Condons and Clangibbon
Parish	Brigown
Street	North of N73
Townland	Corracunna
Archaeological Monuments	None within subject site boundary or in immediate vicinity
Architectural Sites	None as listed by the NIAH or RPS within or in the immediate vicinity of the site boundary.
ITM	Centred on 582968/614334

Table 13.1: Location details

13.8 Archaeological Baseline Data

13.8.1 General Archaeological and Historical Background

Several Giant Irish Deer (*Megaloceros Giganteus*) skulls, large antlers, antler fragments and various long bones were retrieved below the peat stratum at Ballyoran Bog (04E1014) on the route of the N8 Rathcormac Fermoy. A radiocarbon date of BP 11201-10962 was returned for the Giant Irish Deer. Giant Irish Deer are extinct but are known to have inhabited Ireland during two separate periods in the Pleistocene (from 37,000-32,000 BP and 11,750-10,950 BP), with examples from lake deposits beneath peat bogs frequently dating to the period between 11,750 BP and 10,950 BP (Woodman et al. 1997). The Ballyoran Bog examples were found in this typical location of lacustrine (lake) sediments beneath peat and pre-date the beginnings of bog formation and the first human settlement of the area.

13.8.1.1 Mesolithic Period.

The Mesolithic (middle stone age) people were the first inhabitants of Ireland, arriving about 9000 years ago (*ca*. 6000BC – 4000 BC). They were a mobile society relying on wild resources for food which was hunted and gathered using stone tools as well as boats, nets, and traps. Settlement was in temporary and semi-permanent groups of huts constructed of wood slung with hide which may have operated as seasonal or hunting camps. In Munster, most of the evidence for Mesolithic occupation, mainly in the form of flint scatters, has 'come from the Blackwater valley in Co. Cork' (Woodman 1989, 116). Flint scatters were recorded in the townlands of Kilcummer Lower (CO034-060---) on the northern bank of the Blackwater *ca*. 19km to the south-west and in Ballynamona (CO018-099) and Wallstown (CO018-100) on the northern and southern sides of the Awbeg river respectively *ca*. 20km to the west of the subject site (Power et al. 2000, 2). Mesolithic sites and find spots were recorded on other road schemes in Co. Cork, these included Rath-healy 3 03E1678 and Curraghprevin 3 03E1138 (N8 Rathcormac Fermoy Bypass), Ballynacarriaga 1 01E0567 (N25 Youghal Bypass), Ballinaspig More 5 01E0546 (N22 Ballincollig Bypass) and Carrigrohane 3 02E0431 (N22 BG). Mesolithic activity was recorded on the route of the N8 Fermoy-Mitchelstown at Gortore E2410 and at Caherdrinny 3 E2422 and Mesolithic stone tools were recovered from Ballinglanna North 1 E2414, Ballinglanna North 3 E2416 and Ballinglanna North 6 E3972. These included Rath-healy 3 03E1678 and Curraghprevin 3 03E1138 (N8 Rathcormac Fermoy Bypass), Ballynacarriaga 1 01E0567 (N25 Youghal Bypass), Ballinaspig More 5 01E0546 (N22 Ballincollig Bypass) and Carrigrohane 3 02E0431 (N22 BG) (Johnson & Kiely, 2019).

13.8.1.2 Neolithic Period

Farming was first adopted in the Middle East but spread gradually across Europe in succeeding centuries, arriving in Ireland about 4000 BC. Tending of crops and animals required a more sedentary lifestyle and larger permanent settlements were built. The megalithic (from the Greek mega – large and lith – stone) monuments of the Neolithic people built as communal tombs or for ceremonial purposes, are relatively common in the landscape. New methods were adopted for shaping stone tools and the first long distance trade networks were established.
A substantial Neolithic settlement site has been recorded at Lough Gur, Co. Limerick. Previously the nearest known Neolithic house was in Pepperhill (CO016-22601--) *ca*. 30km to the west of the subject site which was discovered in 1986 during construction of Bruff-Mallow gas pipeline (Gowen 1988, 44-51).

Two wedge tombs located at Labbacallee (CO027-086---) and at Manning (CO027-091--) are both located roughly 13km to the southwest. Recent infrastructural work on the N8 Rathcormac to Fermoy and the Ballincollig Bypass have added significantly to the number of Neolithic sites in the county with examples excavated at Gortore and at Barnagore along the route of the Ballincollig Bypass. Both of these Cork examples produced essentially the same radiocarbon results (cal BC 3940-3620 at Barnagore and cal BC 3928-3655 from Gortore) and they represent the oldest known houses in the county.

13.8.1.3 The Bronze Age/The Iron Age

As stone tools were replaced using copper, later combined with tin to make bronze, the structure of society also changed over centuries. While some communal megalithic monuments, particularly wedge tombs continued to be used, the Bronze Age is characterised by a movement towards single burial and the production of prestige items and weapons, suggesting that society was increasingly stratified and warlike. The most common Bronze Age site within the archaeological record is the burnt mound or fulacht fiadh. These sites are often found near low-lying marshy areas or adjacent to streams or rivers. Over 2,000 examples have been recorded in County Cork alone.

In late Bronze Age Ireland, the use of the metal reached a high point with the production of high-quality decorated weapons, ornament, and instruments, often discovered from hoards or ritual deposits. Iron objects are found rarely but there is no evidence for the warrior culture of the rest of Europe although the distinctive La Tené style of art with animal motifs and spirals was adopted. A Bronze Age cemetery site at Mitchelstowndown West, *ca*. 16 km to the north, contains 53 small barrows. Until recently, Bronze Age settlement sites were a rarity in North Cork. Recent excavations associated with N8 Glanmire-Watergrasshill Bypass and the N8 Mitchelstown Relief Road recorded Bronze Age occupation sites.

Life in Iron Age in Ireland seems to have been much as it was in the early historic period – mixed farmers living in or around small, defended settlements known as ringforts or stone cashels. There is little evidence in the area for Iron Age activity. A scatter of pits, post-holes and stake-holes were recorded at Stagpark (04E1120) on the N8 Mitchelstown Relief Road. Early and Later Bronze Age dates and a Middle Iron Age date were returned from the site.

13.8.1.4 The Early Medieval Period

With an expansion in population, the Early Medieval Period (*ca*.500 AD-1200 AD) witnessed the introduction of a new settlement type generally known as the ringfort. Other names for this site type include rath, lios, cashel and dun. These circular enclosures, numbering between 30,000 and 40,000 across the country, represent the homesteads of Irish Early Medieval society. Ringforts are generally circular areas surrounded by a bank(s), walls, and an external ditch. In some cases, there can be up to three sets of defences. The larger more impressive multi-vallate, raised and platform raths are generally regarded as higher status settlements and are the foci around which the smaller satellite univallate enclosures would be arranged. Ringforts are frequently found on sloped sites within lowland areas providing better access to soils and having the security of wide visibility. In some cases, they can be associated with underground chambers and passages, known as souterrains dating to *ca*. AD 750–1250. Ringforts and enclosures represent the most numerous of the recorded archaeological monuments within the area usually occupying sloping sites on hillsides chosen for their better access to soils and open visibility.

In the fifth century Christianity was introduced to Ireland and monastic sites began to be founded throughout the country. Between the 6th and 8th centuries the influence of the Church continued to grow and through the secular and ecclesiastical legislation, it is possible to trace the gradual assimilation of the Church into early Irish society. The impact of Christianity on subject area is indicated by the presence the nearby monastery of Brigown founded in the 7th century by Fanahan. The ecclesiastical remains comprise a church, graveyard, holy well and site of round tower (CO019-301-05--).

13.8.1.5 Later Medieval Period

The archaeology of the Later Medieval Period (c. AD 1100 to 1650) is dominated by the fortresses built by the new colonists. Originally invited by Diarmuid Mac Murchada as mercenaries to assist in the recovery of his Leinster Kingdom, the Anglo-Normans quickly set about making territorial claims for themselves. By 1171 King Henry II mounted a second invasion, resulting in his Lordship of Ireland. Administration of this new order resulted in the shiring of counties, the creation of boroughs and foundation of towns, many surrounded by stone walls. Newly acquired territory was held by the construction of military powerbases in various forms – including motte and baileys, ringworks, moated sites, and later masonry castles. Tower houses were more widespread than the earlier Norman fortifications. In the succeeding centuries internecine fighting and fluctuating alliances between Anglo-Normans, native Irish and combinations of both resulted in the building of more defensive residences, particularly the ubiquitous tower house. These imposing buildings were usually rectangular towers of four or five storeys accessed by a spiral staircase leading to the battlements. Other architectural features designed for security included machicolations, bartizans, looped windows, a murder hole over a grilled entrance and a base batter. Most tower houses would have been surrounded by other buildings, often within a defensive walled enclosure known as a bawn. Medieval sites in the general area are common.

Mitchelstown was formerly known as Brigown/Mitchelstown (CO019-149--). It was listed as a market town in 1299 and was located on the southern bank of the Gradoge River, to the east of Mitchelstown Castle (Power et al. 2000). The town developed under the patronage of the Desmonds. It passed into the hands of the Earls of Kingston in the 17th century (Power 1996, 23). The Condon family controlled the barony of Condons and Clongibbon.

The post-medieval period (generally consider as c. 1650 to the present) is characterised by mills, limekilns, workhouses, country houses and associated demesnes, vernacular buildings, and field systems. The Williamite victory at the Battle of the Boyne in 1690 set in motion measures to exert more control over the Catholic majority in Ireland. These culminated with the oppressive Penal Laws, which were implemented vigorously during the Georgian Period. Multiple demesne landscapes and large houses were established throughout the County during the 18th century, the nearest being the demesne of Carrigane roughly 1.5km to the east. The site of a workhouse (C0019-113001--) built in 1852 is in Kilshanny townland to the east of Mitchelstown.

Of note in more recent history is the shooting of two Volunteers by British Forces at Corracunna Cross on the night of 21 July 1920. The event is described as follows in the online collections of the Bureau of Military History: 'On July 22nd, 1920, two Volunteers (Dan McGrath and Thomas McDonnell) were shot by a party of British Military at Corracunna Cross about 1 ½ miles-from Mitchelstown on the road to Cahir. They were standing with a crowd of civilians at the cross-roads. I arrived at the crossroads shortly after the shooting and had to send other Volunteers who had been with me on parade to search the fields to ascertain if any others had been shot. At the inquest held on these Volunteers the jury brought in a verdict of murder against the Crown Forces and I think that this was one of the last inquests held. The Crown Solicitor representing the British Forces involved asked the jury not to bring in a verdict of murder or they would all be shot.'

According to a report in the Freeman's Journal two days later, 'McGrath was shot through the head and also in the side; McDonnell was shot through the back of the neck, [with] the spinal column and vertebrae being shattered. Rev. M. O'Connell, C.C., Rev. Fr Casey, U.S.A., and Dr T. O'Brien arrived, but the men were then beyond all aid. After the shooting the Volunteers warned the people to keep to their houses. They also took charge of the bodies. Indignation prevails in the district, which is one of the quietest in Ireland.''

13.8.2 World Heritage Sites

There are no World Heritage Site or potential World Heritage Site contained in the Tentative List of Candidate Sites within 5km of the study area.

13.8.3 National Monuments in State Care, Guardianship or under Protection Order

There are no National Monuments within 200m of the proposed works.

13.8.4 Record of Monuments and Places/Archaeological Survey Database/Register of Historic Monuments

The following sections contain information relative to the Register of Historic Monuments (RHM), the Record of Monuments and Places (RMP) and the Archaeological Survey Database (ASD). Archaeological monuments are general registered by the National Monuments Service using a Sites and Monuments Record (SMR) number.

There are no monuments recorded by the National Monuments Service (NMS) within the boundary of the subject site. The nearest monument, a moated site (CO010-053----) is located *ca*. 700m to the northwest of the main site and 300m from the route of the proposed discharge pipeline.

CO010-053----

- Moated site.
- GARRANE (Condons and Clongibbon By.)
- Description: In undulating pasture. Indicated as rectangular, overgrown field (*ca*. 65m NE-SW; *ca*. 60m NW-SE) surrounded by double fence on 1842, 1905 and 1936 OS 6-inch maps; double fence only on NW and NE sides on 1905 OS 6-inch map; inner fence hachured on 1936 OS 6-inch map. Levelled; area of marshy ground enclosed on all four sides by barely perceptible depression also visible as differential growth pattern. Site inspected by OPW in 1974 prior to land reclamation works; their records describe a moated site, defined by fosse (*ca*. 20ft wide) with inner bank (ext. H *ca*. 8ft from base of fosse) and low outer bank (int. H *ca*. 6ft from base of fosse; ext. H *ca*. 2ft); also 'slight, recent-looking outer fosse'; NW side had been breached to allow tractor into interior to remove bushes. Listed by Barry (1981, 83, no. 33).

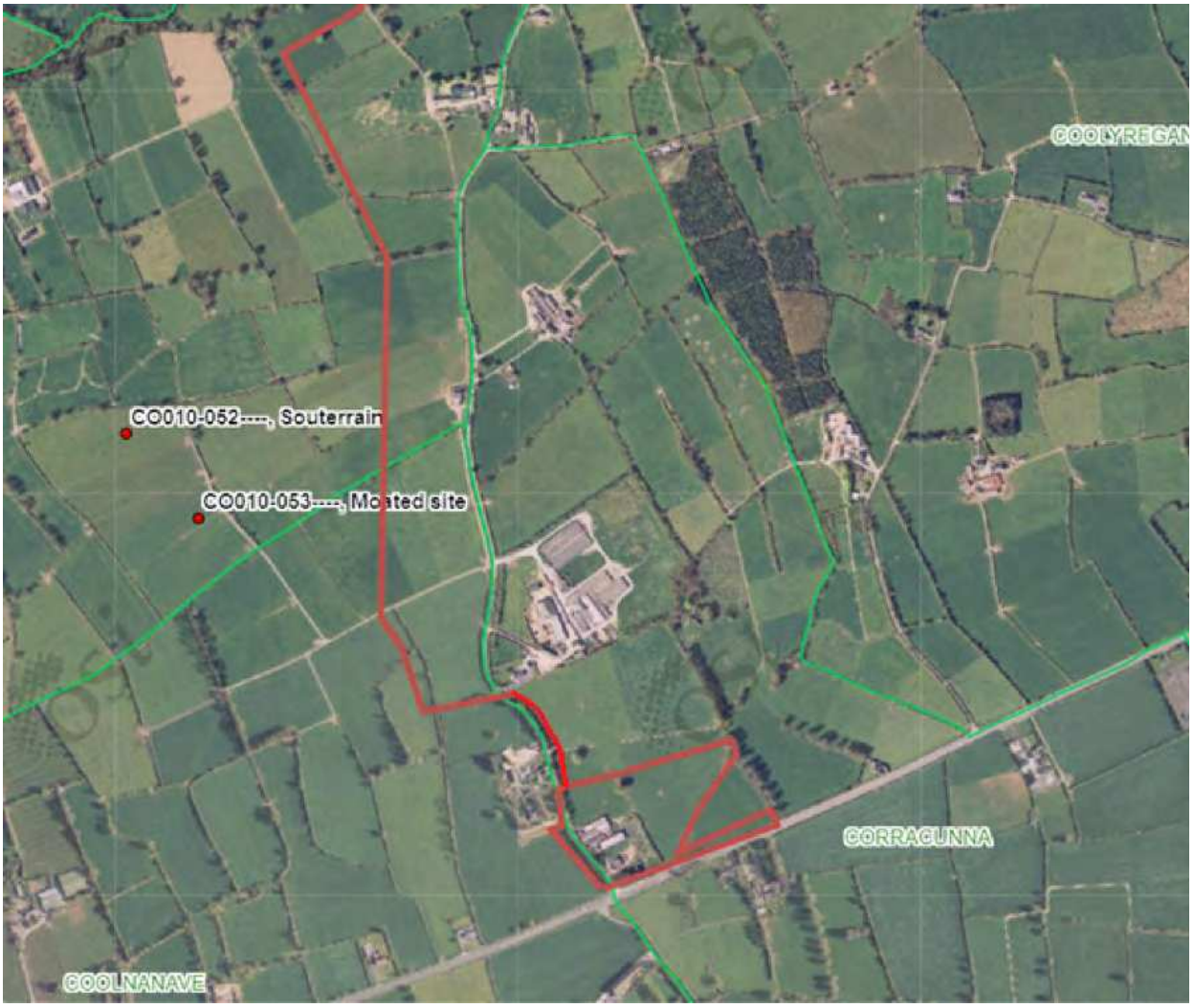

Figure 13.4: Site boundary and proximity to recorded monuments.

13.8.4.1 Map Regression

The primary cartographic sources consulted were the Down Survey Map of 1654-6, Ordnance Survey 6" and 25" maps, first, second and third editions.

The Civil Survey, so called because it was ordered by the Civil Authority, was taken from 1654-6 in order to value the lands in Leinster, Munster, Ulster, and Connaught assigned to satisfy the claims of soldiers for their arrears of pay during the Civil War, and of those Adventurers who made cash available in the 1640's to pay for the war and were promised land in Ireland in return. No structures or identifiable features are depicted. The pre famine first edition map depicts the subject site as enclosed greenfield. A rectangular structure is depicted at the west of the site at the location of the modern farm buildings. By the time of the second edition little has changed with the subject site remaining greenfield.

13.8.4.2 Aerial Photography

A review of available aerial photographs was undertaken to identify any previously unrecorded anomalies of historical potential. Inspection of the aerial photographic coverage of the Proposed Development area held by the Ordnance Survey (1995-2013), Google Earth (2002-2020) and Bing Maps was completed. Nothing of potential archaeological significance was noted.

13.8.4.3 Topographical Files of the National Museum of Ireland

A review of the online resource www.heritagemaps.ie was completed. No finds are recorded in the vicinity of the subject site. It should be noted that not all recorded finds in the Topographical Files are included in www.heritagemaps.ie. The review of www.heritagemaps.ie indicates that there are no relevant files in the vicinity.

13.8.4.4 Previous Archaeological Fieldwork in the vicinity

A number of significant sites were excavated in advance of construction of the N8 Fermoy–Mitchelstown Road scheme. Three are in the vicinity of Corracunna. These are summarised below:

2006:355 - Kilshanny 3, Cork

- County: Cork Site name: Kilshanny 3
- Sites and Monuments Record No.: - Licence number: E002432
- Author: James Lyttleton, for Eachtra Archaeological Projects, Ballycurreen Industrial Estate, Kinsale Road, Cork.
- Site type: Burnt mound/fulacht fiadh
- ITM: E 583371m, N 613066m

The site at Kilshanny 3 was discovered during Phase 1 pre-construction testing in advance of the N8 Fermoy–Mitchelstown road scheme (Cotter et al. 2006). Features found during testing included an oval mound of charcoal-rich heat-shattered stone, comprising a burnt mound/fulacht fiadh. Excavation commenced on 9 November 2006 and continued for six weeks.

Excavation revealed a large area of a dark-brown silt clay overlying a light-grey clay, the

natural subsoil in this area. One trough, two pits and a post-hole were excavated, and modern field drains truncated the archaeological features in parts of this site.

The mound of charcoal and heat-shattered stone was 19.9m long by 19.4m. It was a maximum of 0.3m deep and appeared to be disrupted by later activity, most probably agricultural (i.e. ploughing). Three further spreads of burnt-mound material were discovered. These were probably a continuation of the main mound, only surviving as isolated deposits as a result of later truncation at the site.

The trough was located almost directly in the centre of the fulacht fiadh underneath the burnt-mound material. It was aligned from north-east to south-west and was 2.4m long by 1.6m wide. It was rectangular in shape, with sharply sloping sides and what appeared to be a step to the south-west end.

Two pits and a post-hole were discovered underneath the burnt-mound material, located in close proximity to the main trough. The larger of the two pits lay 0.2m to the north of the trough. It measured 1.15m north–south by 0.8m and was subcircular in shape. The smaller of the pits was located 2.1m to the south-east of the trough. It was 1.05m long by 0.8m and was oval in shape. The post-hole was located 0.7m south-east of the trough. It was circular in shape and measured 0.5m in diameter. All three features were filled with burnt-mound material, originating from the use of the main trough, and are therefore contemporary with it.

The burnt mound/fulacht fiadh appears to have been disturbed by later modern features, including two field drains and a pit. These features appear to be agricultural in nature.

Bibliography

Cotter, E., Buckley, K. and Drumm, M. 2006 N8 Fermoy Mitchelstown, Phase 1, Final Archaeological Testing Report, Licence Number 05E1150. Unpublished Eachtra Archaeological Projects report submitted to the NRA.

2008:253 - Kildrum 1, Cork

- County: Cork Site name: Kildrum 1
- Sites and Monuments Record No.: N/A Licence number: E003971
- Author: John Tierney, Eachtra Archaeological Projects, Ballycurreen Industrial Estate, Kinsale Road, Cork.
- Site type: Fulacht fiadh/burnt mound
- ITM: E 583797m, N 613406m

Phase 2 excavation works were undertaken along the route of the N8 Fermoy–Mitchelstown Bypass, on behalf of Cork County Council. The proposed bypass involves the construction of *ca*. 16km of dual carriageway extending from Gortore north of Fermoy to Carrigane north-east of Mitchelstown. A programme of advance archaeological testing (Phase 1) had been carried out in October 2005, the results of which appeared in Excavations 2005.

A fulacht fiadh/burnt mound was excavated at Kildrum 1. The site comprised five troughs with numerous fills of burnt-mound material. The actual burnt mound survived only as two shallow layers. The remaining features excavated at the site included three post-holes, a tree bole, a pit, seven stake-holes and two drains. There were two unconnected layers of shattered stone located between 3m and 15m apart from the mound and the trough.

One layer of burnt-mound material covered an irregular area, and it was truncated by a drain. It

measured 6m long, 5.3m wide and 0.1m deep. The layer overlay two troughs. The second layer of burnt-mound material was C-shaped. It measured 5m long, 1.4m wide and 0.22m deep. It was truncated by a modern drain and was located in close proximity to a trough.

Two of the troughs were associated with stake- and post-holes; the base of one trough was cut by four stake-holes and the base of another was cut by three stake-holes and a post-hole. In both cases the stake-holes were situated around the basal edges of the troughs and were probably the remains of upright supports that held a trough lining in place. The post-hole was cut into the break of slope between the top and the basal edge of the trough; it was inserted at an oblique angle into the edge. The function of a post in this position is unclear.

2007:AD16 - Carrigane 1, Cork

- County: Cork Site name: Carrigane 1
- Sites and Monuments Record No.: N/A Licence number: E002434
- Author: Simon Ó Faoláin, Eachtra Archaeological Projects, Ballycurreen Industrial Estate, Kinsale Road, Cork.
- Site type: Post-medieval agricultural activity
- ITM: E 584610m, N 614311m

Phase 2 excavation works were undertaken, on behalf of Cork County Council, along the route of the N8 Fermoy–Mitchelstown bypass. The proposed bypass involves the construction of *ca*. 16km of dual carriageway extending from Gortore north of Fermoy to Carrigane north-east of Mitchelstown. A programme of advance testing (Phase 1) had been carried out in October 2005, the results of which appeared in Excavations 2005.

Six linear features were investigated at Carrigane. Four were straight and they shared the same west-south-west to east-north-east alignment, while two others were not straight, both having a pronounced turn of *ca*. 90° along their exposed lengths. Five modern field drains found at the site were clearly later than the linear features. The site covered an area of *c*a. 1650m2.
Three possible stake-holes had charcoal-rich fills but, as there are signs of fairly modern scrub-burning and burnt roots in the field immediately to the west of Carrigane 1, it is possible that these ‘stake-holes’ are also possible root holes. Similarly a charcoal-rich dump deposit that filled a natural hollow was also interpreted as burning of scrub. Three possible pits were also found, some with irregular cuts. There were no finds from the pits and no obvious function for any of these features.

Two metalled areas were found. The first consisted of tightly packed pebbles and small stones in a matrix of grey/brown silt. It was extremely compact and lay directly on the natural subsoil. The second metalled area consisted of tightly packed pebbles and small stones in a matrix of pinkish-orange clayey silt. It was extremely hard and lay directly on the natural subsoil. No finds were recovered from either of the metalled areas.
It is likely that all of the features investigated at this site were post-medieval or modern in origin.

13.8.4.5 Townlands, Townland Boundaries and Toponym Analysis

The townland name is Corracunna derives from the Irish Currach an Chonnaidh and means 'marsh of the firewood'.

13.8.4.6 LiDAR

The Open Topographic Data Viewer built and hosted by Geological Survey Ireland does not at present cover the area of the subject site.

13.8.4.7 Architectural Heritage

13.8.4.8 Architectural Conservation Areas (ACA)

There are no ACA's adjacent to the site boundary or within the vicinity of the subject site.

13.8.4.9 Record of Protected Structures (RPS)/National Inventory of Architectural Heritage (NIAH)/Industrial/Vernacular Heritage

There are no RPS sites or NIAH sites within or within the vicinity of the subject site. The nearest relevant site is Woodview House (NIAH No. 20901009) which is located over 680m to the west. Of Regional significance this is a detached two-storey house, built *ca*. 1890, having three-bay first floor and four-bay ground floor, with gabled dormer windows and porch to front. Pitched slate roof with decorative terracotta ridge crestings and rendered chimneystacks.

13.8.4.10 Designed Landscapes-Demesnes, Historic Gardens & Country Estates

There are no demesnes landscapes within the vicinity.

13.8.5 Folklore, Other Cultural Heritage Features and Areas of Potential

13.8.5.1 Townland Boundaries

No townland boundary will be directly impacted by the proposed works. The townland boundary with Coolnanave forms the western boundary of the site and comprises hedgerow and mature trees.

13.8.5.2 Folklore Commission

A review of the National Folklore Collection was completed on www.Dúchas.ie. No records relating to Corracunna were noted.

13.8.5.3 Other Cultural Heritage Features

There are two roadside memorials at the southwest of the site set back from the junction between the N73 and the local road to the west of the site. These features are outside of the planned development boundary and shall not be impacted by development.

Memorial 1: Corracunna Memorial

- Inventory No. 469
- Place: Corracunna crossroads.
- Description and dimensions: Limestone slab. Height 45cms, width 35cms.
- Recorded by: Michael Dolan, February 2008.
- Text: 'In Remembrance Of TOM McDONNELL, Aged 25 years And DAN McGRATH, Aged 17 years, Innocent Victims Who Were Shot Dead At This Place Corracunna Cross By British Soldiers On 21st July 1920, Ar dheis laimh Dé Go raibh a n-anamacha.'

The second memorial is of more recent provenance and reads ‘Pray for the Soul of Clancy accidently killed 23rd July 1992, RIP’.

Plate 13.1: Roadside Memorials

13.9 Fieldwork

A field inspection was carried out on the 18th of December 2023 and entailed walking the 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.

The site comprises low lying marshy pasture which gradually slopes from the north. The site is bounded by mature trees and hedgerow and a now removed ditch at its eastern extent. Nothing of archaeological significance was noted during the site inspection.

Plate 13.2: Looking south at subject site

Plate 13.3: Looking north at subject site

13.10 Potential Effects

13.10.1 Potential Direct Effects

Direct negative impacts may occur where sites of archaeological and cultural heritage significance are located within the footprint of the Proposed Development, which would potentially be impacted upon by ground disturbances.

In relation to the Proposed Development, direct, physical impacts on the archaeological and cultural heritage can manifest themselves in the following ways:

- Where an archaeological or cultural heritage site, structure, monument, or feature is located within an area where works takes place and the works either intentionally or unintentionally entail the alteration or removal of all or part of the site, structure, monument or feature a direct, physical impact will occur.
- Direct, physical impacts can also occur in gaining access to the site. Where archaeological, architectural, or cultural heritage sites, structures, monuments, or features are intentionally or unintentionally removed or altered when transporting and/or facilitating access for machinery, equipment and/or materials to or from site a direct physical impact will occur; and
- There is the potential for direct, physical impacts on previously unrecorded archaeological and architectural sites, structures, monuments, or features.

If these effects cannot be remediated, for example if archaeological deposits are destroyed during excavations, then the impacts will be permanent.

13.10.1.1 Potential Direct Effects on Recorded Archaeological Monuments

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

13.10.1.2 Potential Direct Effects on Unrecorded Archaeological Monuments or Features

There is a low to moderate potential for unrecorded sub-surface deposits surviving below ground at this location.

13.10.1.3 Potential direct Impacts Architectural Sites

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

13.10.2 ‘Do Nothing Scenario’

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

13.10.3 Potential Effects on the Setting/Operational Effects

Effects on setting are primarily visual and examine the effect of the proposed works upon the setting of a site within the wider landscape. Impacts on Setting can be reduced with sensitive

site development and screening. The impact of the development is usually proportional to the extent to which that development is visible to and from the extant recorded monuments and features.

13.10.3.1 Archaeological Sites

The Proposed Development will not impact the visual amenity of any known monuments.

13.10.3.2 Architectural Sites

The Proposed Development will not impact the visual amenity of these sites/features.

13.10.4 Cumulative Effects

The permitted and Proposed Developments within a 500m study area have been considered as part of the cumulative impact assessment. No cumulative impacts upon the archaeological resource have been identified, as any remains that may be identified within the Proposed Development area will be fully excavated and recorded. As the Proposed Development will not result in any impacts on the architectural heritage resource, no cumulative impacts have been identified.

13.11 Mitigation Measures and Residual Effects

13.11.1 Mitigation Measures

The mitigation strategies outlined in this section detail the measures to be adopted to ameliorate the effects that the proposed works may have on features of archaeological, architectural, or cultural heritage within the study area during both the construction and operational phases of the scheme. The residual effects that will remain once these mitigation measures have been implemented are also identified.

- It is recommended that a programme of archaeological testing be carried out at pre-construction stage. Test excavation is that form of archaeological excavation where the purpose is to establish the nature and extent of archaeological deposits and features present in a location which it is proposed to develop (though not normally to fully investigate those deposits or features) and allow an assessment to be made of the archaeological impact of the Proposed Development. It may also be referred to as archaeological testing (DAHGI 1999a, 27).

- 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.

- Testing should be carried out under licence to the National Monuments Service at the DHLGH. The application for such a licence requires a detailed method statement, outlining the procedures to be adopted to monitor, record, and recover material of archaeological interest during such work. Should archaeological material be uncovered at any location, the feature will be summarily investigated to determine the form, age, nature, depth, and extent of the feature. The feature will be planned, photographed, and recorded to best professional standards.

- Adequate funds to cover excavation, post-excavation analysis, and any testing or conservation work required should be made available if required. Upon completion of the works, dissemination of the results will take the form of a stratigraphic report and full report to publishable standard lodged with the licensing section (NMS) and the Planning Section (NMS) and the National Museum of Ireland. A summary of the report will also be submitted to the Excavations Bulletin within six weeks of the end of fieldwork. Should results warrant it, wider dissemination in the form of a full publication may be recommended.

- In addition, the report on the results of the test excavation and an impact statement will be submitted to the planning authority to inform the archaeological site strategy. Where archaeological material is identified, the developer will submit an archaeological mitigation strategy and a detailed method statement for written agreement with the planning authority detailing proposed mitigation including, preservation in situ by way of avoidance or redesign, and/or archaeological excavation under a Section 26 licence in advance of development.

- The agreed archaeological mitigation (preservation in situ/full excavation) shall take place under licence prior to the commencement of development. The developer shall make provision for excavation, post excavation, interpretation, and publication of the results. A preliminary report detailing the findings of the agreed resolution shall be submitted to the planning authority within four weeks of the licence expiry and a full and final report shall be

submitted to the planning authority within 1 year of the licence expiry date.

The above recommendations are subject to approval by the National Monuments Service at the DHLGH and other relevant authorities.

13.12 Residual Impact Assessment

This section assesses potential significant environmental impacts which remain after mitigation measures have been implemented.

13.12.1 Construction Phase

If the above-described mitigation is implemented there will be no significant residual impacts on the archaeological resource.

13.12.2 Operational Phase

Not applicable to the archaeological and architectural resource.

13.12.3 Summary of Post-Mitigation Effects

If the above-described mitigation is implemented there are no predicted residual impacts on the archaeological and architectural resource.

13.12.4 Cumulative Residual Effects

No cumulative impacts have been identified upon the archaeological and architectural resource and as such there will be no residual cumulative effects.

13.12.5 “Worst Case” Effect

Under a worst-case scenario, the works would disturb previously unrecorded deposits, features or objects without proper excavation and recording being undertaken.

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- http://www.logainm.ie/

- http://www.museum.ie/
- https://www.townlands.ie/
- http://webgis.archaeology.ie/
- http://www.worldheritageireland.ie/tentative-list/

Appendix 13.2 – Conventions, Directives and Legislation

Conventions

Ireland has ratified several European and international conventions in relation to the protection of its cultural heritage. This section summarises Ireland's obligations as a signatory to several International and European conventions relating to the protection and conservation of cultural heritage sites. Also included is a synopsis of existing national legislation governing the care and protection of our cultural heritage resources.

ICOMOS Xi'an Declaration, 2005
Ireland is a signatory to an international declaration sponsored by International Council on Monuments and Sites (ICOMOS), the Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas, 2005, that endeavours to ensure the safeguard and conservation of the World's cultural heritage as part of its sustainable and human development.

EIA Directive 85/337/EEC as amended.
To assist planning and other consent authorities in deciding if significant effects on the environment are likely to arise in the case of development below the national mandatory EIS thresholds, the DHLGH published a Guidance document in August 2003.

The European Landscape Convention 2000
In 2002 Ireland ratified the European Landscape Convention - also known as the Florence Convention, which promotes the protection, management and planning of European landscapes and organises European co-operation on landscape issues. It is the first international treaty to be exclusively concerned with all dimensions of European landscape.

Valletta Convention, 1997
In 1997 the Republic of Ireland ratified the Council of Europe, European Convention on the Protection of the Archaeological Heritage (the 'Valletta Convention'). Obligations under the Convention include provision for statutory protection measures, including the maintenance of an inventory of the archaeological heritage and the designation of protected monuments and areas.

Granada Convention, 1997
Under the European Convention on the Protection of the Architectural Heritage (Granada Convention), 1997, the Republic of Ireland is obliged to maintain inventories of architectural heritage, to protect the architectural heritage and adopt conservation policies as integrated planning objectives.

UNESCO World Heritage Convention, 1972
This Convention provides for the identification, conservation, and preservation of cultural and natural sites of outstanding universal value for inclusion in a world heritage list. The World Heritage status is a non-statutory designation, and no additional statutory controls result from this designation. However, the impact of Proposed Development upon a World Heritage Site will be a key material consideration in determining planning applications.

Legislation

The Planning and Development (Strategic Infrastructure) Act 2006

The Planning and Development (Strategic Infrastructure) Act 2006 ensures the protection of the archaeological heritage resource by requiring that all applications under this Act are accompanied by an EIAR including information on material assets, including the architectural and archaeological heritage, and the cultural heritage.
The National Monuments Act 1930 to 2004
Irish legislation for the protection of archaeological heritage is based on the National Monuments Acts 1930 and amendments of 1954, 1987, 1994 and 2004. These acts are the principal statutes governing the care of monuments in Ireland. They provide for the protection of national monuments using preservation orders. The overall state archaeological service is provided by the DHLGH and delivered through the Planning and Heritage Section of the DHLGH and the National Museum of Ireland (Irish Antiquities Division) on behalf of the Minister.

Monuments are protected under the National Monuments Acts in several ways:

- National Monuments in the ownership or guardianship of the Minister or a local authority.
- National Monuments, which are subject to a preservation order.
- Historic monuments or archaeological areas recorded in the Register of Historic Monuments; and
- Monuments recorded in the Record of Monuments and Places (RMP).

The Planning and Development Act 2000

Under arrangements which came into operation on 1 January 2000 (The Planning and Development Act 2000), the system of listing buildings was replaced with strengthened procedures for the preservation of protected structures and structures in architectural conservation areas (ACA).

The Architectural Heritage and Historic Properties Act, 1999

This Act provides for the establishment of a national inventory of architectural heritage which forms the basis for recommendation from the Minister to local authorities of sites for inclusion in the local authorities Record of Protected Structures

ORS

Appendix 13.3 – Figures, Plates, Abbreviations, Coordinate System

Figures

Plates

Abbreviations

AAP	Area of Archaeological Potential
ACA	Architectural Conservation Areas
ASD	Archaeological Survey Database8hyu8
ASI	Archaeological Survey of Ireland
DHLGH	Department of Housing, Local Government and Heritage
DLHG	Demesne Landscapes and Historic Gardens
NIAH	National Inventory of Architectural Heritage
NMS	National Monuments Service
NMI	National Museum of Ireland
OSI	Ordnance Survey Ireland
RMP	Record of Monuments and Places
RPS	Record of Protected Structures
SMR	Sites and Monuments Record
ZAP	Zones of Archaeological Potential
ZoN	Zone of Notification

Coordinate System

All GPS coordinates given in this report are in Irish Transverse Mercator (ITM).

14 Material Assets

14.1 Introduction

Material Assets are as defined in the 'Advice Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2022 as 'built services and infrastructure'). This can include roads and traffic, electricity, telecommunications, gas, water supply, sewerage, and waste management infrastructure.

This chapter of the EIAR addresses the likely significant effects of the Proposed Development on the existing services and Material Assets of the site and its surroundings. Material Assets discussed here are in relation to the built services and infrastructure within and surrounding the Proposed Development site. Traffic and Transportation is assessed separately within **Chapter 12** of this EIAR.

The EIA Directive requires that Architectural and Archaeological Heritage (Cultural Heritage) is assessed as part of Material Assets. However, such is the importance of this issue in Ireland, EIA best practice has established that it is important to address this issue separately and not as an adjunct to the Material Assets section in the EIAR document. Accordingly, Archaeology, Architectural and Cultural Heritage is assessed in **Chapter 13** of this EIAR.

14.2 Consultation

ORS have been commissioned to assess the potential impacts of the Proposed Development in terms of Material Assets during the construction and operational phases.

The principal members of the ORS EIA team involved in this assessment include the following persons:

- **Project Scientist & Lead Author:** Killian Smith – B.Sc. Agri-Environmental Science. Current Role: Environmental Consultant. Experience *ca.* 2 years.
- **Project Lead & Reviewer:** Oisín Doherty – B.Sc. (Geography with Environmental Science), MSc. (Environmental Management), CEnv, MIEnvSc. Current Role: Chartered Environmental Consultant. Experience *ca*. 15 years.

Consultation between the Applicant, ORS and members of the planning/design team was made in order to obtain information required to assess the potential construction and operational phase impacts on material assets.

14.2.1 Legislation, Policy & Guidance

This EIAR chapter and the assessment contained within has been carried out in accordance with the 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (EPA, 2022) and the associated 'Advice Notes On Current Practice (in preparation of Environmental Impact Statements)' (EPA, 2003).

In addition, this chapter was carried out in accordance with best practice outlined in the following guidance documents:

- European Commission (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report;
- Government of Ireland (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.

The assessment methodology in accordance with the guidelines is described in detail the following section.

14.2.2 Scope

This EIAR chapter aims to identify the likely significant effects that the Proposed Development may have on Material Assets as defined in the legislation and guidance set out above. These are discussed under the following headings:

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

14.3 Assessment Methodology

The methodology used to produce this chapter included a review of relevant legislation and guidance, a desk study, a site walkover, an evaluation of potential effects, an evaluation of significance of the effect and an identification of measures to avoid and mitigate effects.

14.3.1 Desktop Study

A comprehensive desk study was undertaken to assess the Material Assets associated with the Proposed Development and their capacities. This study involved the collation and assessment of data from the following sources:

- Google Earth
- Environmental Protection Agency (EPA) online mapping
- OSI Mapping
- Irish Water Utility mapping
- ESB Networks Utility mapping
- Gas Networks Ireland Service mapping
- Eir Telecommunications Network mapping
- Road Infrastructure mapping
- QGIS
- Aerial Photography mapping

14.3.2 Site Investigation

A site walkover was undertaken on the 13th of December 2023 to provide an accurate interpretation of the site location, existing infrastructure, and environs.

14.3.3 Prediction of Impacts and Effects Prior to Mitigation

This chapter of the EIAR describes the likely significant direct effects of the Proposed Development on the specified Material Assets within and surrounding the Proposed Development. The aim of establishing significance of impacts is to provide a measure of the risks of disturbance to, or undue burden on, existing built services.

14.3.4 Significance Criteria

The ‘Guidelines on the information to be contained in Environmental Impact Assessment Reports’ (EPA, 2022) have been followed in order to clearly identify how the significance of impacts has been assessed. This common framework follows a ‘matrix approach’ to environmental assessment which is based on the characteristics of the impact (magnitude and nature) and the value (sensitivity) of the receptor.

14.4 Receiving Environment

14.4.1 General

This section of the chapter provides the baseline information in relation to Material Assets that exists in the vicinity of the Proposed Development. The Proposed Development site is located in the townlands of Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork approximately 2km northeast of the town of Mitchelstown, Co. Cork and approximately 43km northeast of Cork City, Co. Cork.

The total site area measures *ca*. 5.62ha. The site is partially brownfield and contains a former piggery and disused agricultural buildings. The site is currently used as agricultural pastureland in part and bounded to the north, south, east, and west by further agricultural pastureland. An operational piggery is located *ca*. 300m to the north.

The site is adjacent to the N73 national road directly to the south. The L90813 local road is located directly west of the site.

The Material Assets within the receiving environment of the Proposed Development are described below under the following headings:

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

14.4.2 Characteristics of the Proposed Development

The development will consist of the following:

- Demolition of existing single storey disused agricultural buildings, silos, and tank within the western portion of the site (total demolition gross floor area (GFA) of c. 1,781 sq.m). One single storey agricultural building (with a GFA of 87.8 sq.m) will be stabilised and retained as a biodiversity building.
- Construction of 3 no. digesters (c. 15.5m in height), 2 no. digestate storage structures (c. 15.5m and 11m in height), 2 no. liquid storage tanks (c. 12.2m in height), and a liquid feed tank (c. 8m in height) located in the southeast portion of the site.
- 3 no. pasteurisation tanks (each c. 6m in height), a post pasteurisation cooling tank (c. 12.2m in height) and pre fertiliser manufacturing tank (c. 12.2m in height) located in the centre of the site.
- A part single-storey and part two-storey reception hall (with a GFA of c. 2,112.6 sq.m and an overall height of c. 15.5m) to accommodate a laboratory, panel room, tool store, workshop, and storage areas, with a liquid feed intake adjacent to the reception hall, located in the central portion of the site, to the north of the digesters.
- A single-storey solid digestate storage and nutrient recovery building (with a GFA of c. 879.9 sq.m and an overall height of c. 12.4m in height) located to the west of the reception hall, in the central portion of the site.

- Odour abatement plant (c. 6m in height) and equipment, a digestate offtake area, and a fuel tank (c. 1.6m in height) will be provided to the north of the solid digestate storage and nutrient recovery building.
- Construction of an ESB substation (c. 3.4m in height), 2 no. CO_2 tanks (c. 14.5m in height), along with associated plant structures including a CO_2 loading pump, CO_2 auxiliaries, CO_2 liqueufactor, a CO_2 compressor (c. 6.7m in height), and a CO_2 pre-treatment skid, located in the southwest portion of the site.
- Construction of a biogas treatment skid, a biogas compression system, a biogas upgrading module (with an overall height of c. 5.1m) and a grid injection unit within a fenced compound (c. 2.8m in height), located within the southwestern portion of the site.
- Construction of an emergency biogas flare (c. 11.3m in height) and 2 no. propane tanks (c. 1.3m in height) located further to the west of the site.
- Construction of an O2 generation unit (c. 2.6m in height), a biomethane boiler (c. 5.6m to top of flue stack) a combined heat and power (CHP) unit and panel room (with a maximum height of c. 6m to top of flue), 2 no. pump houses (c. 2.6m in height, each with a GFA of c. 29 sq.m) located in the southwestern portion of the site.
- Construction of a two-storey ancillary office and administration building (with an overall height of c. 8.6m and a GFA of c. 271.5 sq.m) located within the western portion of the site, adjacent to the main site entrance.
- A discharge pipe route extending to the northwest of the main anaerobic digestion facility site, crossing the L90831 and through agricultural lands to the River Funshion.
- Alterations to the adjacent local road (L90831), to allow for improved access and safety, including provision of a passing bay and setting back of boundaries alongside the site entrance.
- Provision of landscaping and tree planting, including the provision of an extensive treeline alongside the N73 to the southeast of the main site area, along with additional landscaping and planting on lands to the west of the L90831.
- Associated and ancillary works including parking (16 no., including 3 no. EV and 1 no. accessible parking spaces), and bike storage (10 no. spaces), access arrangements (including new access points to the site from the L90831 to the west), internal roads, bunds, a weighbridge, wastewater treatment equipment, attenuation pond, boundary treatments, lighting, services, lightning protection masts, drainage, and all associated and ancillary works.

A further detailed description of the Proposed Development is provided in **Chapter 2: Project Description.**

14.4.3 Road Infrastructure

As outlined above, a Traffic and Transport chapter has been prepared by ORS and is submitted as a part of this EIAR. The impact that the Proposed Development would have on the Roads Infrastructure in the vicinity of the Proposed Development has been fully assessed in the Traffic and Transport chapter.

The Proposed Development is located approximately 2.0km northeast of Mitchelstown and approximately 43km northeast of Cork City. There is no designated footpath, cycle path and hard shoulder along its length. As the site is of the N73, it offers connectivity to various locations across the county.

The Proposed Development plans include providing vehicular access from L90813 to the west of the site. This access will primarily be via the National Road N73, located south of the site, and will utilise the L90813/N73 T-junction, as shown in **Figure 14.1**.

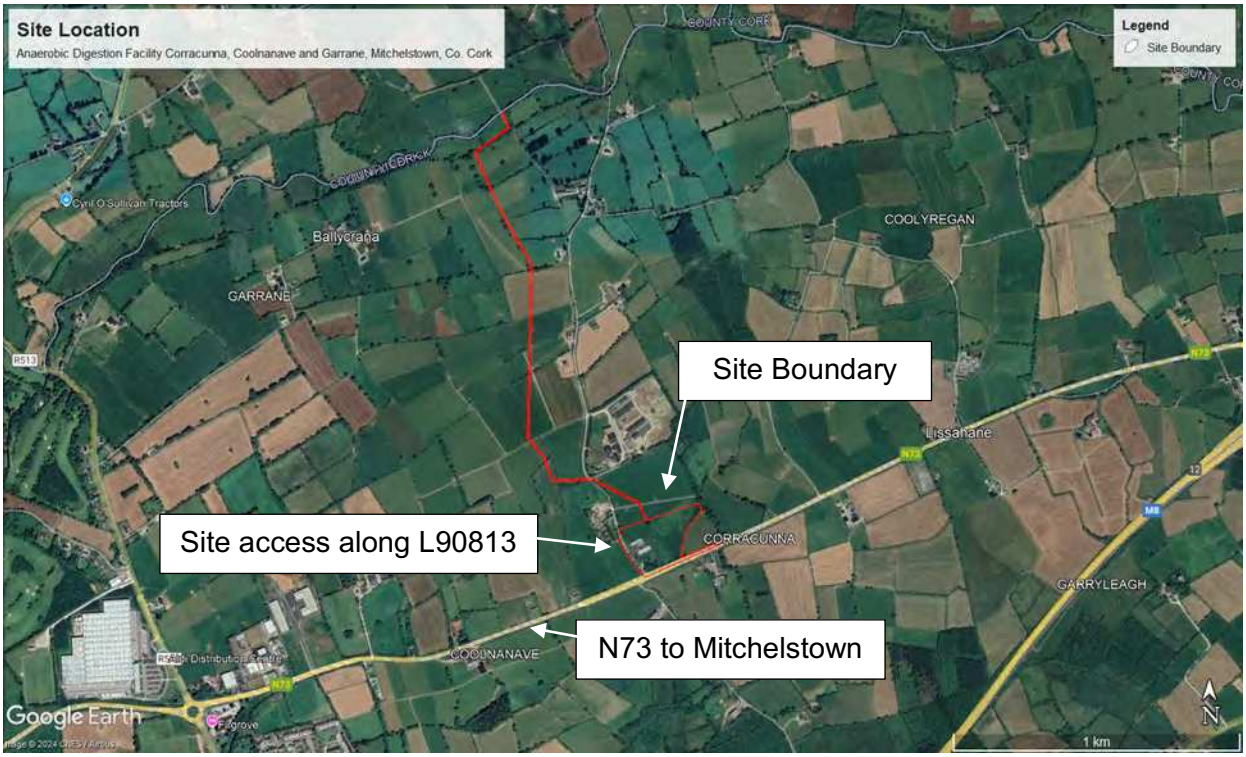

Figure 14.1: Site location and surrounding road infrastructure

It is proposed to create 1 no. passing bay along the L90813, from the junction off the N73 and northwards up to the site, to facilitate the simultaneous passage of two large vehicles. An overview of the proposed passing bay is included in **Figure 14.2**.

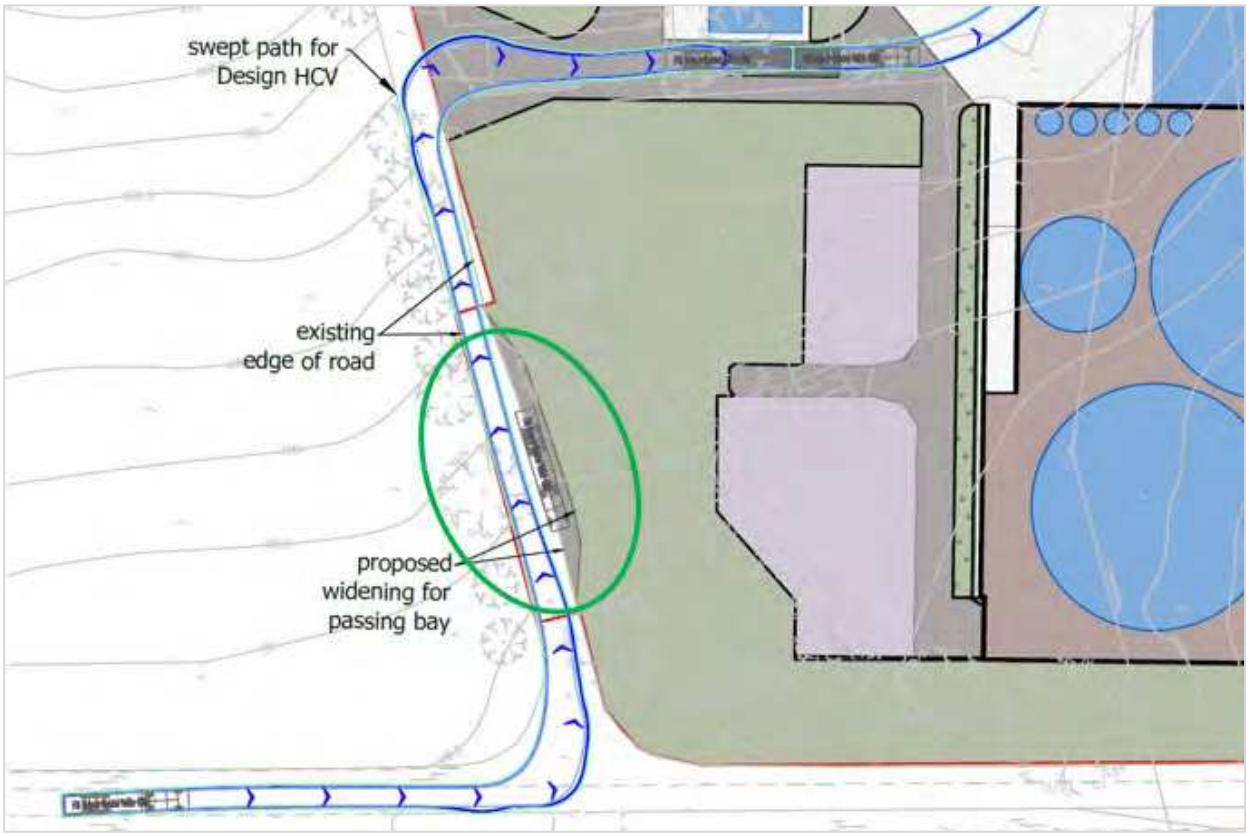

Figure 14.2: Proposed passing bay

Vehicular access to the Proposed Development will be provided by a primary access gate to the west of the site boundary. **Figure 14.3** below provides an overview of the proposed access point to the site**.**

Detailed drawings are included in EIAR Volume 2: Drawings (**Drawing Ref: 24055-DR-0504_issue PL01**).

14.4.4 Foul Water Network

The site does not feature access to the public foul water network at present.

The Proposed Development will have 5 workers on site each day with normal loadings of 30l/day and BOD of 20g/day. The wastewater from the toilet and canteen will be treated using a proprietary system as recommended in the Site Suitability Assessment.

Testing and assessment have been carried in accordance with the requirements of EPA Code of Practice Wastewater Treatment Manuals Treatment Systems for Single Houses (p.e.< 10).

14.4.5 Surface Water Network

The Proposed Development will comprise two separate drainage networks:

- Run-off from the buildings and yards in the facility will be collected in a sealed pipe network which will discharge to the watercourse;
- 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 facility.

SUDs Regime – Quantity

Discharge Rate

Subsoils are unsuited to infiltration of all surface water run-off and so it will be necessary to discharge surface water run-off to an outfall.

The rate of discharge to the stream will be restricted to a maximum permissible rate of 12.8 l/sec.

Storage of Attenuated Surface Water

The restriction on discharge will trigger the requirement for attenuation on-site whenever surface water run-off rates exceed the discharge rate to the stream from the site.

This attenuated water will be stored temporarily in an attenuation pond located in a grassed landscaped area close to the receiving watercourse.

14.4.6 Public Water Network

The water requirements for the Proposed Development will be met as follows:

Fire-water: Fire-fighting water will be stored in an underground tank. The tank will be fed by run-off from roofs.

Potable Water: Potable water will be taken from a connection to an existing watermain in the public road. The potable water demand is estimated to be 700 litres/day (IW Code of Practice for Wastewater Infrastructure).

Any other water, for example wash water, will be supplied from rainwater harvesting or from treated process water. This water will go through UV treatment before storage and use.

14.4.7 Gas Network

Biomethane will be supplied to the existing gas network via the Grid Injection Unit (GIU) and a new pipeline connecting the site to the existing medium pressure distribution gas pipeline An existing medium pressure distribution pipeline is located at Coolnanave, Co. Cork *ca*. 1.0km west of the site.

GNI has confirmed that the existing grid capacity is adequate to accommodate the production output of the Proposed Development. All works to the existing and proposed gas pipelines will be carried out by GNI in accordance with *Standard I.S. 328 2021 Gas transmission – Pipelines and pipeline installations*.

Figure 14.4 illustrates the existing gas networks in the area and the proposed pipeline connection route from the Proposed Development.

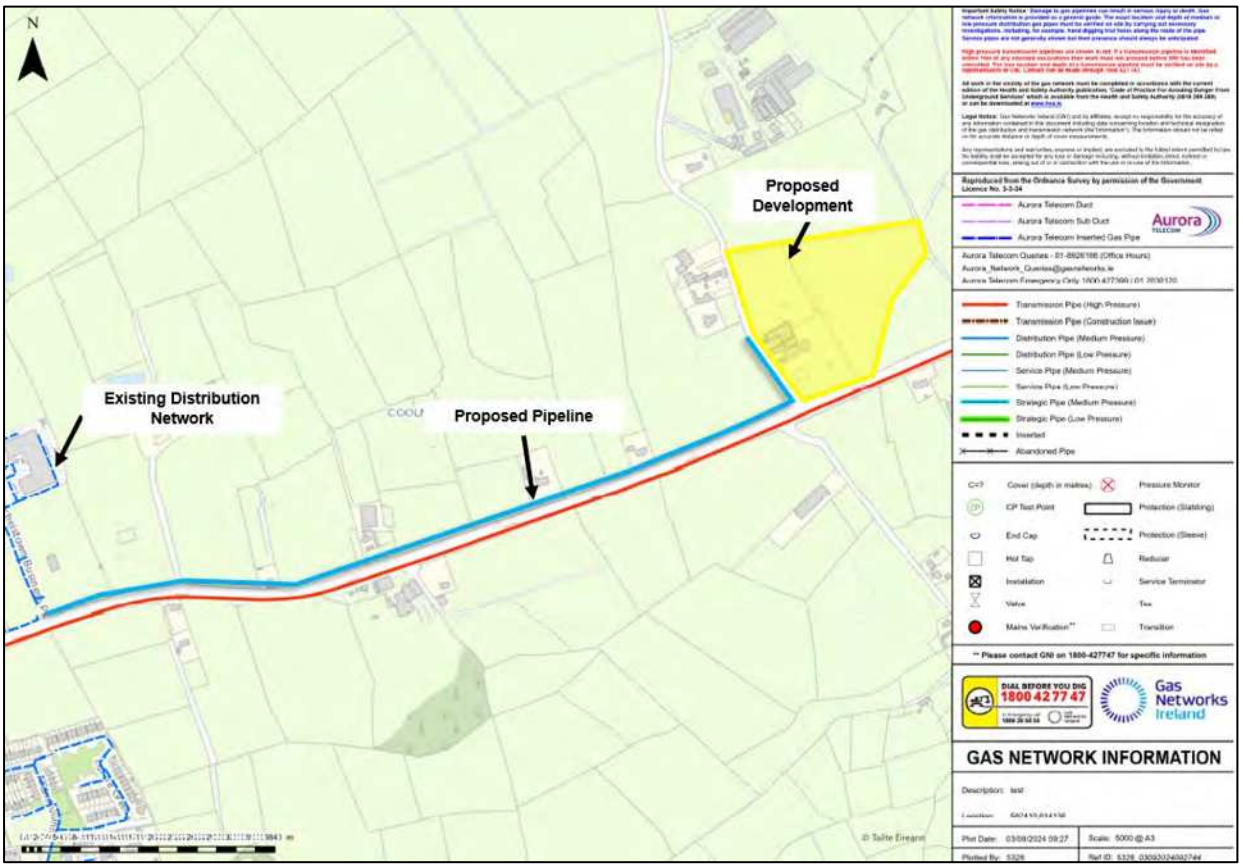

Figure 14.4: Existing gas network infrastructure & proposed pipeline route from the Proposed Development

14.4.8 Electricity Network

There is currently a Medium Voltage (MV) (10KV/20KV) main line network, predominantly situated on the western side of the site, with overhead lines branching off in north, east, south and western directions from the site from northwest to southeast.

There is also a LV (400V/230V) overhead line which is located to the northeast corner of the site.

To facilitate construction of the proposed development, the existing overhead lines to the west

of the site will require relocation. Consultation with ESB will be required to facilitate the works prior to construction.

An ESB substation will be installed within the proposed development. The substation will be designed and constructed in accordance with published ESB standard details and subject to ESB certification. A transformer will be incorporated into the substation to convert imported high voltage electricity to low voltage for use on site. Consultation with ESB is underway and a grid connection application has been submitted.

The site 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.

An ESB substation will be installed within the boundary of the site. The substation will be designed and constructed in accordance with published ESB standard details and subject to ESB certification. A transformer will be incorporated into the substation to convert imported high voltage electricity to low voltage for use on site. Consultation with ESB is underway and a grid connection application has been submitted.

See **Figure 14.5** below for an overview of the existing Electricity Network in the Corracunna area.

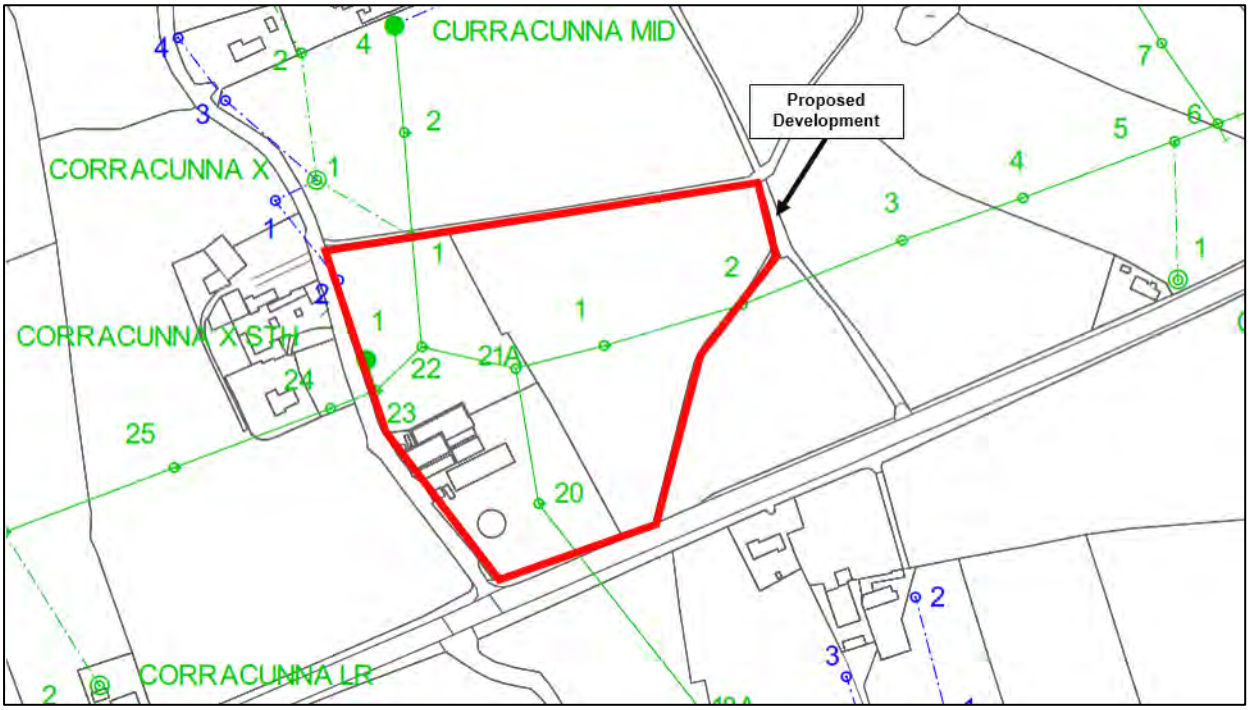

Figure 14.5: Existing Electricity Network (ESB). Medium Voltage (MV) (10KV/20KV) main overhead line indicated in green.

14.4.9 Telecommunications Infrastructure

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

At present, telecommunication lines run along the N73 along the access point and the along the L90813 to the west of the Proposed Development. **Figure 14.6** below shows the overview

of the existing telecommunication network and its proximity to the Proposed Development.

Figure 14.6: Existing telecommunication network (blue lines) within site and surrounds (Eir). Proposed Development indicated in red.

14.4.10 Municipal Waste

There will be a number of waste streams generated during the construction phase of this project. These waste streams and 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.

Given the nature and scale of Proposed Development, significant volumes of waste during the operational phase are not anticipated. It is proposed that 10 no. full-time staff will occupy the premises once operational. Reference was given to British Standard Waste Management in Buildings – Code of Practice (BS 5906:2005) to provide an estimate volume of waste arisings during the operational phase. Assuming a volume of 50l of waste arising per employee per week, it is estimated that weekly waste arisings will equate to approximately 300l per week.

14.5 Likely Significant Impacts

The assessment focuses on predicted effects in relation to the Material Assets.

Based on the dataset obtained during the desk study, and evidence collected, the following risk assessment has been carried out. The assessment relates to effects occurring during both the construction and operational phases of the development.

This is provided with reference to both the characteristics of the receiving environment and the characteristics of the Proposed Development while also making references to the magnitude and intensity, duration, and probability of the impacts.

An impact assessment addresses direct, indirect, secondary, cumulative, short, medium, and long-term, temporary, permanent, positive, and negative effects as well as impact interactions.

14.5.1 Construction Phase

Potential construction phase effects are considered in detail below and summarised in **Table 14.1**.

Roads Infrastructure

During the construction phase, deliveries and construction personnel will access the site on a daily basis. The arrivals and departures are expected to be spread out throughout the day; however, it is expected that they will be arranged in a manner to avoid traffic peak hours in the surrounding road network.

The construction will operate within Cork City and County Council's recommended hours, which are from 08:00 to 18:00 from Monday to Friday and between 08:00 to 14:00 on Saturdays. No works shall be carried out on Sundays and public holidays or outside the aforementioned hours.

Construction traffic associated with the Proposed Development will include:

- Construction personnel accessing the site by private vehicles and vans
- 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 8 no. to 10 no. construction personnel to be at the site at the same time and the deliveries to be arranged during off-peak hours.

Haul routes for construction traffic are to be agreed upon with Cork City and County Council during the preparation of the Construction Traffic Management Plan (CTMP).

L90813

The L90813 local access road accessing the Proposed Development will be impacted by an increased flow on construction-related traffic.

Installation of a passing bay will require the implementation of traffic management measures along the L90813.

In the absence of mitigation, as a result of these works there is potential for there to be **negative, slight to moderate, temporary** impacts on the L56391 during the construction phase

N73

Establishing the pipeline connection to the existing gas network will require the implementation of temporary traffic management measures along.

In the absence of mitigation, as a result of these works there is potential for there to be ***neutral, slight*** and ***temporary*** impacts on the N73 during the construction phase.

Installation of Gas Pipeline

The proposed pipeline will be owned, installed and operated by Gas Networks Ireland. All works proposed on the existing and proposed gas pipelines will be carried out by GNI under their statutory powers and completed in accordance with Standard I.S. 328 2021 Gas transmission – Pipelines and pipeline installations.

In the absence of mitigation, as a result of these works there is potential for there to be ***negative, slight*** and ***temporary*** impacts on the N73 primarily as well as the L90813 as a result of traffic management measures during the installation of the pipeline during the construction phase**.**

The effect on traffic and transport is assessed in further detail in **Chapter 12: Traffic and Transport**.

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 to cater for the foul water arising from staff facilities on-site only (Population Equivalent 'PE' of 2). A Site Suitability Assessment conducted by Bolger-Hynes Architectural Design in line with the EPA Code of Practice for onsite domestic wastewater treatment systems (2022) has concluded that the soils at the Proposed Development have sufficient absorption capacity for the installation of a percolation area suited for this PE.

The sizing of the proposed packaged wastewater treatment plant shall be minimum of 2Pe @150l/day = 300l/day + 2,000 litres = 2,300l (minimum) rounded up to a 3m3 tank.

The overburden is determined to be 'suitable for percolation purposes' and available to support Groundwater Protection Responses (GWPR). The wastewater treatment plant will comprise a secondary treatment system (septic tank), followed by a percolation area.

The total required length of percolation shall be 72.0m. The maximum run per trench length shall be 18.0m with 4no. trenches. There shall be an air vent upstand attached at the end of each percolation pipe run the width of each percolation trench shall be 0.5m. There shall be a gradient of 1 :200 for each percolation pipe.

Testing and assessment have been carried out in accordance with the requirements of EPA Code of Practice Wastewater Treatment Manuals Treatment Systems for Single Houses (p.e.< 10)

It is concluded that impacts on the local foul water network during the construction phase is ***neutral, slight*****,** and ***temporary***.

Surface Water Network

Impacts that may arise as a result of construction works include;

- Increased runoff and sediment loading reaching surface water receptors.
- Accidental spillages of harmful substances such as fuels, oil, chemicals and cement and subsequent migration to surface water receptors.

If best practice is not adhered to, there is the possibility of increased surface water runoff and sediment loading particularly during periods of heavy rainfall that may impact the local surface water receptors (Refer to **Chapter 8** for further details).

In the absence of mitigation, as a result of these works there is potential for there to be ***negative, slight,*** and ***temporary*** impacts on the local surface water network.

Public Water Network

The water requirements for the Proposed Development will be met as follows:

Fire-water: Fire-fighting water will be stored in an underground tank. The tank will be fed by run-off from roofs.

Potable Water: Potable water will be taken from a connection to an existing watermain in the public road. The potable water demand is estimated to be 700 litres/day (IW Code of Practice for Wastewater Infrastructure).

Any other water, for example wash water, will be supplied from rainwater harvesting or from treated process water. This water will go through UV treatment before storage and use.

In the absence of mitigation, as a result of these works there is potential for there to be ***negative, slight,*** and ***brief*** impacts to the public water network supply during the construction phase.

Gas Infrastructure

Biomethane will be supplied to the existing gas network via the Grid Injection Unit (GIU) and a new gas pipeline connecting to the existing medium pressure distribution gas pipeline located to the west of the Proposed Development, at Coolnanave, Co. Cork. The GIU will be owned and operated by Gas Networks Ireland. There may be a brief disruption to the local gas supply to facilitate the connection works during the construction phase.

All works proposed on the existing and proposed gas pipelines will be carried out by GNI under their statutory powers and completed in accordance with Standard I.S. 328 2021 Gas transmission – Pipelines and pipeline installations.

In the absence of mitigation, as a result of these works there is potential for there to be ***negative, slight,*** and ***brief*** impacts on the gas supply network during the construction phase.

Electricity Network

Power supply for plant and machinery during the construction phase will be predominantly supplied by generators onsite. An ESB substation will be installed onsite for use during the operational stage. There may be partial disruption to the existing electricity network as connection to the grid via the substation is established.

In the absence of mitigation, as a result of these works there is potential for there to be ***negative, slight,*** *and* ***temporary*** impacts to the local electricity network during the construction phase.

Telecommunications

Fixed services telecommunication will not be operational during the construction phase.

Potential loss of connection to the telecommunications infrastructure while carrying out works to extend the existing network to service the proposed development could occur.

In the absence of mitigation, as a result of these works there is potential for there to be ***negative, slight,*** and ***brief,*** impacts on the telecommunication network during the construction phase.

Municipal Waste

The proposed development will generate a range of non-hazardous and hazardous waste materials during site excavation and construction. General housekeeping and packaging will also generate waste materials, as well as typical municipal wastes generated by construction employees, including food waste.

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 at the Development Site and in adjacent areas.

In the absence of mitigation, as a result of these works there is potential for there to be ***negative, slight,*** and ***temporary*** impacts to the local waste infrastructure during the construction phase.

Summary of Construction Phase Effects

Table 14.1: Construction Phase Effects (Unmitigated)

Asset	Potential Environmental Effects	Quality	Significance	Duration
Roads Infrastructure	Increased flow of construction-related traffic. Installation of the passing bay will require the implementation of temporary traffic management measures along the L90813 Establishing the pipeline connection to the existing gas network will require the implementation of temporary traffic management measures along the N73.	**Neutral to Negative**	**Slight**	**Brief to Temporary**
Foul Water Network	During the construction phase, welfare facilities for staff will be supplied via portable toilets and waste collected and tankered offsite.	**Neutral**	**Slight**	**Temporary**

	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.			
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**
Public Water Network	Disruption to existing network while establishing connection.	**Negative**	**Slight**	**Brief**
Gas Infrastructure	Disruption to existing network while establishing connection.	**Negative**	**Slight**	**Temporary**
Electricity Network	Power supply for plant and machinery during the construction phase will be predominantly supplied by generators onsite. Relocation of existing overhead power lines, to be managed by ESB networks. Temporary disruption to the local power supply may occur while relocation is completed.	**Negative**	**Slight**	**Temporary**
Telecommunications	Disruption to existing network while establishing connection.	**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**

14.5.2 Operational Phase

Potential operational phase effects are considered in detail below and summarised in **Table 14.2.**

Roads Infrastructure

It is proposed that a passing bay be constructed along the L90813 local road adjoining the N73 national road which will provide more efficient passage of vehicles during the operational phase.

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.

This will improve the degree of safety for all road users once established. As a result of these works, the movement of traffic will be more efficient when compared to the existing infrastructure.

As a result of these works there is potential for there to be ***positive, slight,*** and ***long-term*** impacts on the Road Infrastructure during the operational stage.

Foul Water Network

Connection to the public foul water network will not be required during the operational phase. The Proposed Development will have 5 workers on site each day with normal loadings of 30l/day and BOD of 20g/day. The wastewater from the toilet and canteen will be treated using a proprietary system as recommended in Site Suitability Assessment.

Testing and assessment have been carried in accordance with the requirements of EPA Code of Practice Wastewater Treatment Manuals Treatment Systems for Single Houses (p.e.< 10).

As a result of these works there is potential for there to be ***neutral, imperceptible,*** and ***long-term*** impacts to the foul water network.

Surface Water Network

The Proposed Development will comprise two separate drainage networks:

- Run-off from the buildings and yards in the facility will be collected in a sealed pipe network which will discharge to the watercourse;

- Rain falling on the bunded area will be collected in a sperate 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 facility.

SUDs Regime - Quantity

Discharge Rate

Subsoils are unsuited to infiltration of all surface water run-off and so it will be necessary to discharge surface water run-off to an outfall.

The rate of discharge to the stream will be restricted to a maximum permissible rate of 12.8 lit/sec. 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.

Storage of Attenuated Surface Water

The restriction on discharge will attenuate surface water run-off within the Site when the run-off from the Proposed Development exceeds the discharge rate.

This attenuated water will be stored temporarily in an Attenuation Pond located in a grassed landscaped area close to the receiving watercourse

During the operational phase, it should be noted that a risk of spillage / leakage is posed as a result of vehicle movements while carrying materials such as biobased fertiliser or feedstocks. Should spillage occur, surface water receptors may be impacted.

Taking the proposed surface water management systems into consideration, in the absence of mitigation there is potential for there to be ***negative, slight,*** and ***long-term*** impacts to the surrounding surface water network.

Public Water Network

All potable water will be extracted from public water network. Water usage during the operational phase will be largely limited for domestic use. Any other water, for example wash water, will be supplied from rainwater harvesting or from treated process water. This water will go through UV treatment before use and storage. As such, water use from the public water network will be minimal during the operational phase.

As a result of these works there is potential for there to be ***negligible, slight,*** and ***long-term*** impacts to demand on the public water network.

Gas Infrastructure

During the operation phase, biomethane will be supplied to the existing gas network via the Grid Injection Unit (GIU) and a pipeline connecting the site to the existing medium pressure distribution gas pipeline located to the west of the Proposed Development, at Coolnanave, Co. Cork.

The GIU comprises equipment which will ensure that the biomethane is compliant with all necessary standards and regulations before it enters the gas network.

Based on the feedstock composition and design operating capacity, it is projected that the Proposed Development will produce 810-960 Nm^3 of biomethane per hour, to be supplied to the existing gas network.

As a result, there will be ***positive, significant,*** and ***long-term*** impacts on gas infrastructure.

Electricity Network

Power will be produced on site by CHP generation and solar PV panels to supply the daily operation of the Proposed Development. 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.

As a result of these works there is potential for there to be ***negative, slight,*** and ***long-term*** impacts on the electricity network during the operational phase.

Telecommunications

Fixed services telecommunication will be required during the operational phase of this project. There will be an office/canteen/lab onsite that will require use of this asset. Connection to the existing telecommunications network to the south of the site will be established during the construction phase. The impact from the operational phase will see an increase in demand on the local telecommunications network. It is not envisaged that demand on the telecommunications network will be significant.

As a result of these works there is potential for there to be ***negative, slight,*** and ***long-term*** impacts.

Municipal Waste

It is proposed that 5 no. full-time staff will occupy the premises once operational. Reference was given to British Standard Waste Management in Buildings – Code of Practice (BS 5906:2005) to provide an estimate volume of waste arisings during the operational phase. Assuming a volume of 50l of waste arising per employee per week, it is estimated that weekly waste arisings will equate to approximately 250l per week.

Waste contractors will be required to service the Proposed Development on a regular basis to remove waste. It is essential that all waste materials are dealt with in accordance with regional and national legislation.

As a result of these works there is potential for there to be ***negative, slight, long-term*** impacts on Municipal Waste infrastructure.

Summary of Operational Phase Effects

Table 14.2: Operational Phase Effects (Unmitigated)

Asset	Potential Environmental Effects	Quality	Significance	Duration
Roads Infrastructure	A passing bay constructed along the L9081 local road adjoining the N73 national road which will provide more efficient passage of vehicles during the operational phase. As a result of these works, the movement of traffic will be more efficient when compared to the existing infrastructure.	**Positive**	**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.	**Neutral**	**Imperceptible**	**Long-Term**
Surface Water Network	Establishment of clearly defined work areas which can be monitored and isolated if required, for example, the bunded area. Run-off from the buildings and yards in the facility will be collected in a sealed pipe network which will discharge to the watercourse. Rain falling on the bunded area will be collected in a sperate sealed drainage network and discharged to a sump, from which it will be pumped to the surface water drainage system	**Negative**	**Slight**	**Long-term**

	for the remaining areas of the facility. Subsoils are unsuited to infiltration of all surface water run-off and so it will be necessary to discharge surface water run-off to an outfall. 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 supplied to the existing gas network via the Grid Injection Unit (GIU) and a pipeline connecting the site to the existing medium pressure distribution gas pipeline located to the west of the Proposed Development. 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 810-960 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.	**Negative**	**Slight**	**Long-Term**
Telecommunications	Increased demand on existing network.	**Negative**	**Slight**	**Long-Term**
Municipal Waste	Increased waste production of ca. 300l per week. Increased demand on waste collection services.	**Negative**	**Slight**	**Long-Term**

14.6 Mitigation Measures

14.6.1 Construction Stage

Mitigation measures proposed in this section relate primarily to the prevention and mitigation of negative impacts to the surrounding environment during construction of the Proposed Development. A Construction Environmental Management Plan (CEMP) will be prepared and implemented by the Contractor during the construction phase. This document will outline best practice and site-specific mitigation measures to minimise disruption and impacts to receptors. Typical mitigation measures that are incorporated on a project such as this are outlined below.

Roads Infrastructure

Mitigation measures to lessen the impact on the local road network and regulate traffic flows during the construction phase include:

- 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 (gas, telecommunications, water) are established.

Foul Water Network

Mitigation measures to prevent undue impacts to the foul network during the construction phase include:

- 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

Mitigation measures to minimise impacts to the surrounding surface water network and receptors during the construction phase will be included in the site-specific CEMP generated for this development. The primary mitigation measures typically implemented are summarised as follows:

- 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

Potable water will be taken from a connection to an existing watermain in the public road.

Mitigation measures to prevent undue impacts to the public network during the construction phase include:

- Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and the aquifer.
- Consultation with Irish Water be undertaken prior to works on the existing public water network and notification given to local population.

Gas Infrastructure

Mitigation measures to prevent undue impact to the existing gas network during the construction phase include:

- All works to the existing and proposed gas pipelines will be carried out by GNI in accordance with Standard I.S. 328 2021 Gas transmission – Pipelines and pipeline installations.

Electricity Network

Mitigation measures to prevent undue impact to the existing electricity network during the construction phase include:

- 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 Infrastructure

Mitigation measures to prevent undue impact to the existing telecommunications network during the construction phase include:

- 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 telecommunications outages that may occur.

Municipal Waste

Mitigation measures to improve waste management practices and prevent excessive waste generation during the construction phase include:

- 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.
- 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.

14.6.2 Operational Stage

Mitigation measures proposed in this section relate primarily to the preservation and protection of the existing Material Assets near the Proposed Development. An Environmental Management System (EMS) to ISO 14001 standard 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 the environment.

Having regard to current law and practice, the Proposed Development will require an application for an Industrial Emissions (IE) licence to the EPA. In the event of a grant of licence by the EPA to carry out activities that require such licence, it is expected that the licence will contain several conditions which the operator must remain in compliance with for the entire duration of the Anaerobic Digestion Facility's lifespan. Typical conditions relating to environmental management include:

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

Mitigation measures aimed at minimising impacts to the Material Assets outlined above during the operational phase are listed below.

Roads Infrastructure

The operational phase of the development will generate a maximum of 42 vehicles a day, where 24 are HGVs and 5 are private vehicles and vans. The additional vehicles will represent a maximum of 3.5% increase in traffic and will not generate increased queues or delays along the road network in the vicinity of the site, therefore, no mitigation measures are proposed for the operational phase of the development.

Strong lines of communication with hauliers, strict delivery schedules and just-in-time delivery methods will be in operation to ensure no more than two trucks will visit the site at any one time.

Foul Water Network

Mitigation measures to prevent undue impacts to the foul network during the operational phase include:

- 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

Surface water drainage measures onsite will be constructed in accordance with SUDs standards. Mitigation measures to ensure adequate usage of the surface water network during the operational phase include:

- 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

Potable water will be taken from a connection to an existing watermain in the public road.

Mitigation measures for protection of the public water network are summarised as follows:

- Wash water will be supplied from rainwater harvesting or from treated process water. This water will undergo UV treatment and reverse osmosis prior to storage and use.

Gas Infrastructure

Mitigation measures to prevent undue impact to the existing gas network during the operational phase include:

- The GUI and gas connection pipeline will be installed and maintained by Gas Networks Ireland. All works to the existing and proposed gas pipelines will be carried out by GNI in accordance with Standard I.S. 328 2021 Gas transmission – Pipelines and pipeline installations.

Electricity Network

Mitigation measures to prevent undue impact to the existing electricity network during the operational phase include:

- 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 due to increased demand on the existing network is unavoidable.

Municipal Waste

Mitigation measures to improve waste management and prevent excessive waste generation during the operational phase include:

- 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 waste collection permit holder and disposed of at a facility licenced to take said waste.
- Maintain good waste records onsite to ensure all waste is accounted for.

14.6.3 Do Nothing Scenario

If the Proposed Development does not proceed there will be no additional impact on the local Material Assets. The rate of demand on the road infrastructure, electrical, public water, foul water, surface water, and telecommunication networks would remain unchanged.

Under the 'Do Nothing' scenario there would be no change to the current land use of the site.

A breakdown of consequences for each material asset listed in this report is outlined below.

Roads Infrastructure

According to projections outlined in Chapter 12 – Traffic and Transport, traffic flow along the N73 national road will increase in coming years. Under the 'Do Nothing' scenario, traffic volume and flow would increase at the N73/L90813 Junction.

Foul Water Network

Under the 'Do Nothing' scenario, there would be no further impacts on the local foul water network.

Surface Water Network

Under the 'Do Nothing' scenario, there would be no further impacts on the local surface water network. Surface water outflows from the site would remain at existing greenfield runoff rates.

Public Water Network

Under the 'Do Nothing' scenario, there would be no further impacts on the local public water network.

Gas Infrastructure

Under the 'Do Nothing' scenario, an opportunity to supply the national gas grid with a renewable source of biogas will be missed.

Electricity Network

Under the 'Do Nothing' scenario, there would be no further impacts on the local electricity network. The site would remain as greenfield and the need for a connection to the national power grid would not be required.

Telecommunications Network

Under the 'Do Nothing' scenario, there would be no further impacts on the local telecommunications network. Proposed connection to the telecommunications network would not be required and slight negative impacts to the network would not be established.

Municipal Waste

Under the 'Do Nothing' scenario, waste generated by the site would remain at existing levels. The slight negative impacts to local waste infrastructure associated with the Proposed Development would not be established.

14.7 Cumulative Effects

Within the European Commission - Guidelines for the Assessment of Indirect and Cumulative effects as well as Impact Interactions, dated May 1999, cumulative effects are described as "effects" that result from incremental changes caused by other development, plans, or projects together with the Proposed Development or developments".

The cumulative effects of the proposed construction and operation of an Anaerobic Digestion Facility at Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork with other developments in the area is reviewed in this section with specific regard to the local Material Assets.

The site is situated on land zoned as part of a Greenbelt surrounding Mitchelstown approximately 2.0km northeast of the town, in a rural area with limited transport infrastructure in place. According to the Cork County Council Planning records, two approved developments (PA 23/4963 and PA 19/6089) will utilise the road network near the Proposed Development, but no significant cumulative traffic impacts are anticipated.

Material Assets are linked with multiple chapters outlined in this EIAR.

Material Assets are linked with Biodiversity as discussed in Chapter 5. Implementation of successful surface water mitigation measures onsite will ensure the likelihood and consequence of environmental incidents that could impact downstream habitats. As there is an extensive downstream distance between the Proposed Development and the protected sites, it is considered that, even in the absence of mitigation, significant effects will not arise.

Material Assets are linked with Populations and Human Health as discussed in Chapter 6. Links between these chapters mainly relate to onsite resource and waste management. Implementing rigorous waste management and cleaning protocols onsite will ensure that hygiene is maintained across site and the risk of vermin infestation is minimal.

Material Assets are linked with Hydrology and Hydrogeology as discussed in Chapter 8. The proposed foul, surface, and public water infrastructure comprising part of the Proposed Development will lead to potential impacts on the surrounding networks.

Material Assets are linked with Traffic and Transport as discussed in Chapter 12. There are no proposed improvements to the public road network surrounding the site. Strict lines of communications and adherence to traffic management will ensure regular traffic flows along the L90813, N73 and connecting roads.

14.7.1 Potential Cumulative Impacts

Construction Phase

The construction phase of the project will involve an increased demand on the existing waste infrastructure, road infrastructure, public water network and surface water network. The mitigation measures outlined in the CEMP and above should be applied throughout the construction phase of the Proposed Development. This will ensure any significant cumulative impacts on Material Assets and the greater environment are prevented.

Operational Phase

The major cumulative impacts of significance on the Material Assets for the operational phase of the Proposed Development are mainly from an increased demand on services such as the road infrastructure/traffic, telecommunications network, and surface water network.

The mitigation measures outlined in this report will ensure that cumulative impacts on Material Assets arising during the operational phase are minimised.

14.8 Residual Effects

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 effects on the surrounding Material Assets.

The purpose of this assessment is to specify mitigation measures where appropriate to minimise the ‘risk factor’ to all aspects of the Material Assets and surrounding environment such as to minimise the potential damage to the existing networks during excavation, reduce the overall demand on the systems by promoting sustainable use of resources, 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.

Construction Phase

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 to the surrounding environment.

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 14.3**.

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 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 14.4**.

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***.

Table 14.3: Summary of predicted construction phase impacts, mitigation measures and residual impacts.

Potential Source	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Roads Infrastructure	Increased flow of construction-related traffic. Creation of 1 no. passing pay will require the implementation of traffic management measures along the L90813. Establishing the pipeline connection to the existing gas network will require the implementation of temporary traffic management measures along the N73.	**Negative**	**Slight to Moderate**	**Temporary**	• 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 to underground services (gas, telecommunications, water) are established.	***Negligible, Imperceptible, 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**	• 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.	***Negligible, Imperceptible, Temporary***
Surface Water Network	Contaminated runoff reaching surface water receptors. Spillage of contaminants such as fuels, oils, chemicals, and cement material and	**Negative**	**Slight**	**Temporary**	• 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.	***Negligible, Imperceptible, Temporary***

Potential Source	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
	subsequent migration into surface water receptors.				• 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	Disruption to existing network while establishing connection.	**Negative**	**Slight**	**Brief**	• Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and the aquifer. • Consultation with Irish Water be undertaken prior to works on the existing public water network and notification given to local population.	***Negligible, Imperceptible, Brief***
Gas Network	Disruption to existing network while establishing connection.	**Negative**	**Slight**	**Temporary**	• All works to the existing and proposed gas pipelines will be carried out by GNI in accordance with Standard I.S. 328 2021 Gas transmission – Pipelines and pipeline installations.	***Negligible, Slight, Brief***
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. Relocation of existing overhead power lines, to be managed by ESB networks. Temporary disruption to the local power supply may occur	**Negative**	**Slight**	**Temporary**	• 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.	***Negligible, Slight, Brief***

Potential Source	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
	while relocation is completed.					
Telecommunications Network	Disruption to existing network while establishing connection.	**Negative**	**Slight**	**Brief**	• 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 telecommunications outages that may occur.	***Negligible, Imperceptible, 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**	• 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. • 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.	***Negligible, Slight, Temporary***

Table 14.4: Summary of predicted operational phase impacts, mitigation measures and residual impacts.

Potential Source	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Roads Infrastructure	1 no passing bay constructed along the L90813 will provide more efficient passage of vehicles during the operational phase.	**Positive**	**Slight**	**Long-Term**	• The increase in traffic will not generate increased queues or delays along the road network in the vicinity of the site, therefore, no mitigation measures are proposed for the operational phase of the development.	***Positive, 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.	**Neutral**	**Imperceptible**	**Long-Term**	• 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.	***Neutral, Imperceptible, Long-Term***
Surface Water Network	Establishment of clearly defined work areas which can be monitored and isolated if required, for example, the bunded area. The Proposed Development includes two attenuation ponds which will be used for attenuation of surface water and to control the rate of the discharge from the Proposed Development. Run-off will be channelled through sediment chambers, oil traps, drainage systems and attenuation pond. Leakage / spillage of biobased fertiliser or feedstocks via vehicle movements.	**Negative**	**Slight**	**Long-Term**	• 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. • In the event of a grant of licence by the EPA to carry out activities that require such licence, it is expected that the site will be subject to annual inspections from the EPA which will assess compliance with conditions outlined in any licence. Surface water outflows from the site will be assessed as part of any inspections to ensure emissions from the site are compliant with any license.	***Negligible, Imperceptible, Long-Term***

Potential Source	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
Public Water Network	Potential contamination to the local aquifer Potential risk to human health	**Negligible**	**Slight**	**Long-Term**	• 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.	***Negligible, Imperceptible, Long-Term***
Gas Network	Biomethane will be supplied to the existing gas network via the Grid Injection Unit (GIU) and a pipeline connecting the site to the existing medium pressure distribution gas pipeline located to the west of the Proposed Development. The GIU comprises equipment which will ensure that the biogas is compliant with all necessary standards and regulations before it enters the gas network. It is projected that the Proposed Development will produce 810-960 Nm^3 of biomethane per hour, to be supplied to the existing gas network.	**Positive**	**Significant**	**Long-Term**	• The GUI and gas connection pipeline will be installed and maintained by Gas Networks Ireland. All works to the existing and proposed gas pipelines will be carried out by GNI in accordance with Standard I.S. 328 2021 Gas transmission – Pipelines and pipeline installations.	***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.	**Negative**	**Slight**	**Long-Term**	• 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.	***Neutral, Imperceptible, Long-Term***
Telecommunications Network	Increased demand on existing network.	**Negative**	**Slight**	**Long-Term**	• 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 slight impacts to the existing network is unavoidable.	***Negative, Slight, Long-Term***
Municipal Waste	Increased waste production of *ca.* 300l per week.	**Negative**	**Slight**	**Long-Term**	• Inform staff through toolbox talks/training etc on the relevance and importance of correct waste segregation and management.	***Negligible, Imperceptible, Long-Term***

Potential Source	Impact Description	Quality	Significance	Duration	Mitigation	Residual Impact
	Increased demand on waste collection services.				• 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. • Ensure waste is collected by a registered waste collection permit holder and disposed of at a facility licenced to take said waste. • Maintain good waste records onsite to ensure all waste is accounted for.	

14.9 Monitoring

The Construction Environmental Management Plan (CEMP) will include provision for the monitoring of construction-related activities including the following:

- Water Quality Monitoring of the surface water receptors in the vicinity of the site
- Daily inspections for housekeeping and site cleanliness
- Dust Suppression on dry days or during concrete cutting
- Risk assessment for the prevention of fuel spillages
- Monitoring of stockpiles to determine if further measures are required to prevent erosion
- Daily site inspections to ensure procedures outlined within the CEMP are adhered through throughout the site.

Once completed, the Proposed Development will be subject to annual inspection by the Environmental Protection Agency who will critically assess the site's compliance with the conditions of its IEL. Monitoring of daily activities will be carried out in line with measures outlined in the EMS and IEL.

14.10 Summary of Significant Effects

The receptors for this assessment are considered to be local material assets which includes Roads Infrastructure, Foul, Public, and Surface Water Networks, Gas Network, Electricity Network, Telecommunications Network and Municipal Waste. Whilst the development proposals have the potential to cause significant effects to the Material Assets identified, the recommended mitigation measures will ensure that the risk of potential effects are reduced to **negligible**.

14.11 Statement of Significance

The significance of impact upon all identified Material Assets have been assessed for both during the construction and operational phases. The results of the assessment are presented in **Table 14.3** and **Table 14.4**.

Where a potential impact has been identified, the significance of impact upon these receptors ranges from **slight to significant.**

Where a potential impact has been identified, mitigation measures have been provided which if implemented reduces the impact of significance to **negligible**. The mitigation for the Proposed Development is discussed in **Section 14.6** of this chapter.

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.

All environmental factors are interlinked to a degree such that interrelationships exist on numerous levels. Interactions within the study area can be one-way interactions, two-way interactions and multiple-phase interactions which can be influenced by the proposed development. As this EIAR has been prepared by a number of specialist consultants an important aspect of the EIA process is to ensure that interactions between the various disciplines have been taken into consideration.

Chapters 5 to 14 have described the potentially significant effects posed by the proposed development upon a variety of environmental receptors. Given the complexity of the proposed development, there is the potential for interaction amongst these impacts that may not be perceived when examined individually, hence, it is necessary to consider the relationships between the impacts.

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 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.

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

15.2 Population & Human Health

As referenced throughout the report, there are numerous inter-related environmental topics described in detail throughout this EIAR document which are of relevance to human health. This chapter of the EIAR has been instructed by updated guidance documents reflecting the changes within the 2014 EIA Directive. These documents include the EU and Irish guidelines for preparation of an EIAR and carrying out an EIA. Therefore, in line with the guidance documents referred to, this chapter of the EIAR focuses primarily on the potential likely and significant impact on Population & Human Health in relation to health effects/issues and environmental hazards from the other environmental factors and interactions that potentially may occur.

Where there are identified associated and inter-related potential likely and significant impacts which are more comprehensively addressed elsewhere in this EIAR document, these are referred to.

15.3 Archaeology & Cultural Heritage

No interactions were identified in the Archaeology & Cultural Heritage chapter.

15.4 Biodiversity

There are interactions between this Biodiversity Chapter and those of Hydrology & Hydrogeology (Chapter 8), Land, Soils & Geology (Chapter 7) and Landscape & Visual (Chapter 6).

In terms of land and soils, there is overlap with the biodiversity chapter in that the potential impact of the construction works, through excavation, construction etc., can have an effect on the receiving environment in terms of changes in land use, soil erosion, contamination, or compaction that leads to degradation of soil quality, leading to habitat loss and decreased biodiversity. The mitigation measures in both chapters overlap somewhat as they deal with protecting the receiving environment from the construction works e.g., protecting waterbodies from pollution and sedimentation.

Likewise with hydrology, potential impacts to ecological receptors downstream of the site are considered. Biodiversity interacts with hydrology & hydrogeology in several crucial ways. Hydrology, which involves the distribution and movement of surface water, and hydrogeology, which deals with groundwater, both play pivotal roles in sustaining diverse ecosystems. Again, the potential for the construction phase to impact on receiving waterbodies and ecology in the vicinity of the Site is addressed via the mitigation measures proposed in the EIAR.

In terms of Landscape & Visual, the proposed landscaping of the Site interacts with its biodiversity and ecology; through the changes that will occur to the existing habitats and flora at the Site. The avoidance of *Fraxinus excelsior*, in the planting plan species mix 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. The emphasis on disease resistant, resilient screening trees of native and naturalised provenance which will incorporate alternative climax species to ash will ensure a good addition to the local biodiversity.

15.5 Landscape & Visual Impact

Interactions in respect of the landscape and visual aspects of the proposed development relate to the architectural design of the proposed development and the landscape proposals for the site, as summarised in the design-related mitigation measures in **Section 11.5** of the EIAR.

The landscape proposals also relate to biodiversity on the site, both existing and proposed, in that they seek to protect and conserve habitat of value, most notably, an emphasis on disease resistant, resilient screening trees of native and naturalised provenance which will incorporate alternative climax species to ash will ensure a good addition to the local biodiversity.

15.6 Land, Soils & Geology

The most significant interactions with land, soils & geology is with the hydrology and hydrogeology chapter in terms of water and hydrology. The characteristics and management of land, soils & geology significantly influence both surface water (hydrology) and groundwater (hydrogeology) systems. Due to the inter-relationship between groundwater and surface water the discussed impacts are considered applicable to Chapter 8 (Hydrology & Hydrogeology).

The EIAR identifies how the proposed development might potentially affect the balance between land and soils and water systems. This understanding is crucial for developing effective mitigation strategies to protect soil health and ecosystems and limit adverse environmental impacts to hydrological and hydrogeological receptors.

The mitigation measures that will be put in place at the proposed development will ensure that the impact of the proposed development complies with all surface and groundwater legislative limits.

15.7 Hydrology and Hydrogeology

The most significant interactions with hydrogeology and surface water are with land, soils & geology and population & human health. Due to the inter-relationship between groundwater and surface water the discussed impacts are considered applicable to Chapter 7 (Land and Soils).

Again, the EIAR identifies how the proposed development might potentially affect the balance between land and soils and water systems. This understanding is crucial for developing effective mitigation strategies to protect water quality, manage water resources sustainably, and prevent adverse environmental impacts to underlying soils.

Hydrology and Hydrogeology also interacts with Biodiversity (chapter 5). With the successful implementation of adequate mitigation measures potential hazards will be managed and the likelihood of environmental incidents occurring is low. Any potential impacts are therefore resolved or minimised.

The mitigation measures that will be put in place at the proposed development will ensure that the impact of the proposed development complies with all surface and groundwater legislative limits.

15.8 Air, Odour & Climate

Air quality does not have a significant number of interactions with other topics. The most significant interactions are with population & human health. In an EIAR, chapters focusing on various environmental factors must closely interact with those addressing air quality and climate to ensure a thorough evaluation. Air quality is influenced by emissions from the proposed development, which can stem from construction activities, transportation, and operational processes.

An adverse impact due to air quality in either the demolition, construction or operational phase has the potential to cause health and dust nuisance issues. The mitigation measures that will be put in place at the proposed development will ensure that the impact of the proposed development complies with all ambient air quality legislative limits.

Interactions between air quality and traffic can be significant. With increased traffic movements and reduced engine efficiency, i.e. due to congestion, the emissions of vehicles increase. The impacts of the proposed development on air quality are assessed by reviewing the change in annual average daily traffic on roads close to the site.

In an EIAR, the interactions between biodiversity, air quality and climate are crucial considerations for understanding ecosystem health and resilience. Biodiversity, encompassing a variety of plant and animal species, plays a vital role in maintaining air quality by influencing oxygen production, carbon sequestration, and pollutant filtration. Healthy ecosystems help regulate local air quality by absorbing pollutants and releasing oxygen through photosynthesis, thereby mitigating the impacts of human activities on air pollution.

With the appropriate mitigation measures to prevent fugitive dust emissions, it is predicted that there will be no significant interactions between air quality and land, soils & geology. No other significant interactions with air quality have been identified.

15.9 Noise and Vibration

Noise and vibration interact significantly with other environmental factors to assess potential impacts and propose mitigation measures. Noise assessments consider sources such as transportation, industrial activities, and construction activities associated with the proposed development. They evaluate potential impacts on communities, wildlife, and sensitive receptors.

The chapter's most interlinked with noise and vibration assessments include Population & Human Health (Chapter 6), Traffic & Transport (Chapter 12) and Biodiversity (Chapter 5).

In compiling this impact assessment, reference has been made to the project description provided by the project co-ordinators, project drawings provided by the project architects and traffic flow projections associated with the development provided by the traffic consultants. There is also an impact interaction with human health, which has informed Chapter 6 of this EIAR - Population & Human Health.

15.10 Material Assets

Interactions between Material Assets and other environmental topics are outlined throughout this EIAR document. The material assets chapter interacts closely with various other chapters to comprehensively evaluate their impact and propose mitigation measures.

The Material Asset chapter assess how proposed developments may affect material assets through construction activities, changes in land use, and operational impacts. Interaction with chapters on socio-economic factors is crucial to understand the implications on local economies, employment, and community services.

Material Assets is linked with Biodiversity as discussed in Chapter 5. Implementation of successful surface water mitigation measures onsite will ensure the likelihood and consequence of environmental incidents that could impact protected sites downstream of the River Funshion and the River Blackwater.

Material Assets interacts with Population & Human Health (Chapter 6). Links between these chapters mainly relate to onsite resource and waste management. Implementing rigorous waste management and cleaning protocols onsite will ensure that hygiene is maintained across site and the risk of vermin infestation is reduced.

Material Assets interacts with Hydrology and Hydrogeology (Chapter 8). The proposed foul, surface water, and public water infrastructure comprising part of the Proposed Development will lead to potential impacts on the surrounding networks.

Material Assets interacts with Traffic and Transport (Chapter 12). The proposed construction and operational phase of the development will generate a minimal impact on the road network in the vicinity of the site. The proposed mitigation measures proposed will also help reduce or eliminate any potential impact associated with the proposal. The proposal, off the L90813 Local Road, close to the N73 National Road, is located in an 100km/h speed limit zone and the narrow road width of the L90813 will not give rise to potential hazards, on the other hand, will reduce traffic speeds and increase road safety benefits.

15.11 Conclusion

This chapter has summarised and addressed the interactions between environmental topics as discussed within the preceding chapters of the EIAR.

The purpose of this chapter of the EIAR is to draw attention to significant interaction and interrelationships in the existing environment.

In preparing and co-ordinating this EIAR, ORS ensured collaboration between the specialist consultants who in turn dealt with the likely interactions between effects predicted as a result of the proposed development, ensuring that appropriate mitigation measures were incorporated into the design process where relevant.

By addressing these interactions comprehensively, this EIAR not only meets regulatory requirements but also strives to promote sustainable development practices that safeguard natural resources and limit adverse effects from the proposed development to the receiving environment.

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 outline in **Table 16.1**, and measures proposed during the operational phase are presented in **Table 16.2** below.

16.2 Construction Phase

Table 16.1: Mitigation and monitoring (Construction Phase)

EIAR Chapter No.	Mitigation Ref.	EIAR Section Ref	Description of Mitigation/Monitoring measure
Ch 5 Biodiversity **(Pre Construction)**	**BIO 1**	**5.13.2**	**Impacts to existing site biodiversity post construction commencing** Site preparation and construction must be confined to the Proposed Development site only and it must adhere to all the mitigation measures outlined in the Biodiversity chapter. Work Areas should be kept to the minimum area required to carry out the propsed works and this area should be clearly marked out in advance of the poposed works

	BIO 2	**5.13.2**	**Water Quality of the Funshion River and tribuatary within the site.** **T**he site engineer and the contractors must be made aware of the ecological sensitivity of the Proposed Development site and its connection to the River Funshion and its tribuatry within the site. They must be made familiar with the mitigation measures outlined in the Biodiversity Chapter and a signed statement saying that they have taken on board the mitigation measures contained herein should be presented to the local authority along with the Notice of Commencement. The applicant will be responsible for alerting the engineers and contractors to the sensitivity of the habitats and water receptors surrounding the Proposed Development site. This will be done prior to the commencement of any site works.

	BIO 3	**5.13.3**	**Impacts on existing Terrestrial Habitats & Features** In accordance with the policies and objectives of the Regional and County Development Plans, the existing green infrastructure (GI) of the Proposed Development site, i.e., the treelines and hedgerows, must be incorporated into the development. In order to prevent damage to treelines / hedgerows in the Proposed Development site that are to be retained, then protective barrier fencing should be erected at a minimum 2m out from these boundaries to protect these features prior to the commencement of site clearance works. There must be no dumping or storage of construction waste or machinery in this zone during construction. Any small tree or shrubs that require removal should be removed outside of the bird nesting season (March – August). This includes removal of vegetation along the proposed discharge pipeline route. Unnecessary clearance of vegetation should be avoided and only areas necessary for building works should be cleared. All existing grassland habitats within 10m of the watercourse within the site should be retained. The retention of these areas will also help retain storm water run-off from the site during construction and operation.

CH 4 Biodiversity **(During Construction)**	**BIO 4**	**5.13.4.1**	**Water quality in the River Funshion which is upstream of the Blackwater River (Cork / Waterford) SAC and the Blackwater Callows SPA.** Adhereance to the following best practice documents: Construction Industry Research and Information Association (CIRIA) (2005) Environmental Good Practice on Site (C692). Construction Industry Research and Information Association (2001) Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532). Construction Industry Research and Information Association (2000) Environmental Handbook for Building and Civil Engineering Projects (C512). Environmental Protection Agency (2015) List of Waste and Determining if Waste isHazardous or Non-Hazardous. Environment Agency et al. (2015) Guidance on the Classification and Assessment of Waste, Technical Guidance WM3.

			Works should be avoided during periods of heavy rainfall. There must be no uncontrolled discharges of contaminated waters to ground or surface waters from this development, either during the construction or operation of the development. The control and management of hydrocarbons on site will be vital to prevent deteriorations in surface and groundwater quality locally. During construction re-fuelling of equipment and machinery must be done off site. If this is not possible, then a dedicated re-fuelling location must be established on site in the compound area away from ground clearance or rock-breaking activities. Spill kits stations must be provided at the fuelling location for the duration of the works. Staff must be provided with training on spill control and the use of spill kits. All fuel storage containers must be appropriately bunded, roofed and protected from vehicle movements. These bunds will provide added protection in the event of a flood event on site.

			All chemicals must be stored as per manufacturer's instructions. A dedicated chemical store within a building must be provided on site if chemicals are to be stored on site. Procedures and contingency plans must be established on site to address cleaning up small spillages as well as dealing with an emergency incident. A stock of absorbent materials such as sand, spill granules, absorbent pads and booms should be kept on site, on plant working near the water and at the refuelling area. Daily plant inspections will be completed by all plant operators on site to ensure that all plant is maintained in good working order. Where leaks are noted on these inspection sheets, the applicant must remove the plant from operations for repairs.
			All personnel shall observe standard precautions for handling of materials as outlined in the Safety Data Sheets (SDS) for each material, including the use of PPE. Where conditions warrant, emergency spill containment supplies should be available for immediate use. Best practice concrete / aggregate management measures must also be employed on site during construction.

			It is important that run-off from the construction works does not enter the watercourse that is within the site. Therefore, it is recommended that silt fences are installed along the buffer zones of this watercourse. The silt fences should be sturdy and constructed of a suitable geotextile membrane (Hy-Tex Terrastop Premium silt fence, or similar) to ensure that water can pass through, but that silt will be retained. The silt fences must be capable of preventing particles of 425mm from passing though. The footing of the fencing to be buried into the ground and the visible fencing to be ca. 0.5m high.
			An interceptor trench will be required in front of this silt fence. The silt fences should be monitored daily to ensure that they remain functional throughout the construction of the Proposed Development. Maintenance of the fences should be carried out regularly. Fences should be inspected thoroughly after periods of heavy rainfall. 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 removed off-site for treatment. The concrete washout skip is to be located to the east of the site, where the underlying overburden is greater.

			Excavations lined with an impermeable liner are not permitted as concrete washout bays on the site. Large excess loads of concrete are to be returned to the supplier or poured into concrete block modules (Betonblock or similar design), in order to minimise waste and reduce the risk of concrete being dumped throughout site. Best practice in bulk-liquid concrete management should be employed on site, addressing pouring and handling, secure shuttering, adequate curing times etc.
			Stockpile areas for sands and gravel must be kept to a minimum size, well away from drains on site. Where concrete shuttering is used, measures should 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 should be controlled by dampening down the areas. Raw and uncured waste concrete should be disposed of by removal from the site.

	BIO 5	**5.13.4.2**	**Impacts to Funshion River Quality during construction of gas pipeline and discharge pipe** During the laying of the pipeline though the identified lands, works must not take place within 6m of hedgerows and treelines. Where the pipeline must cross over a hedgerow or treeline, then the removal of mature trees must be avoided. Any vegetation removal must be done outside of the bird nesting season. Vegetation removal must be overseen by an ECoW. All guidelines within the document Inland Fisheries Ireland Requirements for the Protection of Fisheries Habitats during Construction and Development Works and River Sites (www.fisheriesireland.ie) and the updated guidelines entitled Guidelines on Protection of Fisheries During Construction Works in And Adjacent to Waters (2016) should be adhered to during the construction of the headwall and they include: Consultation with Inland Fisheries Ireland (IFI) to ensure that the development proceeds with due regard to the provisions of the Fisheries Acts and Habitats Regulations; Consultation with IFI in order to determine the correct timing of works on the site; There should be no in stream works carried out within the streams without prior approval from IFI.

			In order to construct the pipe to allow discharge into the Funshion River, approximately 1-2m of bankside vegetation will have to be cleared. The works should be carried out under the supervision of the ECoW. Works to remove the vegetation should be done by hand and heavy machinery on the banks should be avoided as this could destabilise the riverbank. Prior to the works along the bankside, the proposed outfall location along the riverbank should be inspected by the ECoW to ensure that the works will not disturb any otter holts or bird nests. It is recommended that the inspection is done instream with waders. The inspection should focus on the discharge point plus 5m either side of it. Works on the installation of the pipe from the buffer tank to the Funshion River will utilise the “Mole Plough” installation method. This will limit trenching requirements and reduce the risk of sediment laden run-off. Some trenching will also be required. The trenches must be infilled and stabilised immediately and vegetation along the route restored.
			The timing of installation of the discharge pipe into the Funshion River must be scheduled to ensure no instream works are carried out during the closed season for instream works. (October 1st to June 30th). IFI must be notified prior to works taking place. The timing of works shall be in accordance with to IFI (2016) Guidelines on the Protection of Fisheries during Construction Works in and Adjacent to Water. Works associated with the construction should be supervised by an Ecological Clerk of Works (ECoW). Full details on the construction and installation of the head wall must be detailed in the CEMP.

		5.13.4.3	**Negative biodiversity impacts from Construction Waste and Soil** All construction waste must be removed from site by a registered contractor to a registered site. Evidence of the movement and safe disposal of the construction waste must be retained and presented to the Local Authority upon request. Removal of the construction waste should occur as soon as possible after construction works. There must be no disposal of construction waste or topsoil in any designated site or site of biodiversity value. All topsoil generated from site works should be stored within the Proposed Development site until it is required for landscaping. It must not be stored outside the Proposed Development site boundaries and it must not be used for the infilling of any area outside of the Proposed Development site. If there is more topsoil than is needed for landscaping, it must be removed from site by a registered contractor for appropriate use elsewhere. The end location of the topsoil must be identified and records presented to the local authority if requested.

	BIO 6	**15.13.4.4**	**Prevention of the Spread of Invasive Species** Both Japanese knotweed and Himalayan balsam were recorded along the proposed discharge pipeline route. Himalayan balsam generally spreads by seed, which are propelled large distances from ripened seed heads, whilst knotweed spreads vegetatively through extensive networks of underground rhizomes and vegetative fragments. It is important that prior to construction works, that a full survey of these species along the route is undertaken by an indemnified and qualified invasive species specialist. Balsam can be controlled by hand removal and herbicides. However, knotweed requires specialist assessment for best methods of control. Exclusion zones around the existing knotweed stands might have to be included to ensure that construction works do not disturb the existing root system as this may result in further spread of this species. Machinery hygiene may be also required to ensure that small vegetative particles of knotweed are not transported elsewhere.
	BIO 7	**5.13.4.5**	**Protection of Badger Setts** An active badger sett was recorded close to the proposed route of the discharge pipe at 52.288600, -8.256377. It is vital that this sett is fully protected from all site works. A 30m buffer around the badger sett must be clearly marked out prior to commencement of works. This buffer zone must be inspected and signed off on by an Ecological Clerk of Works prior to commencement of works.

	BIO 8	**5.13.4.6**	**Protection of Bats** The following measures are recommended for the protection of bats within the site: During the construction and operation of the proposed development, general mitigation measures for bats will follow the National Road Authority's 'Guidelines for the Treatment of Bats during the Construction of National Road Schemes' NRA (2005) and the 'Bat Mitigation Guidelines for Ireland: Irish Wildlife Manuals, No. 25' (Kelleher, C. & Marnell, F. (2006)). These documents outline the requirements that should be met in the pre-construction and construction phases of developments to minimise negative impacts on roosting bats or prevent avoidable impacts resulting from significant alterations to the immediate landscape. Lighting near the mature oak tree retained (as well as other retained vegetation) within the site should be avoided.

			Lighting During Construction Construction works will primarily take place during hours of daylight to minimise disturbance to any nocturnal mammal species. Where lighting is required, lighting mitigation measures will follow Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers (Bat Conservation Ireland, 2010). The following measures will be applied in relation to construction works lighting: Lighting will be provided with the minimum luminosity necessary for safety and security purposes. Where possible, lighting will be restricted to the working area and using the cowl and angling noted above, will minimise overspill and shadows on sensitive habitats outside the construction area. During construction, lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the potential impact on retained vegetation within and adjoining the site. Site lighting will typically be provided by tower mounted temporary portable construction floodlights. The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. The following measures will be applied in relation to site lighting. Where possible, construction lights will be switched off when not in use.

			Demolition/ Tree Removal Although no signs of roosting bats were recorded, Building 1 has low potential to support roosting bats. Therefore, Building 1 is to be retained and maintained as a biodiversity enhancement feature and potential roosting structure for bats. Care must be taken when renovating roofs or walls, to ensure that bats are not present. Structures will be examined immediately prior to the commencement of any such works using an endoscope where necessary by the supervising ecologist to ensure there are no signs of bat activity. If bats are recorded during site works, the NPWS will be informed immediately and no works will proceed without a relevant derogation licence from the NPWS.

			With the exception of one mature Oak tree (which has moderate potential roost value), the trees onsite are of low to negligible potential for roosting bats. However, as a precaution, the following mitigation measures will be implemented during tree removal. The contractor will take all required measures to ensure works do not harm individuals by altering working methods or timing to avoid bats, if necessary: Crown reduction on trees will be minimised and that trees earmarked for retention are adequately protected. Felled trees will not be mulched immediately. Such trees shall be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. If bats are seen or heard in a tree that has been felled, work shall cease and the local NPWS Conservation Ranger shall be contacted. Trees will be retained where possible and no ‘tidying up’ of dead wood and spilt limbs on tree specimens shall be undertaken unless necessary for health and safety. Bat Report, Corracunna 37 DixonBrosnan 2024. Trees/treelines outside the proposed development area but adjacent to it and thus at risk, shall be clearly marked by a bat specialist to avoid any inadvertent damage.

			It is noted that the Oak Tree (T57874-A3) will be retained and pruned. Where pruning is required, this will be undertaken in the period September to late October/early November. During this period bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken. If bats are seen or heard in a tree that has been felled, work shall cease and the suitability qualified ecologist will specify protection methods and will contact the National Parks & Wildlife Service. If bats are found, no works will proceed without a relevant derogation licence from the National Parks and Wildlife Service.
			Enhancement Measures Six bat boxes, suitable for breeding will be located on retained trees along the boundary of the site located along the periphery of the site. Bat boxes will be erected under ecological supervision to provide alternative roosting habitat prior to the commencement of works on the building. It is proposed that five bat boxes will be located on mature trees within the overall site.
Ch 6 Population & Human Health	**PHH 1**	**6.7.1**	**Impacts to local Population during the Construction Phase** Potential impacts 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.

	PHH 2	**6.7.5.1**	**Air Pollution** Construction and operation phase mitigation measures are outlined in Chapter 9: Air, Odour & Climate.
	PHH 3	**6.7.5.2**	**Noise Pollution** Construction and operation phase mitigation measures are outlined in Chapter 10: Noise and Vibration.
	PHH 4	**6.7.5.3**	**Installation of Gas Pipeline** The trenches will be backfilled shortly after excavation following the installation of each section of gas pipeline. Any Asphalt waste material will be correctly segregated and disposed of by a licenced contractor, therefore limiting the risk to human health. The final pipeline will be designed, consented and delivered by Gas Networks Ireland in accordance with the following standard: I.S. 328 2021 Gas transmission — Pipelines and pipeline installations.
	PHH 5	**6.7.5.4**	**Human Health** Adverse health and safety effects during the construction phase will be minimised through the implementation of the Construction Management Plan on site.

Ch 7 Land Soils & Geology	**LSG1**	**7.6.1**	**General Mitigation Measures** Construction Environmental Management Plan (CEMP) The implementation and compliance with the conditions of the CEMP will be overseen by the Project Supervisor Construction Stage (PSCS) and/or onsite Environmental or Ecological Clerk of Works (ECoW) where necessary
	LSG2		Site preparation and construction must be confined to the Proposed Development only and it must adhere to all the mitigation measures outlined in this Chapter. Work areas should be kept to the minimum area required to carry out the proposed works and this area should be clearly marked out in advance of the proposed works
	LSG3		Prior to the commencement of developments on site, the PSCS/ ECoW will ensure that contractors will be made aware of the sensitive receptors identified in this chapter and the associated mitigation factors. A signed statement saying that they have taken on board the mitigation measures contained herein should be presented to the local authority along with the Notice of Commencement
	LSG4		A wheel wash/ power wash facility will be established at the site-setup stage of construction to limit the translocation of sediment onto the local road network.
	LSG5		A best practice measure in reducing the risk of the translocation of invasive species all machinery initially arriving to site will be inspected. Any dirty equipment will be refused entry to site.

	LSG6		All construction waste will be removed from site by a registered contractor to a registered site. Evidence of the movement and safe disposal of the construction waste will be retained and presented to the Local Authority upon request. Removal of the construction waste will occur as soon as possible after construction works.
	LSG7		The following Guideline documents should be adhered to: - Construction Industry Research and Information Association (CIRIA) (2005) Environmental Good Practice on Site (C692). - Construction Industry Research and Information Association (2001) Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532). - Construction Industry Research and Information Association (2000) Environmental Handbook for Building and Civil Engineering Projects (C512). - Environmental Protection Agency (2015) List of Waste and Determining if Waste is Hazardous or Non-Hazardous. - Environment Agency et al. (2015) Guidance on the Classification and Assessment of Waste, Technical Guidance WM3.
	LSG8		**Topsoil Removal** Excavated topsoil will be stockpiled in an area abounded by silt fencing to contain/ reduce any sediment run-off during times of inclement weather.
	LSG9		Driving machinery on topsoil stockpiles is not advised as it damages the soil structure, reduces porosity, and subsequent percolation rates, and can result in ‘smearing’ of the soil surface, which prevents water infiltration into the soil.

	LSG10		Any excess topsoil will be removed from site and disposed of appropriately.
	LSG11		Stockpiling and slight compaction of stockpiles to minimise both hydraulic and climatic erosion.
	LSG12		Running stockpiles in the direction of prevailing wind to minimise windborne erosion rates, SW-NE. (EPA, 2013).
	LSG13		Construction of silt fences around topsoil stockpiles to contain sediment run-off.
	LSG14		Minimise the export of topsoil off site by incorporating in the final landscape design.
	LSG15		Minimise handling and tracking of material to maintain optimum soil structure.
	LSG16		Landscaping to take place as soon as possible to reduce exposure of subsoil and topsoil stockpiles.
	LSG17		Works will be avoided during periods of extended rainfall.

	LSG18		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 and it must not be used for the infilling of any area outside of the Proposed Development. If there is more topsoil than is needed for landscaping, it must be removed from site by a registered contractor for appropriate use elsewhere. The end location of the topsoil must be identified and records presented to the local authority if requested.
	LSG19		**Excavation** Excavation work will be conducted in stages to minimise the exposure of unprotected soil, subsoil and bedrock.
	LSG20		Where possible excavated subsoil material will be reworked and used on site.
	LSG21		A geotechnical investigation of the site will be required in order to assess the potential of the underlying soil, subsoil and bedrock for reuse.
	LSG22		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.
	LSG23		Light compaction of stockpiles to minimise the rate of erosion from climatic methods.
	LSG24		Stockpile heights should be kept to a minimum to ensure stockpile stability and minimise wind borne erosion.
	LSG25		Excavations will be postponed in high rainfall conditions to reduce the risk of excavation collapse and erosion to soil and subsoil profiles.
	LSG26		If extreme weather conditions are forecast high sediment stockpiles will be covered to minimise erosion.
	LSG27		Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and bedrock.

	LSG28		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.
	LSG29		All long-term soil stockpiles are to be planted with a vegetative cover to bind the soil and improve slope stability.
	LSG30		Engineered retaining walls are to be installed where required to ensure stability of contiguous and Proposed Development topography.
	LSG31		“Mole Plough” installation method will be utilised to install the stormwater discharge pipe to the Tinhalla stream. This will limit trenching requirements and reduce the risk of sediment laden run-off.
	LSG32		The timing of installation of the stormwater discharge pipe into the watercourse must be scheduled to ensure no instream works are carried out during the closed season for instream works. (October 1st to June 30th). IFI must be notified prior to works taking place. The timing of works shall be in accordance with to IFI (2016) Guidelines on the Protection of Fisheries during Construction Works in and Adjacent to Water. Works associated with the headwall construction should be supervised by an Ecological Clerk of Works (ECoW).
	LSG33		**Soil Compaction** Construction of a hardcore gravel access road on and around the site.
	LSG34		Confine site traffic to designated routes.
	LSG35		Minimise traffic flows on site and establish a construction stage parking compound.
	LSG36		Avoid the use of oversized machinery when and where possible.
	LSG37		Prevent movement of vehicles on site during and after periods of rainfall.
	LSG38		Driving machinery on topsoil stockpiles will be avoided as it damages the soil structure, reduces porosity, and subsequent percolation rates, and can result in ‘smearing’ of the soil surface, which prevents water infiltration.
	LSG39		Works will be avoided during periods of extended rainfall.

	LSG40		**Run-Off** As a standard best practice measure a silt fencing will be erected along the eastern extents of the Proposed Development site to limit accidental discharge of sediments into the adjacent drainage channel. The 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.
	LSG41		An interceptor trench will be installed in front of the silt fence.
	LSG42		The silt fence will be visually inspected daily to ensure that they remain functional throughout the construction of the Proposed Development. Maintenance of the fences will be carried out regularly. Fences will be inspected thoroughly after periods of heavy rainfall.
	LSG43		Excavated and/or imported material will be stockpiled and silt fencing will be constructed around stockpile locations to contain/ reduce any sediment run-off during times of inclement weather.
	LSG44		Compacting of stockpiles will reduce the rate of airborne and hydraulic erosion.
	LSG45		Stockpile areas for sands and gravel should be kept to minimum size, well away from storm water drains and gullies leading off-site.
	LSG46		Silt Fences to be erected where excavation works are required in close proximity to water features and along depressions in land where there's increased surface water flow rates.
	LSG47		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.
	LSG48		A temporary drainage system will be established complete with a settlement pond to remove contaminants from run-off, prior to discharge.
	LSG49		Temporary staff welfare facilities will be installed on site at the pre-commencement stage. These will include toilet facilities. All foul discharges from welfare facilities will be collected in a septic storage tank. This tank will be regularly emptied, and the contents disposed of at a registered facility.

	LSG50		**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.
	LSG51		The concrete washout skip is to be located to the west of the site, away from the drainage ditch.
	LSG52		Excavations lined with an impermeable liner are not permitted as concrete washout bays.
	LSG53		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.
	LSG54		Best practice in bulk-liquid concrete management should be employed on site addressing pouring and handling, secure shuttering, adequate curing times etc.
	LSG55		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.
	LSG56		Activities which result in the creation of cement dust will be controlled by dampening down the areas.
	LSG57		Raw and uncured waste concrete will be disposed of by removal from the site.
	LSG58		**Construction Contaminants** Fuels, oils and other environmental deleterious chemicals are to be stored in a bunded well-ventilated chemical stores.
	LSG59		Use of such chemicals and fuels is to be contained to bunded areas, where possible.
	LSG60		Fuel bowsers to be located in bunded areas which can cater for 110% of the primary vessel capacity.

	LSG61		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.
	LSG62		Oil spill containment kits are to be situated near areas of potential spills.
	LSG63		Regular inspections carried out on plant and machinery for leaks and general condition.
	LSG64		Use of ready-mixed supply of wet cement products.
	LSG65		Scheduling cement pours for dry days.
	LSG66		Maintenance and repair works will be carried out at least 10m from any collection of surface water.
	LSG67		No refuelling will be undertaken within 50m of the adjacent watercourse.
	LSG68		Ancillary machinery equipment such as hoses, pipes and fittings which contain hydrocarbons will be stored within a bund or drip tray.
	LSG69		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.
	LSG70		Daily checks prior to start-up of plant and machinery will minimise the risk of breakdown and associated contamination risks for on-site repairs. Daily pre-start checks will be undertaken and records maintained. A clean site policy and diligent housekeeping will also reduce the potential of hydrocarbon release on-site.
	LSG71		**Importation of Contaminated Materials** All material will be sourced and transported by registered suppliers.
	LSG72		All materials will be inspected prior to acceptance on site.
	LSG73		Any deliveries found to be contaminated will be refused access to deposit on site. Any contaminated materials accidentally deposited on site will be removed immediately from site. If this is not possible then it will be stored in a “quarantine zone”.

	LSG74		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 7-43 materials. The quarantine zone is to be fenced off and surrounded by silt fencing, as a secondary containment measure.
	LSG75		**Excavation of Contaminated Soils** All excavated materials will be visually assessed for contamination.
	LSG76		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.
	LSG77		A full geotechnical site investigation will be undertaken prior to commencement of construction to assess the quality and quantity of waste concrete and soils within the brownfield portion of the site.
	LSG78		An asbestos survey is recommended for the existing structures prior to the commencement of demolition works.

	LSG79		**Eutrophic Pond Removal** Dewatering of the pond will be performed prior to the commencement of construction works Drained waters will be transported off-site to a suitable facility for disposal Once the pond has been drained and sediment is removed, the area should be graded to match the surrounding landscape. The pond basin may need to be filled with clean fill material (such as gravel, sand, or compacted soil) to create a stable and even surface. The ground will be levelled to achieve the proposed FFL of 101.4 m. The fill material should be properly compacted to avoid future subsidence.
Ch 8 Hydrology + Hydrogeology	**HH1**	**8.6.1**	**General Mitigation Measures** Construction Environmental Management Plan (CEMP)

	HH2	**8.6.1**	**Increased Run-off and Sediment Loading** 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. A temporary drainage system will be established complete with oil interceptors and settlement ponds to remove contaminants from run-off, prior to surface water 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. Storage of harmful materials and stockpiles should not be in close proximity to the adjacent drainage ditch and/or the sinkhole present at the eastern boundary of the site. 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 minimize weathering and reduce the increased vulnerability in the area surrounding the sinkhole.

	HH3	**8.6.1**	**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. 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. Demolition waste must be stored away from the adjacent drainage ditch and sinkhole on the eastern side of the site until it is collected by a licensed contractor.

	HH4	**8.6.1**	**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 to take place as soon as possible to reduce weathering. Additional trial pits are recommended prior to construction to verify the presence of a minimum 2-meter depth of subsoil beneath the proposed locations for built structures and ponds, as required in areas with Regionally Important Aquifers. Installation of impermeable liners is recommended under the attenuation pond.
	HH6	**8.6.1**	**Excavation of Contaminated Soils** Procedure in place for incidence of contaminated land within CEMP Contaminated soils encountered to be tested, quantified, segregated and transported for disposal by a licenced contractor

	HH7	**8.6.1**	**Conversion of Permeable Soils to Hard standing** The rate of discharge to the stream will be restricted to a maximum permissible rate of 12.8 lit/sec. 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. Floor levels upstream of the storage areas are at least 500mm above the top water level in the detention basins for the 100-year event. Overtopping does not occur during rainfall events ranging from 30 minutes to 1440 minutes. No risk of flooding of adjacent areas. Attenuation Pond will accommodate the total catchment area capacity and will provide a minimum storage capacity of 1,864.74 m3 (designed to accommodate the estimated rainfall events)

	HH8	**8.6.1**	**Demolition Works** Prior to demolition, a comprehensive building survey must be conducted to assess the condition of existing structures, including construction materials, building fabric, the presence of wastewater, hazardous substances (e.g., asbestos), and any potentially dangerous areas. Ensure all cutting, grinding, or sawing equipment on site is equipped with or used alongside dust suppression methods, such as water sprays or local extraction systems. Covers are to be provided over demolition debris stockpiles when high wind and inclement weather are encountered if required. Demolition waste must be stored away from the adjacent drainage ditch and sinkhole on the eastern side of the site until it is collected by a licensed contractor. Further mitigation measures are present on the accompanying CDWMP.
Ch 9 Air Odour & Climate	**AOC1**	**9.8**	**Fuel Storage** Temporary Fuels used during construction will be stored in sealed containers.

	AOC2		**Stockpiling** At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance. During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust
	AOC3		**Use of heavy plant / multiple plant use** The Contractor must monitor performance of plant and machinery to ensure that the proposed mitigation measures are implemented, and that dust effects and nuisance are minimised. The prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.

	AOC4		**Topsoil stripping** During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions. During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided. Overburden material shall be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors. Sufficient watering will take place to ensure the moisture content is high enough to suppress dust.

	AOC5		**Construction and operation of compound buildings and amenities** Implementation of Construction Environmental Management Plan. The specification of a site policy on dust and the identification of the site management responsibilities for dust issues. The development of a documented system for managing site practices with regard to dust control. The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed. The specification of effective measures to deal with any complaints received. The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details site. A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out. At all times, the procedures put in place will be strictly monitored and assessed.

			The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. Record any exceptional incidents that cause dust and/or air emissions, either on or off site and the action taken to resolve the situation in a dedicated logbook.

	AOC 6		**Constructing and operating site access roads** A speed restriction of 15 km/hr will be applied as an effective control measure for dust for onsite vehicles using unpaved site roads. Access gates to the site shall be located at least 10m from sensitive receptors, where possible. Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only. Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust. A wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. Public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.
Ch 10 Noise & Vibration	**NV1**	**10.7**	Construction phase mitigation measures as outlined in the CEMP.

	NV2	**10.7**	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.
Ch 11 Landscape & Visual	**LV1**	**11.5**	**General Mitigation Measures** 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. An irrigation plan to be put in place to allow for establishment of plantings with 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 may be used.

	LV2		**Avoidance, Prevention, Reduction and Offsetting** The positioning of the digestion tanks into the topography by retaining the bunds and sloping the access into the site of the Proposed Development has prevented the structures breaking the skyline at specific viewpoints and reduced its impact.
	LV3		**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.
	LV4		**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.

	LV5		**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; o Japanese knotweed Fallopia japonica o Giant knotweed Fallopia sachalinensis o Bohemian knotweed Fallopia x bohemica o Himalayan knotweed Persicaria wallichii o Old man's beard Clematis vitalba o Winter heliotrope Petasites fragrans o Garden Yellow Archangel Lamiastrum galeobdolon ssp argentatum Of these knotweed is most likely to be problematic if introduced onsite. Palisade fencing to be allowed to soften in over time with vegetation permitted to come through the fence. All hedgerows and hedgerow trees to be protected during the construction process with a root protection zone established outside the dripline of the trees and hedges whichever is greater, 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.
	LV6		Planting specifications to be overseen by a qualified landscape architect during the construction and operational period as required.

	LV7		**Reinforcing Landscape** Stone walls are in good condition and it is recommended that they receive local repairs with any damage received during construction to be repaired in the traditional manner . Repairs are not to be carried out using heavy machinery but rather in the manner of traditional hand worked stone walls. All plantings to be properly executed and irrigated with correct amounts of fertiliser and pruning given to ensure plant health and vigour.

	LV8		**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. Any areas requiring artificial shelterbelt to help them establish are to be identified at the outset after planting is commenced. 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 growing needs.

	LV9		**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
Ch 12 Traffic & Transport	**TT1**	**12.6.1**	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.
Chp 13 Archaeology & Cultural Heritage	**ACH 1**	**13.4**	It is recommended that a programme of archaeological testing be carried out in advance of construction. Test excavation is that form of archaeological excavation where the purpose is to establish the nature and extent of archaeological deposits and features present in a location which it is proposed to develop (though not normally to fully investigate those deposits or features) and allow an assessment to

			be made of the archaeological impact of the proposed development. It may also be referred to as 'archaeological testing' (DAHGI 1999a, 27).
	ACH 2	**13.4**	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.
	ACH 3	**13.4**	Testing should be carried out under licence to the National Monuments Service at the DHLGH. The application for such a licence requires a detailed method statement, outlining the procedures to be adopted to monitor, record, and recover material of archaeological interest during such work.
	ACH 4	**13.4**	Should archaeological material be uncovered at any location, the feature will be summarily investigated to determine the form, age, nature, depth, and extent of the feature. The feature will be planned, photographed, and recorded to best professional standards.

	ACH 5	**13.4**	In addition, the report on the results of the test excavation and an impact statement will be submitted to the planning authority to inform the archaeological site strategy. Where archaeological material is identified, the developer will submit an archaeological mitigation strategy and a detailed method statement for written agreement with the planning authority detailing proposed mitigation including, preservation in situ by way of avoidance or redesign, and/or archaeological excavation under a Section 26 licence in advance of development.
	ACH 6	**13.4**	The agreed archaeological mitigation (preservation in situ/full excavation) shall take place under licence prior to the commencement of development. The developer shall make provision for excavation, post excavation, interpretation, and publication of the results. A preliminary report detailing the findings of the agreed resolution shall be submitted to the planning authority within four weeks of the licence expiry and a full and final report shall be submitted to the planning authority within 1 year of the licence expiry date.

Ch 14 Material Assets	**MA1**	**14.6.1**	**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 to underground services (gas, telecommunications, water) are established.
	MA2	**14.6.1**	**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.

	MA3	**14.6.1**	**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.
	MA4	**14.6.1**	**Public Water Network** Excavations to be backfilled as soon as possible to prevent any infiltration of contaminants to the subsurface and the aquifer. Consultation with Irish Water be undertaken prior to works on the existing public water network and notification given to local population.
	MA5	**14.6.1**	**Gas Network** All works to the existing and proposed gas pipelines will be carried out by GNI in accordance with Standard I.S. 328 2021 Gas transmission – Pipelines and pipeline installations.

	MA6	**14.6.1**	**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.
	MA7	**14.6.1**	**Telecommunications Network** 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 telecommunications outages that may occur.

	MA8	**14.6.1**	**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.

16.3 Operational Phase

Table 16.1: Mitigation and monitoring (Operational Phase)

EIAR Chapter No.	Mitigation Ref.	EIAR Section Ref	Description of Mitigation/Monitoring measure
Ch 5 Biodiversity **(During Operation)**	**BIO 9**	**5.13.5.1**	**Enforcing the Environmental Management System** An Environmental Management System (EMS) accredited to ISO14001:2015 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.

	BIO 10		**Uncontrolled releases to the Funshion River and tributary within the site.** Dedicated hard standing for off-loading areas, with a minimum separation distance from adjacent water courses. Use of spill kits, bunded pallets and secondary containment units, as appropriate. All bunds sized to contain 110% of the volume of the primary storage vessel. Environmental Management System to include site specific standard operating procedures pertaining to waste management and emergency response. There will be no process water discharges to surface or groundwater bodies during the operational phase. The entire digestion tank area of the Proposed Development site will be underlain by an impermeable bund structure, acting as secondary containment in the event of a catastrophic failure. Tanks and bunds will be subject to integrity assessments by a suitably qualified engineer.

	BIO 11	**5.13.5.2**	**Discharge Monitoring** The monitoring of the discharge into the Funshion River will be vital to ensure that ELVs are not elevated. The discharge will be monitored and should there be any increase in ELVs above prescribed limits an alarm will sound and an automated shut off valve will be used to ensure there is no further discharge into the river. Monitoring frequency and emission limit values will be in line with BAT Waste treatment CID and proposed EPA licence conditions. Discharge monitoring shall include the following: TOC to be continuously monitored. Total N, Total P and Suspended Solids to be tested daily as outlined in BAT 7.

	BIO 12	**5.13.5.3**	**Harmful effects of Landscaping and Lighting on Biodiversity** The treelines and hedgerows around the site are important ecological corridors. These features should be enhanced and maintained for the benefit of wildlife. The existing hedges should be enhanced with some more native shrubs if possible, such as hawthorn, gorse, and blackthorn. Trees such as willow provide early sources of pollen for bees, as would fruit blossoms such as crab apple and wild cherry. Planting should focus on providing year-long interest for pollinators. Planting should be delivered in accordance with the Landscape Plan (Document Ref: 24/NRG/ORS/Mt/M/001) which accompanies the application. The natural verges along the hedgerows could also provide excellent opportunity for the benefit of wildlife. These should be managed as old hay meadows, cutting only in late summer. This will be of significant benefit to local pollinators. It is recommended that further actions that are outlined as part of the National Pollinator Plan should be implemented. There is a specific guide for farms (Farmland: Actions to help pollinators - //pollinators.ie/farmland). Nesting areas for solitary bees could be included by providing south or east-facing banks or areas of bare earth. Bee boxes for cavity-nesting bees could be created by drilling holes in untreated wooden blocks and attaching them to an outdoor structure. Bat boxes could be installed around the Proposed Development.

			When erecting bat boxes externally put up a minimum of three boxes facing in different directions to provide a range of temperature conditions. The use of herbicides within the Proposed Development should be minimised. The clearance of vegetation around fences should be done by hand if possible. Where spraying is necessary, it should be done with a knapsack sprayed to minimise spray and target required areas only. All rodenticides use on the Proposed Development should be in accordance with the Campaign for Responsible Rodenticide use.
			Lighting should be kept to a minimum around the remaining trees on the Proposed Development. Guidelines from Bat Conservation Ireland will be provided for considering how to avoid light pollution of the hedgerows to allow for feeding, commuting, and roosting. There should be no lighting directed from the Proposed Development site towards mature vegetation or the watercourse within the site. Lighting shall be controlled to avoid light pollution of green areas and shall be targeted to areas of human activity and for priority security areas. Motion-activated sensor lighting is preferable to reduce light pollution. None of the remaining mature trees or trees proposed for planting shall be illuminated.

			Dark corridor for movement of bats along the grounds of the Proposed Development. Lighting shall be directed downwards away from the treetops and shall not illuminate the Tinhalla Stream or vegetation along its banks. All luminaires shall lack UV elements when manufactured and shall be LED. A warm white spectrum (ideally <2700 Kelvin) to reduce blue light component. Luminaires shall feature peak wavelengths higher than 550nm. Tree crowns shall remain unilluminated. Planting shall provide areas of darkness suitable for bats to feed and commute.
	BIO 13	**5.13.5.4**	**Land and water pollution from use of the Biobased Fertiliser 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. Records will kept by the farmer and routinely provided to the Applicant for verification.
Ch 6 Population & Human Health	**PHH 6**	**6.7**	**Impacts to Population & Human Health during the Operational Phase** No mitigation measures are required during the operational phase.

Ch 7 Land Soils & Geology	**LSG79**	**7.6.2**	**General Mitigation Measures** An Environmental Operating Plan (EOP) will be prepared and implemented by the plant management company during the operational phase. This is a practical document which will include detailed procedures to address the main potential effects on surface water and groundwater.
	LSG80		The proposed facility 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: - 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
	LSG81		**Uncontrolled Releases and Spillages** Dedicated hard standing for off-loading areas, with a minimum separation distance from adjacent water courses.

	LSG82		Use of spill kits, bunded pallets and secondary containment units, as appropriate.
	LSG83		All bunds sized to contain 110% of the volume of the primary storage vessel.
	LSG84		Environmental Management Plan (EMP) to include site specific standard operating procedures pertaining to waste management and emergency response.
	LSG85		There will be no intentional discharge of untreated storm water to surface or ground waters during the operational phase. All stormwater discharges from site will be via the attenuation ponds with all areas, with the exception of the roofs, being directed through Class 1 petrol/oil interceptors before passing through the attenuation ponds prior to discharge.
	LSG86		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.
	LSG87		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.

	LSG88		**Land Spreading of Biobased Fertiliser** 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 (Good Agricultural Practice for Protection of Waters) Regulations, 2022).
	LSG89		The spreading of the biobased fertiliser on the customer farms must be done in accordance with the specific Nutrient Management Plan for that farm.
	LSG90		Application of biobased fertiliser to be conducted in compliance with the Nitrates Action Programme (e.g. prohibited periods and nitrogen application rates).
	LSG91		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.
	LSG92	**7.6.3**	**Decommissioning Phase** A Closure, Restoration and Aftercare Management Plan (CRAMP) will be developed as a condition of the industrial emission licences and in compliance with the Guidance to Licensees on Surrender, Cessation and Closure of Licensed Sites set by the EPA (2012)
Ch 8 Hydrology + Hydrogeology	**HH9**	**8.6.2**	**General Miitgation Measures** An Environmental Management System (EMS) will be prepared and implemented by the operator during the operational phase. The Proposed Development will operate under an Industrial Emissions Licence (IEL) issued by the Environmental Protection Agency (EPA). 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

	HH10		**Contaminated Run-off** esign criteria adopted for the development include : Overtopping from rainfall is concentrated at the locations of detention basins only. Floor levels upstream of the storage areas are at least 500mm above the top water level in the detention basins for the 100-year event. Drainage systems will be designed to attenuate excess surface water runoff with suitable storage volumes Reduction of outflow rate to below the existing greenfield runoff rate before discharging into the watercourse from the attenuation pond. Sumps in gullies and manholes collect silts in run-off from roads Where feasible, run-off will discharge to filter drains. The filter material will treat run-off before its entry to pipes Class 1 discharge bypass separator treats surface water for hydrocarbons run-off before its discharge to the attenuation pond All surface water run-off will discharge to the attenuation pond. The floor of the basin will be shaped to allow for the retention of silts in the pond. 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) The rate of discharge to the stream will be restricted to a maximum permissible rate of 12.8 lit/sec. 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.
	HH11		**Foul Water** All sewage infrastructure to be installed in accordance with the relevant industry standards and pressure tested/CCTV surveyed prior to commissioning to ensure absence of defects Programme of inspection and maintenance to ensure any defects are repaired A domestic scale wastewater treatment plant is proposed to cater for the foul water arising from staff facilities on-site only (Population Equivalent ‘PE’ of 2). A Site Suitability Assessment conducted by Bolger-Hynes Architectural Design in line with the EPA Code of Practice for onsite domestic wastewater treatment systems (2022) has concluded that the soils at the Proposed Development have sufficient absorption capacity for the installation of a percolation area suited for this PE. The sizing of the proposed packaged wastewater treatment plant shall be minimum of 2Pe @150l/day = 300l/day + 2,000 litres = 2,300l (minimum) rounded up to a 3m3 tank. The overburden is determined to be ‘suitable for percolation purposes’ and available to support Groundwater Protection Responses (GWPR). The wastewater treatment plant will comprise a secondary treatment system (septic tank), followed by a percolation area. The total required length of percolation shall be 72.0m. The maximum run per trench length shall be 18.0m with 4no. trenches. There shall be an air vent upstand attached at the end of each percolation pipe run the width of each percolation trench shall be 0.5m. There shall be a gradient of 1 :200 for each percolation pipe. The treatment plant will be specified and installed by an appropriately qualified

			technician and will be subject to regular desludging and maintenance, subject to manufacturers recommendations.
	HH12		**Increased Groundwater Vulnerability** The tank farm area will be completely bunded and constructed to Eurocode standard (BS EN 1992-3:2006)
	HH12		**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. All retention infrastructure systems will be automatically activated in the event of a fire alarm being triggered.

	HH13		**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.
	HH14		**Conversion of Permeable Soils to Hardstanding** Sustainable Urban Drainage Systems (SuDS) such as such as Sumps in gullies and catchpits collect silts in run-off from roads, filter drains, discharge bypass separator and an attenuation pond. Drainage systems will be designed to attenuate excess surface water runoff with suitable storage volumes for the Proposed Development and reduce the outflow rate to below the estimated greenfield rate before discharging.

	HH15		**Uncontrolled Releases & Spillage of Digestate and Feedstocks** Compared to untreated manures and slurries, fertiliser poses a lower risk of nutrient leaching into watercourses. The balanced nutrient composition and slow-release nature of biobased fertiliser minimise the likelihood of excess nutrients washing away into streams or groundwater. This reduction in nutrient leaching coupled with land spreading best practice helps mitigate water pollution and eutrophication, safeguarding aquatic ecosystems and maintaining water quality. 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.
	HH16		**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 of animal by products as organic fertiliser.
	HH17		**Attenuation Pond** The attenuation pond 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 pond.

CH 9 Air, Odour & Climate	**AOC 7**	**9.8**	**Biogas Release** The flare stack will have an operational capacity of 110% of the expected maximum hourly biogas production and will ensure the safe and complete combustion of the biogas where necessary.
	AOC 8		**Odour Release (Various)** The odour abatement proposed for the facility will consist of odour treatment system and carbon filters with a high level of efficiency to remove impurities such as hydrogen sulphide, ammonia, bioaerosols, siloxanes etc. in the exhaust gas to prevent odour impacts of significance beyond the site boundary. H2S will be trapped on activated carbon; CO2 and water vapour will be emitted to the atmosphere.
			The reception hall has been designed to allow for 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 building 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 carbon filtration and / or UV methodologies to remove odorous compounds. The building will operate under negative pressure with up to 2 air changes per hour. Ventilation pipe work installed in the headspace of the building will be connected to an industrial centrifugal fan 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 6.0m 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. All feedstocks will be delivered in covered or sealed containers. Feedstock delivery times will be controlled in order to minimise truck waiting times outside of the reception building and therefore minimising fugitive odour emissions on-site. Digestate will be stabilised before storage and removal from the site in order to minimise odour generation. As part of the company ISO14001 standard EMS, 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.

	AOC 9		**Combustion Process (Various)** The proposed gas upgrading plant will include in line sensors for CH4, CO2, H2S and the gas will be recirculated back through the scrubbing process if it does not meet the required levels for emission. The stack height proposed for the CHP emission point emission point has been designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with the EU ambient air quality standards at all off-site locations (including background concentrations for air pollutants).
	AOC10	**9.8**	**Dust Nuisance** Vehicles exiting the reception hall will be subjected to cleaning procedures in accordance with the DAFM Conditions Document in a designated cleaning area.
	AOC12		All feedstocks will be delivered in covered or sealed containers. Feedstock delivery times will be controlled in order to minimise truck waiting times outside of the reception building and therefore minimising fugitive odour emissions on-site.

	AOC13		Digestate will be stabilised before storage and removal from the site in order to minimise odour generation. As part of the company ISO14001 standard EMS, 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.
	AOC14	**9.8**	**Fugitive Methane Emissions** The facility will adhere to BAT principles in both its design and operational phases to enhance environmental performance. All anaerobic digestion (AD) tanks will be sealed, fitted with covers, and connected to an integrated biogas collection system to prevent methane escape. All feedstocks will be managed within a dedicated Feedstock Reception Building equipped with air handling and odour treatment systems, minimising potential emissions. Biogas storage membranes will typically be maintained at 50% capacity to provide a storage buffer under standard operating conditions. The facility will operate under a SCADA system, ensuring continuous 24/7 monitoring and control of all critical processes.

	AOC15		To reduce residual biomethane content in digestate, the AD system will maximise hydraulic retention time, maintaining a standard HRT of 60 days. All digestate will undergo pasteurisation prior to dispatch, effectively neutralising anaerobic bacteria. This treatment ensures any subsequent breakdown of organic material is aerobic, producing CO_2 rather than methane.
	AOC16		**Methane Detection Surveys:** Commissioning Survey: A comprehensive methane detection survey will be conducted during commissioning to identify and address any potential leaks before full operations commence. Annual Surveys: Methane detection surveys will be performed annually to locate any emissions. Any identified leaks will be prioritised for immediate repair.
	AOC17		The applicant's lifecycle maintenance budget will include provisions for the replacement of gas domes on a 7-10 year cycle to maintain integrity.
	AOC18		Emergency flare and PRVs will be included in the facility's routine Planned Preventative Maintenance (PPM) Plan to ensure reliable and efficient operation.
	AOC19		When market conditions allow, the applicant will begin capturing and marketing biogenic CO_2 emissions, enhancing the facility's carbon management strategy.
Ch 10 Noise & Vibration	**NV0**	**10.7.1**	There are no mitigation measures required to minimise the impact of the operational phase with the exception of planned maintenance. If applicable, replacement plant may be required to be assessed in the future.

CH 11 Landscape and Visual	**LV1**	**N/A**	There are no mitigation measures required to minimise the impact of the operational phase on lanscpae and visual.
CH 12 Traffic & Transport	**TT2**	**12.6.2**	The operational phase of the development will generate a maximum of 42No. vehicle movements day, where 32No. are HGVs and 10No. are private vehicles and vans. The additional vehicles will represent a maximum of 4% increase in traffic and will not generate increased queues and delays along the road network in the vicinity of the site, therefore, no mitigation measures are proposed for the operational phase of the development.
Ch 14 Material Assets	**MA9**	**14.6.2**	**Roads Infrastructure** The operational phase of the development will generate a maximum of 36 vehicles a day, where 26 are HGVs and 10 are private vehicles and vans. The additional vehicles will represent a maximum of 4.95% increase in traffic and will not generate increased queues or delays along the road network in the vicinity of the site, therefore, no mitigation measures are proposed for the operational phase of the development.
	MA10		**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.

	MA11		**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.
	MA12		**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.
	MA13		**Gas Network** The GUI and gas connection pipeline will be installed and maintained by Gas Networks Ireland. All works to the existing and proposed gas pipelines will be carried out by GNI in accordance with Standard I.S. 328 2021 Gas transmission – Pipelines and pipeline installations.

	MA14		**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.
	MA15		**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 slight impacts to the existing network is unavoidable.
	MA16		**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.