PURSER

Volume 2:

05

Consideration of Reasonable Alternatives

5.0 Consideration of Reasonable Alternatives

5.1 Introduction

This chapter outlines the reasonable alternatives considered by Nua Bioenergy during the design and pre-application phases of the proposed development. It presents the primary rationale for the selected option in terms of design, technology, location, size, and scale, taking into account the environmental impacts of each alternative and aligning with the project objectives.

5.2 Methodology

The EIA Directive 2014/52/EU (Article 5(1)(d) and Annex IV (2)) requires the consideration of reasonable alternatives relevant to the project, taking into account their environmental effects. According to the Directive, an EIAR must include:

> *"...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), aligns with this requirement, stating in Part 1 (d) that the EIAR must provide:

> *"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."*

The 2022 EPA Guidelines recommend that various types of alternatives be considered throughout the EIAR process. As environmental issues emerge, alternative designs or mitigation options may need to be evaluated, with early consideration of design alternatives and later consideration of potential mitigation measures.

The EPA Guidelines (2022) advise:

> *"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 in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required."*

The EU's 2017 Guidance Document on EIAR preparation similarly states:

> *"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."*

Furthermore, the guidance clarifies that alternatives *"must be relevant to the proposed project and its specific characteristics, and resources should only be spent assessing these alternatives."* It recognises that selection should balance feasibility, ruling out alternatives only when they pose significant inconvenience or cost, but excluding those that are excessively costly or technically or legally impractical.

In accordance with these legislative and guidance requirements, this chapter addresses alternatives under the following headings:

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

5.3 Legislative and Policy Context

The EU has pledged to achieve climate neutrality by 2050. The need to recognise the impact of climate change caused by human activity and to alter our way of life to address the effects of climate change has been included within European policy and legislation. Member states like Ireland have committed to reducing their individual greenhouse gas emissions in order to meet wider targets set by the EU.

The current Renewable Energy Directive 2018/2001/EU44 was created in December 2018 and has since been amended by Directive EU 2023/24135 (RED III). On 12 September 2023, RED III was adopted by the EU Parliament. The Directive establishes a basis in policy for the production and promotion of renewable energy. These directives require Ireland along with other member states to 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 May 2025.

The 2030 Climate Target Plan recognises the significant contribution of the agricultural sector to greenhouse gas emissions. While it may not be possible to eliminate these emissions entirely, they can be reduced. Efficient use of fertilisers, adopting precision farming, and the deployment of anaerobic digestion technologies can be used to assist in significantly reducing these emissions and manage agricultural waste. EU strategy to reduce methane emissions points to the benefits of biogas derived from organic agricultural wastes to reduce methane emissions and generate new revenue streams from farms and contribute to wider rural development.

Combined with the need to reduce emissions, is the need for the EU to become more energy secure. This has been highlighted as critical following the Russian/Ukraine conflict. REPowerEU seeks to scale up the creation of sustainable biomethane.

Ireland's ambitious climate targets, aligned with EU requirements, strongly influence national, regional, and local planning policies. The role of rural areas in providing a sustainable renewable energy supply is recognised in the NPF (2018) and the draft NPF (2024):

> *"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."*

CAP2024 requires a reduction in annual agricultural emissions by 25%. This is Ireland's biggest contributor to greenhouse gases. The National Biomethane Strategy states that Ireland will develop and support a sustainable biomethane industry to meet the ambitious targets set by the EU. This will be done by increasing indigenously produced biomethane to 5.7 TWh per annum by 2030 through the development of a new agri-centric biomethane industry.

Both the Regional Spatial and Economic Strategy (RSES) for the Southern Region and the Tipperary County Development Plan 2022–2028 highlight the importance of reducing carbon emissions and advancing renewable technologies, such as biomethane, to support environmental and economic goals. The Tipperary Development Plan specifically recognises the National Bioeconomy Campus at Lisheen as a critical resource to promote innovation in the bioeconomy, with the proposed development located within Tipperary's designated Decarbonisation Zone. This designation aims to facilitate climate action and supports the county's role in national and EU climate objectives.

The Renewable Energy Strategy within the Development Plan further establishes targets for a low-carbon future by promoting sustainable bioenergy development, including the use of anaerobic digestion to produce biomethane. This strategy, combined with Tipperary's commitments under the RSES, aims to reduce greenhouse gases, increase renewable energy production, and provide a foundation for sustainable rural economic development

For a more detailed review of relevant legislation, policies and guidelines, please refer to **Volume 2:Chapter 4**.

5.4 Project Objectives

Nua Bioenergy's proposed biomethane and bio-based fertiliser facility aims to align with Ireland's renewable energy, environmental, and agricultural sustainability goals. The project objectives are as follows:

1. **Achieve the Goals of the National Biomethane Strategy and Renewable Energy Directives:** Ensure that the facility advances Ireland's National Biomethane Strategy and complies with EU Renewable Energy Directive (RED III) objectives. The project is specifically designed to produce biomethane at scale, directly supporting Ireland's renewable energy targets and aligning with both national and EU climate action policies.

2. **Advance the Circular Economy**: Promote a circular economy by converting agricultural and food industry waste into biomethane and bio-based fertiliser. This approach maximises resource recovery, reduces waste, and reintegrates valuable nutrients into agricultural use, creating a sustainable closed-loop system.

3. **Support National Energy Independence**: Increase the supply of domestically produced renewable gas, reducing reliance on imported fossil fuels and enhancing Ireland's energy security. Contribute to REPowerEU's goals, supporting a resilient and renewable energy system for Ireland.

4. **Decarbonise Agriculture**: Aid in the decarbonisation of Ireland's agricultural sector by capturing methane emissions from organic waste and producing bio-based fertiliser. This will reduce reliance on synthetic fertilisers, supporting sustainable farming practices and soil health.

5. **Operational Efficiency and Resource Optimisation**: Utilise advanced designs and technologies to optimise resource use, maximise energy recovery, and ensure efficient feedstock management. This facility will prioritise productivity, low waste, and conservation of natural resources.

6. **Economic Viability and Local Development**: Establish a financially sustainable facility that creates local employment, stimulates the rural economy, and supports Ireland's bioeconomy. By attracting investment and fostering innovation in renewable energy, we contribute to local and national economic growth.

5.5 Consideration of Alternatives

5.5.1 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.*"

The key considerations are set out below:

5.5.1.1 Missed Opportunity to Develop a Brownfield Site of Limited Value

The 5.5-hectare brownfield site, once a lead-zinc-silver mine, has remained vacant since 2015, providing minimal environmental, ecological, or community benefits. Currently characterised by scrub vegetation and a mature hedgerow, the site holds limited ecological value, lacks archaeological or cultural features, and does not serve as an amenity for the local community.

In the 'Do-Nothing' scenario, no Biomethane or Bio-based Fertiliser production facility would be developed, and existing land-use practices would remain unchanged, leaving the site idle. This outcome would perpetuate the limited environmental and community value currently offered by the site, as it provides only marginal ecological value, lacks any archaeological or cultural heritage significance, and offers minimal landscape or visual interest. Additionally, the site does not serve as a community amenity.

Without development, this site would remain underutilised, missing an opportunity to transform it into a productive asset aligned with Ireland's renewable energy and bioeconomy objectives.

5.5.1.2 Missed Opportunity to Realise Policy and Legislative Objectives

In the "Do Nothing" scenario, several policies supporting the bioeconomy and renewable energy goals would go unrealised, representing missed economic and environmental gains. Key aspects are considered below.

a) **Climate Action and Low Carbon Development (Amendment) Act 2021**
This act legally commits Ireland to net-zero emissions by 2050 and a 51% reduction by 2030. Biomethane is critical for this transition, offering a renewable alternative to fossil gas in hard-to-decarbonise sectors. Without this facility, the opportunity to utilise Tipperary's bioenergy resources for biomethane production, contributing to emissions reductions, would be missed.

b) **National Biomethane Strategy**
Ireland's target to produce 5.7 TWh of biomethane by 2030 requires a large-scale anaerobic digestion (AD) industry. The proposed facility would help meet this target by generating biomethane from agricultural waste. Without the project, Ireland's renewable energy transition and energy independence goals would be hindered, increasing reliance on fossil fuels.

c) **Regional Policy**
The RSES for the Southern Region, particularly Objective RPO 59, supports the Lisheen Bioeconomy Hub's sustainable development. Without the facility, the site's potential as a bioeconomy hub remains unfulfilled, stalling regional growth in sustainable industries and impeding goals to boost rural employment and renewable energy innovation.

d) **Development Plan Policy**
The Tipperary County Development Plan, through Policy 10-D, promotes the bioeconomy sector and the Lisheen Bioeconomy Campus. Without this AD facility, the site's potential to drive innovation and rural economic growth remains untapped, limiting local employment, technological advancement, and the development of bio-based solutions for energy and agriculture. Additionally, the county's commitment to sustainable bioenergy development and efficient waste resource use would be constrained, limiting support for climate action and circular economy initiatives.

In summary, the "Do Nothing" scenario leaves critical policies unfulfilled, with the Lisheen Bioeconomy Campus underutilised and missing key contributions to Ireland's bioeconomy and renewable energy targets, which represents a considerable lost opportunity for North Tipperary and beyond.

5.5.1.3 Missed Opportunity for Greenhouse Gas Reductions

Agriculture accounts for 49.9% of Tipperary's total carbon emissions[1], making agriculture the single largest emitter of greenhouse gasses in the county. This equates to 11,848,900 tCO2e per year, resulting in a 25% emissions reduction target of 2,962,225 tCO2e from agriculture by 2030. This proposed development alone can produce 9.8M m^3 of biomethane annually thereby greatly reducing County Tipperary's CO_2 emissions per year. This will also contribute to the overall county reduction target of 25% emissions reductions from agriculture. In the 'Do-Nothing' scenario, this contribution to a reduction in emissions from agriculture would not be achieved and the agricultural sector would continue to be the highest contributor to carbon emissions.

5.5.1.4 Continued Use of Agricultural Manure and Chemical Fertilisers

Under current practices, agricultural manures, slurries, and organic by-products are spread directly onto land, often untreated, contributing to methane emissions and nutrient runoff. Without the anaerobic digestion facility, these high-emission methods would likely continue with the continued addition of chemical fertiliser. Furthermore, the associated CH_4 would not be captured within the anaerobic digestion process.

In contrast, the facility would produce a natural, bio-based fertiliser that would replace traditional chemical fertilisers, capturing methane and reducing nutrient runoff, thus advancing Ireland's circular economy goals. Additionally, traffic movements related to manure transport for land spreading would likely remain unchanged. In

[1] Tipperary County Council Climate Action Plan https://www.tipperarycoco.ie/sites/default/files/2024-04/Climate%20Action%20Plan%20-%20Digital.pdf

the "Do Nothing" scenario, the opportunity to modernise and reduce the environmental impact of these agricultural and food production practices would be lost, continuing to contribute to Ireland's carbon emissions.

5.5.1.5 Loss of Economic and Social Benefits

Without the proposed development, the region would miss out on substantial economic and social benefits during both the construction and operational phases. Construction would directly employ approximately 50 contractors, while also creating indirect economic activity in the local economy through supply chains, support services, and retail. Additionally, the project would contribute to the construction sector's vitality, with spin-off benefits in professional and technical services, supply services, and other associated fields.

Operationally, the facility would provide direct employment for 3-4 permanent staff and indirectly support jobs in haulage, logistics, and various ancillary services. This ongoing employment would foster further economic stability and opportunity for businesses catering to staff and operational needs, including retail, transport, and subsistence services. Such development in a rural context is significant, as it aligns with and advances the Tipperary County Development Plan's objectives for rural employment and economic resilience.

Under the "Do Nothing" scenario, these direct and indirect job creation opportunities would be lost, along with the potential for local economic growth and community revitalisation. The community would not experience the broader social and economic uplift associated with increased employment and local spending, nor would regional development goals for rural sustainability be fully realised.

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

5.5.2 Consideration of Alternative Locations

5.5.2.1 Strategic Suitability

Ireland's commitment to renewable energy development, as outlined in national and EU policies like the Climate Action Plan, the National Biomethane Strategy, and the EU Renewable Energy Directive (RED III), makes it a prime location for bio-based energy projects such as anaerobic digestion (AD).

Through an initial strategic review, certain counties—including Tipperary, Kildare, Kilkenny, Limerick, and others—were identified as optimal regions for Nua Bioenergy to focus efforts in locating candidate sites for the proposed development. This strategic process highlighted counties with high levels of agricultural activity, providing a dependable local supply of feedstock, such as manure and crop residues, to support the circular economy goals of the National Biomethane Strategy.

The review also prioritised counties with strong connectivity to major road networks, facilitating efficient transport of feedstock and distribution of bio-based fertiliser and biomethane. Following this strategic assessment, the

Applicant identified and assessed specific sites available for lease or purchase within these counties as potential candidate sites.

5.5.2.2 Detailed Site Selection Process

Following strategic review, a detailed site selection process was undertaken by the Applicant, evaluating three primary candidate sites for the proposed development:

- **Site A:** Former Lisheen Mine Site, County Tipperary
- **Site B:** North Kilkenny
- **Site C:** South Kildare

The site selection process involved a comprehensive review of each site against a defined set of criteria, set out below:

a) Land availability
b) Site size
c) Existing Land Use
d) Availability and proximity to Feedstock Supply
e) Availability and proximity to Digestate Receivers
f) Transport Network and Access
g) Proximity to Sensitive Receptors
h) Ecological Designations
i) Access to Gas Grid
j) Access to Electricity Grid
k) Topography
l) Flood Risk
m) Landscape Sensitivity
n) Archaeological Designations
o) Proximity to Suitable Water Course or Sewer
p) Proximity to Drinking Water Source

Assessment and Scoring

A scoring matrix was devised to evaluate each site based on the criteria above. Site visits and desk-based studies were conducted to gather detailed information on each location. The criteria were then systematically applied, and each site was assigned an overall score. The specific selection criteria and scoring methodology are provided in **Table 5.1**.

Criteria	Scoring	Score			Weighing	Total Score		
		Site A	Site B	Site C		Site A	Site B	Site C
Land availability	1. Not for Sale or Lease 2. Available for Sale or Lease but financially unviable 3. Owned or for sale/lease	3	3	3	3	9	9	9
Site size	1. 2-3 ha 2. 3-4 ha 3. Greater than 5 ha	3	1	2	3	9	3	6
Existing Land Use	1. Urban or greenfield 2. Rural Brownfield 3. Rural Brownfield and Zoned / Policy Support for AD Use	3	1	1	2	6	2	2
Availability and proximity to Feedstock Supply	1. 50% available within 80km 2. 50% available within 50km 3. 50% Available within 20 km 4. Immediately adjacent to major source of feedstock.	3	2	2	2	6	4	4
Availability and proximity to Digestate Receivers	1. 50% available 80km 2. 50% available within 50km 3. 50% Available within 20 km	3	2	2	2	6	4	4
Transport Network and Access	1. 1- 5 km from Regional Road 2. Less than 1 km from Regional Road. 3. Less than 10 km from Motorway.	3	1	1	3	9	3	3
Access to Electricity Grid (power supply)	1. Greater than 5km 2. 1-5km 3. <1km	3	2	2	3	9	6	6
Access to Gas Grid	1. Greater than 40 km 2. Less than 20 km 3. Less than 10 km	1	1	2	2	2	2	4

Criteria	Scoring	Score			Weighing	Total Score		
		Site A	Site B	Site C		Site A	Site B	Site C
Proximity to Suitable Water Course or Sewer	1. Greater than 1km 2. Less than 1km. 3. Immediately adjacent or on site	3	1	1	2	6	2	2
Topography	1. Undulating or severe level changes 2. Moderate level changes that can be addressed. 3. Relatively flat and level.	3	2	3	2	6	4	6
Flood Risk	1. In a Flood Risk Zone 3. Outside Flood Risk Zone	3	3	3	3	9	9	9
Proximity to Sensitive Receptors	1. Less than 250m. 2. less than 1km. 3. Greater than 1 km	2	1	1	2	4	2	2
Landscape Sensitivity	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	2	2	6	4	4
Ecological Designations	1. Adjacent to designated site 2. >1km from designated sites 3. >5km from designated sites	3	2	3	2	6	4	6
Archaeological Designations	1. Adjacent to archaeology sites 2. >1km from archaeology sites 3. >5km from archaeology sites	1	2	2	2	2	4	4
Proximity to Drinking Water Source	1. Greater than 1km 2. less than 1km. 3. Less than 250m.	3	1	1	1	3	1	1
TOTAL RANKED SCORE						**98**	**63**	**72**

Table 5.1: Site Specific Selection Criteria. (Source: Nua Bioenergy, collated by Purser.)

5.5.2.3 Rationale to Support Site Selection

The rationale used in the identification of the proposed development site at the former Lisheen Mine Site, Kilcoran, Moyne, Thurles, Co. Tipperary is further discussed in the following sections.

a) Land availability
All candidate sites were for sale or lease, making availability a non-deciding factor. However, the cost associated with acquiring the Lisheen site was deemed viable, supporting the financial feasibility of the project.

b) Site size
The former Lisheen Mine site offers over 5.5 hectares, with the option to expand by purchasing adjacent land if required. This site provides ample space for development, unlike other candidate sites, and supports future flexibility for the facility's operations.

c) Existing Land Use
Aligned with project objectives, Nua Bioenergy prioritised brownfield land to avoid converting agricultural land or natural habitats. The selected site is a brownfield location with policy support for AD use, making it highly suitable and advantageous compared to other candidates.

d) Availability and proximity to Feedstock Supply and to Digestate Receivers
The selected site in Tipperary is centrally located between feedstock suppliers and digestate receivers, strategically positioned within a county that is rich in agricultural activity and produces large volumes of manure, slurries, and food processing residues. This location enables efficient sourcing of feedstock from within a 45 minute drive, ensuring a reliable, sustainable supply chain for the facility. This proximity to suppliers minimises transport distances, reducing emissions, and associated transport costs, reinforcing the project's commitment to environmental sustainability and the circular economy.

While other sites considered, particularly the Kildare location, offered closer access to the private gas grid injection point, they lacked the Lisheen site's strategic balance of feedstock availability and proximity to end-users for the bio-based fertiliser. Situated near the M8 motorway, the Lisheen site benefits from unrivalled connectivity to key transport routes, enabling efficient, streamlined distribution of digestate to local farms and nearby customers. This central positioning between suppliers and customers maximises logistical efficiency, reducing operational costs and environmental impacts associated with transport.

The Lisheen site's location supports a sustainable, closed-loop model, enhancing its alignment with the National Biomethane Strategy's objectives and providing a strong foundation for future growth in biomethane production and bio-based fertiliser distribution.

e) Transport Network and Access
The Lisheen Mine site is approximately 10 km from the M8 motorway, providing efficient connectivity to both Dublin and Cork. The site also connects to regional roads (R639, R502) and a previously established HGV route,

which mitigates impact on local traffic and facilitates the safe transport of feedstock, bio-based fertiliser and biomethane.

f) Proximity to Sensitive Receptors and Ecological Designations

The site is not located near any Special Area of Conservation (SAC) or Special Protection Area (SPA) and has limited local biodiversity, reducing ecological impact. No nationally designated sites, such as Natural Heritage Areas, are adjacent, further minimising environmental risk.

g) Access to Gas Grid

While the site does not have immediate access to a gas connection, other benefits, such as access to local feedstock and policy support, outweigh this limitation. The South Kildare site offered closer grid connections but lacked other advantages unique to the Lisheen site.

h) Access to Electricity Grid

The former Lisheen Mine benefits from a 110 kV substation on-site, providing excellent power availability. Surrounding wind farms offer surplus power, which the Applicant aims to leverage for the facility's energy requirements, reinforcing the site's renewable energy integration.

i) Topography

The site's flat and stable ground conditions are highly suitable for development, requiring minimal alteration and supporting efficient construction and operational setup.

j) Flood Risk

The site lies within Flood Zone C, indicating a low flood risk. Previous regrading and infill have created a stable elevation profile, ensuring resilience against flooding. The Flood Risk Assessment confirms the site's suitability for the proposed development.

k) Landscape Sensitivity

Situated within an industrialised area previously used for mining, the site's landscape sensitivity is minimal. The surrounding structures and vegetation limit the visibility of the application site.

l) Archaeological Designations

The site has undergone extensive archaeological monitoring during the construction of the Lisheen Mine, with any features previously excavated and preserved by record. Thus, the risk of impacting undiscovered heritage sites is low.

m) Proximity to Suitable Water Course or Sewer

The Cooleney Stream is located approximately 200 metres south of the site, providing proximity to a watercourse for drainage purposes without risk of contamination due to distance and containment measures.

n) Proximity to Drinking Water Source
The site benefits from an existing connection to the Moyne Group Water Scheme, ensuring a reliable water supply. Other candidate sites lacked comparable water access, giving Lisheen an operational advantage.

Each of these factors contributes to a strategic decision to select the Lisheen Mine site, balancing operational feasibility, environmental compatibility, and alignment with policy goals. This location offers the greatest potential for a sustainable and efficient anaerobic digestion facility, with minimal environmental impact and strong support from surrounding infrastructure and policy objectives.

5.5.3 Consideration of Alternative Design and Site Layout

The design of the proposed development has been a collaborative and iterative process from the outset, engaging specialists across multiple disciplines, including design, engineering, planning, environmental, hydrological, geotechnical, archaeological, landscape, and traffic. At key stages, the design was adjusted based on expert feedback, consultation insights, and findings from site investigations and baseline assessments, enabling a balanced response to site-specific issues and opportunities and ensuring the proposed development meets high design standards.

Throughout the preparation of the EIAR, the site layout was refined to align with environmental considerations and site constraints, ultimately evolving from an initial concept to the final, optimised layout. Key adjustments were influenced by discussions with the Local Authority through formal pre-planning meetings[2], as well as on-site consultations with ESB High Voltage Engineers. This collaborative approach has resulted in a more sustainable and environmentally compatible design, demonstrating responsiveness to identified constraints and optimising the site for operational efficiency and environmental protection.

5.5.3.1 Initial Design Considerations

The initial design for the facility was positioned to the north of the application site, with the assumption that the existing overhead ESB cables could be undergrounded. (See **Figure 5.1**.) This layout included a combined outfall system for process and non-process area runoff via a constructed wetland. While viable, this design posed several logistical and environmental challenges. Following consultations, ESB confirmed that the overhead cables could not be feasibly or viably diverted underground, prompting a re-evaluation of the layout.

[2] The Applicant and key members of its Design Team attended 2 No. Pre-Planning Meetings with Tipperary County Council on 18 June 2024 and 13 September 2024, respectively.

Figure 5.1: Drawing of Initial Design. Not to scale. (Source: Donnachadh O'Brien and Associates.)

5.5.3.2 Revised Design and Environmental Enhancements

The proposed site layout was subsequently revised, moving the development to southwards (i.e. to the location of the application site) to avoid interference with the overhead cables. This change eliminated the need for cable diversion, significantly reducing environmental disruption (including power outages etc. that would have been required to facilitate the works). (See Figure 5.2) Additionally, the wetland outfall system was replaced with a circular surface water / process water system, eliminating process runoff discharge into local watercourses. This closed-loop water management approach aligns with the project's sustainability goals by capturing surface water runoff for re-use on site, supporting both water conservation and environmental protection of the surrounding area.

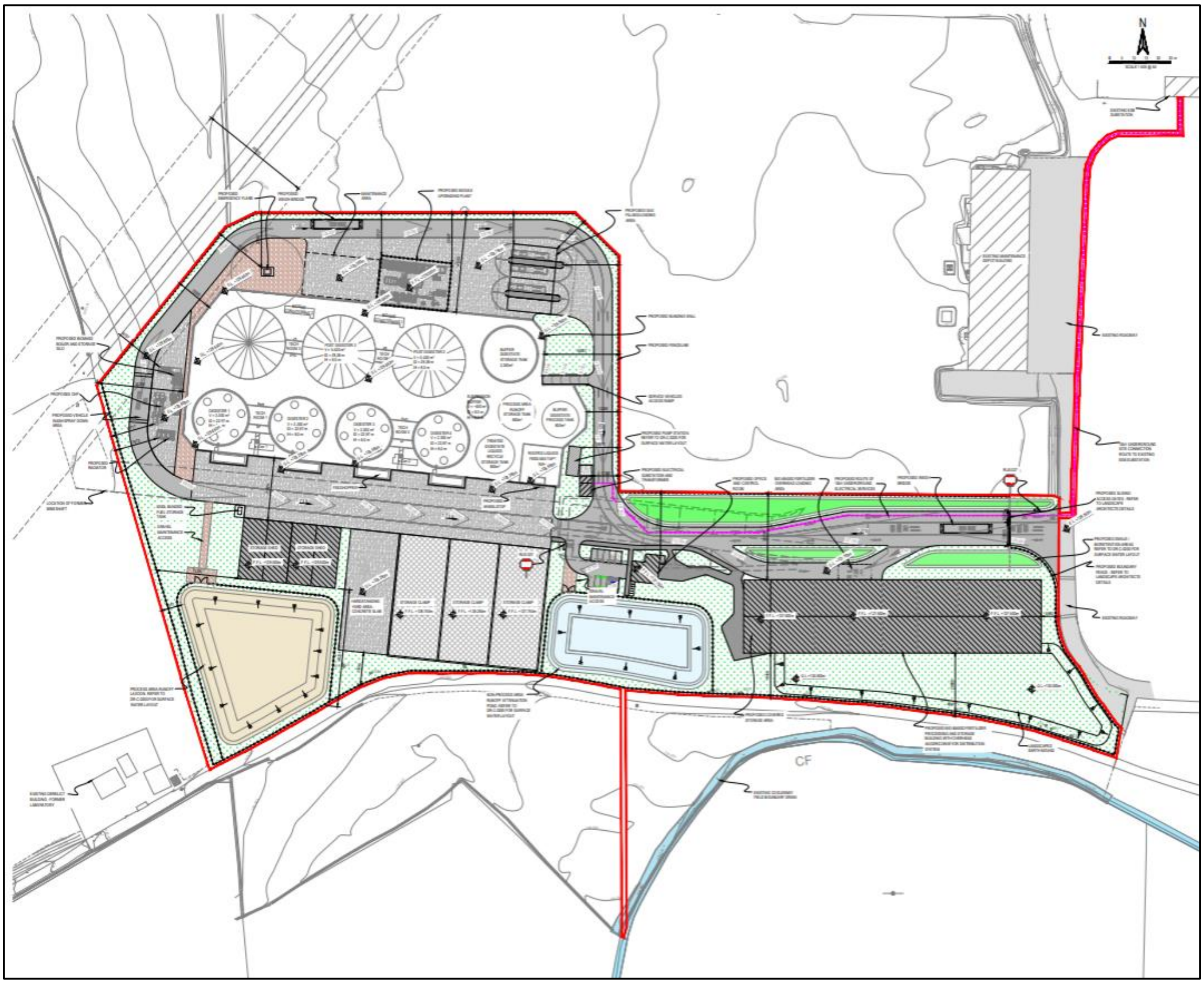

Figure 5.2: Drawing of Revised Design (i.e. the proposed development) . Not to scale. (Source: Donnachadh O'Brien and Associates.)

5.5.3.3 Additional Benefits of the Revised Layout

The revised layout offers multiple environmental and operational benefits:

Efficient Infrastructure Use: The revised design makes better use of existing internal road infrastructure and provides a safer, one-way system for vehicle circulation, minimising the risk of vehicular conflict and enhancing operational efficiency.

Improved Access and Proximity: The layout optimises proximity to key site assets, such as the ESB power source and the outfall location, reducing the need for extensive excavation and preserving the ecological value and natural topography of the site.

Enhanced Safety and Buffer Distances: Greater separation is achieved between the anaerobic digestion plant, the gas loading area, and existing buildings on site (such as the former maintenance building/ permitted Irish Bioeconomy R&D unit, and recycling facility). This buffer zone between high-activity areas and existing structures improves safety for personnel and provides better spatial organisation on site.

Minimised Environmental Impact: To address environmental considerations in the design, a revised site layout was developed to reduce excavation and preserve soil and vegetation. Initially, a combined outfall through a constructed wetland was considered; however, design refinements replaced this with a rainwater /surface water reuse system. This system captures and recycles surface runoff from process areas within the biomethane facility. By directing process runoff into a dedicated lagoon, the facility operates without an outfall, supporting a closed-loop system for water conservation.

In summary, both the initial and revised layouts were technically feasible. However, the revised layout aligns more effectively with environmental and site constraints, optimising infrastructure use and achieving enhanced safety, accessibility, and resource conservation. This final layout best serves the operational and sustainability goals of the project, demonstrating responsiveness to both site-specific limitations and environmental considerations.

5.5.4 Consideration of Alternative Technical Configurations

Alternative Technical Configurations were considered as part of the design process of the proposed development. to ensure that the proposed development would achieve high environmental performance and operational efficiency.

There are several different process configurations around which anaerobic digestion 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.

The sections below outline the key factors considered and the associated technical configurations. Alternative technological configurations have been considered in accordance with the project's environmental and operational objectives, with a focus on minimising water and energy use, optimising land use, and reducing the overall environmental footprint.

5.6.4.1 Best Available Techniques (BAT)

The processes outlined in Chapter 6 – Description of the Proposed Development - 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 technologies are well-established in the industry, proven for emission control, and aligned with environmental objectives.

5.5.4.2 High-Energy Feedstocks

The proposed biomethane production facility will use a mix of locally produced agricultural feedstocks, comprising animal and farmyard manures, crop residues, silage as well as some byproducts of local agri-food industries such as belly grass from the beef processing sector and dairy sludges and byproducts from the dairy processing sector.

The site will not intake any raw cattle or pig slurry due to its low energy content and high-water content – all feedstocks arriving on-site are relatively high dry matter or have been partially dewatered prior to arrival. In addition, the bio-fertiliser produced from digestate on-site is a solid, stackable compost-like material that can be returned to feedstock providers and crop producers as a valuable fertiliser which can replace artificial fertiliser. Both feedstock and digestate can be transported using the same trucks and trailers, resulting in fewer truck movements to and from site.

The selected technology enables a closed-loop system with no water discharge. By choosing high-energy, low-water-content feedstocks, the process is optimised for energy efficiency and minimises the environmental impact of transport and water use.

5.5.4.3 Water Use

Conventional Anaerobic Digestion processes require a lot of water to operate efficiently, optimal conditions for digestion usually occur at 6-10% dry matter, or a soup like consistency. High dry matter feedstocks must be diluted with water or slurries to achieve biological breakdown. The untreated digestate is a relatively low value fertiliser, making it uneconomic to transport beyond a limited radius. Solids separation leaves a dilute low value effluent which contains mainly nitrates which is usually land spread.

High Solids Anaerobic digestion occur at 16-30% dry matter, or a porridge like consistency. High dry matter feedstocks are broken down into a pumpable, semi-solid digestate which is separated into a solid compost like material which can be used as a replacement for artificial fertiliser. Separated liquids are recycled into the process, resulting in no effluent being tankered off-site or discharged into water courses.

The proposed high-solids anaerobic digestion process aligns with project objectives to use minimal water and prevent discharge, promoting a more environmentally sustainable operation.

5.5.4.4 Energy Use

Conventional Anaerobic Digestion occurs at 38-42 degrees Celsius or mesophilic conditions. This means that the entire volume of liquid in the digester must be heated by an external energy source to sustain these conditions. Usually, these sites run a combined heat and power generator (CHP) or a biogas boiler to generate enough process heat. This can result in up to 25-30% of the biogas produced on site being used for process heat and power.

High Solids Anaerobic Digestion occurs at 48-52 degrees Celsius or thermophilic conditions but actually requires less external heat input per unit of biogas produced due to the lower water content, we anticipate that the site in Lisheen will use only 5-8% of biogas produced for self-consumption, resulting in 92-95% of the biogas being upgraded to biomethane to be used in higher value end-use applications.

By opting for a thermophilic, high-solids process, the facility significantly reduces internal energy consumption, maximising biomethane output for higher-value applications and supporting the project’s environmental goals.

5.5.4.5 Land Use

Conventional Anaerobic Digestion tend to produce about 2m3 of biogas per m3 of digester volume per day. A 40GWh AD plant would require about 12,000m3 of digester tanks. In addition, a conventional 40GWh AD site would require significant storage on site for digestate or effluent which would amount to 26,000m3 of additional effluent lagoons on-site, assuming 16 weeks storage during the winter close period where liquid digestate can't be land spread. By comparison, the total tank volume associated with a 40GWh high solids AD site would be c 10,500m3, due to higher gas output per unit of digester volume and a reduced requirement to store digestate, separated digestate liquid is recycled as process water and only solid digestate leaves the site.

The selected technology's efficient land use allows for a smaller facility footprint, reducing land requirements and environmental impact. This approach also aligns with sustainable land management practices, a core project objective.

5.6 Conclusions

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.

This chapter sets out the reasonable alternatives considered for the proposed development and the criteria used to identify the preferred options, in terms of design, technology, location, size and scale. It is clear from the above, that the effects of the options considered on the environment were given due consideration in this assessment.

The selected option now forms the proposed development, as described herein in Chapter 6 - Description of Proposed Development. It is this development, as described herein that is assessed as the proposed development within the EIAR and is the subject of the planning application.

5.8 References

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