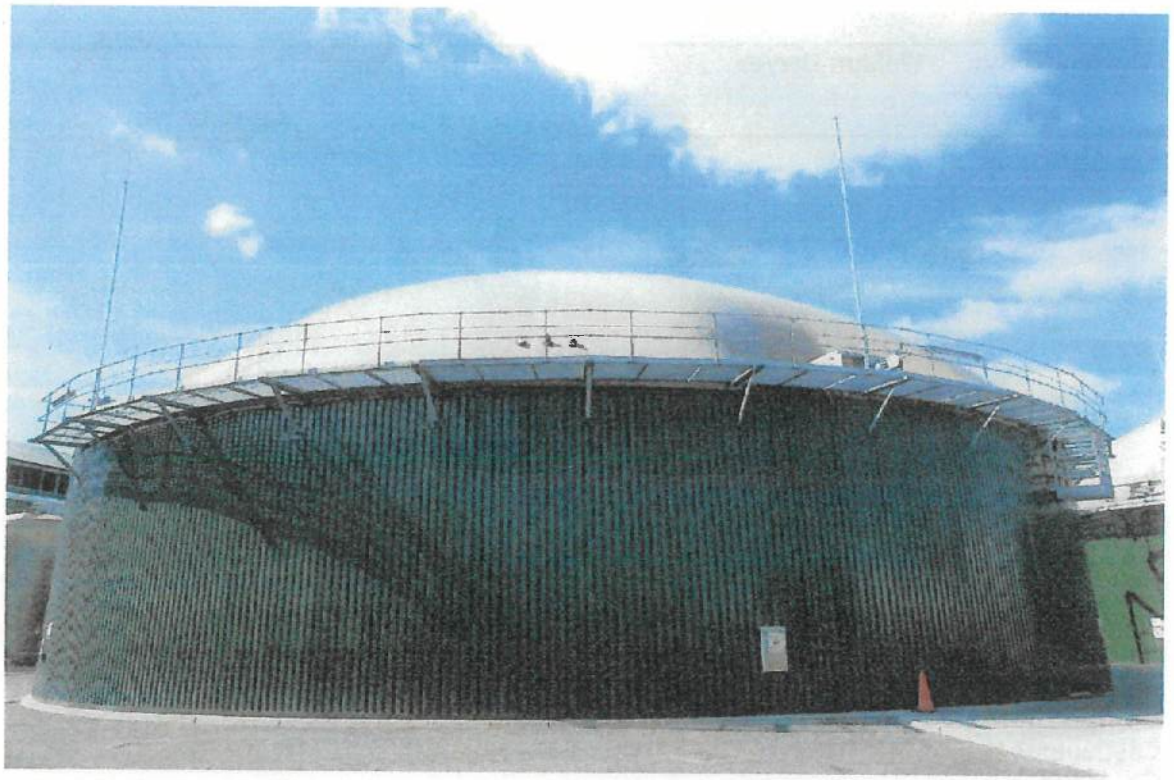
HALSTON

SUSTAINABLE BIO-ENERGY LIMITED

BIOGAS PLANT
GORT
COUNTY GALWAY



ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR)

NON-TECHNICAL SUMMARY (VOLUME 1)

NOVEMBER 2019

Document Control

Client:	Sustainable Bio-Energy Limited
Project Name	Sustainable Bio-Energy Limited Biogas Plant, Gort, County Galway.
Project Ref. No.	SEP-0251

Document Checking:

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Issue	Date	Status
v2.0	19/11/19	FINAL

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TABLE OF CONTENTS

1 INTRODUCTION

An Environmental Impact Assessment Report (EIAR) has been prepared to accompany an application to Galway County Council for full planning permission by Sustainable Bio-Energy Limited for the development of a biogas plant in the townlands of Ballynamantan, Glenbrack and Kinincha, County Galway. This volume of the EIAR provides a non-technical summary (NTS) of the Environmental Impact Assessment (EIA).

1.1 Overview of the Proposed development

The proposed development involves construction of a Biogas Plant on a 10.1 hectare site near the town of Gort, Co. Galway. The proposed development site is described as improved grassland (pastures), currently used for agricultural (grazing) and equine related purposes. The site is a highly modified site with alterations to levels and field boundaries undertaken around the year 2000. The topography of lands surrounding the site are generally flat. The proposed development will be accessed via a new site entrance and access laneway which will be constructed off the N18 /R458 road. It is proposed that site traffic will avail of the nearby M18 motorway, particularly travelling to /from destinations located to the south of the site and thereby avoiding travelling through the town of Gort.

The proposed Biogas Plant will accept and process feedstock from the agri-food sector. The feedstock will primarily comprise grass silage and this will be co-digested with animal manures from local farmers (cattle slurry) and residues from industrial producers /processers in the agri-food sector (e.g. dairy products). A summary of the proposed feedstocks is presented in Table 1.1.

Table 1.1 Proposed Annual Feedstock Quantities

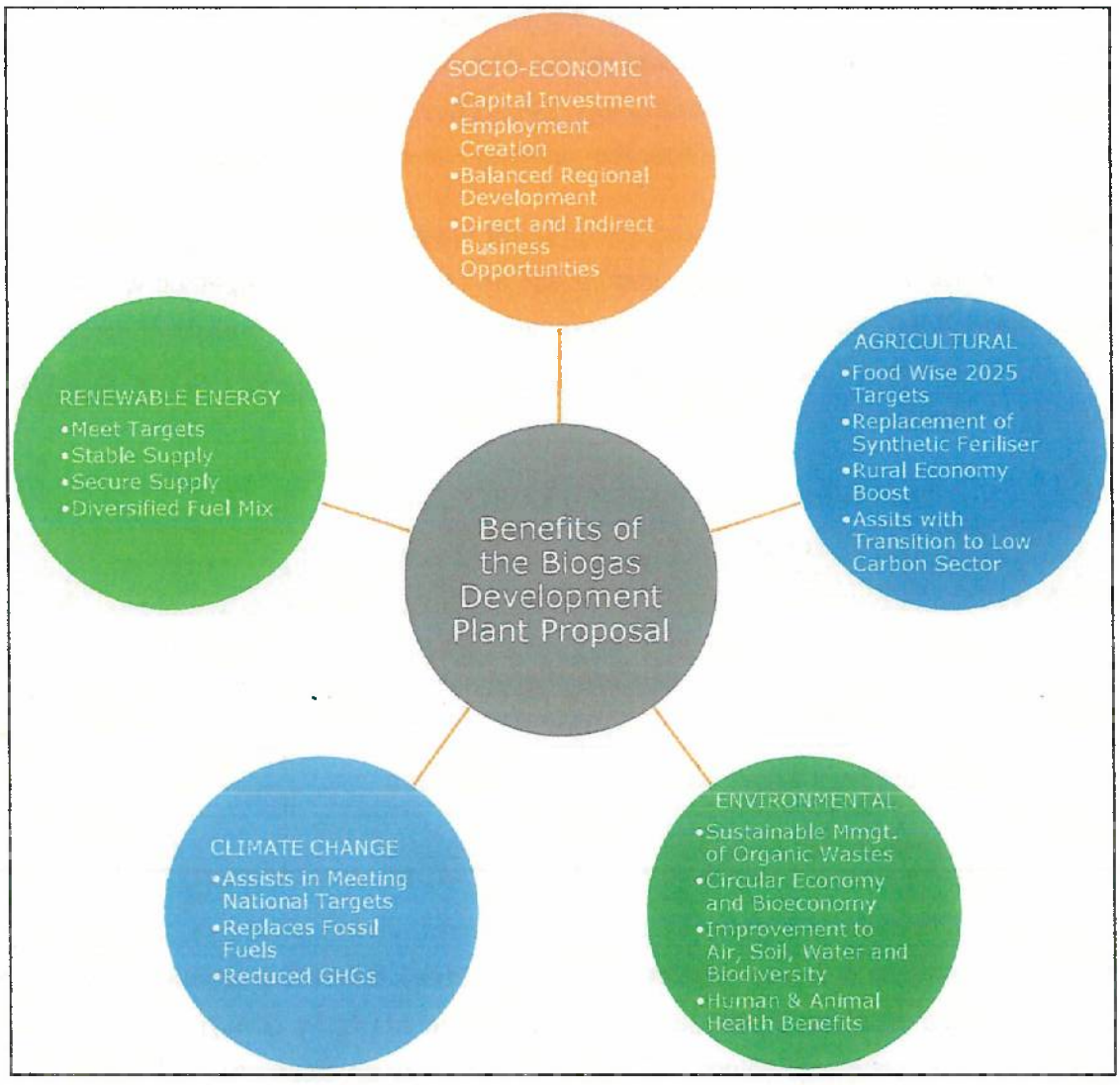
Feedstock	Annual Tonnage	% of Input Feedstock
Grass Silage	54,000	60%
Cattle Slurry	22,500	25%
Agri-Food Industry Residues	13,500	15%
Total Tonnage Per Annum	**90,000**	**100%**

Incoming organic feedstocks will be fed to the AD process; sealed airless vessel (digester). In this oxygen free environment, bacteria naturally break down the organic material to produce biogas [a mixture of carbon dioxide (CO_2) and methane (CH_4)] and digestate. The renewable gas produced (biomethane) will be used as an alternative and substitute

energy source for fossil fuels in the electricity, heat and transport sectors. Carbon dioxide produced will be supplied back to industry as a raw material, e.g. as an input material in the food and beverage sector. The digestate arising from the Biogas Plant will be used by farmers on pastures as a renewable organic fertiliser and as a substitute to chemical fertilisers in accordance with the European Union (Good Agricultural Practice for Protection of Waters) Regulations 2014 (SI No. 31 of 2014) (referred to as the "Nitrates Regulations"). For a more detailed description of the proposed project, including the various components and processes, refer to Chapter 2 of the EIAR (Volume 2).

1.2 Need for the Project

The need for the project is driven by a wide range of cross-sectoral climate change, environment, energy, waste, transport and agriculture policies. The proposed biogas plant will support and encourage sustainable development in the local and regional economy particularly in the area of agriculture



The proposed Sustainable Bio-Energy Limited Biogas Plant accords with EU, national and local policies and will assist with reducing greenhouse gas emissions and positively contribute to renewable energy, environmental and agricultural targets.

1.3 Environmental Impact Assessment Report

Environmental Impact Assessment (EIA) is the process of examining the anticipated environmental effects of a proposed project. An Environmental Impact Assessment Report (EIAR) is a report or statement of the effects, if any, which the proposed project, if carried out, would have on the environment.

The obligations under Irish law in respect of EIA are derived from obligations incurred as a result of membership of the European Community. Under Irish legislation, the definition of the process of EIA and the type of development for which an EIAR is required is set out under *Part X* of the Planning and Development Acts 2000 to 2018 and Part 10 of the Planning and Development Regulations 2001 to 2019. Within the Regulations, Schedule 5, 6, 7 and 7A prescribes details in respect of *'Development for the Purposes of Part 10', Information to be contained in an EIAR, 'Criteria for determining whether Development listed in Part 2 of Schedule 5 should be subject to an Environmental Impact Assessment, and 'Information to be provided by the Applicant or Developer for the Purposes of Screen Sub-threshold Development for Environmental Impact Assessment'.*

The type of development for which EIAR is required is prescribed in the planning and development legislation outlined above. Following review of the relevant legislation and consultation with Galway County Council, it was determined that a full EIAR should be prepared in support of the planning application.

This EIAR has been prepared in accordance with the following guidance:

- 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);
- Environmental Protection Agency (2017), *"DRAFT Guidelines on the information to be contained in Environmental Impact Assessment Reports";*
- Environmental Protection Agency (2015) *DRAFT Advice notes for preparing Environmental Impact Statements;*
- Environmental Protection Agency (2003), *"Advice notes on current Practice (in the preparation of Environmental Impact Statements)";*
- Environmental Protection Agency (2002), *"Guidelines on the information to be contained in Environmental Impact Statements";*

Each Chapter included in the EIAR has followed the same general format:

- Introduction; An overview and context of the project.
- Assessment Methodology and Significance Criteria: A description of the methods used in baseline surveys and in the assessment of the significance of effects
- Description of Receiving Environment: A description of the existing baseline relevant for the assessment, based on the results of surveys, desk information and consultations, and a summary of any information that could not be obtained;
- Impact Assessment: A description of how the baseline environment could potentially be affected for the EIA Development, including a summary of the measures taken during the design of the EIA Development to minimise effects;
- Mitigation Measures and Monitoring: A description of measures recommended that will be implemented to minimise and/or off-set potential negative effects and a summary of the assessed level significance of the effects of the Proposed Development and/or the EIA Development after mitigation measures have been implemented;
- Residual Impacts: a summary of final or intended effects which occur after the proposed mitigation measures have been implemented.
- Statement of Significant Impacts
- Statement of Significance

The EIAR comprises of three volumes:

- Volume 1: Non-Technical Summary
- Volume 2: Main Report
- Volume 3: Appendices

1.4 Applicant

Sustainable Bio-Energy Limited is an Irish renewable energy company (the applicant) set-up to identify, develop and finance viable biogas projects. Sustainable Bio-Energy Limited is a sister company of Connective Energy Holdings, a specialist bio-energy producer, at the forefront of producing clean renewable energy and products for the agricultural and manufacturing sectors. Connective Energy Holdings have interests in a number of operational biogas plants in both Ireland and the United Kingdom, including the 5MWe Glenmore Biogas plant in County Donegal. Sustainable Bio-Energy Limited is focused on developing sustainable biogas projects based on local market conditions and positively contributing to future renewable energy targets whilst also delivering environmental and socio-economic benefits.

2 DESCRIPTION OF THE PROPOSED PROJECT

Sustainable Bio-Energy Ltd propose to develop a Biogas Plant on a site located in the townlands of Ballynamantan, Kinincha and Glenbrack, County Galway. The facility will accept and process up to 90,000 tonnes of feedstock per annum for the purpose of generating biogas and organic fertiliser. The feedstocks for the proposed facility will predominately be sourced locally and will comprise grass silage which will be co digestated with agricultural manures (cattle slurry) and residues from the agri-food industry. Feedstocks will be supplied to the facility by HGVs. The proposed mix of feedstock accords with sustainability criteria as set out in EU legislation (in particular the recast Renewable Energy Directive). An analysis of available and suitable feedstocks was undertaken and it was concluded that there are sufficient feedstocks to supply up to 90,000 tonnes of feedstock annually to the plant.

The development proposal includes for four primary and four secondary digesters (i.e. two stage digestion) each with a working volume of 5,100m^3. Digesters and storage tanks (tank farm) will be constructed within a purpose-built concrete bund which will provide for 25% of the total volume of substances stored within the tank farm bund. The primary digesters will be fed by enclosed pipelines directly from the feedstock mixing and process area. The digesters will be will be heated (38°C to 42°C) and continuously stirred /mixed. The process is a closed-loop process and effluents generated will be contained and collected and recycled to the process. The biogas generated from the breakdown of the organic material within the digesters will be collected beneath the dome covers before being upgraded to produce biomethane (CH_4) and carbon dioxide (CO_2). It is proposed that the biomethane will be compressed and exported from site for injection into the national gas grid or supplied to other third parties as a flexible, dispatchable renewable fuel. The renewable carbon dioxide will be upgraded to food grade quality before being shipped off-site for supply to the food and beverage industry. The digestate produced at the facility will used as organic fertiliser and is a direct replacement for chemical /mineral fertilisers. As part of feedstock supply arrangements with local farmers, digestate will be delivered back to the local farms, thereby recycling nutrients to agricultural lands. The use of digestate as an organic fertiliser closes the nutrient cycle and supports the bioeconomy. Digestate storage facilities have been included within the scheme to cater for the closed spreading season.

A tree planted /grassed soil berm will be constructed along the eastern boundary of the site to provide for screening of the development and enhancement of biodiversity.

The main components of the proposed development are as follows:

- New site entrance (from N18) and connecting access road serving the plant;
- Weighbridge;
- Office /administration building;
- Feedstock reception building served by an odour control unit and containing feedstock reception plant, feedstock mixing equipment and pasteurisation equipment;
- Eight digester vessels (primary and secondary) and four storage tanks (4 no.) with dome covers within a concrete bund;
- Pump houses;
- Process, stormwater and foul drainage systems;
- Biogas upgrading plant, compression equipment, storage vessels and ancillary plant /structures;
- Digestate enhancement area which will include a separator for the purposes of producing fibre digestate;
- Gas flare and booster station;
- Combined heat and power plant and back-up boilers;
- Lighting fencing and security gates.

A package of engineering drawings prepared in support of the planning application provides layout, elevation and section details for the various components on site. This includes the site location map (ref. GBIO-19001), site layout drawings (ref. GBIO-19002 to GBIO-19004) and site sections (GBIO-19-005).

A detailed Description of the Proposed Development and all constituent components is contained in Chapter 2 of the EIAR (Volume 2).

In accordance with the First Schedule to the EPA Act 1992, as amended, the facility will require an Industrial Emissions Licence and will be regulated by the Environmental Protection Agency (EPA). The plant will therefore also be regulated by the Department of Agriculture Food and the Marine (DAFM) as required by Regulation (EC) No. 1069/2009 and Regulation (EU) No. 142/2011.

2.1 Alternatives Considered

DO NOTHING ALTERNATIVE

A do-nothing scenario will result in higher levels of pollutants and greenhouse gas emissions and further deterioration in quality of groundwater and surface water bodies and impede Ireland's commitment to meet its EU and national emissions targets.

LOCATIONS

At the outset of the project, a site options appraisal (SOA) study was undertaken which examined the suitability of four sites in the vicinity of the town of Gort and its environs. The study determined that proposed site to be most suitable for the development following consideration of a range of criteria including Policy, Location and Land Use, Landscape and Visual Impact, Site Conditions & Operational Parameters and Infrastructure (existing and proposed).

LAYOUTS

The proposed and preferred layout was designed following consideration of infrastructural requirement of the proposal and to provide maximum buffer distance to potential sensitive receivers. Incorporating digestate storage facilities into the overall scheme was considered a key aspect of the development. It was proposed to design and incorporate a new entrance and access road to the site to address aspects raised by stakeholders in respect of traffic and transport and the potential effect on receivers.

DESIGNS

A number of alterative designs were investigated and considered. The final design has sought as far as practicable to minimise visual intrusion. The base elevation of the tank farm was set at 17m AOD to reduce the overall height of the development within its setting whilst carefully considering and assessing the potential for groundwater ingress or flooding. The design uses the naturally higher elevated lands to the west and the provision of a planted berm along the eastern boundary minimises any potential adverse visual impacts of the development. The office and feedstock reception buildings are purposely placed to provide screening to proposed structures further north within the site (e.g. gas clean up plant and tank farm).

PROCESSES

Several different process configurations were considered as part of the design process. Factors which were considered included the following:

- Type of feedstock and fulfilling sustainability criteria (as laid down in RED II)
- Batch or Continuous feed system
- Single Stage or "Multi-Stage" process
- Type of tank, its sizing and arrangement
- Mesophilic or Thermophilic AD temperatures
- Front-end pasteurisation or Back-end pasteurisation

- Type 1 Plant Type; EU transformation parameters (70°C for 60mins to remove pathogens such as *E. coli* and *Salmonella* and reduce particle size to 12mm or less standard) or National transformation parameters (Type 2 Plant Type) /alternative transformation parameters (Type 5 Plant Type)

The chosen process design is a continuously feed system with multi-stage process (primary and secondary digesters). The proposed plant is designed as a Type 1 Plant (EU Transformation parameters) and the AD process operates at mesophilic temperatures.

3 PLANNING & POLICY CONTEXT

The development was assessed in the context of the following:

- National Policy; including the National Development Plan 2018-2027 and Energy, Climate Change and Waste Policy;
- Regional Policy; including the Connacht Ulster Waste Management Plan 2015-2021, the Draft Regional Spatial and Economic Strategy for the Northern and Western Regional Assembly Region (NWRA RSES), and Regional Planning Guidelines for the West 2010-2022;
- County and Local Policy; including the Galway CDP 2015-2021 and the Gort LAP 2013-2023; and
- Planning History of the Site.

The proposed development site is located within 1.0km of the M18 motorway network which is shown as the north /south aligned *"strategic development corridor" as per the* Overall Spatial Strategy and Proposed Development Option Map of the Galway CDP 2015-2021. The site is located with an area defined as an *"economic engine"* (ref. EDT 1 map of the Galway CDP 2015-2021. The designation and promotion of *"Gort, and its environs"*, as an Energy Hub in the Galway CDP 2015-2021 was also a key factor in the selection of the preferred site. Due to its siting close to the town of Gort, the development proposal will be connected to public services (foul sewer and water) along Kinincha Road (Objective DS 12 of the Galway CDP – Service Led Development).

The EU has established several cross sectoral policies, regulations, directives and actions with a clear target and roadmap aimed at sustainable agriculture, sustainable energy generation, greenhouse gas emissions abatement, preservation of soil and aquatic systems and food security. The need to recognise and consolidate practices dealing with the effects of climate change arising from the agri-food sector is considerably dealt with across International, European, and National legislation.

In Ireland the agri-food sector accounts for 7.5% of total numbers of persons employed in the region (NWRA) and it is acknowledged that the sector is entering into a period of radical transformation underpinned by smart farming practices, growth in global demand and consumer sophistication[1]. One of the primary competitive advantages that Ireland has is the ability to grow grass and the extensive knowledge relating to this in the sector led by Teagasc. Grassland is the dominant biomass resource in Ireland and accounts for

[1] Draft Regional Spatial and Economic Strategy, NWRA 2018

up to 92% of agricultural land area in the country; having some of the highest yields of grass per hectare in Europe. To provide for growth in line with FoodWise 2025, implementation of an approach that makes Ireland a leader in sustainable and low-carbon farming and land management is required. The proposed development enables this and provides a solution to mitigate pressures on surface water and groundwater systems, biodiversity and air quality & climate.

Feedstock inputs will be sourced from the agri-food sector and outputs from the Biogas Plant will be supplied in the form of renewable resources to the energy and agri-food sectors in the form of organic fertiliser, carbon dioxide and biomethane; thereby supporting sustainable growth and development of the rural economy and bioeconomy.

Under the Renewable Energy Directive (2009/28/EC) (RED I), Ireland is committed to producing from renewable sources at least 16% of all energy consumed by 2020. Ireland has committed to meeting this national target through 40% renewable electricity, 12% renewable heat and 10% renewable transport. The recast directive, RED II (Directive 2018/2001), provides a framework towards meeting the binding Union target of at least 32% renewable energy in gross final energy consumption by 2030 and a cut in GHG emissions by at least 40%[2]. Notably, RED II increased the sustainability criteria for biofuels used in transport and bioliquids, and solid and gaseous biomass fuels used for heat and power. A minimum 65% GHG saving for fuel used in transport was introduced and a minimum 70% GHG saving threshold is introduced for bioenergy pathways in the electricity, heating and cooling sectors. RED II (Article 23) also sets out the need to increase the level of renewable energy in the heat sector by 1.1 to 1.3% per annum from 2021 to 2030. In response to aspects relating to indirect land use change (ILUC), RED II also contains a number of provisions to encourage the use of advanced biofuels (such as biomethane) over biofuel produced from feed and food crops. These include GHG saving criteria and linking financial incentives to biofuels produced from Annex IX Part A[3] feedstocks.

The proposed development will deliver many cross-sectoral environmental, economic and social benefits (direct and indirect) particularly to the agri-food sector and will generate renewable energy for the electricity heat and transport sectors. On the basis of siting

[2] *Requirement for the ETS sector to cut emissions by 43% and the non-ETS sector by 30% (compared to 2005).*

[3] *Annex IX Part A. Feedstocks for the production of biogas for transport and advanced biofuels, the contribution of which towards the minimum shares referred to in ..Article 25(1) may be considered to be twice their energy content: This includes; (d) Biomass fraction of industrial waste not fit for use in the food or feed chain....., (f) animal manures, and (p) "Other non-food cellulosic material" whose definition includes: (42) grassy energy crops with a low starch content, such as perennial ryegrass*

criteria policy examined and detailed in Chapter 3 of the EIAR, the selection and development of the proposed Biogas Plant on agricultural lands supported by the agri-food sector in the environs of Gort is appropriate. Development of the Sustainable Bio-Energy Limited Biogas Plant on lands beyond the Gort urban boundary is in accordance with the principles of proper planning and sustainable development and compatible with National, County and Local Development Plans and Policies.

4 POPULATION AND HUMAN HEALTH

4.1 Introduction

This assessment comprised a desktop study and considered the potential impact of the development on population and human health and includes the following broad areas of investigation:

- Population and Settlement Patterns;
- Employment;
- Land Use; and
- Health and Safety.

4.2 Description of Receiving Environment

According to the Central Statistics Office (CSO) the site is located in the electoral division of Gort where the population density is 82.14 per km^2. The Gort town boundary is located just beyond the southern boundary of the proposed Biogas Plant. The strategic geographical location of Gort makes it accessible to most major towns in the region. Gort is located approximately 32 kilometres south of Galway Gateway and 64 kilometres north from Limerick Gateway on the M18 Motorway. Gort is also identified as a main town/important urban settlement on the Galway-Limerick/Shannon Development Corridor which connects Galway Gateway with Limerick Gateway and is one of four corridors as contained within the Atlantic Gateways Corridor Development Framework. In terms of population trends, according to the most recent 2016 CSO figure, the population of Gort was recorded as 2,994 persons representing an increase since the 2011 figures (increase of 350 persons). The CSO report in 2016 that there was a 18.1% unemployment rate within the ED of Gort (280 persons) of a total labour force of 2,380.

A summary Overview and Description of the Proposed Development is provided in Section 1 and 2 of this NTS. A detailed Description of the Proposed Development and all constituent components is contained in Chapter 2 of the EIAR (Volume 2).

4.3 Impact Assessment and Mitigation

The proposed plant will offer many positive benefits to the economy of the local area. The most significant positive impact will be the permanent employment opportunities that will result from the construction and operational phases. Indirect employment will also arise

from the development in the form of hauliers and other contractors supplying services and goods to the plant.

Employment levels during construction will vary depending on the stage of the construction programme and the extent of activities occurring on the site. It is expected that during peak activities, there will be up to 80 construction workers at the site.

During operation, it is expected that the plant will employ 20 staff working over three shifts. Personnel employed in a full-time capacity on site will include:

- Site Manager
- Operations Supervisor
- General Operatives
- Drivers
- Maintenance Engineer
- Laboratory Technician
- Administrative Personnel
- Weighbridge Operator
- Security

Along with direct employment, here is also likely benefit which would accrue to the local area and region in terms of indirect and induced employment, e.g. employment through spin-off sectors; such as organic farming, etc. A renewable biogas plant producing green biomethane could also potentially be attractive for companies looking to establish in the Gort area who wish to be provided with a clean sustainable energy source. Overall, there will be a significant positive direct and indirect impact to employment during construction and a moderate positive direct and indirect impact during construction and decommissioning.

Building and operating a biogas plant presents health and safety risks both during construction and operation. A key aspect in the carrying out of these roles and complying with legislation is the identification of hazards and quantifying the risks they pose. Such hazards can then be designed out during the planning phases or if that is not possible mitigation can be put in place to minimise the risk. Typical hazards, which are not specific to biogas plants and exist at various types of industrial /manufacturing activities, include the following:

- Environmental hazards;
- Health hazards;
- Hazardous substances;

- Biological agents;
- Hazards from electrical equipment;
- Mechanical hazards;
- Gas hazards;
- Explosion and fire hazards;
- Sources of danger from the surrounding environment;
- Hazards arising from inappropriate behaviour.

Design and operational control will be implemented to mitigate and minimise impacts to workers and members of the public. These include engineering and procedural controls as detailed in the EIAR.

4.4 Summary of Significant Effects

It is anticipated that the proposed Sustainable Bio-Energy Limited Biogas Plant will realise significant positive overall benefit to the local community and wider region. No residual negative impacts are predicted.

The development proposal has been assessed as having the potential to result in impacts of a slight positive, long-term impact overall. Following implementation of mitigation measures outlined for air, hydrology, hydrogeology, traffic, noise and in relation to safety the impact on Human Health will be imperceptible.

5 BIODIVERSITY

5.1 Introduction

This Section of the EIAR evaluates the impacts of the proposed EIA Development on terrestrial biodiversity. Means to mitigate any significant impacts are proposed. As well as considering potential impacts on flora and fauna, the Section also considers impacts on designated areas. The Biodiversity Section of the EIAR is supported by a Natura Impact Statement report.

5.2 Description of Receiving Environment

5.2.1 Desk Study and Consultation

A desktop survey was undertaken to gather information on the likely occurrence of species in the general area prior to the survey visits so that a targeted approach to surveying could be undertaken. Information was gathered online from a variety of sources including the National Biodiversity Data Centre and National Parks and Wildlife Service online databases.

5.2.2 Field Surveys

Field surveys were undertaken between December 2017 and 20th August 2019. All surveys undertaken followed industry-standard methodologies within season timing limitations. Field survey data was recorded on maps and each record was accompanied by a photo and six figure grid references, using 'EcoLog' software operating on a mobile phone. As a result, the data collected could then be used in Geographical Information System.

HABITAT SURVEYS

Habitat surveys of the Proposed Development Site were undertaken on 15th December 2017 in the form of an initial site assessment (with a further detailed habitat survey planned for May 2018), following the standard methodology described in the Heritage Council publication *A Guide to Habitats in Ireland*[4]. Further detailed vegetation survey was conducted on 30th July 2018 using quadrats on the grassland habitat in the site. The entire Application Site was walked with ecological features of interest noted and the habitats

[4] Fossitt J.A. (2000). *A Guide to Habitats in Ireland*. The Heritage Council. ISBN 1 901137 27 9

present classified into recognised communities. An update habitat survey was conducted on the 6th August 2019. Full details of the habitat assessment are provided in Section 5.3.

WINTER BIRD SURVEYS

Winter bird surveys were undertaken in 2018, focusing on the wetland area adjacent to Kinincha Road on 15th December 2017, 30th January 2018 and 15th February 2018. These surveys included the recording of all bird species occurring within and adjacent to the Application Site as well as counts of all waterfowl species, their location and behaviour.

BREEDING BIRD SURVEYS

A total of three breeding bird surveys were conducted within the Application Site in 2018. An early season breeding bird walkover survey was undertaken on 27th March 2018, with two additional surveys conducted on 12th June 2018 and 29th June 2018. All bird species were recorded within the Application Site along with their location and behaviour.

PROTECTED SPECIES SURVEYS

Surveys were undertaken for protected species likely to occur in the Proposed Development Site and within the immediate vicinity. Protected species surveys included badger, otter, fox, Irish hare and bats. These surveys included the identification of suitable habitat, detection of field signs such as tracks, markings, feeding signs, droppings and scent-points, and direct observation.

5.2.3 Site Setting

The Application Site abuts the western side of the Kinincha Road (a minor road leading north from Gort town). The site lies east of the M18 and the R458/N18 (which run parallel to the west of the Application Site). The majority of the Application Site lies approximately 900m north of Gort town at approximate Grid Reference: M 45490 03291. The proposed biogas plant, which occupies an area of c. 10.1 ha, is currently used for horse grazing and as an exercise track for horses.

The general area where the Application Site is situated is within an area of *High* groundwater vulnerability which is due to its karst landscape (the stratigraphy here is Burren Limestone). The environs support a concentration of limestone lakes and turloughs. The Gort River/Castletown River runs to the east of the site (immediately adjacent to the north-east site extents) and Ballynamantan Lake is situated c. 360 m north of the site boundary. The Coole-Garryland Complex Special Area of Conservation (SAC) lies c. 900 m to the west of the Proposed EIA Development. Turloughs* (a European

priority habitat) are one of the reasons for the designation of this SAC, and the groundwater within this area is sensitive to changes in water levels and water quality impacts. The groundwater body in which the Application Site is situated is the Groundwater Dependent Terrestrial Ecosystem (GWDTE) Caherglassaun Turlough (SAC000238). The central area of this particular turlough (and its' SAC boundary) lies directly c. 4.6 km northwest of the Application Site, however, the SAC shares a groundwater body with the Application Site. The proposed location for the Biogas Plant is surrounded by improved agricultural land to the west, north and north-east. Calcareous grassland, scrub and wet grassland exists to the south and east of the site.

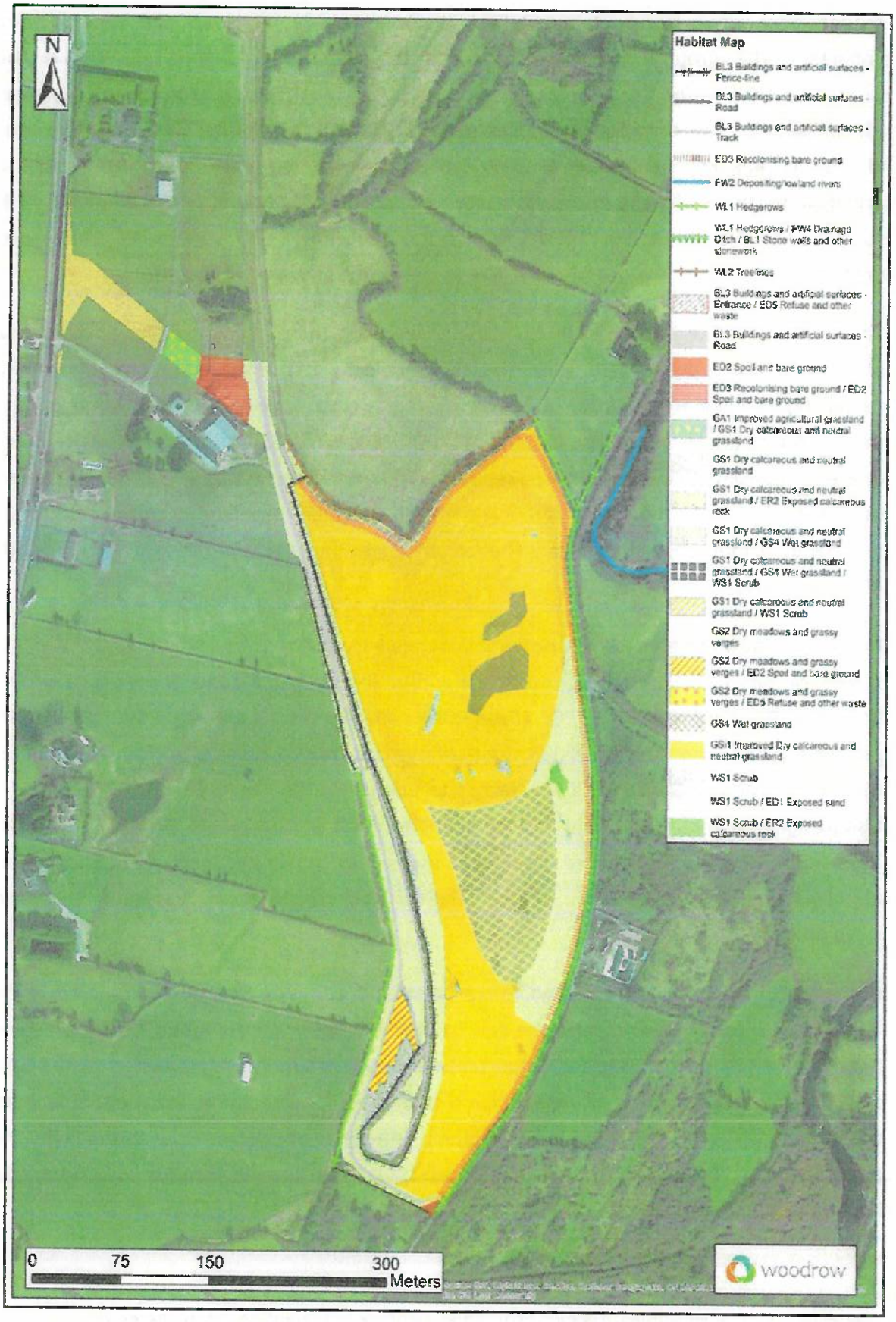
The Application Site has undergone clearance works in the past. According to the online historic mapping[5], pre-1995 much of this area supported dense scrub and grassland along its central and eastern extents, while the north and west extents appeared to have been managed for agriculture. Large extents of the Application Site, if not the entire site, were cleared (according to the Aerial mapping from 2000), and re-vegetated by 2005. However, the Application Site continues to support a mosaic of rough grassland, wet and calcareous grassland. A map showing the distribution of habitats at the site (according to Fossitt, 2000) is provided in Figure 4.1.

In terms of designated site with potential connectivity to the proposal, 10 SACs, 2 SPAs, 1 Ramsar Site, 1 NHA and 12 pNHAs lie within the potential zone of influence of the Proposed Development Site. Of these designated areas, 2 Natura 2000 sites have potential surface water connectivity with the Proposed Development Site. These are Coole-Garryland Complex SAC and Coole-Garryland Complex SPA. Coole-Garryland Complex is also designated in part as a Ramsar Site as Coole Lough and Garryland Wood Ramsar Site. In addition, the Coole-Garryland Complex NHA is connected in the same way. These sites are hydrologically connected to the Gort River which flows adjacent Proposed Development.

Coole-Garryland Complex SAC and Coole-Garryland Complex SPA are considered to be features of International importance due to their EU designated status. Coole-Garryland Complex NHA is a site of National importance but as it is largely encompassed by the SAC and SPA footprints and is proposed for designation for the same features, it is here considered alongside these Natura 2000 sites. Other sites have potential connectivity via groundwater, falling within the same groundwater body of the site within a karst area, and holding groundwater dependent features.

[5] GeoHive – Ordnance Survey Ireland: http://map.geohive.ie/mapviewer.html (Accessed September 2019).

Figure 4.1 Habitat Map



A summary Overview and Description of the Proposed Development is provided in Section 1 and 2 of this NTS. A detailed Description of the Proposed Development and all constituent components is contained in Chapter 2 of the EIAR (Volume 2).

5.3 Impact Assessment and Mitigation

The 'do nothing' option includes the continuation of the use of an area as an equine exercise track, with a typically close-grazed sward. It is considered that, without intervention (or fertilising) the grassland may continue to improve in terms of floral diversity due to the limestone influence and may start to align with Annex I habitat mentioned in the previous section such as priority habitat orchid-rich calcareous grassland (6210) and lowland hay meadows (6510).

Potential impacts during the construction phase encompass both direct impacts and secondary impacts, which include:

- Clearance of vegetation, soil and removal of individual semi-mature trees for infrastructure
- Placement of material arising from infrastructure works; and
- Access by construction equipment, including access away from the proposed infrastructure location (compaction and other damage).
- Stockpiling of materials on-site (run-off, erosion etc.);
- Use of potential pollutants (including hydrocarbons, cement and chemicals) during construction;
- Collection / drainage of surface water runoff; and
- Avoidance by birds and mammals due to disturbance.

Potential impacts of the proposal during the operational phase are considered to be largely limited to those arising from water quality and air quality changes and operational lighting. In terms of water quality changes, the potential pathways are via groundwater and surface water with the potential receptors being designated areas and downstream ecology associated with the Gort River. In terms of air quality changes, the pathway is through air movements associated with proximity and wind direction and the receptors being designated areas and sensitive habitats in the wider area. In terms of operational lighting the potential is direct impact on bat populations using the locality for commuting and foraging.

Mitigation proposed includes that which has been identified in other chapters of the EIAR, the outline Construction Environmental Management Plant (CEMP), Embedded Mitigation

(project design) and also specific mitigation by avoidance, reduction and offsetting as specified within this chapter.

The principle mitigation measures proposed are:

- There will be no direct discharge to watercourses, including land drains.
- All outflows from drainage associated with construction will be by diffuse overland drainage at appropriate locations.
- There will be no on-site holding of any effluent or construction run-off potentially containing chemical pollutants or cementitious material excepting within appropriately bunded / contained areas.
- Disturbed ground within the site will be actively revegetated immediately post construction.
- The proposals to control potential pollution detailed within the Chapter 8: Water of this EIAR will be implemented in full.
- Works relating to the widening of the road will be subject to the requirements of 'Guidelines on protection of Fisheries during Construction Works in and Adjacent to Waters' (IFI 2016)
- A Construction Environmental Management Plan will be developed for the construction period. This will include details of the implementation and monitoring of environmental control measures to be applied during the construction process
- The Landscape Planting Scheme includes approximately 430m of hedgerow / treeline planting
- The Landscape Planting Scheme includes the creation of circa 1ha of calcareous grassland, 0.3ha of woodland and 430m of hedgerow / treeline.
- Waterbodies (attenuation ponds) within the site will be created to optimise wildlife benefit taking account of their attenuation function requirements
- Lighting will be designed for the site to minimise lighting spill to any features potentially used by bats. This includes the existing treelines and hedgerows as well as hedgerow, woodland and pond features comprising the landscape concept. The aim will be to ensure light levels at these locations do not exceed 4 lux.
- Any works during the breeding season will also be preceded by a breeding bird survey to ascertain the location of active nests.
- A Project Ecologist will be appointed to ensure best practice is implemented during the construction of the EIA Development and any construction during the bird nesting season will be monitored by them. The Project Ecologists role will include the application of appropriate buffers to ensure the protection of nesting birds from disturbance in line with current scientific understanding

- The Landscape Planting Scheme includes the creation of circa 0.3ha of woodland and over 1,500m of hedgerow / treeline

5.4 Summary of Significant Effects

Measures have been proposed to reduce and avoid potential significant effects. These measures include appropriate working and design approaches to control hydrological impacts and effectively sever any potential hydrological link outside the Application Site. They also include minimising impact on habitats and providing replacement habitats where feasible. A Landscape Planting Scheme is proposed that includes features specifically aimed at enhancing the area for bats, passerines and raptors such as barn owl and kestrel.

It is concluded that following the implementation of mitigation as detailed in Section 5.6 of the EIAR, there is a significant (worst case residual) impact at local scale in the case of calcareous grassland with other potentially significant effects being reduced to a level of not significant.

6 SOILS AND GEOLOGY

6.1 Introduction

This Section of the EIAR focuses on the geology and soil environment and discusses the potential impacts associated with the proposed development during the construction and operational phases.

6.2 Description of Receiving Environment

A review of the Teagasc Soils map on the GSI map viewer details that the soil cover is composed 'deep well drained soils' (BmindDW) (mainly basic), described as grey brown podzolics and brown earths (medium-high base status) within the northern area and shallow well drained soils (BminSW) (mainly basic), described as renzinas and lithosols across the remaining site area.

A review of the SIS National Soils map on the EPA maps viewer details that the soil cover is composed Faoldroim, defined as fine loamy drift with limestones across the entire site. The soil exhibits good drainage. River Alluvium is present along the banks of the Cannahowna River to the east of the site.

A raised embankment is situated along the site's western boundary. The material used to construct the embankment is understood to be reworked till sourced from within the site. The embankment is an engineered feature associated with the earthworks during the construction of the horse gallop (circa 2000). The GSI Quaternary Geology online viewer indicates that the majority of the site is underlain by 'till derived from limestones'. The far north corner contains river alluvium. The southern area of the site is shown to be absent of quaternary sediments and is instead underlain by the outcropping bedrock geology of the Tubber Formation.

A review of the 'Teagasc Subsoils' map on the EPA maps viewer confirms that the cover is composed Limestone Tills (Carboniferous) within the northern area and surface bedrock (Limestone) across the southern site area.

Field works undertaken determined that the thickness of soil cover generally reduces from north to south with soils being described as sandy in nature, therefore of higher permeability than clay rich till deposits and will subsequently have limited potential to restrict vertical infiltration of surface water.

The GSI 100k bedrock maps demonstrate that the development site is underlain by the Tubber Formation. The unit is Carboniferous in age and is 300m in thickness. There are

no recorded boreholes on-site. Three (3 no.) boreholes are recorded within 1km of the site on the Geological Survey Ireland's online mapping. They are all deep bedrock boreholes.

A summary Overview and Description of the Proposed Development is provided in Section 1 and 2 of this NTS. A detailed Description of the Proposed Development and all constituent components is contained in Chapter 2 of the EIAR (Volume 2).

6.3 Impact Assessment and Mitigation

The proposed development will not have any significant effects on the geological environment when all mitigation measures proposed in the EIAR are implemented. The site development will result in the creation of low permeability and impermeable surfaces, limiting the potential for contamination of the subsurface. The primary embedded mitigation (design) associated with the operational phase of the development is bunding of the site and placement of digesters and storage vessels (tank) within a concrete bund. The proposal also provides for the recovery and recycling of all effluents generated and associated with processing to the AD treatment process.

6.4 Summary and Significant Effects

The proposed development will result in physical disturbance to the existing soil profile, however since the site has limited agricultural potential, the residual effect is negligible. Where a potential impact has been identified, mitigation measures have been provided which reduces the impact of significance to *'negligible'*.

7 HYDROLOGY & HYDROGEOLOGY INTRODUCTION

This Section of the EIAR focuses on the Hydrological and Hydrogeological environment and discusses the potential impacts associated with the proposed development during the construction and operational phases. While closely linked to the previous Soils and Geology Chapter of the EIAR, this Chapter focuses on the water environment (surface water and groundwater) and the its interrelationship with the underlying limestone karst environment.

7.1 Description of Receiving Environment

A number of field surveys were undertaken as part of this assessment including walkover surveys in late during the period November 2017 to May 2019, trial pitting in February 2018 and a geophysical survey in May 2019 to determine the extent of karstified bedrock below the site.

A review of the topographical survey completed at the site demonstrates an undulating topography, gradually sloping from the north west to the south east. On the western boundary of the site there is a steep embankment along which a perimeter track is shown to follow. A smaller, vegetated embankment follows the northern boundary of the site. The western embankment is considered to be an engineered feature associated with the earthworks during the construction of the horse gallop (circa 2000). The topographical survey confirms that site levels range from 18.3mAOD at the middle of the eastern boundary of the site and 27.5 mAOD at the north west of the site to east. The topography of the region is characterised by large areas of low lying ground between the hills of the East Burren Complex to the west and the Slieve Aughty Mountains to the east.

The site lies in the Galway Bay South East catchment area. This catchment includes the area drained by all streams entering tidal water in Galway Bay between Black Head and Renmore Point, Galway. The total drainage area of the catchment is 1,270km^2. The catchment area is predominantly underlain by karstified limestone, and the groundwater and surface water systems in the area are known to be hydraulically connected. The northern portion of the site is covered by the Kilchreest sub-catchment which covers an area of 356.7km^2. This sub-catchment includes the Coole-Garryland Nature Reserve Area and surrounding Turloughs. The sub-catchment stretches west to Corranroo Bay and Kinvara Bay. The southern portion of the site is covered by the Cannahowna sub-catchment which covers an area of 135.9km^2. The Cannahowna Sub-Catchment includes Lough Cultra.

The main surface hydrological feature in relation to the site is the Cannahowna River. The River runs south-north to the east of the site. At its closest point in the north corner of the site, the river is only 10m east of the site boundary. The river source is located at the north outlet of Lough Cultra as the Beagh River The river flows in a westward direction for 3km. At the 'devils punchbowl', the river sinks into a subterranean river, continuing to flow underground in a northwest direction for 1.4km. The river then re-emerges into the Cannahowna River and flows in a northerly direction through Gort town for 5km before again sinking into a subterranean river. From this point, the river flows in a north westerly direction, flowing both over ground and underground at different sections of the Kilchreest River before discharging into Coole Lough. Waters from Coole Lough drain via a series of turloughs and underground pathways, into Corranroe Bay (South of Kinvara), approximately 10km northwest of the site.

The bedrock geology underlying the proposed site is predominantly mapped as the Tubber Formation with minor sections mapped as the Newtown Member. The Tubber Formation comprises the stratigraphical interval above the Waulsortian Limestones up to the base of the Burren Formation in the Burren region of Counties Clare and Galway. The formation is characterised by crinoidal medium-grey packstone and wackestone and sometimes has fine-grained limestone with shaly partings. The basal part of the formation consists mostly of fine- to medium-grained, moderately well-sorted, skeletal and peloidal packstone and grainstone with some coarse-grained bioclastic grainstone intervals. The northern section of the site, with current development plans indicating an entrance and road way down to the biogas facility, is shown to be underlain by the Newtown Member. The Newtown Member is one of the differentiated strata that makes up the Tubber Formation. The Tubber Formation has been observed to have a maximum thickness of approximately 300m. The site overlies the Kinvara/Gort GWB which occupies the area between Gort, Kinvara and Ardrahan.

The hydrogeology and hydrology of the site is highly influenced by the underlying karst landscape in which it lies. The bedrock geology underlying the site shows extensive evidence of karstification. The aquifer underlying the site is classed as a regionally important karstified bedrock aquifer. An aquifer is defined as a subsurface layer of geological strata which allows either a significant flow of groundwater or the abstraction of significant quantities of groundwater. This aquifer has been designated as a regionally important karstified bedrock aquifer that is dominated by conduit flow (Rkc) therefore, there is a significant possibility of groundwater flow through subsurface conduits underlying the site.

The most significant karst feature picked out by the geophysical survey is seen is the resistivity/ seismic profile section R6 shown in Figure 7.16 of the EIAR**Error! Reference source not found.**. This section shows a vertical area of low resistivity which persists over 20 metres below ground level. This area is interpreted as weathered or fissured limestone and is likely to represent a significant fissure within the limestone bedrock. In general, any decrease in resistivity within limestone bedrock (in areas which are not interpreted as a change in lithology) may be interpreted as an area of possible karst. Irregular bedrock topography and lower than normal seismic velocities can also indicate possible karstic conditions. Resistivity interpretation is presented in Table 7.1.

Table 7.1 Resistivity Interpretation

Resistivity (Ohm-m)	Interpretation
150 - 250	Sandy Gravelly CLAY
250 - 500	Clayey SAND/GRAVEL
500 - 1275	Weathered / Fissured LIMESTONE
1275 - 10000	Slightly Weathered to fresh LIMESTONE
>10000	LIMESTONE with open fissures / voids
175 - 1275	DOLOMITE / Muddy LIMESTONE

High resistivities (>10,000 Ohm-m) within limestone bedrock are typically indicative of air filled fissures or voids. High resistivities were observed on ERT profiles across the central and southern parts of the site. Areas where karstified bedrock has been observed are highlighted in geophysical cross sections R6, R7, R10, R12, R13. These cross sections are shown below in Figures 7.22 – 7.26 of the EIAR (Chapter 7).

FLOOD RISK ASSESSMENT

A Flood Risk Assessment (FRA) was undertaken for the proposed development. Using the predicted information from the CFRAM and estimated probable flood levels extended across the development it can be confirmed that the site is located in Flood Zone C, at low risk of fluvial flooding, and is in agreement with the core principles contained within.

The assessment states that the concrete bund is the critical piece of infrastructure that will ensure the site is mitigated against the upwelling of high groundwater levels related to the fluvial flood levels on the Gort River. The top level of the bund and the buildings outside of the bund were designed and set at appropriate levels to offer protection against maximum estimated flood levels including the impacts of climate change.

The surface water management strategy has been comprehensively designed to manage the risk of pluvial/surface water flooding. This includes a robust approach to storage and discharge of surface water flow volumes. The stormwater drainage system has been

designed to include elements of SuDS (as per Galway CDP requirements) and the system includes capacity to deal with exceedance/management of residual risk.

A summary Overview and Description of the Proposed Development is provided in Section 1 and 2 of this NTS. A detailed Description of the Proposed Development and all constituent components is contained in Chapter 2 of the EIAR (Volume 2).

7.1.1 Impact Assessment and Mitigation

The receptors for this assessment are considered to be surface waters and groundwater. A Source – Pathway – Receptor qualitative method risk assessment has been prepared to determine the likelihood of identified risks to groundwater due to the construction and operation of a biogas facility.

Geophysical surveying has identified karstified bedrock across the southern and central sections of the site. Pre-construction ground investigations will inform the detailed design and the exact foundation solution required in order to mitigate against karstified bedrock impacting on the foundation and bund integrity of the biogas facility. The ground investigations that will take place as part of the detailed design of the facility will give an adequate evaluation of the karst bedrock which in turn will allow appropriate mitigation measures to be implemented to ensure the integrity of the foundation and bund design. Mitigation measure against settlement on site due to karstified bedrock will involve founding the foundations of the biogas facility in competent bedrock. Founding of the structure on competent bedrock will mitigate against any possible settlement of the structure as a result of karst processes.

7.2 Summary and Significant Effects

Whilst the development proposals have the potential to cause impact to the sensitive receptors (the hydrogeological and hydrological setting) identified, the recommended mitigation measures will ensure that the risk of potential impacts are reduced to negligible.

8 AIR QUALITY, ODOUR AND CLIMATE

8.1 Introduction

The air quality and odour impact assessment has been prepared to assess the potential air quality impact on the nearest neighbouring residential properties and ecological receptors in proximity to the site and the odours form the main potential odour sources on site.

8.2 Description of Receiving Environment

The background air quality in the area of the development is of very good quality and the site is located in 'Zone D' as denoted by the EPA. The EPA has divided the country into zones for the assessment and management of air quality. The zones adopted in Ireland are Zone A, the Dublin conurbation; Zone B, the Cork conurbation; Zone C, comprising 21 large towns in Ireland with a population >15,000; and Zone D, the remaining area of Ireland. Concentrations of air quality pollutants in Zone D are very low and well below the relevant air quality limit values. Background odours are most likely to be typical of intermittent rural area odours influenced by existing agricultural activities, etc.

To verify publicly available data used to characterise the receiving environment, air quality monitoring was undertaken in proximity to the proposed AD development site (during the period 11th June to 10thJuly 2019. Site specific baseline air quality monitoring was carried out in proximity to the site and specifically in proximity to the nearest designated European sites. Monitoring was undertaken at monitoring locations representative of the nearest point of the two closest designated European sites to the proposed AD development site. and at a monitoring location along the N18 /R458 at the entrance to the proposed AD development site. Nitrogen oxides (NOx) and nitrogen dioxide (NO_2) was monitored using diffusion tube survey. Nitrogen dioxide (NO_2) is classed as both a primary and a secondary pollutant. As a primary pollutant NO_2 is emitted from all combustion processes (such as a gas / oil fired boiler or a car engine). As a secondary pollutant NO_2 is derived from atmospheric reactions of pollutants that are themselves, derived mainly from traffic sources. NO_2 has been shown to reduce the pulmonary function of the lungs. Long-term exposure to high concentrations of NO_2 can cause a range of effects, primarily in the lungs, but also in the liver and blood. The NO_2 annual mean limit for the protection of human health is 40 $\mu g/m^3$.

Oxides of nitrogen (NO_x) are the sum of NO_2 and NO and is both a primary and secondary pollutant. NO_x is an atmospheric precursor for acid rain on reaction with water to form nitric acid. NO_x may have a positive or negative impact by acting as a fertiliser or a

phytotoxicant. Effects are mainly on growth, photosynthesis and nitrogen assimilation / metabolism. The NOx annual mean limit for the protection of vegetation is 30 µg/m³.

The results indicate that existing NOx concentrations in the area are less than 25% of the annual limit for the protection of vegetation (30 µg/m³). The results indicate that existing NOx concentrations at the nearest point of the two closest designated European sites to the proposed AD development site are less than 15% of the annual limit for the protection of vegetation (30 µg/m³). The results indicate that existing NO_2 concentrations at the residential properties in closest proximity to the proposed AD development site are less than 10% of the annual limit for the protection of human health (40 µg/m³). Therefore, it was verified by survey that air quality is very good in the study area.

The nearest and most sensitive ecologically designated sites to the Sustainable Bio-Energy Limited Biogas facility are the Coole-Garryland Complex SAC and the East Burren Complex SAC. The Coole-Garryland Complex SAC is located approximately 1km to the east of the Biogas facility and is a sensitive habitat on account of the presence of limestone pavements. The East Burren Complex SAC is located approximately 3.75km to the south-west of the Biogas facility and is a sensitive habitat on account of the presence of Alpine and Boreal heaths.

A summary Overview and Description of the Proposed Development is provided in Section 1 and 2 of this NTS. A detailed Description of the Proposed Development and all constituent components is contained in Chapter 2 of the EIAR (Volume 2).

8.3 Impact Assessment and Mitigation

The assessment and evaluation of the air quality and odour impact arising from the proposed development involved the identification of sources, quantification of emission rates, dispersion modelling of emissions and a comparison of modelling results with relevant criteria.

There are no odour Emission Limit Values (ELVs) from Anaerobic Digestion /Biogas plants and since the facility is not operational, it was not possible to monitor site specific emissions. In the absence of such information, estimations of future releases from the various identified sources had to be made to inform the dispersion model. Based on available technical guidance documents it is recommended that an odour target value of $C_{98,\ 1\text{-Hour}}$ 1.5 ou_E/m^3 should be adopted at the nearest sensitive receptors. The odour control system is designed to extract and treat odorous gases from the reception building. The odorous gases from these areas will be drawn by the extraction fan and discharged into a series of scrubbers and carbon filter. The treated air is finally discharged to

atmosphere via a 22m exhaust stack. The predicted odour concentrations were determined to be well below the odour benchmark of 1.5 ou_E/m^3 at the odour sensitive receiver locations and due to the location of the proposed site (and buffer distance to receivers) it is not anticipated that odour impacts will occur at any odour sensitive receiver locations. Appropriate operational designs and procedures have been recommended which will be enforced on site to prevent potential odour impacts. There is no potential for exceedances of the air quality standards as a result of emissions to atmosphere from the proposed CHP engine due to regulatory emission controls.

8.4 Summary and Significant Effects

The Air Quality Impact Assessment has demonstrated that the emissions will be in accordance with the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). The scheduled emission points at the proposed Biogas Plant will be regulated through the EPA Licensing process. It was determined that will be no impact to ecologically sensitive designated sites as a result of nitrogen deposition impacts.

9 NOISE AND VIBRATION

9.1 Introduction

The noise impact assessment has been prepared to assess the noise levels in proximity to the main noise sources on site and to assess the potential impact on the nearest neighbouring residential properties in proximity to the site.

9.2 Description of Receiving Environment

The noise impact assessment and evaluation of the noise impact arising from the proposed development involved the completion of a baseline noise survey, a comparison of the noise impact on the nearest residential receivers against the World Health Organisation (WHO) *Guidelines for Community Noise* and an assessment in accordance with the EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4). The background noise climate of the area is dominated by traffic noise from the M18 motorway and distant urban and traffic noise sources in Gort.

A 10-day baseline noise monitoring survey was undertaken at the boundary of the proposed development site closest to the nearest residential properties from 19th January to 22nd January 2018 and from 26th January to 2nd February 2018. The purpose of this long-term monitoring location is to determine a background (LA_{90}) noise level for the area of the proposed development. The fact that the monitoring location was selected away from the nearest main noise sources in the area, i.e. the R458 and the M18 motorway ensures that a realistic background (LA_{90}) noise level for the area has been determined.

Short-term daytime noise monitoring surveys were also undertaken in proximity to the proposed access off the R458 and at residential properties located along the R458 on 11th June 2019. The noise monitoring surveys were undertaken in accordance with ISO 1996 Description and Measurement of Environmental Noise.

The 10-day noise monitoring survey location was selected in an open area to minimise the potential effect of reflections from buildings and is representative of the existing background noise climate in the area. The sound level meter was set to record data over 15-minute intervals. The sound level meter was calibrated before and after the survey. The Time Weighting used was Fast and the Frequency Weighting was A-weighted.

For the short-term baseline noise monitoring survey, the locations were selected to minimise the potential effect of reflections from buildings and are representative of the existing daytime noise levels in the area along the R458. The sound level meter was set

to record data over 15-minute intervals. The sound level meter was calibrated before and after the survey. The Time Weighting used was Fast and the Frequency Weighting was A-weighted.

The main measurement parameters recorded during the baseline surveys are defined as follows:

- L_{Aeq} is the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an average value.
- L_{A10} is the A-weighted sound level that is exceeded for 10% of the sample period and is used to quantify traffic noise.
- L_{A90} is the A-weighted sound level that is exceeded for 90% of the sample period and is used to quantify background noise in the absence of the main noise source.

Following of the assessment of results in accordance with the recommended EPA guidance (NG4), the proposed development is not deemed to be an area of low background noise, and the reduced noise limits are not applicable at receptors in proximity to this proposed development location. Accordingly, the noise limit criteria, as outlined below in Table 9.1, have been determined based on the results of the screening processes and noise surveys undertaken.

Table 9.1 Recommended Noise Limits

Scenario	Daytime Noise Criterion, dB $L_{Ar,T}$ (07:00 to 19:00hrs)	Evening Noise Criterion, dB $L_{Ar,T}$ (19:00 to 23:00hrs)	Night-time Noise Criterion, dB $L_{Aeq,T}$ (23:00 to 07:00hrs)
'All other areas'	55dB	50dB	45dB

A summary Overview and Description of the Proposed Development is provided in Section 1 and 2 of this NTS. A detailed Description of the Proposed Development and all constituent components is contained in Chapter 2 of the EIAR (Volume 2).

9.3 Impact Assessment and Mitigation

The main sources of noise due to construction of the proposed development will be from activities such as earth movement and excavations, foundations and general building construction activities. Noise associated with this phase of the development will be temporary and intermittent in nature. The additional traffic flow during construction of will result in less than a 1 dB(A) increase in noise levels at properties along the R458.

The results of the predicted noise level modelling undertaken at the noise sensitive receivers in the area during daytime due to plant and equipment and traffic noise sources are presented in Table 9.10 of the EIAR. The predicted worst-case 1-hour noise during the operational phase (the plant itself and associated traffic) is shown to be in compliance with the EPA Noise Limits for "All other area" for daytime, evening-time and night-time periods. The predicted noise levels at the nearest residential properties during daytime, evening and night-time during the operational phase of the development are also are in accordance with the WHO *Guidelines for Community Noise* during daytime and night-time.

Other than the embedded design mitigation included, no further site-specific operational noise mitigation measures are deemed necessary. However, as part of an Environmental Improvement Programme for the site, the project developer will focus on reducing noise breakout off site where possible and aim to improve noise attenuation measures on the site in accordance with the EPA licence.

9.4 Summary and Significant Effects

This noise impact assessment has compared the measured noise levels in proximity to the nearest noise sensitive properties to the relevant guideline noise limits outlined in the WHO *Guidelines for Community Noise* and the EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).

The measured noise levels at the noise monitoring location are in accordance with the relevant guideline noise limits outlined in the WHO *Guidelines for Community Noise* and the predicted noise levels at the nearest residential properties are in accordance with the WHO *Guidelines for Community Noise* during daytime and night-time.

The worst-case assessment of operational noise from the proposed plant and traffic movements associated with the proposed development has indicated that the EPA's noise limit criteria will not be exceeded at the nearest residential properties.

No site-specific operational noise mitigation measures are deemed necessary. However, as part of an Environmental Improvement Programme for the site, the project developer will focus on reducing noise breakout off site where possible and aim to improve noise attenuation measures on the site.

10 LANDSCAPE AND VISUAL

10.1 Introduction

The LVIA describes the landscape context of the proposed development and assesses the likely landscape and visual impacts of the proposed Development on the receiving environment. Although closely linked, landscape and visual impacts are assessed separately. This LVIA uses methodology as prescribed in the following guidance documents:

- Environmental Protection Agency (EPA) publication 'Guidelines on the Information to be contained in Environmental Impact Statements (updated draft 2017) and the accompanying Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (updated draft 2017); and
- Landscape Institute and the Institute of Environmental Management and Assessment publication entitled Guidelines for Landscape and Visual Impact Assessment (2013).

Production of this Landscape and Visual Impact Assessment involved;

- A desktop study to establish an appropriate study area, relevant landscape and visual designations in the Galway County Development Plan as well as other sensitive visual receptors. This stage culminates in the selection of a set of potential viewpoints from which to study the effects of the proposal;
- Fieldwork to establish the landscape character of the receiving environment and to confirm and refine the set of viewpoints to be used for the visual assessment stage;
- Assessment of the significance of the landscape and visual impacts of the Development.

In the interests of a comprehensive appraisal, a 5km radius study area is used for this project. However, there is a particular focus on receptors contained within 2km of the site.

10.2 Description of Receiving Environment

A Landscape Character Assessment for County Galway was undertaken in 2003 and this has been incorporated into the current Galway County Development Plan. As part of this assessment, the county has been divided up into areas with different Landscape Value Ratings. The site is located within a localised area of County Galway that is classified as having 'Medium' Landscape Value. The Landscape Character Assessment also identifies 25 geographically distinct Landscape Character Areas (LCAs). The proposed site is

situated within LCA 4 *'Southeast Galway (Clarinbridge to Gort)'*. The landscape within this LCA is described as *"...undulating scrubby grassland, bound by field hedgerows without mature trees. The landscape is scenic without being remarkable and there are long distance views of the Slieve Aughty Mountains to the east."* The landscape sensitivity of this LCA is rated as *'Medium sensitivity'* (Class 3), with some pockets of *'Special sensitivity'* (Class 4) within 2km west of the application site, and a broad expanse of *'Moderate Sensitivity'* (Class 2) within 5km east of the site.

The application site is located approximately 1km north of Gort town centre and is a considerably modified environment. It is understood that ground conditions, ground levels and field boundaries were significantly disturbed and modified circa year 2000, to facilitate development of a horse gallop and associated horse-training facilities. These site works also involved the excavation of soils, profiling of ground, removal of field boundaries and resulted in a basin that is enclosed on three sides and open to the east in the direction of the Gort River. Immediately west the land plateaus out until it reaches the former N18 (now R458). The topography of lands surrounding the site undulates less dramatically and there are two lakes within the study area; Coole Lough, approximately 2km west of the site, and Lough Cultra, approximately 4km southeast of the site.

With a population of approximately 3,000 residents and located within 1km south of the site, Gort is the centre of population not just for the study area, but for south Galway as well. There are low-density residential housing estates in the peri-urban margins of Gort, within 500m of the southern boundary of the site. Two residences are located within 250m north of the site, along the cul de sac local Kinincha Road that aligns the site's eastern boundary. A third (albeit derelict) residence is located along the same road, immediately south of the site. There is a sizeable array of one-off rural housing located 300-500m west of the site along the R458 and along a third-class road linking the townlands of Ballymurphy and Castletown, approx. 1km northeast of the site.

In the eastern half of the study area, the M18 links Limerick city to Galway city. Since its opening, the former N18, which runs 300-500m west of the application site and dissects the study area in a north-south orientation, has been downgraded to a regional road (R458). The only other non-local road in the study area is the N66 that runs, in places, within 1km east of the site, and the R460 approx. 1.5km southwest of the site.

A summary Overview and Description of the Proposed Development is provided in Section 1 and 2 of this NTS. A detailed Description of the Proposed Development and all constituent components is contained in Chapter 2 of the EIAR (Volume 2).

10.3 Impact Assessment and Mitigation

In terms of landscape impacts, the proposed development is considered to result in substantial physical disturbance and permanent change to the landform and land cover of the site itself. However, this is in the context of already much-modified landform within the site over the last 25 years, which contributes to the site and its immediate surrounds being considered a *'Low' sensitivity* landscape in this appraisal.

There will be noticeable impacts on landscape character as a result of the introduction of the propose biogas plant. These will be most apparent in the localised environs of the site, which are predominantly rural in character. However, when considered in the slightly broader context of the northern urban fringe of Gort the scheme, although considerable in scale, the scheme is consistent with the gradual progression of peri-urban development and is not incongruous in terms of form of function within this landscape setting. These effects are aided by the siting and design of the development which takes advantage of an existing enclosed setting, which can be readily modified to reduce the base levels of structures and enclose the only open side of the site using excavated material from the site.

Visual impacts were assessed at eight viewpoints representing a variety of distances, angles and viewing contexts. These viewpoints are considered to range in sensitivity between *Medium* and *Low* depending mainly on the extent of the view in question and whether each takes in a predominantly rural or mixed peri-urban landscape context. No designated scenic views will be affected by the proposed development.

Visual impacts tend to be in the mid to low range with the most impacted viewpoint (VP5) occurring directly across the Gort River to the east of the site from an elevated railway overpass. Even from this location the scheme appears strongly contained within the landscape context in view, which is that of Gort's urban fringe. Proposed mitigation screen planting further enhances the sense of consolidation within the landscape. Similar effects occur for both VP2 on the N66 to the south of the site, and VP4 from a cluster of local residences to the northeast, albeit at longer viewing distances such that the initial and post mitigation impacts are lower.

10.4 Summary and Significant Effects

Based on the landscape and visual impact judgements provided throughout this LVIA, the proposed biogas development north of Gort is not considered to give rise to any significant landscape or visual impacts. Instead, landscape and visual impacts are likely to be no greater than Moderate-Slight from select locations within the immediate vicinity of the

scheme and generally lower at increasing distances. Though not considered critical in terms of reducing otherwise significant impacts, the proposed planted perimeter berm along the eastern side of the site (embedded mitigation) is considered to be highly successful at reducing potential levels of landscape and visual impact as a *'best-practice'* mitigation measure.

11 TRAFFIC AND TRANSPORT

11.1 Introduction

The Traffic and Transport Assessment details the impacts related to the construction and operation of a proposed development in Gort, Co. Galway. The development proposal will accept naturally occurring organic feedstock delivered to the site by HGV and sourced from the agri-food industry. The biogas plant process will transform the feedstock using anaerobic digestion techniques and produce clean renewable gas (biomethane and carbon dioxide) and organic fertiliser. The proposal involves the creation of a new site access junction off the R458 regional road (N18); provision of approximately 200m of new internal road within the development site; and, widening of an existing internal road within the development site.

The proposed development will access onto the R458 regional road approximately one kilometre to the north of its junction with the M18 motorway and R380 regional road. Hauliers making deliveries related to the proposed development will be contracted to enter the site from the south via the M18 motorway junction 16 to the north of Gort, and via the R458 regional road from the motorway junction to the site access. No feedstock deliveries will be made using tractor hauled slurry type tankers. No feedstock deliveries will be routed through Gort town centre. No access to the development site is proposed from the L85314-0 Kinincha Road. Where possible, construction materials will be sourced locally and will be delivered to the site using the most direct route.

11.2 Description of Receiving Environment

The design characteristics of the R458 (N18) regional road in the vicinity of the proposed development are consistent with its former status as a national primary route. The R458 carriageway is formed from two 3.5m wide running lanes, bounded by 2.4m wide shoulders. The carriageway is demarcated by a dashed centreline, dashed edge-lining and road studs. The surfaced carriageway is bounded by grass verges, backed by stone walls. A number of residential and agricultural accesses are present. Galway County Council have confirmed that the relevant posted speed limit is 80km/h.

The Road Safety Authority online Collstats database[6] has been consulted for the period currently available (2005 to 2016 inclusive). This database indicates that one head-on collision resulting in serious injury to one person and minor injury to two further people

[6]https://www.rsa.ie/RSA/Road-Safety/RSA-Statistics/Collision-Statistics/Ireland-Road-Collisions

occurred in the immediate vicinity of the proposed site access junction off the R458 regional road between 23:00 and 03:00 on a Tuesday in 2016.

The Road Safety Authority online Collstats database includes three further collisions between junction 16 of the M18 motorway and the proposed new site access junction, all rear-end collisions. All of these recorded collisions occurred before the opening of the M18 motorway to the north of Gort on Wednesday 27th September 2017, during a period whilst the R458 regional road was still the N18 national road with considerably higher traffic flows[7] and a speed limit of 100km/h. No collision data is currently publicly available for this section of the R458 regional road following the opening of the M18 motorway.

An Automatic Traffic Count (ATC) on the R458 regional road in the vicinity of the new site access junction over a 15-day period from 9th to 23rd May 2019 inclusive. Based on this traffic count, the local traffic peak hours identified for assessment of the site access junction were 08:30-08:29 and 17:30-18:29. The assessment of local traffic peak hours tests the impact of the proposed development in a worst-case scenario, such that if the impact of the development does not cause congestion and queuing during the local traffic peak hours, it is very unlikely to cause congestion and queuing at other times.

For the purpose of analysis, the traffic count data has been converted into Passenger Car Units (PCUs) using factors of: 0.2 for pedal cycles; 0.4 for motorcycles; 1.0 for cars and light goods vehicles (LGV) including those towing trailers; and 2.3 for buses and all types of rigid and articulated Medium and Heavy Goods Vehicle (HGVs). Factoring the traffic count data in this way allows the relative impact of different types of vehicles to be modelled in a standard way, generally acknowledging the greater impact on road space and capacity of a HGV compared to a car or LGV.

Weekday AM peak hour and PM peak hour traffic flows recorded on the R458 regional road are summarised in Table 11.1, and traffic count data for the entire survey period is included in Appendix 11.1 of the EIAR (Volume 3).

Table 11.1 Weekday peak-hour traffic flow recorded on the R458 regional road

Mode	Northbound		Southbound	
	AM	PM	AM	PM
Bicycle	6	7	6	7
Motorcycle	2	0	0	1

[7]TII traffic counter output indicates an Annual Average Daily Traffic (AADT) flow of approximately 19000 prior to the opening of the M18 to the north of Gort.

Mode	Northbound		Southbound	
	AM	PM	AM	PM
Car/LGV	150	208	209	230
HGV	9	4	6	6
Equating to PCUs	173	219	224	246

A summary Overview and Description of the Proposed Development is provided in Section 1 and 2 of this NTS. A detailed Description of the Proposed Development and all constituent components is contained in Chapter 2 of the EIAR (Volume 2).

11.3 Impact Assessment and Mitigation

The Traffic Impact Assessment takes account of a range of factors including: background traffic growth, the site access junction and specified haulage routes, and the trip generation associated with the various phases of the proposed development.

Construction of the new site access junction off the R458 regional road, construction of the new internal road within the proposed development site, and widening of an existing internal road within the proposed development site, should be programmed to be completed in advance of construction commencing of the Biogas plant.

The predicted maximum daily operational phase movements (PCUs) are presented in Table 11.2. For the purpose of the assessing the impact of operational stage effect, traffic has been distributed based on existing movements on the R458 regional road. Operational phase trips equate to 4.2% of the AM peak hour traffic movements and 3.6% of the PM peak hour traffic movements at the R458/new site access junction, both below the normal threshold levels for assessment and intervention, which is 5%.

Table 11.2 Predicted maximum daily operational phase movements (PCUs)

Trip Type	Average Daily two-way movements		Maximum Daily two-way movements	
	Vehicles	*PCUs* [8]	Vehicles	*PCUs*
Operatives (employees) accessing the site (Cars and LGVs)	22	*22*	22	*22*
Vehicles (HGVs) delivering non-hazardous organic feedstocks	10	*25*	11	*25*
Vehicles (Tankers) collecting whole digestate	7	*16*	10	*24*

[8]For definition of PCUs refer to Section 11.2.6

Trip Type	Average Daily two-way movements		Maximum Daily two-way movements	
	Vehicles	*PCUs* [8]	Vehicles	*PCUs*
Vehicles (HGVs) collecting fibre digestate	4	*9*	4	*9*
Tankers collecting biomethane	4	*9*	4	*9*
Tankers collecting CO_2	4	*9*	4	*9*
Total daily movements (Cars/LGVs/HGVs)	51	*90*	55	*98*
Total Daily HGV movements	29	*68*	33	*76*

The operation of the R458/New site access junction has been assessed using the industry standard PICADY modelling software package for the operational years of 2022, 2027 and 2037. The results of the PICADY analysis are summarised in Table 11.5 of the EIAR (Volume 2), and detailed in Appendix 11.4 (Volume 3). The traffic modelling shows that the junctions tested will operate with over 98% spare capacity, with negligible queuing, during the operational phase of the proposed development. Minor changes to the operational phase trip generation and/or distribution will not affect the validity of this assessment.

11.4 Summary and Significant Effects

With the recommended mitigation measures in place, no significant adverse roads and traffic related environmental impacts are anticipated during the construction, operational or decommissioning phases of the proposed development.

12 ARCHAEOLOGY AND CULTURAL HERITAGE

12.1 Introduction

The Archaeology and Cultural Heritage Assessment provides an assessment of potential impacts on the cultural heritage resource within the environs of the site of the proposed Biogas Plant at Gort, County Galway. The term *'cultural heritage'* is used to encompass the overall archaeological, architectural, historical and folklore heritage resources. This Section of the EIAR presents an assessment of the proposed development site (PDS) and a study area extending for 1km from its boundary. It provides the location of all recorded archaeological and architectural heritage sites within this study area and also provides their published inventory descriptions as appendices.

The assessment commenced with a desktop study of the known cultural heritage resource within the study area and outlines the legal and planning framework designed for its protection. This was followed by an inspection of the subject site to assess the existing environment in terms of landscape, existing land use and the potential presence of unrecorded archaeological and architectural heritage sites.

The principal sources reviewed for the assessment of the known archaeological resource were the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP) for County Galway. These provide comprehensive lists of the known archaeological resource. The Record of Protected Structures (RPS) and the National Inventory of Architectural Heritage (NIAH) were the main sources consulted for assessing the recorded architectural heritage resource. Other consulted sources included:

- Database of Irish Excavations;
- Galway County Development Plan, 2015-2021;
- Cartographic Sources;
- Aerial Images;
- Literary Sources;
- Placenames Database of Ireland; and
- National Museum of Ireland Topographical Files.

12.2 Description of the Receiving Environment

The PDS comprises approximately 10.1ha and is located in lands to the northwest of Gort town, within the townlands of Ballynamantan, Kinincha and Glenbrack. The site largely consists of improved grassland, which is used for agricultural (grazing) and equine related purposes, as well localised areas of woodland scrub to the south and east. Ground

conditions, ground levels and field boundaries within the site were significantly altered in c. 2000 when the site was extensively landscaped to facilitate the development of a horse gallop with access to associated stables and a lunging ring located off-site to the northwest of the PDS. The enabling works undertaken within the subject site at this time involved excavation of soils, profiling of ground, removal of field boundaries, importation of screened fine soils, grass reseeding, construction of a perimeter track and fencing.

There are no recorded archaeological sites within the PDS or within 200m of its boundary and the nearest example is a ringfort (GA122-016----) located approximately 250m to the northwest. The Section of the EIAR presents the classifications and locations of all recorded archaeological sites within the environs of the scheme in map and table formats. Their published inventory descriptions are provided in Appendix 12.1.

EARLY PREHISTORIC PERIODS

There are no recorded early prehistoric sites within the study area, however, activity from the Mesolithic and Neolithic periods have been uncovered within the county during archaeological excavations undertaken as part of the various road schemes.

LATE PREHISTORIC PERIODS

The study area contains four fulachta fiadh, which translates as cooking places of the wild (or of deer). They are often interpreted as the remains of Bronze Age cooking sites and are the most numerous archaeological site types in Ireland. The study area contains another recorded archaeological site of possible the Bronze Age origin; a ritual site (GA122-089----) located at a pond in Glenbrack townland, c.600m west of the PDS. Within the wider environs of the subject site, but outside the study area, a significant number of Bronze Age archaeological sites, predominantly comprising further fulachta fiadh, were revealed during archaeological investigations associated with the construction of M18 motorway in the lands to the west of the study area.

EARLY MEDIEVAL

The study area contains six recorded ringforts and the closest of these is located c.250m to the northwest of the subject site in Ballynamantan townland (GA122-016----). Three of the ringforts within the study area contain souterrains which are underground chambers constructed within ringforts that had a defensive and/or storage function. An enclosure site (GA123-064----) in Lavally townland may also date to the early medieval period. Ringforts comprise roughly circular enclosures delimited by roughly circular earthen banks formed of material thrown up from a concentric external ditch. Archaeological excavations

indicate that the majority were early medieval farmsteads with internal timber buildings and were surrounded by associated field systems.

LATE AND POST MEDIEVAL PERIODS

There are eleven recorded archaeological sites dating to the late and post medieval period within the study area and the majority of these are located within Gort town centre. The area was settled around the 12th century by the O'Shaughnessy's who built a stronghold there during the late medieval period, before being deposed after the Battle of the Boyne. The O'Shaughnessy lands around Gort were subsequently granted to Thomas Prendergast in payment for his service to William of Orange. The development of much of the existing building stock in Gort began in the early 19th century when it was still under the control of the Prendergasts (later titled Lord Gort), although the street pattern in the historic core may preserve its earlier layout. The town grew rapidly during the 19th century with many domestic, retail and civic buildings being constructed and by the 1830s the population had risen to 3,627 inhabitants, within 563 houses.

MONUMENTS IN STATE OWNERSHIP OR GUARDIANSHIP

There are no monuments in state ownership or guardianship recorded within the study area.

PRESERVATION ORDERS

There are no Preservation Orders on any of the recorded archaeological sites within the study area.

CARTOGRAPHIC AND AERIAL SOURCES

The historic Ordnance Survey (OS) maps indicate that the PDS has been occupied by enclosed, primarily pastoral farmland since at least the 19th century and significant sub-division of fields was undertaken in the second half of that century. The maps show the line of a now levelled section of the Kinincha-Glenbrack townland boundary extending through the north end of the PDS. The 25-inch edition map shows a small circular feature (c.10m diameter) near the east-central margin of the site and this possibly represents an animal pen. The feature is not present on the earlier and later editions of the 6-inch OS maps.

AERIAL SOURCES

The extent of the ground reduction works undertaken within the site during the development of the horse gallop is clearly demonstrated on an OS aerial image taken

during the course of the ground works in 2000. There are no visible traces of soil marks that may suggest the presence of an archaeological site evident in the exposed subsoils on this image. A 2005 image shows the completed horse gallop and indicates that the townland boundary between Kinincha and Glenbrack was levelled during the site preparation works.

PLACENAMES

The PDS extends into sections of the townlands of Kinincha (Cionn Inse: headland of the river meadow) and Glenbrack (An Gleann Breac: the speckled glen).

RECORDED ARCHAEOLOGICAL FINDS

The National Museum of Ireland topographical files were inspected on the 26th January 2018 and contained no entries for townlands in the study area.

PREVIOUS ARCHAEOLOGICAL EXCAVATIONS

The Excavations Database lists no archaeological investigations within the PDS, indicating that the ground works undertaken in the early 2000s were not archaeologically investigated. Approx. 20 archaeological investigations have been undertaken within townlands in the surrounding study area and the results are provided within the Section.

ARCHITECTURAL AND BUILT HERITAGE

The subject site is located outside the Gort Architectural Conservation Area and there are no Protected Structures or NIAH listed features within 500m of the subject site.

FIELD INSPECTION

The ground levels within the PDS have been impacted by extensive modern ground reduction works. Potential surface traces of the levelled townland boundary between Kinincha and Glenbrack in the north end of the site are barely perceptible as three low remnants of the base of the earthen bank, marked by hawthorn bushes. There is no clear trace of the boundary bank or ditch visible recent OS aerial images of the site. The environs of the small enclosed feature (ITM 545513, 703371) visible on the 25-inch map is occupied by an overgrown dump of large stones over a 5m x 7m area. No surface traces of an enclosure feature were evident. While topsoil stripping and some reduction of natural subsoil levels appear to have been carried out across the entire site it is possible that areas of undisturbed natural subsoil retaining some archaeological potential survive beneath introduced soils in areas where previous ground works were limited to topsoil stripping.

A summary Overview and Description of the Proposed Development is provided in Section 1 and 2 of this NTS. A detailed Description of the Proposed Development and all constituent components is contained in Chapter 2 of the EIAR (Volume 2).

12.3 Impact Assessment and Mitigation

Given the absence of any recorded cultural heritage sites on the footprint of the proposed development or in its close environs combined with the extensive ground reduction works undertaken across the entire site in recent decades, the impacts of the proposed scheme on the known archaeological and cultural heritage resource are assessed as being imperceptible in nature. There is, nonetheless, the potential to reveal hitherto unknown sub-surface archaeological remains in areas where previous ground reduction works were shallow in nature. The enactment of the mitigation measures will provide for either the avoidance of any unknown archaeological features or their proper and adequate recording of this resource during the construction phase. As a result, there shall be no cumulative or residual effects on the archaeological resource including during the decommissioning phase of the proposed development.

All ground works that may impact on any sub-surface traces of the townland boundary will be subject to a programme of archaeological monitoring. A stone dump noted during the site inspection may represent the remnants of a late 19th century agricultural feature or may be associated with the modern site clearance activity. Works at this location will also be subject to archaeological monitoring. In the event that any potential archaeological features are identified, all works at their location will be halted, the area will be cordoned off and the NMS will be consulted to determine the appropriate mitigation strategy.

A report on the archaeological supervision of localised ground works will be submitted to the NMS and Galway County Council as part of the monitoring process for the proposed development mitigation measures.

12.4 Summary and Significant Effects

There are no predicted significant adverse impacts arising from the proposed development on the cultural heritage resource of the PDS and its environs. The impacts of the proposed scheme on the known archaeological and cultural heritage resource are assessed as being 'imperceptible' in nature.

13 MATERIAL ASSETS

13.1 Introduction

As described in Chapter of the EIAR, the proposed development consists of the construction of a Biogas Plant on a 10.1-hectare site in the townlands of Ballynamantan, Kinincha, Glenbrack, County Galway. Sustainable Bio-Energy Limited is applying for full planning permission for this development.

There will be no severance of land as a result of the proposed development or loss of rights of ways or amenities. While the proposed Sustainable Bio-Energy Ltd. biogas plant is being developed on agricultural lands, the proposal conforms with national and international best practice in relation to the siting of such bioenergy infrastructure.

Development of the proposed biogas plant will support the agri-food sector by processing and converting raw organic wastes into certified organic fertiliser with known nutritional composition. Application of digestate product to lands will also require effective and robust nutrient management planning to ensure appropriate application rates in consideration of soil types, topography, cropping etc. This will inevitably lead to better management, control and prevention of pollution (including diffuse run-off of nutrient and sediments) of waterbodies from agricultural sources; agriculture is identified as being a significant pressure in 53% of the 1,460 water bodies nationally identified as being *At Risk* of not meeting their environmental objectives.

In terms of air quality and climate change, developing the proposed Sustainable Bio-Energy Ltd. Biogas plant will result in reduced GHG emission by:

- Recovering biogas (methane and carbon dioxide) from organic feedstock, including animal manures;
- Replacement of fossil fuels with biomethane (renewable gas);
- Recovery of carbon dioxide from biogas and replacing other sources;
- Utilisation of digestate (organic fertiliser) by farmers replacing synthetic fertilisers - the manufacturing of which results in significant emissions of greenhouse gases; and
- Reduction in N_2O emissions from land application of digestate in comparison to the use of other fertilisers - Digestate having higher nitrogen availability and reduced losses.

The feedstocks proposed for the plant accord with sustainability criteria laid down in the renewable energy directive (RED II) and mitigate potential effects of indirect land-use

competition (ILUC). There are no predicted significant adverse impacts arising from the proposed development on material assets (including those of natural and human origin).

13.2 Summary and Significant Effects

There are no predicted significant adverse impacts arising from the proposed development on material assets. The impacts of the of the proposed Sustainable Bio-Energy Limited Biogas Plant are long-term slight /moderate positive; direct and indirect in nature.

14 INTERACTIONS OF THE FOREGOING

While all environmental factors are inter-related to some extent, the significant interactions were taken into consideration by each specialist during preparation of the EIAR. This required each specialist to review other relevant Sections of the EIAR prior to determining the potential interactions. Potential impacts identified can be eliminated by the implementation of mitigation measures as detailed in each Section of the EIAR

Table 12.1 Summary of Interactions

Interaction of Environmental Factors	Description
Population and Human Health	Interactions of environmental factors will occur during construction activities as a direct result of earth works associated with site clearance and civils works (construction of structure foundations, road improvement works, internal road constructions, berm construction, etc). These activities will result in the generation of noise and dust. The development would have the potential for negative impact if construction activities were to proceed without implementing adequate mitigation measures. Health and Safety on site is also recognised as being of paramount importance to human health during the construction, operation and decommissioning phases and this will not be compromised, if the specified mitigation measures outlined in the various chapters of the EIAR are adhered too.
Air Quality and Population & Human Health and Biodiversity	There is potential for impact to human beings living in the area of the proposed development during the construction, operation and decommissioning phases of the development. These have been outlined and assessed in Section 8 (Air Quality, Climate and Odour) of the EIS. The air quality impact at the nearest residential receivers is predicted to be below the relevant air quality standard limit values and is therefore determined to be low. The assessment of odour impact shows that worst-case odour impact will be well below the odour target value of $C_{98,\,1\text{-Hour}}$ 1.5 ou_E/m^3 at the sensitive residential receptors in the area. The emissions from the Feedstock Reception Building Odour Control Stack results in effective dispersion of the odours from the Sustainable Bio-Energy Limited facility. The main interactions between air quality and flora and fauna are related to emissions of acidifying gases such as nitrogen oxides (NOx). The predicted nitrogen deposition rate at the Coole-Garryland Complex SAC (0.394 Kg/Ha/Yr) is 7.9% of the relevant Critical Load of 5 Kg/Ha/Yr. The predicted nitrogen deposition rate at the East Burren Complex SAC (0.02 Kg/Ha/Yr) is 0.2% of the relevant Critical Load of 5 Kg/Ha/Yr. As the maximum predicted nitrogen deposition rate at the Coole-Garryland Complex SAC and the East Burren Complex SAC is less than 10% of the relevant Critical Level (Cle) and 3.9% of the existing background nitrogen deposition level, the proposed Sustainable Bio-Energy Limited facility will not have a significant impact on nitrogen deposition rates at nearby designated sites or sensitive habitats.

Interaction of Environmental Factors	Description
	One of the most important contribution of biogas technology to environmental protection is that it avoids additional carbon dioxide (CO_2) emissions compared with fossil energy sources. Producing energy from biogas is largely CO_2 neutral, i.e. the CO_2 released by burning biogas was previously removed from the atmosphere during the generation of biomass through photosynthesis. The fermentation of manure also reduces emissions of methane, a gas that has an effect on the climate and would otherwise escape uncontrolled from raw liquid manure with far more damaging effects for the climate than CO_2. New research suggests that emissions of laughing gas (N_20) – which also has an effect on the climate – can also be reduced by fermentation. Furthermore, fermentation reduces the development of odours during liquid manure storage and spreading since the odours contained in it are broken down and neutralised during the fermentation process. In addition, fermentation improves the quality of manure as pathogens and weed seeds are killed and nutrients made more available for plants, enabling the manure to be applied in a more targeted fashion as a substitute for inorganic fertilisers. Therefore, the digestate is an ideal fertiliser in arable farming/crop production and a good soil conditioner
Noise, Human Beings and Biodiversity	The impact of noise on the human beings living in the area of the proposed development has been addressed during the construction, operational and decommissioning phases of the proposed development. Appropriate mitigation measures have been recommended to ensure the construction phase target noise limits are not exceeded. The contractor will also be required to adopt and implement suitable control measures as recommended in BS 5228. These will be further prescribed in a construction management plan subject to planning. The predicted noise levels at the nearest neighbouring residential properties due to the operation of the proposed Anaerobic Digestor and CHP Plant are in accordance with the WHO *Guidelines for Community Noise* during daytime and night-time and the relevant noise limits outlined in the EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4). In relation to the interaction of noise from the proposed development with biodiversity, the noise generated by the development will not have a significant adverse impact on the local birdlife and wildlife. Local birdlife and wildlife will quickly accustom to any change in the noise climate of the area as occurs throughout the country. Noise levels generated during the operation of the proposed development will not be audible at the nearest sensitive ecological receptors.
Landscape and Visual, Biodiversity, Population and Human Health	The landscape and visual impacts have potential interactions with impacts resulting from other environmental statement topics. The interactions of these impacts are usually highly complex in practice and this section serves to act as a brief overview to these issues. In addition, the proposed development will create varying impacts during the construction phase and the operation phase. No designated scenic views will be affected by the proposed development. The removal of some of the existing vegetation along boundaries and roadsides, will temporarily impact on the volume of

Interaction of Environmental Factors	Description
	vegetation providing potential wildlife habitat. However, the proposed mitigation planting (including a new berm; refer Appendix 10.2) will increase the variety of native tree and shrub species on site and this will have a positive impact of providing increasing screening and increased ecological benefit. The management of the site vegetation will also result in a positive impact to the appearance and condition of site vegetation. There will be noticeable impacts on landscape character as a result of the introduction of the propose biogas plant. These will be most apparent in the localised environs of the site, which are predominantly rural in character. However, when considered in the slightly broader context of the northern urban fringe of Gort the scheme, although considerable in scale, is consistent with the gradual progression of peri-urban development and is not incongruous in terms of form of function within this landscape setting. These effects are aided by the siting and design of the development which takes advantage of an existing enclosed setting, which can be readily modified to reduce the floor levels of structures and enclose the only open side of the site using excavated material from the site.
Soils, Geology, Hydrology and Hydrogeology	There is a strong interaction between soils & geology and Hydrology and Hydrogeology (surface waters and groundwater). The disturbance of soil during construction has the potential to impact on water quality. Construction activities which disturb or expose the soil have the potential to elevate suspended solids in runoff from the site which could impact on surface water bodies such as the Gort River. Mitigation measures during the construction process will prevent sediment run-off and construction discharges. The outline CEMP will be further developed and implemented for the construction phase of the development. This document will provide a framework under which construction activities which have potential for environmental impact (e.g. generation of dust, ecological impacts, surface water discharge, etc) will be managed. Mitigation measures as outlined in the EIAR are included within this plan. There will be no direct discharges to soils or surface water bodies during the operational phase of the development. A tank farm bund has been designed in accordance with best practice to contain and spillages /escape of organic materials. A second outer concrete bund, which encompasses areas where processing relating activities will be carried out is also included within the design. This removes the pathway of potential sources of pollution to receptors. Stormwater generated on the site will be managed in accordance with proposals as presented in the drainage report which accompanies the EIAR.
Traffic & Transport, population and human health, landscape and visual, noise &	There will be potential interactions with increased traffic movements as a result of the construction and operation of the proposed biogas plant with population and human health, air quality, odour and climate, landscape & visual and noise and vibration and biodiversity. Recommended mitigation is proposed within each of the Sections of the EIAR.

Interaction of Environmental Factors	Description
vibration, and biodiversity	

The Sustainable Bio-Energy Limited Biogas Plant development has the potential to impact on various environmental aspects, and there are interactions and inter-relationships between these aspects. This EIAR has considered these interactions and inter-relationships throughout the design process through appropriate siting of development components, functional design in accordance with the relevant standards /codes and guidelines and incorporation of mitigation measures as recommended by the EIA team of specialists.

With the successful application of the mitigating measures presented and best practice techniques implemented during construction and operation, the proposed development is not anticipated to have any significant, long term, negative impacts on the environment.

When considered in parallel with other existing and potential developments in the wider locality, it is concluded that the proposed development will not result in greater cumulative impacts that those identified for the proposed development alone.

FIGURES

Figure 1: Site Location Map

&

Figures 2(a) to 2(d): Proposed Site Layout

Figure 1 **Site location Map**

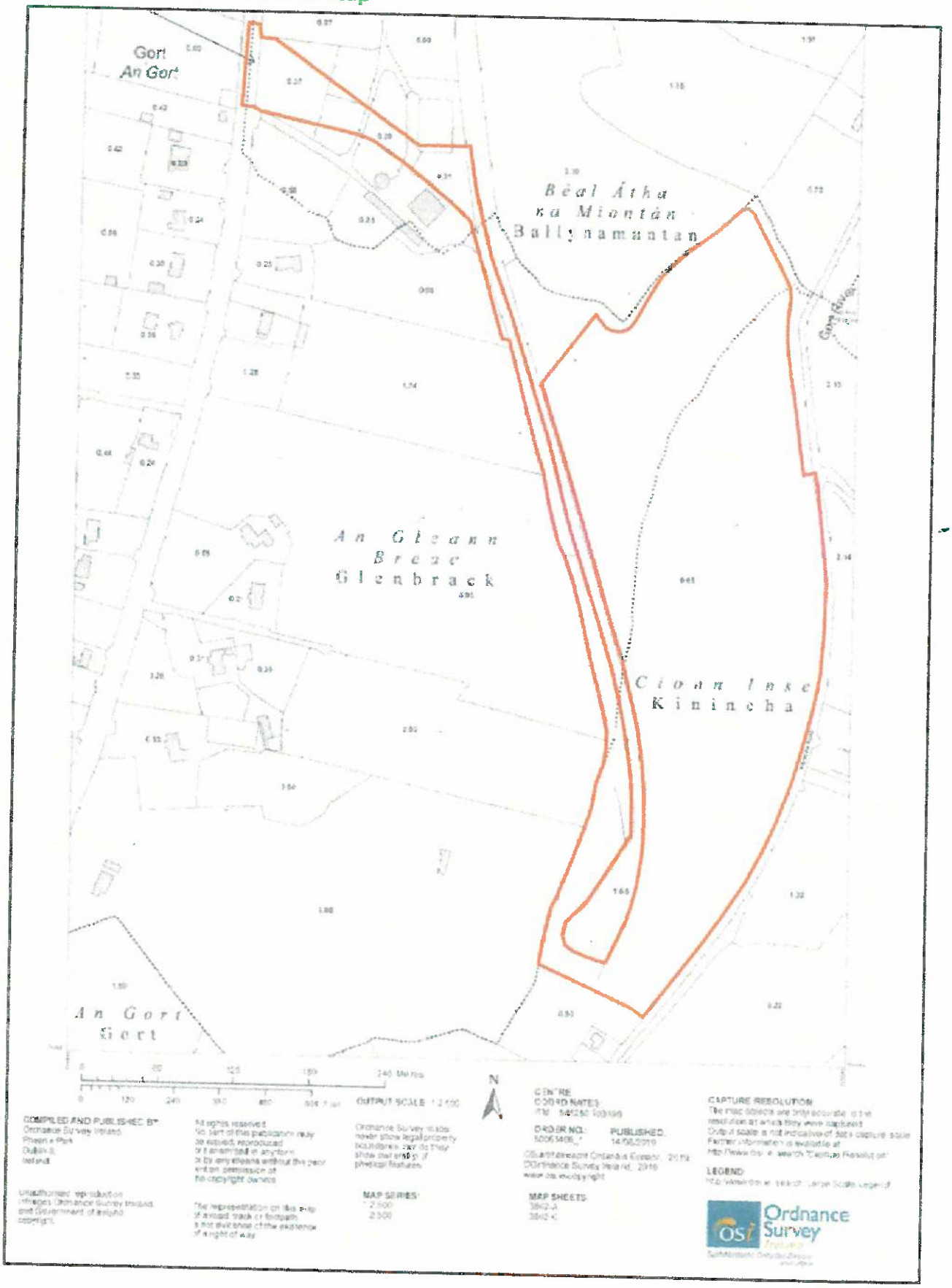


Figure 2 (a) Proposed Plant Layout (Entire Site)

Figure 2(b) Proposed Site Layout (Entrance)

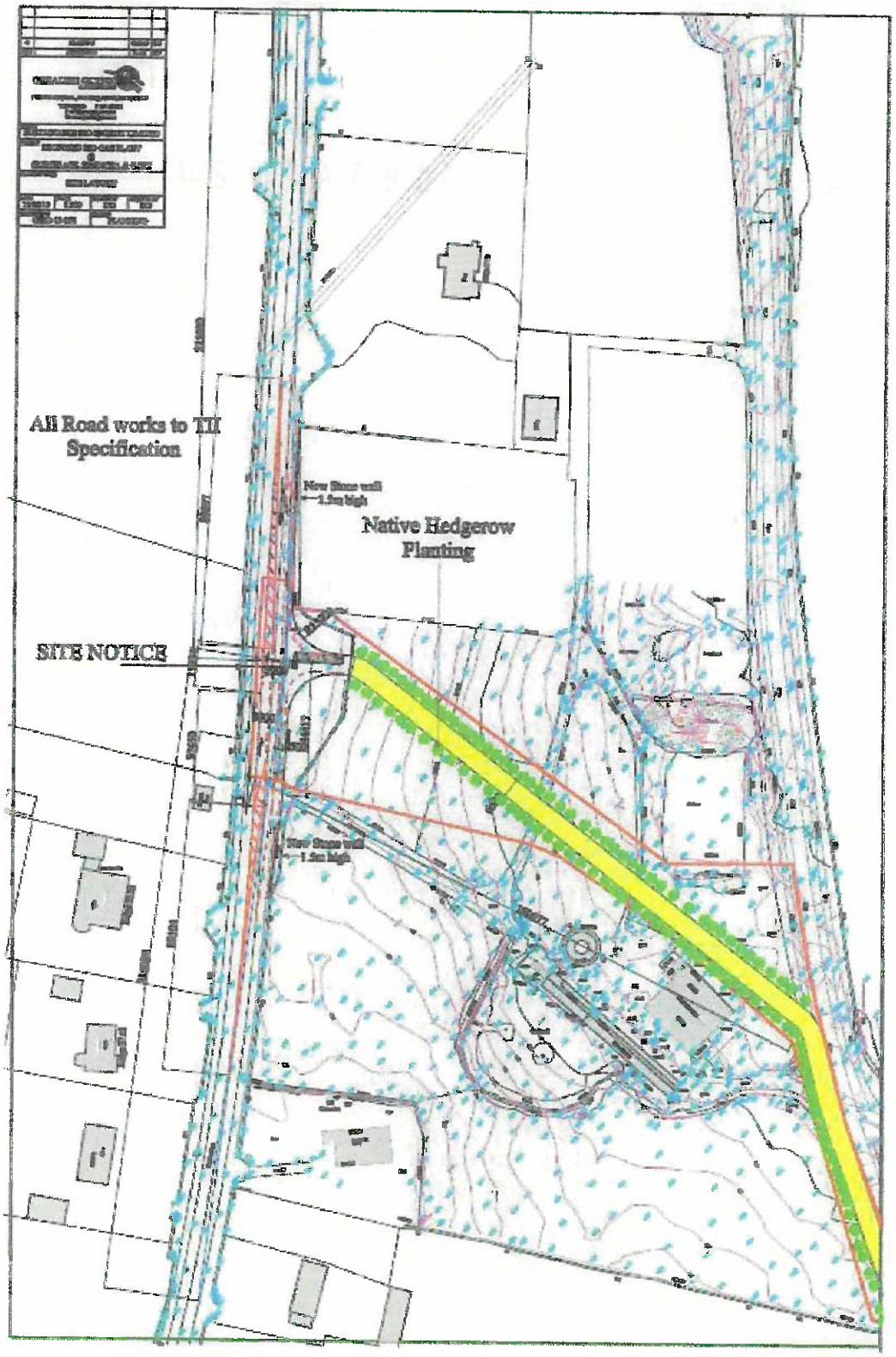


Figure 2(c) Proposed Plant Layout (main site)

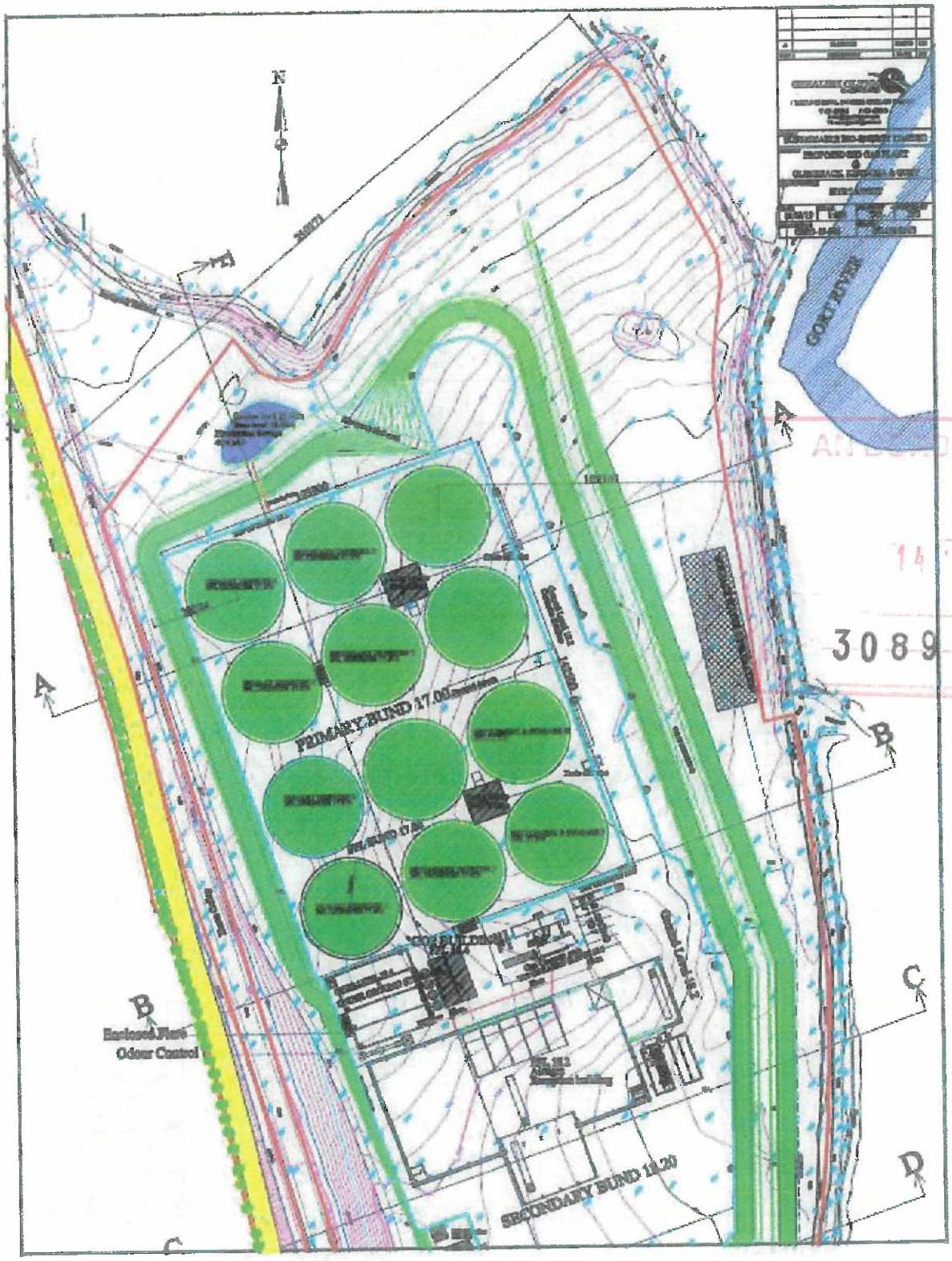


Figure 2.1(d) Proposed Plant Layout (southern part)