EIAR Non-Technical Summary: Killough Bio-Renewables Plant

Proposed Bio-Renewables Plant (incorporating Anaerobic Digestion) at Killough Quarry, Holycross, Co. Tipperary

Roadstone Ltd.

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Basis of Report

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1.0 Introduction

An Environmental Impact Assessment Report (EIAR) has been prepared in support of a planning application on behalf of Roadstone Ltd in support of a planning application under Section 34 of the Planning and Development, Act, 2000 (as amended) to Tipperary County Council which provides for a Bio-Renewable Plant (including anaerobic digester) to be located at the existing Killough Quarry facility, in Gaile townland, Holycross, Co. Tipperary.

An Appropriate Assessment Screening and Natura Impact Statement (NIS) has also been prepared in support of the planning application and is provided as a separate document.

1.1 The Applicant

The applicant, Roadstone Limited is an operating company within CRH plc and is Ireland's leading supplier of aggregates, construction, and road building materials. The company currently employs several hundred people at 65 locations throughout the country.

Roadstone Limited originally developed from aggregate supply companies founded by the Roche Brothers in the 1930s. After steady growth through the 1930s and 1940s, it was floated on the Irish Stock Exchange in 1949. After further significant growth through the 1960s, Roadstone merged with Cement Ltd. in 1970 to become Cement Roadstone Holdings (CRH) plc. Today, CRH plc is one of the leading suppliers of construction materials in the world, operating from over 3,500 locations and employing over 76,000 people in 35 countries.

Although Roadstone's principal business interest in Ireland is aggregate extraction and manufacture of building materials and products, it is also currently restoring a small number of its former pits and quarries under EPA licence using imported inert soil and stone waste.

In addition to these facilities, Roadstone also operates construction and demolition (C&D) waste recycling facilities at several of its locations across the State. These recovery facilities are principally engaged in the recycling / re-use of concrete and bituminous wastes and are regulated by way of Local Authority waste facility permits.

Operations at all Roadstone's locations adhere to the environmental guidelines of the Irish Concrete Federation (ICF) and current best practice for the quarrying industry, as set out in the publication Guidelines on Environmental Management in the Extractive Industries published by the Environmental Protection Agency (EPA, 2006).

Roadstone is committed to achieving and maintaining industry leading environmental standards. To this end, the company has established, and actively implements, an in-house Environmental Management System (EMS) at all its locations include Killough quarry.

1.2 Site Location

The application site is located wholly within the townland of Gaile, Holycross, Co. Tipperary, and within the existing footprint of the Killough quarry development, owned and operated by Roadstone Limited. The site is approximately 3.5km and 6.5km south of Holycross and Thurles respectively, refer to **Figure NTS-1**.

The main transport route within the area is the M8 motorway, approximately 2.5km to the southeast of the site. There are also a number of regional routes in the area, the R659 and R660, east and south of Holycross respectively; and the R639, the former N8, just east of the M8). Access from the site to the primary road network is via c. 2.5 km of local road onto the M8 Motorway between Urlingford and Cashel.

1.3 Surrounding Land-Use

The overall Roadstone landholding (c. 108.3 hectares) encompasses a large portion of Killough Hill and is located over the three townlands of Gaile, Aughnagormaun and Sallsquarter in Co. Tipperary.

Killough Hill is a limestone escarpment which lies within the otherwise flat plain stretching several kilometres to the east and west of the river Suir. The north slope of the hill is steep whilst the southern side, and application area is a gentle slope.

The land immediately surrounding Killough Hill lies at levels of between 110 and 120m AOD. Over a distance of 3.5km to the west of the hill the land falls very gently towards the River Suir to levels just under 80m AOD. Killough Hill which reaches a maximum height of approximately 215m is the only noticeable highpoint within the general area.

The existing main extraction void of the quarry at Killough Hill covers approximately the southern three quarters of the hill. To the immediate northwest, north and east of the void, the land slopes fairly steeply towards the surrounding plain, covering a height difference of between 50-80m over a distance of less than 200m. These steep slopes are covered by conifer and mixed woodland. To the immediate southeast and south of the void the land slopes slightly less steeply and is made up from pasture as well as some woodland scrub areas. To the immediate southwest of the void the quarry processing facilities are located at levels between 140m AOD and 170m AOD.

The flat landscape surrounding Killough Hill is almost exclusively made up from agricultural land (mostly pasture interspersed with some arable fields). The fields, which are usually enclosed by hedgerows, are also variable in size.

Residential development within the general area consists of isolated private residential property and agriculture farms located throughout the surrounding rural landscape, predominantly along the local road network. There are c. 22 residences located within c. 1km of the red line application boundary, of which 12 residences are located within 500m. Gaile national school is located c. 1.4km west of the site.

1.4 Site Access

The proposed development will use the existing permitted access to the existing quarry with direct access to and from the L1309 local road.

All HGV traffic associated with the bio-renewables facility will access and egresses the site via a dedicated weighbridge and wheelwash within the application boundary.

The public site notice is located at the site entrance as indicated on **Figures NTS-2** and **NTS-3**.

1.5 Existing Site Description

The existing quarry has been in operation since the 1950's. Material extracted from the quarry area is processed within the quarry void using mobile processing plant. The materials are then stockpiled, pending further use on site for value added asphalt and concrete production or for transport off-site to market.

Manufacturing facilities at the quarry site include a concrete manufacturing facility, asphalt plant, a limestone production facility and an agricultural lime facility.

Ancillary quarry facilities include offices, weighbridge & weighbridge office, canteen, toilets, wheelwash with overhead spray bar, bunded fuel storage areas and a garage / workshop.

The extraction of the limestone rock is carried out using blasting techniques; processing (crushing and screening) of the fragmented rock to produce lime and aggregates for the

concrete production (readymix and blocks), asphalt, road construction and site development works.

The proposed bio-renewables production facility compound will cover an area of c. 4 hectares within the southwest corner of the existing quarry (as indicated on **Plate 1** below) adjacent to the existing asphalt and concrete batching plants in an area currently used for aggregate stockpiling, refer to **Figure NTS-4**. The proposed facility will utilise the existing quarry entrance and access road, and along with some peripheral buffer areas and the compound site itself, the overall application area for the proposed development is 6.3 hectares.

Plate 1: Proposed Development Location within the existing Killough Quarry site

2.0 Description of the Proposed Development

2.1 Development Overview

The overall planning application site area of c. 6.3 hectares comprises the proposed bio-renewables production facility, buffer screening, ancillary facilities and site access via the existing permitted quarry entrance.

The proposed bio-renewables production facility (incorporating anaerobic digestion) compound will cover an area of c. 4 hectares with c. 16,821.5m² of new buildings consisting of an administration building; a dry matter reception building; a workshop; a bio-conversion building; a pre-treatment, equalisation and gas upgrading building; a digestate handling building; a warehouse storage building; a bio-filling station building; an odour abatement and pumping station building; a linear generator building; and an ESB sub-station building.

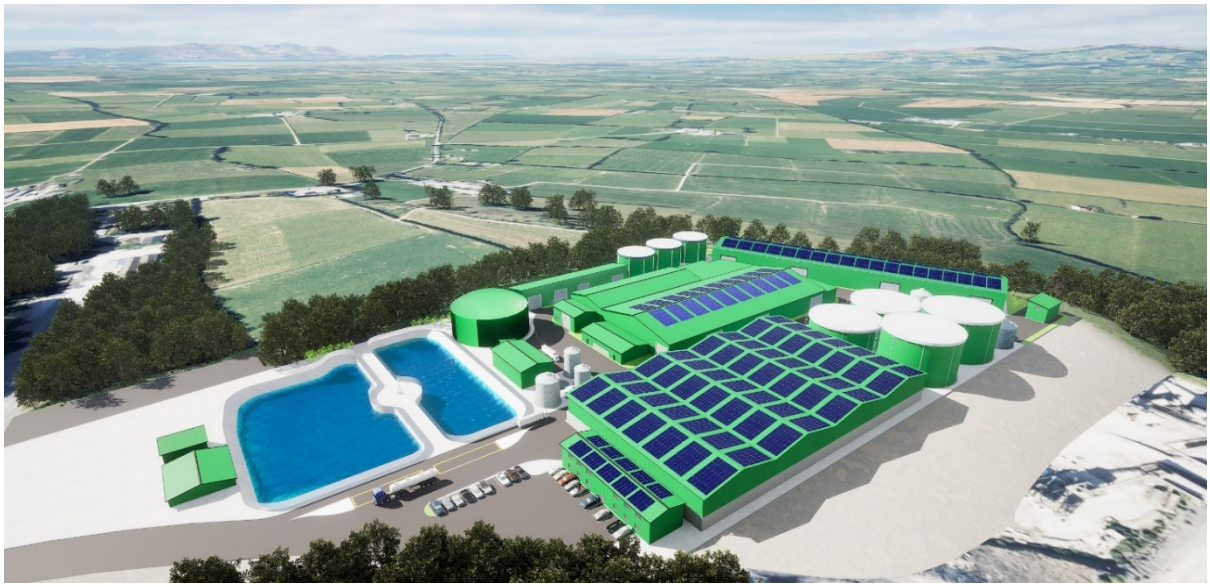
Ancillary facilities to be provided will include, a wheelwash; a weighbridge; surface water and fire water storage ponds; storage tanks for water, silage feed, cattle manure, pot ale and spent grain, maize, chicken litter and gas; effluent collection and storage tanks; staff and visitor car parking and bicycle storage; HGV parking; roof mounted solar panels; hydrocarbon interceptors; wastewater treatment equipment; bunding and surface treatments; boundary treatments and fencing; lighting; services; drainage; landscaping; and all associated ancillary works.

Details of the proposed site layout are shown on **Figure NTS-5** and on **Plate 2** below. Key aspects of the proposed development include:

- Proposed development situated within the footprint of the existing permitted rock quarry at Killough which is owned and operated by Roadstone (i.e. not a greenfield site);
- A maximum tank height of c. 16 metres (gas storage balloon structure) and a maximum stack height of c. 17.5m (associated with the linear generator building);
- Facility will operate 24 hours a day / 7 days a week;
- Delivery of feedstock will be between the hours of 8am to 6pm Monday – Saturday / no deliveries Sundays or bank holidays;
- Feedstock importation will be c. 105,000 tonnes per annum consisting of:
    - Chicken Waste c. 15,000 tpa
    - Cattle Slurry c. 20,000 tpa
    - Grass Silage c. 60,000 tpa
    - Maize Silage c. 5,000 tpa
    - Pot ale and Spent Grain c. 5,000 tpa
- Outputs will consist of:
    - bio-methane (gas);
    - compressed bio-methane (bio-CNG);
    - carbon dioxide (CO_2);
    - electricity (green);
    - organic fertilisers (pelleted); and
    - water.

The adjacent Roadstone Killough Quarry plant will utilise the electricity, bio-methane and water generated by the proposed development. Pelletised fertiliser will be available for supply to local agriculture and traders off-site. CNG and CO_2 will be pressurised and stored for ongoing draw-off by tankers to points of re-use off-site.

Plate 2: 3D Indicative Image of Proposed Development



It is proposed that the permission for the Proposed Development is open ended with no time-limit attached, and therefore the EIAR provided a detailed assessment of the construction and operational stages only.

Should decommissioning be required at a later stage, it would require to be considered in the context of the overriding conditions and trends at that time, and these will be assessed as part of the future planning process and EPA licencing. It is considered likely that any decommissioning activities would involve similar works and time-frame as the construction stage.

As with any development, it is acknowledged that the various plant, equipment and structures will have varying lifespans and replacement of these will be carried out as required on an ongoing basis (examples: windows are assumed will be replaced on a 15 year cycle and doors on a 30 year cycle. Solar panels have also been assumed to have a service life of 25 years.)

2.2 Bio-Renewables Concept

The bio-renewables concept will include conversion of feedstock carbon to biofuels, CO_2 to methane, digestate for further processing on site to capture nutrients for conversion to solid organic fertiliser (N,P,K). All products resulting will be co-products for reuse. There will be no by-products requiring disposal.

The silage, maize and slurry feedstocks required for the manufacturing programme will be supplied from local farms in the region. The total feedstock capacity anticipated from the works will be c.105,000 tonnes per annum.

The concept is based on the breakdown of organic volatiles using the anaerobic digestion process with offtake of biogas and digestate for further processing. CO_2 will be captured and converted to methane for reuse. Digestate will be processed to produce solid fertilisers.

2.3 Best Available Technology (BAT) & Process Design

The works will be designed constructed and operated with BAT (Best Available Techniques) and products will be certified before storage for removal from the facility.

The following points are highlighted with respect to the design:

- Feedstock capacity will be contained at c. 105,000 tonnes per annum including grass, maize, silage, pot ale, spent grain, cattle slurry and chicken waste;
- Pretreatment will include special conditioning to maximise nutrient separation and conversion of volatiles, thereby maximising process performance;
- The digestion process put forward comprises of plug flow reactors running in series with biogas production significantly exceeding that of conventional digesters;
- Biogas will be separated into biomethane and CO_2 with further processing of both products to produce finished fuel, for internal use by Roadstone;
- Digestate will be separated and further processed to provide solid organic fertilisers. All products will be certified;
- The thermal energy resulting from the various in-house unit operations will be captured for reuse at the fertiliser drying stage. The conversion of excess energy to electricity will be executed using state of the art CHP;
- The short-term storage of feedstock, gases, solids and liquids produced on site will be accommodated within the design with BAT environmental management measures;
- There will be no fugitive emissions, so that air quality standards can be maximised ensuring 100% methane and CO_2 capture across the mass balance of the process.

2.4 Contribution to Local & Regional Sustainability

The proposed development will provide a significant contribution to local and regional sustainability. This will include the following:

- The silage, maize and slurry feedstocks will be supplied locally, and consideration will be given to supply within a radius of less than 20 km.
- This feedstock approach increases the potential output of farming in the region and individual contracts will be concluded on the basis of unit feedstock values.
- The fertiliser produced will further increase the potential of agriculture with introduction of regenerative farming and carbon sequestration.
- The energy related products will provide major reduction in carbon footprint (CF) and GHG, specifically:
- Total methane gas production is estimated to be c. 12,170,000m³
- Roadstone will utilise some of the finished fuel to power their machinery at Killough and other centres.
- The balance of the finished fuel will be sold / traded to third parties.

2.5 Plant / Facility Overview

The facility will consist of the following elements to be constructed as detailed in **Table 1** below. Detailed drawings showing the design, layout, finish and dimensions of each plant component are provided in the accompanying planning application drawings prepared by WEW Engineering Limited.

Table 1: Key Plant / Facility Components and Process

Drawing No.	Plant / Facility
WEW 1905-DG-**0001**	Two-storey **administration building with** (gross floor area **664m²** and **8.15m** in height) to accommodate reception and storage areas, canteen, laboratory, first aid room, control room/electrical switch room, storage room, toilets, offices, conference room, training room and kitchenette, and roof solar panels **315m²**
WEW 1905-DG-**0002**	**Dry matter reception building** (gross floor area **5,215m²** and **12.7m** in height) with roof solar panels **4,000m²**
WEW 1905-DG-**0003**	**Workshop building** (gross floor area **122.1m²** and **8.9m** in height) to accommodate workshop and internal gantry crane, store and office at ground level and office at mezzanine level
WEW 1905-DG-**0004**	**Bio-conversion building** (gross floor area **3,257m²** and **12.5m** in height) with roof solar panels **2,400m²**
WEW 1905-DG-**0005**	**Pre-treatment, equalisation and gas upgrading building** (gross floor area **5,685m²** and **12m** in height) to accommodate pre-treatment & equalisation area (3,527m²), utilities area (376m²), heat recovery plant area (361m²), water treatment recovery area (316m²), and gas upgrading facility (1,105m²) with roof solar panels 3,850m²
WEW 1905-DG-**0006**	**Digestate handling building** (gross floor area **692m²** and **8.6m** in height)
WEW 1905-DG-**0007**	**Warehouse storage building** (gross floor area **158m²** and **11.2m** in height)
WEW 1905-DG-**0008**	**Bio-filling station building** (gross floor area **300m²** and **9.75m** in height) with canopy overhang area of 134m², and externally located bio-methane (CH_4) storage tank (**Ø 3m** x **11.5m** height) and bio-carbon dioxide (CO_2) storage tank (**Ø 2.4m** x **9.75m** height) to southern elevation
WEW 1905-DG-**0009**	**Odour abatement and pumping station building** (gross floor area **448m²** and **11.25m** in height) to accommodate odour abatement system area (412m²) and pumping station (36m²) with emissions stack (**Ø 2.6m** x **17.5m** height)

WEW 1905-DG-**0010**	**Linear generator building** (gross floor area **233m²** and **5.82m** in height) with emissions stack (**Ø 1m** x **17.5m** height)
WEW 1905-DG-**0011**	**ESB sub-station building** (gross floor area **47.4m²** and **3.2m** in height)
WEW 1905-DG-**0012**	**Wheelwash** (**18m** x **4.5m**) with associated water top-up sump (**6m** x **1.25m**)
WEW 1905-DG-**0013**	**Weighbridge** (**16.4m** x **4.6m**)
WEW 1905-DG-**0014**	**Surface water storage pond** (**1,900m²** x **6m** depth) and **fire water storage pond** (**2,800m²** x **6m** depth)
WEW 1905-DG-**0015**	**External boundary paladin fencing** (**2.28m** in height)
WEW 1905-DG-**0016**	1 no. **water storage tank** (internal size **Ø 9.4m** x **11.23m** height and volume **800m³**) 3 no. **silage feed soil/mixing tanks** (internal size **Ø 8.54m** x **12.63m** height and volume **770m³**) 2 no. **fire water supply tanks** (internal size **Ø 21.35m** x **14m** height and volume **5,020m³**) 2 no. **treated water storage tanks** (internal size **Ø 27.32m** x **14m** height and volume **8,230m³**)
WEW 1905-DG-**0017**	3 no. **bio-rest tanks** (internal size **Ø 17.1m** x **14m** height and volume **3,220m³**)
WEW 1905-DG-**0018**	1 no. **cattle manure/slurry silo** (internal size **Ø 7.5m** x **10m** height) 1 no. **pot ale / spent grain material tank/silo** (internal size **Ø 5.5m** x **3m** height) 1 no. **maize silo** (internal size **Ø 5.5m** x **7m** height) 1 no. **chicken litter silo** (internal size **Ø 5.5m** x **10m** height) 2 no. **precast concrete units (below ground) for surface water and effluent tanks** (internal size **Ø 5.5m** x **7m** height) 1 no. **below ground precast elliptical concrete sewage collection tank** (**3.2m** x 6**m** height and **8,000 gallon** capacity); 1 no. **gas storage balloon facility** (**Ø 30.6m** x **16m** height) 1 no. flare (**10m** height)
WEW 1905-DG-**0014** WEW 1905-DG-**0019**	Associated and ancillary works including **22 no. staff and visitor parking spaces** (16 no. standard, 4 no. EV charging and 2 no. disabled parking spaces with EV charging points); bike storage for 10 no. bikes); HGV parking area adjacent to workshop; 2 no. hydrocarbon interceptors; wastewater treatment equipment; bunding and surface treatments; boundary treatments; lighting; services; drainage; landscaping; and all associated ancillary works

2.5.1 Administration Building

A two-storey administration building with (gross floor area 664m² and 8.15m in height) as shown on planning drawing WEW 1905-DG-**0001** to accommodate reception and storage areas, canteen, laboratory, first aid room, control room/electrical switch room, storage room, toilets, offices, conference room, training room and kitchenette. The building will be a steel portal frame with blockwork and externally finished with Kingspan architectural wall panels (goosewing grey colour). There will be c. 315m² of solar panels attached to the roof.

The Administration Block will include facilities for ongoing laboratory assessment of feedstocks, gas and fertilisers and water. Wastewaters from the laboratories will be drained to a separate chamber for collection and off-site removal by a licensed contractor.

Certification of bio-methane and organic fertilizer will be carried out with necessary on-site attendances in compliance with the associated regulations, namely:

- Regulation (EU) 2023 / 1640 of 5 June 2023.

- S.I. No. 693/2023

The certificates of origin for the biomethane will be obtained via GNI and will confirm the product as green gas for use across European markets as anticipated on the Ergar market concept.

2.5.2 Dry Matter Reception Building

The dry matter reception building will be a fully enclosed building (gross floor area 5,215m² and 12.7m in height) with roof solar panels covering c. 4,000m² as shown on planning drawing WEW 1905-DG-**0002**. The building will be a steel portal frame with concrete precast walls to the lower 4m section with the upper section and roof consisting of Kingspan twin skinned insulated sheeting (goosewing grey colour). All dry feedstock arriving on site will be delivered by either truck or tractor & trailer into the reception building where the material will be offloaded into divided storage areas.

2.5.3 Workshop

The workshop building will be a fully enclosed building (gross floor area 122.1m² and 8.9m in height) as shown on planning drawing WEW 1905-DG-**0003**. The building will be a steel portal frame with the walls and roof consisting of Kingspan twin skinned insulated sheeting (goosewing grey colour). It will accommodate the workshop area with an internal gantry crane, a store and 2 no. offices, one at ground level and one at mezzanine level.

2.5.4 Bio-Conversion Building

The bio-conversion building will be a fully enclosed building (gross floor area 3,257m² and 12.5m in height) and will contain roof solar panels covering c. 2,400m² as shown on planning drawing WEW 1905-DG-**0004**. The building will be a steel portal frame with the walls and roof consisting of Kingspan twin skinned insulated sheeting (goosewing grey colour).

2.5.5 Pre-Treatment, Equalisation & Gas Upgrading Building

The pre-treatment, equalisation and gas upgrading building will be a fully enclosed building (gross floor area 5,685m² and 12m in height) to accommodate pre-treatment & equalisation area (3,527m²), utilities area (376m²), heat recovery plant area (361m²), water treatment recovery area (316m²), and gas upgrading facility (1,105m²) with roof solar panels 3,850m² as shown on planning drawing WEW 1905-DG-**0005**. The building will be a steel portal frame with the walls and roof consisting of Kingspan twin skinned insulated sheeting (goosewing grey colour).

2.5.6 Digestate Handling Building

The digestate handling building will be fully enclosed (gross floor area 692m² and 8.6m in height) as shown on planning drawing WEW 1905-DG-**0006** to accommodate palletiser station/packing station area (150m²), solid dryer/vacuum evaporator area (392m²) and nutrient adjustment facility (150m²). The building will be a steel portal frame with the walls and roof consisting of Kingspan twin skinned insulated sheeting (goosewing grey colour).

2.5.7 Warehouse Storage Building

The warehouse storage building will be fully enclosed (gross floor area 158m² and 11.2m in height) as shown on planning drawing WEW 1905-DG-**0007**. The building will be a steel portal frame with the walls and roof consisting of Kingspan twin skinned insulated sheeting (goosewing grey colour).

2.5.8 Bio-Filling Station Building

The bio-filling station building will be fully enclosed (gross floor area 300m² and 9.75m in height) with a canopy overhang area of 134m², and externally located bio-methane (CH4) storage tank (Ø 3m x 11.5m height) and bio-carbon dioxide (CO2) storage tank (Ø 2.4m x 9.75m height) to southern elevation as shown on planning drawing WEW 1905-DG-**0008**. The building will be a steel portal frame with the walls and roof consisting of Kingspan twin skinned insulated sheeting (goosewing grey colour).

2.5.9 Odour Abatement & Pumping Station Building

The odour abatement and pumping station building will be fully enclosed (gross floor area 448m² and 11.25m in height) as shown on planning drawing WEW 1905-DG-**0009** to accommodate an odour abatement system area (412m²) and pumping station (36m²) with an emissions stack (Ø 2.6m x 17.5m height). The building will be a steel portal frame with the walls and roof consisting of Kingspan twin skinned insulated sheeting (goosewing grey colour).

The eradication of odorous emissions is necessary to achieve BAT design. During preliminary design stage works the sources of odorous emissions were identified and the constituents requiring specific removal from the diluted gaseous emissions comprise sulphides, ammonia, methane and related volatiles and micro solids. These will be removed and the gaseous emissions will comply with EU EN13725.2022.

Gaseous emissions from buildings will be evacuated and ducted via a ducting network to a modular air purification system using biofiltration and/or adsorption in the odour removal building. Air quality will comply with the guidance recommendations of the EPA Air Guidance Note AG 9, 2019.

2.5.10 Linear Generator Building

The linear generator building will be fully enclosed (gross floor area 233m² and 5.82m in height) as shown on planning drawing WEW 1905-DG-**0010** with emissions stack (Ø 1m x 17.5m height). The building will be a steel portal frame with the walls and roof consisting of Kingspan twin skinned insulated sheeting (goosewing grey colour).

The biomethane diverted to provide an electrical supply to Killough Quarry will be split to a series of linear electricity generators which can provide electrical supply without waste gas emission. The units come as integrated assemblies and may be installed on a modular basis in the Linear Generator Building shown.

2.5.11 ESB Sub-Station Building

The ESB sub-station building will be fully enclosed (gross floor area 47.4m² and 3.2m in height) with a render finish as shown on planning drawing WEW 1905-DG-**0011**. The substation will be constructed in accordance with ESB specifications.

Green electricity will be produced by on-site solar power generation, utilizing the building complex with battery storage and supply forward via the new sub-station.

2.5.12 Wheelwash / Weighbridge

The wheelwash (18m x 4.5m) with associated water top-up sump (6m x 1.25m) as shown on planning drawing WEW 1905-DG-**0012** and the weighbridge (16.4m x 4.6m) as shown on planning drawing WEW 1905-DG-**0013** will be located in line along the entry/exit route and located to the south of the administrative building and carpark area.

All vehicles entering the facility to deliver feedstock or export digestate will enter and depart via the weighbridge. Weighbridge information will be recorded automatically by a weighbridge data management system. The weighbridge will be of steel construction, mounted on load

cells within a reinforced concrete pit chamber while the wheelwash will be a concrete 'bath type' wheelwash through which the trucks drive through.

2.5.13 Storage Tanks & Silos

There are several storage tanks and silos located throughout the site as shown on planning drawing WEW 1905-DG-**0016**, **0017** and **0018**, consisting of:

- 1 no. water storage tank (internal size Ø 9.4m x 11.23m height and volume 800m³);
- 3 no. silage feed soil/mixing tanks (internal size Ø 8.54m x 12.63m height and volume 770m³);
- 2 no. fire water supply tanks (internal size Ø 21.35m x 14m height and volume 5,020m³);
- 2 no. treated water storage tanks (internal size Ø 27.32m x 14m height and volume 8,230m³);
- 3 no. bio-rest tanks (internal size Ø 17.1m x 14m height and volume 3,220m³);
- 1 no. cattle manure/slurry silo (internal size Ø 7.5m x 10m height);
- 1 no. pot ale / spent grain material tank/silo (internal size Ø 5.5m x 3m height);
- 1 no. maize silo (internal size Ø 5.5m x 7m height);
- 1 no. chicken litter silo (internal size Ø 5.5m x 10m height); and
- 1 no. gas storage balloon facility (Ø 30.6m x 16m height).

2.5.14 Flare

An enclosed biogas flare is proposed for installation on the site, serving as an additional safety measure. The flare will be located within the water storage ponds area as shown on planning drawing WEW 1905-DG-**0018** and will only operate under distinct scenarios to ensure safety and compliance. The flare is incorporated for emergency use only and is not anticipated to function during normal operating procedures.

2.5.15 Piping System

All feedstock / digestate pipes will be located above ground so that any leakages in the piping system cannot lead to pollution of the receiving environment. The pipework for the transmission of biogas will be fabricated mostly in stainless steel above the ground. For any biogas pipework located underground, polyethylene will be used. After pipework construction is completed, a tightness test will be carried out with all pipes being pressure tested.

2.5.16 Compound Security

The perimeter of the site will be secured by a paladin fencing and security gates (2.28m in height) as shown on planning drawing WEW 1905-DG-**0015**.

2.5.17 Lighting

Down lighting will be provided at approximately 20m spacing and mounted on buildings, tanks and other suitable structures as shown on planning drawing WEW 1905-DG-**0020**. The lighting will be directed downwards and all lights will be located internally within the site and directed inwards with the buildings and tanks themselves blocking light from being directed externally. Such lighting will be sufficient to permit safe operation of plant and machinery during early morning and late evening periods over winter months.

2.5.18 Landscaping

The overall development plan is shown in **Figure NTS-5**, and entirely within the existing operational quarry site. There is no requirement to remove topsoil or overburden off site. There is no requirement to remove any trees or hedgerows from the application site.

Existing screening berms (c. 4-6m in height) and hedge/tree vegetation bound the southern and western boundaries of the application site.

2.5.19 Operational Hours and Employment

The facility will operate 24 hours per day, 7 days a week, as anaerobic digestion is a continuous biological process. However, transport of feedstock to the site and any products exported from the site will only be carried out between the hours of 0800 and 1800 Monday to Saturday. There will be no feedstock or product transport on Sundays or Bank Holidays.

The proposed development will provide direct employment for 15 to 20 people.

2.5.20 Water Management

Process water and precipitation will be typically reused and not discharged to outfall. On site water will be captured, pumped to storage with in-line quality monitoring, for use on the application site and for use in the adjacent quarry site. Drainage networks are shown on planning drawing WEW 1905-DG**-0014.**

The application site drainage will comprise of:

- run-off from the building roofs in the facility will be collected in a sealed pipe network for onsite storage in the surface water pond and reused in the adjacent quarry site as required;
- drainage of hard standing / trafficked areas will be collected in a separate sealed pipe network for onsite storage in the surface water pond and reused in the adjacent quarry site as required.

2.5.20.1 Water Supply

When the site is operational, process water will be recovered from the digestate and recirculated through the process to dilute incoming feedstock. The feedstock will be on average 70% water (30% DM) and requires dilution to 94% water (6% DM) for processing so process water will be added.

Excess water will be treated and stored for use in the concrete plant on the adjacent quarry site.

There is no requirement for a groundwater supply to the plant. There is no requirement for a connection to any Irish Water infrastructure.

Potable water supply to the offices will be bottled water brought to site.

2.5.20.2 Water Storage

There are surface water ponds and tanks as noted in the project description above for the use of storing fire water, water for reuse in the anaerobic digestion process and water for use in the adjacent concrete batching plant.

2.5.20.3 Foul Wastewater Management

It is estimated that sewage generated by staff, visitors and canteen will vary between 2m^3/d and 4m^3/d. This will gravitate to a collection tank, roofed and with an adsorption roof filter, submersible mixer and sealed tanker connection to prevent any odour emission. It will be

drawn off site once every two weeks for treatment at an existing sewage works by agreement with the STW operator.

Similarly, the laboratory facility will be plumbed separately to a holding tank for collection and removal off site by a licensed contractor. Storage tanks on site will consist of:

- 2 no. precast concrete units (below ground) for surface water and effluent tanks (internal size Ø 5.5m x 7m height); and
- 1 no. below ground precast elliptical concrete sewage collection tank (3.2m x 6m height and 8,000 gallon capacity).

2.5.20.4 Surface Water Management

Surface water runoff and roof water will gravitate to the surface water pond for use as dust suppression water by the adjacent quarry site. Further details of the proposed water management system are provided in EIAR Chapter 7 Water.

2.5.21 Construction Phase

2.5.21.1 Construction & Commissioning Programme

It is envisaged that construction and commissioning of the proposed development will be undertaken over c. 18 months with works expected to commence in 2025.

2.5.21.2 Construction Environmental Management Plan

During the construction phase, the methods of working will comply with all relevant legislation and best practice in reducing the environmental impacts of the project. Construction stage impacts are a short-term localised impact. However, the impacts will be reduced as far as practicable through compliance with the mitigation measures as stated in the EIAR topic chapters and current construction industry guidelines.

As part of the preconstruction preparation a comprehensive Construction Environmental Management Plan (CEMP) will be developed. To ensure the CEMP is tailored to the project and the current environment at the time of construction, it will be prepared by the appointed contractor in advance of any construction works commencing and in accordance with any conditions imposed by the Planning Authority.

The CEMP, in a single document, will outline the procedures and practices for monitoring the effectiveness of the proposed environmental protection measures, and will include at the very least:

- List of all relevant environmental legislation requirements;
- State methods by which the construction works will be managed to avoid, reduce or remedy potential adverse environmental impacts;
- Incorporate environmental mitigation measures and controls in the construction contract documents which will incorporate the mitigation measures as outline in the following chapters of this EIAR; in any conditions attached to a grant of planning permission or any further requirements of statutory bodies;
- Provide a method statement outlining how compliance with the environmental commitments / mitigation measures will be carried out.
- Take account of best practice guidance such as CIRIA C741 Environmental Good Practice on Site (4th edition) and CIRIA C532 Control of Water Pollution for Construction Sites.

In general, disturbance arising from construction works may result from various activities including preparatory works, diversion of services, noise and vibration, excavation operations,

earthworks, construction traffic and delivery of materials. Details of the predicted impacts and mitigation measures associated with the construction of the proposed development are included in the relevant chapters (e.g. Air Quality in Chapter 8, and Noise & Vibration in Chapter 10) with a summary of all mitigation and monitoring proposals provided in Chapter 17.

2.6 Construction Employment

It is expected that c. 20 direct jobs will be created during the construction phase. In addition, many more indirect jobs will be generated.

2.7 Temporary Facilities

A temporary contractors compound will be required for the duration of the construction phase works. This will include temporary staff welfare facilities, temporary car parking and will be located within the red line boundary application area.

2.8 Operational Phase (AD Life-Cycle Processes)

2.8.1 Feedstock

The proposed development has been designed to accept and treat up to 105,000 tonnes per annum of predominantly locally sourced cattle manures, slurries, and crop-based feedstocks along with a small quantity of brewery residues (pot ale and spent grain). The estimated feedstock composition and annual tonnages accepted are outlined in **Table 2** below. These tonnages are indicative and subject to change based on market and season conditions and availability and quality of feedstocks. Overall tonnages will not exceed 105,000 tonnes.

AD can process a broad spectrum of feedstock from various sources. In principle, any biodegradable organic matter can be anaerobically digested to produce biogas.

Cattle manure is one of the most common feedstocks employed in AD because it is readily available in agricultural farms. Despite containing many characteristics favourable for AD (neutral pH, different microbes, a wide variety of nutrients, etc.), they produce a lower amount of biogas than other feedstocks because they are already predigested by the animal intestine.

However, manure is often added as a base substrate and co-digested with other feedstock because of its desirable characteristics. Combination of feedstocks, commonly known as co-digestion process, offers the opportunity to add energy-rich organic waste materials, for example, sustainable co-products from brewing /distilling etc. Typically, these high-energy materials can produce significantly higher levels of biogas than conventional agricultural feedstocks.

Table 2: Estimated Feedstock Composition and Intake

Feedstock	Estimated Quantity (tonnes / annum)
Chicken Waste	15,000 tpa
Cattle Slurry	20,000 tpa
Grass Silage	60,000 tpa
Maize Silage	5,000 tpa
Pot ale and Spent Grain	5,000 tpa

The silage, maize and slurry feedstocks which make up approximate 80% of the feedstock will be supplied locally, and consideration will be given to supply within a radius of less than 20 km.

2.8.2 Feedstock Acceptance and Storage Procedures

Feedstocks will be transported to the proposed development using heavy goods vehicles (HGV's / HDV's) and tractor/trailer, and sealed vacuum tankers. Only feedstocks meeting strict feedstock acceptance procedures and complying with Environmental Protection Agency (EPA) and Department of Agriculture, Food & Marine (DAFM) license conditions will be accepted.

All vehicles entering the facility to deliver feedstock or export compressed bio-methane (bio-CNG), carbon dioxide (CO_2) or organic fertilisers (pelleted) will enter and depart via a weighbridge located along the site access road. Weighbridge information will be recorded automatically by a weighbridge data management system.

All suppliers must complete a Feedstock Acceptance Agreement (FAA). Upon arrival at the site, incoming feedstock deliveries will be weighed and logged at the dedicate weighbridge in accordance with regulatory requirements set by the EPA and DAFM. Visual inspection of feedstocks will ensure conformity with the FAA. Once delivery and documentation are confirmed, delivery vehicles will be directed to the Reception Hall for further processing.

Solid materials will be unloaded into designated feedstock bays within the reception hall which has a storage capacity of c. 10,000 tonnes, to allow for continuous operation of the plant on days where no feedstock deliveries are made. Liquid manure will arrive onsite in sealed tankers and be pumped directly into the sealed storage tanks.

2.8.3 Odour Abatement System

An odour abatement system will recover and treat all odours arising from the processes and activities occurring on site. All major odour sources, inclusive of the reception hall, digestate storage tanks, liquid feed tanks and pasteurisation tanks are connected to the odour abatement system. The odour treatment will be a proprietary system designed and supplied by a specialist contractor with experience of treating odour from biogas and other organic waste facilities.

2.8.4 Feedstock Conditioning

This is carried out in the pretreatment and equalization building which is connected to the odour abatement system via ducting to remove odours.

The respective feedstocks will be conditioned to maximise the efficiency of the biochemical methane potential (BMP).

Incoming feedstocks from grasses, maize and manure origins need to undergo size reduction. Breaking down cell walls directly through physical force using mechanical methods are less likely to contaminate the final product than other methods. The Killough project will utilise proven technology to ensure particle size of <5mm through high-pressure grinding, maceration, pulping and on-line transfer to the mixing plant. The Killough plant will include leading feedstock maceration technology.

The feedstocks from other sources will be added in parallel to the premix chamber to create a standardised feedstock that is easily pumped and mixed into the reactor to ensure close culture contact will result as required for efficient AD reactions.

2.8.5 Anaerobic Digestion Process

Anaerobic digestion (AD) is a natural biochemical process that converts organic materials into combustible biogas. AD has been long practiced for agricultural and urban waste management. The process consists of a series of biochemical reactions where bacteria break down the organic matters of any substrate into a gaseous mixture (CH4, CO2, H2, H2S, etc.) in the absence of free oxygen. Some groups of bacteria involved in the digestion process

cannot survive in the presence of oxygen. Therefore, an anaerobic (oxygen-free) environment is necessary for the process.

The AD process typically occurs in a closed vessel such as that shown in **Plate 1**. Produced biogas flows out to temporary storage and later on to the end-use applications. The main commercial applications of biogas are typically fuel, heat and electricity generation. After AD, the vessel will contain residual solids and organic matter known as digestate. Digestate can be separated into liquid and solid streams. Both streams contain valuable plant nutrients and can substitute as fertilizer in agricultural applications.

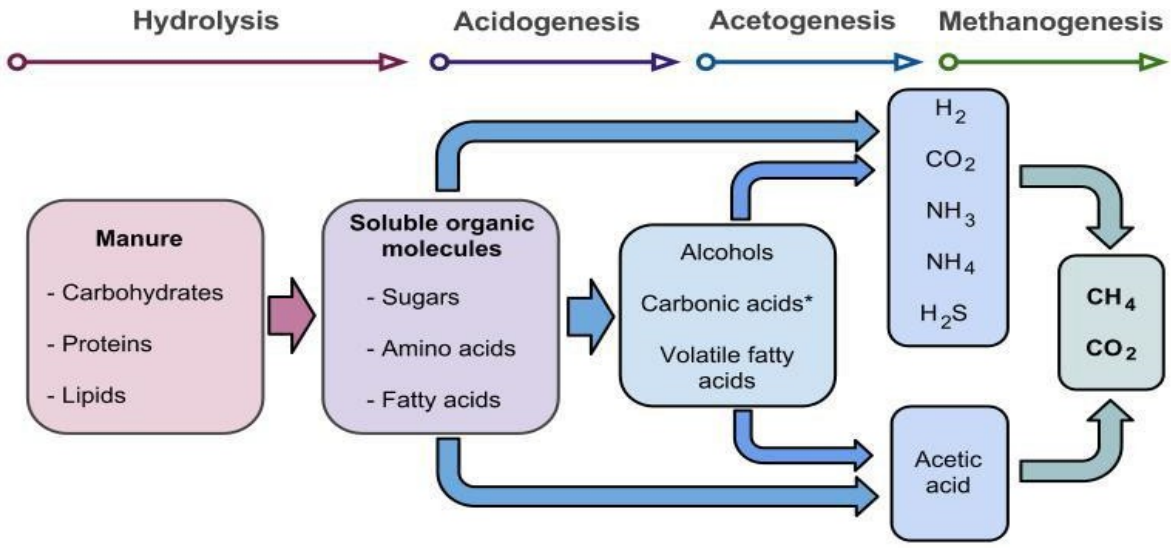
The AD process occurs through multiple steps with complex interactions between different types of microorganisms. Diverse microbial communities collaborate to break down the complex biomass polymers at different stages and turn them into a gaseous mixture. The biochemical AD reactions can be divided into four distinct stages as outlined below and shown in **Plate 2**:

- **Hydrolysis**: this is essentially the first stage of the digestion process. Water and extracellular enzymes break down the complex polymeric structure of cellulose, starch, proteins and convert them into their respective simple units (monomers or oligomers) such as glucose, fatty acids, and amino acids. Some compounds in this stage are ready to be converted into biogas, but most compounds need further breakdown through other stages.
- **Acidogenesis**: the products of hydrolysis are further broken down in the acidogenesis stage by acidogenic (acid-forming) bacteria.
- **Acetogenesis**: is the third step of anaerobic digestion. Products from fermentation (organic acids, alcohols) are converted into hydrogen (H_2), carbon dioxide (CO_2) and acetic acid (CH_3COOH). To produce acetic acid, acetogenic bacteria need oxygen and carbon. For this, they use the oxygen solved in the solution or bound-oxygen. Hereby, the acid-producing bacteria create an anaerobic condition, which is essential for the methane-producing microorganisms responsible for the final step of anaerobic digestion which is methanogenesis.

Methanogenesis: This is the final stage where methane is produced from all intermediate products of the previous stages. This stage is strictly anaerobic as the methanogenic bacteria cannot survive in the presence of oxygen. CH_3COOH (acetic acid) and H_2 are converted into CO_2 and CH_4 by two different groups of bacteria, such as acetophilic and hydrogenophilic. Acetophilic bacteria convert acetate into CH_4 and CO_2, while hydrogenophilic bacteria convert H_2 and CO_2 into CH_4.

Plate 1: Typical Reactor Bank

Plate 2: Stages of the Anaerobic Digestion Process



The AD technology chosen for the site utilises plug flow AD technology and also incorporates internal high rates of reaction due to high intimate contact area. This maximises series performance of the hydrolytic, acidification and methanogenic bacterial groupings.

The plug flow reactor type technology has been researched, patented and proven over years by Antec Biogas. It allows the development of an AD plant that offers a small footprint versus biogas yield with a tight control of the hydrolysed feedstock to the anaerobic bioreactors. The system will also include ammonia stripping to allow for increased processing of high-energy by-products. Please refer to the accompanying technical report prepared by the design engineers WEW Engineering Ltd.

2.8.6 Bio-Renewables & Anaerobic Digestion Outputs

The anaerobic digestion process at the site will generate a number of end-products also referenced as co-products as outlined below.

2.8.7 Bio-methane (gas) / Compressed bio-methane (bio-CNG)

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

Biogas can be 'upgraded' to pure methane, often called bio-methane, by removing CO_2, H_2S, moisture and other trace gases. The biogas upgrading process produces a purified stream of biomethane. The upgrading process also produces a CO_2 rich gas stream which can be recovered for treatment within a CO_2 recovery system for use off site.

The gas will also be processed further to generate compressed natural gas (CNG) / compressed bio-methane (bio-CNG) which is commonly used by passenger cars, vans, buses, and trucks. The compressed gas will be used as a fuel source for the Killough Quarry operations and any surplus will be tankered off-site for use at other Roadstone facilities or sold on the open market.

2.8.8 Carbon Dioxide (CO_2)

As noted above, upgrade of the biogas requires the removing of the CO_2 which would contribute to GHG concentration in the atmosphere if not captured.

The proposed development will provide a biogas upgrading facility which will allow the de-sulphurised biogas to be separated into biomethane and CO_2 while using membrane technology. The separated CO_2 will be compressed and stored on the site for removal on an ongoing basis. By utilising this process, the biogenic CO2 from biomethane production which would have been emitted to the atmosphere is now captured, purified, and reused, thereby creating a circular economy.

In the EU, the specification for CO_2 for use as a food or beverage additive is defined in Commission Regulation No 231/2012. The regulation gives recommendations on establishing levels of such impurities, taking account of variability in naturally sourced CO_2 or in source processes using natural feedstocks, and on the quality assurance procedures that should be applied to compressed-CO_2 storage and supply operations. The CO_2 may then be upgraded to a standard where it can used in various industries, for example food, pharmaceutical, chemical etc.

2.8.9 Electricity from bio-methane

As noted above, upgrade of the biogas requires the removing of the CO_2 which would contribute to GHG concentration in the atmosphere if not captured.

The proposed development will convert a proportion of the biomethane produced directly to electricity for use by the adjacent Roadstone quarry operations without passage through the mains grid.

In addition to the above electricity generation, solar photovoltaic (PV) modules are included upon the roof structures of the administration, dry reception, bio-conversion and pre-treatment buildings, covering a total surface area of c. 10,565m^2 with anticipated electricity generation of between 1.5 to 1.8 GWh per annum.

2.8.10 Organic Fertilisers

The other by-product of the anaerobic digestion is digestate, which consists of undigested inert material and water. The digestate is composed of liquid and solid components and the system carries the nutrients carried into the system via the feedstock to the end co-product as organic fertiliser. Unit operations will be installed which will convert the digestate produced to a certified pelleted fertiliser for use by farmers in place of synthetic fertilisers.

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

2.8.11 Water

When the site is operational, process water will be recovered from the digestate and recirculated through the process to dilute incoming feedstock. The feedstock will be on average 70% water (30% DM) and requires dilution to 94% water (6% DM) for processing so process water will be added.

The system design is based on reuse of excess waters locally by Roadstone at the Quarry and concrete plant. Water from processing will be treated to potable standards, S.I. No. 99/2023 and will be stored on site for export to the quarry site after servicing firewater storage requirements.

Roof waters and clean rainwater will pass via a drainage network to the collection and storage tanks and will be pumped in a programmed manner to the Roadstone Quarry site for re-use.

2.9 Environmental Controls

2.9.1 General

Site operations and activities at the application site will require a number of environmental controls to eliminate or minimise the potential disturbance to the public arising from the onsite processing operations. The environmental control measures to be put in place at the site are outlined in the relevant EIAR Chapters that follow.

2.9.2 Pest Control

Anaerobic digestion (AD) is a natural process involving the conversion of feedstock (any organic non-woody material) by micro-organisms in the absence of oxygen into biogas and digestate. Given the nature of organic material being used as feedstock, there is potential for the site to be attractive to flies, birds, vermin and other feral animals.

If these potential pests were not controlled there could be a risk to public health and surrounding agriculture because of the potential for spread of disease they can represent.

However, effective pest control procedures are a mandatory requirement for all waste management facilities and a specialist pest control agency will be engaged for monitoring and management (where required) during all stages of the proposed development.

2.9.3 Bird Control

As the feedstock materials will be transported in covered or sealed vehicles, and stored within fully enclosed buildings, site activities are not anticipated to attract scavenging birds such as gulls and crows for the duration of works. Accordingly, it is not intended to implement any specific bird control measures at the site as is the case at present at the quarry site.

2.9.4 Traffic Control

As the planning application relates to development within the existing quarry site, the proposed development will utilise the existing site entrance.

2.9.5 Litter Control

As the proposed development will be largely free of litter, the daily operational activities are unlikely to give rise to problems with windblown litter. Accordingly, there is no requirement to implement any specific litter control measures at the site.

2.9.6 Odour Control

As noted previously, an odour abatement system will be implemented to eradicate odours arising from the processes and activities occurring on site. All major odour sources, inclusive of the reception hall, digestate storage tanks, liquid feed tanks and pasteurisation tanks are all connected to the odour abatement system. The odour treatment will be a proprietary system designed and supplied by a specialist contractor with experience of treating odour from biogas and other organic waste facilities.

2.9.7 Fire Control

In the unlikely event that a fire does occur, the local fire station will be contacted and emergency response procedures will be implemented. A range of fire extinguishers (water, foam and CO_2) will be kept at the site office to deal with any localised small-scale fires which might occur.

Additional fire-fighting capacity will be provided by storing water in a dedicated firewater pond (9,800 m^3).

2.9.8 Environmental Management System (EMS)

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

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

2.9.9 Airborne Emission Control

The eradication of odorous emissions is necessary to achieve BAT design. During the preliminary design the sources of odorous emissions were identified. The constituents requiring specific removal from the diluted gaseous emissions comprise sulphides, ammonia, methane and related volatiles and micro solids. These will be removed and the gaseous emissions will comply with EU EN13725.2022 with a design odour number not greater than C 98 5 OUE/m^3.

Gaseous emissions from buildings will be evacuated and ducted via a ducting network to a modular air purification system using biofiltration and/or adsorption in the odour removal

building. Air quality will comply with the guidance recommendations of the EPA Air Guidance Note AG 9, 2019.

Gaseous emissions from each operations building will be monitored for flow, ammonia, sulfides and methane (specific to the gas production and gas handling areas). The system will be automated with emergency alarms.

2.9.10 Noise Generation and Control

Prior to commencement of works, the Applicant (and any appointed Contractors) will compile and submit to Tipperary County Council a Construction Noise and Vibration Management Plan (NVMP). The plan shall:

- Outline management processes and mitigation measures to be utilised to remove or reduce significant noise impacts from the intended construction works;
- Define noise and vibration monitoring and reporting;
- Include method statements for each phase of the works including associated specific measures to minimise noise and vibration in so far as is reasonably practicable for the specific works covered by the plan and a detailed appraisal of the resultant construction noise and vibration generated.

The Applicant will also proactively engage with the local community and notify the public and potential noise / vibration sensitive premises before the commencement of any works which would be likely to generate any appreciable levels of noise or vibration, explaining the nature and duration of the works.

The Applicant will also distribute information circulars informing the local community of the progress of site-based construction works which will also highlight any likely periods of significant noise and vibration.

The Applicant also intends to implement best practice noise and vibration management techniques throughout the operational phase of the proposed development to control, and where possible, further reduce the noise impact to nearby noise sensitive receptors.

- All noise generating mechanical plant will be reviewed for potential tonal and impulsive properties or characteristics and ensure that appropriate noise reduction is fitted at source, where practicable.
- Based on the noise emissions of the selected mechanical plant items, the sound insulation performance of all building elements making up the façades, roofs, louvres, roller doors and personnel doors of all process buildings will be designed, specified and constructed in a manner that ensures that applicable noise thresholds can be achieved offsite.
- The CHP exhaust stacks will be fitted with suitable acoustics attenuators as standard.
- In order to minimise noise breakout, doors to all buildings with potentially elevated levels of noise will be installed with auto rollers or segmented personnel and vehicle access doors.
- Loader operators will be required to restrict heavy impact of the loader bucket against concrete hardstand or material bunkers.
- Access / internal haul roads will be kept clean and maintained in a good state of repair, specifically any uneven surfaces will be repaired, potholes filled, and large bumps removed to avoid unwanted rattle and “body-slap” from heavy goods vehicles.
- All vehicles delivering and operating on the site will have white noise reversing alarms fitted.

- Vehicles waiting within the application site will be prohibited from leaving their engines running and there will be no unnecessary revving of engines.
- Care will be taken when unloading vehicles to reduce or minimise potential for noise disturbance to nearby residents.
- HGVs / trucks accessing and egressing the proposed development should adhere a 60 kmph speed limit travelling along on the L1309 to ensure road traffic noise impacts at the nearest noise sensitive receptors are minimised.
- Any deliveries to the proposed development site will be programmed to arrive during daytime hours only. Licensing Requirements

2.10 Environmental Protection Agency

The EPA was consulted during the pre-planning consultation period to seek feedback on the proposed development. No response was received by the time of the submission of the application.

Having regard to waste authorisation requirements as defined by the classes of waste activity listed in the Third Schedule of the Waste Management (Facility Permit and Registration) Regulations, 2007 (S.I. No. 821 of 2007), as amended and to current law and practice, it is considered that the proposed development will require an application for an Industrial Emissions (IE) licence to the EPA in accordance with Class 11.4 of the First Schedule of the EPA Act 1992 as amended, outlined **in Table 3** below.

Table 3: Class 11.4 of the First Schedule of the EPA Act 1992 (as amended)

11.4 (a)	Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving one or more of the following activities (other than activities to which the Urban Wastewater Treatment Regulations 2001 (S.I. 254 of 2001) apply):
1	biological treatment;
2	physico-chemical treatment;
3	pre-treatment of waste for incineration or co-incineration;
4	treatment of slags and ashes;
5	treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.

11.4 (b)	Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, (other than activities to which the Urban Wastewater Treatment Regulations 2001 (S.I. No. 254 of 2001) apply):
1	biological treatment;
2	pre-treatment of waste for incineration or co-incineration;
3	treatment of slags and ashes;
4	treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.

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

The IE licence will set conditions under which the following will be controlled:

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

2.11 Department of Agriculture, Food, and Marine (DAFM)

The Anaerobic Digestion Facility will be a 'Type 1' plant under the European Union (Animal By-Products (ABP)) Regulations (S.I. No. 187 of 2014). The facility will process Category 2 animal by-products, specifically cattle manures i.e., cattle slurry, and poultry manure (chicken litter). Approval will be required from the Department of Agriculture, Food, and the Marine (DAFM) in accordance with Article 24 of Regulation (EC) No. 1069/2009, for the acceptance and/or treatment of animal by-products.

DAFM was consulted during the pre-planning consultation period to seek feedback on the proposed development. No response was received by the time of the submission of the application.

The proposed development has been designed with consideration to the DAFM guidance CN11: *Conditions for approval and operation of biogas plants transforming animal by-products and derived products in Ireland*.

The application process for approval and operation of the proposed facility by the DAFM occurs in three stages as follows:

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

This application process will commence upon receipt of planning consent.

2.12 SEVESO III Directive / Control of Major Accidents Hazards Regulations (COMAH)

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

The purpose of the COMAH Regulations is to lay down rules for the prevention of major accidents involving dangerous substances, and to seek to limit as far as possible the

consequences for human health and the environment of such accidents when they occur, with the overall objective of providing a high level of protection in a consistent and effective manner.

There are two tiers of establishment, which are related to the quantities of dangerous substances present. Depending on quantity, an establishment may be upper-tier or lower-tier. Upper-tier establishments have greater quantities of dangerous substances present and therefore are obliged to comply with additional requirements specified in the Regulations.

The COMAH Regulations place an obligation on operators of establishments that store, handle, or process dangerous substances above certain thresholds to take all necessary measures to prevent major accidents and to limit the consequences for human health and the environment.

2.12.1 SEVESO/COMAH Assessment of the Proposed Development

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

Under COMAH, P2 flammable gases are subject to a threshold quantity of **10 tonnes** meaning that any biogas facility storing less than 10 tonnes of methane will fall outside of the COMAH Regulations.

- Biogas will be stored at less than 100 mbar with a density of 1.15 - 1.2 kg/m^3.
  - The storage volume is approximately 11,000 m^3.
  - Therefore **13.2 tonnes** of Biogas.
- Biomethane will be stored at up to 250 bar with a density of up to 215 kg/m^3.
  - The storage volume is approximately 81.25 m3.
  - Therefore **17.5 tonnes** of Biomethane.
- **Biogas** would be subject to the 10 tonne Lower Tier Threshold (P2 Gas), the **Biomethane** would be subject to the 50 tonne Lower Tier Threshold *(Named substances 18, Note 19),*
  - (13.2 ÷ 10) + (17.5 ÷ 50) = 1.67
- **Biogas** would be subject to the 50 tonne Upper Tier Threshold (P2 Gas), the **Biomethane** would be subject to the 200 tonne Upper Tier Threshold *(Named substances 18, Note 19),*
  - (13.2 ÷ 50) + (17.5 ÷ 200) = 0.35
- Also just to note that on a long weekend there is the potential for 2No MECG biomethane trucks to be onsite waiting to be moved to another site. This is up to another 50 tonnes.
  - (13.2 ÷ 50) + (67.5 ÷ 200) = 0.6

The assessment set out above confirms the site will exceed the threshold by storing more than 10 tonnes of flammable gas and will therefore be considered a Lower Tier COMAH regulated site.

A detailed Safety Risk Assessment (SRA) has been carried out for the development and is detailed in EIAR Chapter 15.

As noted previously, part of this facility will include an anaerobic digestion (AD) plant. The plant is expected to convert organic feedstock into carbon dioxide and methane, with further processing to produce synthetic biofuel, which will be stored and exported at high pressure.

Carbon dioxide is an asphyxiant whilst methane is a highly flammable gas, with the latter especially raising concerns at a public consultation meeting for land-use planning (LUP).

Roadstone has therefore appointed the SLR Consulting Safety Advisory team (SLR-SA) to conduct a semi-quantitative risk assessment (sQRA) in line with the Health and Safety Authority guidance on land-use planning decisions.

2.13 Consultations

2.13.1 Pre-Planning Consultation

A Section 247 pre-planning meeting was held with Tipperary County Council on the 20th of November 2023 (Pre-planning Ref. PP10095) to discuss the proposed development. In attendance were representatives for the client and the design team, with representatives from TCC planning, environmental and engineering departments. Matters discussed included the development proposals, planning considerations and advice from TCC to the applicant. A copy of the pre-planning minutes is provided in Chapter 1 of the EIAR.

In addition, a pre-planning consultation document was issued to statutory consultees. The list of consultees and any responses received are noted in **Table 4** below, and full details provided in Chapter 1 of the EIAR and relevant technical chapters of the EIAR.

Table 4: Statutory Consultees

Consultee		Response (Y/N)
1	Development Applications Unit (DAU)	Y
2	Transport Infrastructure Ireland (TII)	Y
3	Geological Survey of Ireland (GSI)	Y
4	Uisce Éireann (formerly Irish Water)	Y
5	Inland Fisheries Ireland (IFI)	N
6	Health and Safety Authority (HSA)	Y
7	An Taisce	N
8	Fáilte Ireland	Y
9	National Parks & Wildlife Services (NPWS)	N
10	Heritage Council	N
11	Environmental Protection Agency (EPA)	N
12	Dept of the Environment, Climate and Communications	N
13	Dept of Agriculture, Food and the Marine (DAFM)	N
14	Sustainability Energy Authority of Ireland	N
15	Health and Safety Executive (HSE)	N

A summary of the feedback received consists of the following:

- The Department of Housing, Local Government and Heritage referred to the wider area of known archaeological settlement and activity and emphasised the importance of the study area for the archaeological and cultural heritage assessment being of sufficient size and extent to reflect that. It also advised that the assessment must be carried out by a suitably qualified Consultant Archaeologist.
- Transport Infrastructure Ireland (TII) provided general advice on the methodology and guidance to be followed in assessing the impact on the road network and the

importance of considering cumulative projects in the area in terms of road impacts. TII also highlighted that any improvements required to facilitate development, haul routes and requirements for abnormal loads should be clearly identified and assessed.

- Geological Survey Ireland (GSI) requested consideration of measures by the quarry operator to assist in achieving their geological heritage goals, such as allowing access to quarry faces and facilitating means of allowing wider appreciation of geological heritage with the wider public.
- Uisce Éireann provided advice on ensuring that water resources and infrastructure are safeguarded during all stages of development, and that any new requirements for connection to existing infrastructure are clearly identified.
- The Health and Safety Authority (HSA) highlighted the need to consider whether the project would come within the scope of the Control of Major Accident Hazard Regulations 2015 and requested that the body be notified once a planning application has been submitted.

2.13.2 Public Consultations

Roadstone elected to organise a public consultation event in the form of a 'Public Information Drop-In Event' at a local hotel (the Horse & Jockey), on the evening of Tuesday 25th June 2024. A local residence letter drops, and a newspaper public notice advertisement were carried out in the two-week period prior to the scheduled information drop-in event. The public were invited to submit observations and feedback either in person at the public information session or via email to info@roadstone.ie.

The event was intended to provide an opportunity for potentially impacted local residents and any interested third parties to meet with Roadstone personnel and its advisors to discuss the development and ask any relevant questions.

To facilitate public engagement and discussion, Roadstone set up display's information boards around the meeting room. The display boards provided some background information, proposed layout scheme, brief description of the proposed development along with some 3-D concept views.

Attendees were also invited to submit any further comments or questions to an email (info@roadstone.ie) provided by Roadstone on or before the 26th July 2024. This date was later extended to 23rd August 2024 by Roadstone Limited as requested by a local Councillor.

3.0 Need for Development and Consideration of Alternatives

To align themselves with well publicised International and European requirements in relation to moving to a zero-carbon economy, Roadstone have decided to initiate a full-scale bio-renewables plant at its Killough Quarry outside Thurles, Co. Tipperary where there is capacity for such infrastructure to be installed within the existing quarry site.

Ireland is now legally committed to reducing greenhouse gases to net-zero emissions no later than 2050, the DECC has published a target of up to 10% of national gas demand to come from biomethane by 2030 as part of the Sectoral Emissions Ceilings.

The proposed development will support this target by providing a facility which will provide renewable energy production from biomethane, whilst also supporting the rural circular economy and the effective management of agricultural waste.

These opportunities would be missed should the proposed development not proceed and local agricultural wastes would continue to be applied directly with chemical fertiliser to the land at current volumes. CH_4 would not be captured for renewable energy production, and it would

continue to be a source of greenhouse gas emissions. The economic opportunity and jobs provision associated with the proposed development would also be lost.

The application site at Killough Quarry is considered a suitable location due to:

- its location within the existing and long established quarry site, i.e. a brown field site in a rural area;
- within an appropriate topographic setting i.e. well screened from surrounding areas;
- rural location, but with good access to the regional and national roads network with long established HGV traffic movements on the local road network;
- located directly where the energy and by-products generated will be used, i.e. the asphalt and concrete plants at the existing quarry;
- over 80% of the feedstock (cattle slurry and silage) can be sourced locally, i.e. within a c. 20km radius of the proposed development;
- similarly, there is a local market for use of the organic fertilisers which will be a by-product of the anaerobic digestion process, pelleted fertiliser for use by farmers in place of synthetic fertilisers;
- best practice industry standard methodology and standards can be used; and
- the proposed development will provide renewable energy production, support the circular economy and the effective management of waste in line with EU, National, Regional and Local Policy which all highlight urgent need to diversify Irelands energy sources to provide a carbon neutral and sustainable energy sector in Ireland.

The overall design process has been an iterative process between the design team and Roadstone with inputs from engineering, planning, environmental, hydrological and traffic specialists. This process was implemented to design out any potential significant environmental impacts. Alternative design revisions were considered in relation to sizing of plant and equipment, and reconfiguring of the layout to ensure the best flow for site operations and in order to be proportionate and fit in with the surrounding quarry site. The most environmentally efficient technological configurations incorporated to the process design were selected following extensive feasibility work and review of Best Available Technology as mandated by European and Irish legislation to reduce environmental pollution.

4.0 Existing Environment, Effects and Mitigation

4.1 Population & Human Health

The review of population is based predominantly on a review of settlement and land use patterns to identify existing residential housing and sensitive receptors in the vicinity of the application site. Ordnance Survey maps and aerial photography were also examined. Demographic information from the Electoral Division (ED) of Gaile, in which the application site is located, from the census years of 2016 and 2022 were used in order to identify broad trends in the area.

The census results indicate that the population has increased in the Gaile ED area, albeit at a lower rate than that observed at the county and (in particular) the national level. The census data in relation to economic activity suggests that employment opportunities offered by the proposed development are in line with the requirements of the local workforce and their current industry experience. Long-term employment is envisaged for 15 to 20 direct employees plus a number of indirect sub-contractors, hauliers and service providers for the lifetime of the facility.

The proposed development supports the Tipperary County Development Plan objectives of sustaining the importance of the agricultural economy and supporting the diversification of it, while at the same time developing renewable energy capacity. It will stimulate local employment and boost the bio-energy sector experience and opportunities in the area.

Measures to prevent and control industry specific emissions such as the potential for malodour and the safe handling of gas are identified and proposed based on technical environmental investigations. Therefore, it is anticipated that the potential emissions / disturbance to amenity will be managed and minimised so as not to conflict with tourism, agriculture or any other economic assets in the surrounding area. It is considered likely that the potential diversification that the proposed development can provide for local agricultural enterprises will assist in supporting the viability of existing community services.

4.2 Biodiversity

An ecological field survey was conducted in August 2024 to determine the biodiversity value of the application site and surrounds. The dominant plant species present in each habitat type were recorded and sightings or evidence of any invasive species, birds, mammals or amphibians were also noted. The habitats within the study area were evaluated for their potential to support protected species and trees or structures suitable for bat roosts / foraging were noted. Findings from the field survey have been supplemented by publicly available biodiversity records for the area.

All designated sites for biodiversity within 15 km and with ecological and/or hydrological connectivity were considered as part of the assessment. The site is adjacent to the Killough Hill proposed Natural Heritage Area (pNHA), which is designated due to the presence of nationally rare limestone pavement and associated grassland habitats. The pNHA covers parts of the wider quarry site.

Most of the application site and surrounding area is comprised of active quarry works. Some floral species have grown along the side of tracks but the habitat has negligible value for biodiversity. The existing structures, grounds and earth banks within the application site were also assessed but considered to be of negligible value for biodiversity.

The quarry faces within the existing quarry may provide suitable nesting habitat for peregrine and kestrel, although no nests were identified on the quarry faces during the field survey. There is no potential nesting habitat for these species within the application site itself.

The Site is considered to be of low value to foraging and commuting bats due to the presence of surrounding suitable habitats (i.e. woodland edge) that will be retained and have good connectivity with the surrounding hedgerow network and woodland along the northern boundary of the existing quarry.

The woodland habitats to the north and west of the Site have potential to support local fauna but these do not extend into the proposed project area and the Project will not result in the removal of any of the woodland. The 6 semi-mature trees (beech and pine), 5 young pine and c. 50 young willow trees that will need to be removed in the aggregate stockpile storage area are self-seeded species which are not part of any ecologically valuable woodland or treeline in the area. The clearance of the trees within the Site must be carried out outside of the bird nesting season (1st March – 31st August inclusive) will avoid any potential loss of breeding and foraging habitats for birds. There is sufficient and more suitable bird nesting habitat also available in the surrounding area.

The trees that are to be removed are of negligible roosting suitability as they are not of sufficient size or maturity to be used on a regular basis by bats. The storage building that is due to be removed for the proposed development has entrances that may be accessed by roosting bats. However, the corrugated roof of this building renders it of negligible suitability for roosting bats.

The potential for negative impacts on plant growth from potential nitrogen arising from the emissions from the AD plant was assessed, and it was found that appropriate built-in anaerobic digestion (AD) plant design mitigation measures will prevent any nitrogen deposition.

Best practice operational measures and implementation of a site Environmental Management System (EMS) will be put in place for the facility to ensure the safeguarding of habitats within the Killough Hill pNHA.

4.3 Land, Soils & Geology

The proposed development site is set to be located within the Roadstone Killough Quarry (area c. 108.3 hectares), specifically, in the southeast of the quarry.

It is located within 'Killough Hill' which is a designated County Geological Site in recognition of its intrinsic limestone escarpment value for natural heritage. As such, Killough Hill should be protected and promoted for its heritage value and for recreational and geo-tourism initiatives. These actions are deemed to be more appropriately focused on the quarry site rather than the proposed bio-renewables application site.

The land immediately surrounding Killough Hill lies at levels of between 110 and 120m AOD. The land gently slopes down towards the River Suir (c. 3.5km west of Killough Hill) to just under 80m AOD. Killough Hill is the only noticeable high point in the local area at a maximum heigh of c. 215m.

To the immediate northwest of the site, the land slopes steeply towards the surrounding plainlands, resulting in a height difference of between 50-80m over a distance of roughly 200m. These steep slopes are covered by conifer and mixed woodland. To the immediate southeast and south of the void the land slopes slightly less steeply and is made up from pasture as well as some woodland scrub areas. To the immediate southwest of the void the quarry processing facilities are located at levels between 140m AOD and 170m AOD.

Site investigation data from drilling of groundwater wells in 2020 and a Geotechnical Assessment undertaken in 2016 were to inform the assessment of local soil and geology conditions. The soil association at the application site has been classified as the Elton Series (ISIS Code 1000x). The soil combination is considered to be well draining and widespread within the study area. The Elton Series is especially productive for agricultural uses.

The application site currently consists of rock at the surface and former luvisol type of soils which were previously stripped from the application area as part of the quarrying operations. The bedrock is derived from mainly calcareous parent materials (IFS code BminSW). The bedrock is classified as shallow well drained mineral (Mainly basic). Therefore, soils across the proposed development site are absent.

Distribution of subsoils in the study area is presented as principally Till type occurring in form of Limestone till. Additionally, minor deposits of alluvium (sand and gravel), cutover peat, man-made materials, limestone sands and gravels and lake sediments are present in varying small proportions within the 5 km study area examined.

The boreholes drilled in 2020 (GW1, GW2, and GW3) reached a depth of up to 101 m bgl, primarily encountering strong, medium-grey limestone with occasional minor zones of weak, weathered, and clay-rich sections. The dominant lithology across all boreholes is consistent with the Ballyadams Formation—a fossil-rich, clean limestone commonly quarried.

Bedrock geology underlying the site has high potential economic value, however, this will be minimally disturbed as a result of the proposed development. The status of the site as a proposed Natural Heritage Area (pNHA, site code 000959) due to the presence of unique limestone pavement and calcareous grassland in these areas will not be impacted and no existing geological exposures will be lost.

The nature of the development will entail the change in land use from mineral extraction to renewable energy production.

A direct impact will occur from the removal of a small volume of limestone bedrock at the site to facilitate the construction of the development, including building foundations and water ponds at the site, however, it is considered unlikely that development will have an indirect impact on the broader geological aspects of the environment outside the footprint of the application site.

Standard best practice construction and drainage management mitigation measures will be implemented at the site to manage any accidental fuel or oil leaks that could cause interactive impacts between ground and other environmental features.

4.4 Water (Hydrology and Hydrogeology)

In addition to a desk study of publicly available data, extensive data gathering has been undertaken at the site as follows:

- Drilling of three groundwater monitoring boreholes (GW1 – GW3) was undertaken in August 2020 and all three boreholes were drilled to 101m depth.
- A borehole survey was undertaken in November 2020 to determine which of the existing boreholes could be used for groundwater level monitoring. PW06 was identified as a borehole where groundwater level monitoring could be undertaken. PW05 was monitored until Q2 2022. Pumps are installed in PW01 – PW03, and so the groundwater levels (GWLS) are not monitored at these locations.
- Installation of groundwater level data loggers in November 2022 at groundwater monitoring boreholes GW01 – GW03 and PW06 to facilitate continuous groundwater level monitoring;
- Quarterly manual dipping of groundwater wells and groundwater level logger downloads since November 2020;
- Annual groundwater quality monitoring results at GW01 – GW03 from 2022 to 2024.

The site is underlain by crinoidal wackestone/packstone limestone of the Ballyadams Formation and that a small section in the middle of the site is underlain by cherty, muddy, coarse grained, calcarentic limestone of the Clogrenan Formation. The soils surrounding the overall quarry landholding are fine loamy drift with limestone stones known as the Elton (1000ET) Soil Association.

Surface water features at the proposed development area include two small streams located close to the boundary of the site. The first stream, SUIR_080 is located along the northwestern border and the second stream, LISNAGONOGE_010 is located along the northern boundary and flows into the north of the quarry.

The SUIR_080 stream, located northwest of the proposed development site, flows into the Lower River Suir SAC which is located c. 3.5km north of the proposed development site. The Lower River Suir SAC is also located c. 4km west of the proposed site. The site is within the Water Framework Directive (WFD) Suir_SC_050 Sub Catchment (ID 16_10) and is split between three River Sub-Basin catchments, LISNAGONOGE_010, SUIR_090 and SUIR_080. The proposed development site is split between the SUIR_080 and SUIR_090 River Sub-Basin catchments. Under the WFD classification, the River Suir is ‘At Risk’ status and the Lisnagonoge stream is classified as being of ‘Moderate’ status.

There are no recorded flood events at or near the site, nor is there any risk of potential flooding.

The GSI online map viewer shows the site is underlain by a regionally important karstic aquifer (Rkd). This aquifer is defined as being a good aquifer capable of supplying regionally important supplies e.g. large public water supplies. The groundwater vulnerability at the site

is classed as Extreme and as X (Rock at or Near Surface). The closest karst features are two swallow holes located just over 2km northwest of the proposed development.

The proposed development is located within the Tipperary Groundwater Body (GWB). The groundwater flow in this aquifer is expected to be close to the surface through karstic conduits and enlarged fissures, mainly along fault zones. This GWB is classified as being not at risk status under the WFD classification. This groundwater body is bordered by the Templemore GWB, Clonmel GWB and the North Kilmallock GWB. All of these GWBs, including Tipperary GWB, received a Good WFD status during the 2016-2021 period. However, these same GWBs, are considered At Risk of deteriorating in quality.

There is the Ash Hill Group Scheme Source Protection Area located c. 2.5km east of the site. The closest Group Water Scheme (GWS) is located c. 2km northeast of the site, the Graigue-Moycarkey GWS. The Graigue-Moycarkey GWS well has a depth of 76.2m with no info on the depth of rock. The yield class is noted as good (327.30 m^3/day) and has a productivity class of III. There is no public supply source protection area within the vicinity of the proposed site, the closest is Tobernaloo Public Water Supply (PWS) c. 7km north of the site.

There are ten groundwater well locations within the overall quarry landholding, 4 of which are monitored for groundwater levels and for data loggers and 3 of which are monitored for groundwater quality. Each of these wells have pumps installed and groundwater is regularly abstracted from them.

Between 2020 and 2024, large variations have been observed in all four monitoring wells. It is likely that nearby groundwater pumping is the main cause of these large-scale fluctuations in groundwater levels. Groundwater level data indicates a general groundwater flow direction of south-east to north/north-west, towards the Lisnagonoge stream.

Groundwater quality monitoring was carried out on 7th August 2024, 22nd May 2023 and 3rd February 2022. The results were compared against several legislation and EPA specified limits. Across the three monitoring rounds, no exceedances were reported for Volatile Organic Compounds (VOCs), Total petroleum hydrocarbons (TPHs) and Extractable Petroleum Hydrocarbons (EPHs).

All waters will be managed on site, including clean rainwater, process water and foul waters. Process waters will be treated in the onsite treatment plant. All water will be reused on site where possible but some excess clean water will go to Killough Quarry for use there in concrete production and dust suppression, replacing the current abstraction requirements. There will be no discharge of waters off site.

The water streams at the site are as follows:

- Process waters;
- Roof water;
- Site surface water:
- Firewater; and
- Foul waters.

Water is stored in a number of tanks at the site for use in the process activities and also for emergency purposes.

There will be no discharge of water from the Killough Quarry site associated with the proposed development.

Examination of the identified potential impacts on the receiving environment show that with the inherent design mitigation measures and best practice management in place, there are no significant residual impacts with respect to groundwater and surface water during the construction or operation of the proposed bio-renewables facility development. A monitoring

programme is proposed to demonstrate that the development is not having an adverse impact on the surrounding environment and will document any improvements in water quality.

4.5 Air Quality

A full technical Air Quality Assessment was undertaken in order to predict the following:

- Road traffic trip generation and dust emissions associated with the construction phase;
- Road traffic trip generation associated with the site operations;
- Odour and dust emissions associated with the site operations;
- Emissions to air associated with the on-site combustion of bio-methane; and
- Ammonia emissions associated with the site operations.

With respect to the potential for air quality impacts, the key objective at the application site is to manage activities to ensure that air emissions are prevented where possible, and the effects of any residual releases are minimised.

The Ambient Air Quality Standards Regulations 2022 in Ireland set out the framework for monitoring and managing air quality in accordance with European Ambient Air Quality Directive (2008/50/EC) and its daughter directives, which aim to protect human health and the environment. Within these, standards and objectives for ten priority pollutants are identified, and this provides a framework for quantifying the potential for human health impacts. UK Environmental Protection Agency Guidance are used to provide the framework for assessment of potential ecological impacts.

A review of Irish Environmental Protection Agency monitoring data suggests that NO_2, SO_2 and PM_{10} concentrations monitored are below specified limits.

A wind rose was developed to show the frequency of wind speed and direction in order to determine the broad direction and spread of modelled air and odour emissions.

Air from the areas within which potentially odorous processes will be undertaken will be extracted to and treated by an onsite odour abatement system (which will be in operation 24 hours per day, 7 days a week), or captured by the gas capture system.

The odour exposures predicted as a result of emissions from the proposed development at the identified sensitive receptors are below the relevant impact criterion and deemed not to be significant in line with the relevant guidance thresholds.

A wide range of mitigation and management measures are recommended for implementation during the construction phase of the proposals, and the following operational/containment measures are proposed:

- the chicken litter and brewery residue siloes, cattle slurry tanks, pretreatment and equalization building, bio rest tanks and digestate handling building would be enclosed structures, with air extracted to the odour abatement system;
- the odour abatement system would treat the air extracted from these areas prior to discharge to atmosphere via a dispersion stack at a height of 17.5m;
- the anaerobic digestion process would be undertaken within sealed reactors located within the bioconversion building. These sealed reactors would be connected to the gas capture system, ensuring complete containment;
- a site management system would be in place to ensure routine cleaning measures are undertaken;
- implementation of a speed restriction (25 km/hr) within and around the quarry;
- the existing road surfaces will be maintained;

- water-assisted dust sweeper(s) will be utilised on the access road and local roads, as necessary, to remove material tracked out of the site; and
- vehicles leaving the site will use the existing wheel wash.

With these measures in place, there are no significant effects predicted to human or ecological receptors.

Ongoing dust deposition monitoring is carried out by Roadstone at the existing quarry site at selected locations along the extent of the site boundary. Review of the dust monitoring results from these locations will be used to ensure the mitigation measures are effective for the duration of the construction phase.

Once operational, the proposed development will be a licenced facility under the Industrial Emissions Directive and will therefore be required to conduct “sniff surveys” in accordance with AG5 at regular intervals to demonstrate that mitigation measures are sufficient to prevent odour nuisance at sensitive off-site locations. Stack monitoring of the odour abatement system exhaust may also be required at regular intervals under the conditions of the IE Licence.

Emissions monitoring of selected point sources will also be carried out in accordance with conditions of a future licence.

4.6 Climate

The proposed development is a bio renewable facility for the generation of renewable fuels from agricultural and animal organic matter. The facility includes several buildings of which will be powered by the bio-methane and solar energy generation.

On completion of the proposed development, it is expected to support in the reduction of emissions through the avoided use of fossil fuels for the customers of this facility. A whole life cycle assessment of the potential greenhouse gas emissions associated with the proposed development shows a significant beneficial impact as a result of the project.

There are no expected significant impacts from future climate change on the proposed development however it is recommended the operators of the facility consider supply chain impacts from climate and take this into account when agreeing contracts.

4.7 Noise & Vibration

The noise impact assessment describes and assesses the existing noise characteristics of the local area. The anticipated effects of the proposed development have been applied to these baseline conditions, using worst case assumptions, and the resulting noise impacts assessed. Mitigation measures are identified where necessary to eliminate or minimise adverse impacts, insofar as practical.

The existing topography of the site boundary berms provide some inherent acoustic screening.

The predicted construction noise levels show that construction noise levels will fall below the standard thresholds and impacts are predicted to be temporary.

Notwithstanding the findings of the construction phase noise impact assessment, best practice construction noise and vibration management practice will be adhered to and implemented as a matter of course.

The predicted operational noise levels indicate that under typical operational conditions, the relevant operational noise thresholds during the day, evening and night time periods would be achievable subject to the adherence to best practice noise management practices.

The road traffic noise level arising from hourly HGV movements when the proposed development is operating at maximum capacity have been predicted on assessment as being a negligible to minor potential impact on receptors located along the L1309.

The Applicant will undertake an annual compliance noise survey to establish operational noise emissions arising at the application site and demonstrate compliance with noise emission thresholds set by any grant of planning permission or licence issued by the EPA.

4.8 Material Assets

The material assets assessment comprises the consideration of existing resources pertinent to the proposed development and the application site that are not addressed elsewhere in the EIAR and the likely development impacts on those resources. On this basis, it primarily includes a review of utilities such as electricity, telecommunications, gas, water supply infrastructure and sewerage, as well as waste management arrangements.

Pre-planning consultation feedback of most relevance to the assessment of material assets was received from Uisce Éireann (formerly Irish Water), which stipulated required measures to ensure the protection of supply and protection of public water supplies. This was addressed in EIAR Chapter 7 – Water.

Public consultation feedback in relation to material assets was received in relation to road capacity, water management, safety risks to buildings (from potential explosion of gas or blasting from the quarry) and the management of feedstock to the proposed development.

The water assessment set out in Chapter 7 confirms that the proposed development will not have any adverse impacts on local residents in terms of quality or supply. Monitoring arrangements will be put in place to provide further reassurance. Consultation with Irish Water as part of the material asset assessment confirmed there is no local mains supply in the area. The electricity infrastructure will be enhanced at the application site by way of a new substation to be introduced, and potential enhanced connectivity to renewable energy from solar power and biogas.

All agricultural wastes entering the facility will be required to meet strict feedstock acceptance procedures and complying with Environmental Protection Agency (EPA) and Department of Agriculture, Food & Marine (DAFM) licence conditions.

In developing proposals for the site, technical investigations have been carried out in relation to the application site's suitability and feasibility of the AD plant in this location and the available capacity for the scale of agricultural wastes required to feed it was confirmed.

The 20km radius of the proposed development was estimated to include 133,477 hectares of agricultural land with average farm size of 45 hectares. The estimated requirements of the proposed AD plant would utilise 1.7%, 0.25% and 48% of the present indicative potential production grass silage, maize and bovine slurry annually respectively.

4.9 Cultural Heritage

Chapter 12 of the EIAR provides an assessment of the effects on the archaeological, architectural and cultural heritage of the application site and the surrounding area of a proposal to develop a Bio-Renewables Plant on a brownfield site in the townland of Gaile, Co. Tipperary, within the existing Killough Quarry.

The following sources were examined and a list of sites and areas of archaeological, cultural heritage and architectural potential compiled:

- Record of Monuments and Places (RMP) for County Tipperary SR
- The Sites and Monuments Record that is maintained by the Dept of Housing, Local Government and Heritage

- The County Tipperary County Development Plan 2022-2028
- The National Inventory of Architectural Heritage
- Aerial photography
- Cartography

The application site has also been the subject of several site visits by the author.

The application area is situated in southern Tipperary County, c. 4 km to the west of Horse and Jockey and 2.2km km north-west of the R639. It is situated on Killough Hill which rises to 220m OD.

The application area has already been assessed for developments on two previous occasions and no effects on archaeology, cultural heritage or buildings of special architectural significance have been identified. The entire application area has been completely stripped of topsoil down to subsoil levels and there will be no direct or indirect effects by the proposal on any known items of archaeology, cultural heritage, or buildings of special architectural significance in the application area or the vicinity.

There are no effects on any items of archaeology, cultural heritage, or buildings of special architectural significance in the application area or vicinity and no mitigation is required.

4.10 Landscape & Visual

The Landscape and Visual Impact Assessment (LVIA) was undertaken based on a desk top assessment of relevant plans, guidance and landscape character assessments, as well as a thorough site assessment carried out in April 2024. The desktop study and field work were informed by the following:

- Tipperary County Development Plan 2022-2028
- digital and paper (Ordnance Survey Ireland) mapping at different scales; and
- information available on the internet (such as satellite images and information on recreational facilities and nature conservation sites).

A study area of 1 km surrounding the application area and extending up to 3 km to the northwest, west, southwest, south and southeast was identified during the desktop study, based on the Zone of Theoretical Visibility Map. While the ZTV indicates further areas of visibility beyond this area, the level of visibility is very low and considering the local agricultural landscape with many screening hedgerows, a larger study area is not considered necessary.

Seven representative viewpoints were selected and were provided as annotated panoramic images showing the existing view with software additions to illustrate the visibility of the proposed development, i.e. how much of the proposed structures will become visible above the existing boundary screening berms and vegetation.

The proposed development will result in limited landscape and visual effects during the construction stage, owing partly to the short-term construction stage. Due to the height of the individual buildings it is not feasible to screen all the works and therefore no landscape / visual mitigation measures are considered necessary during the construction stage associated with the proposed development.

No significant landscape or visual effects were identified during the operational stage of the development. Large parts of this development will be screened by the existing boundary berms and vegetation, even more so, when the recently carried out planting on top of the western boundary berm matures. Apart from this planting, which is already in place, no further landscape or visual mitigation measures are considered feasible / necessary during the operational stage of the proposed development.

4.11 Traffic

A traffic assessment was undertaken to examine the traffic implications associated with the proposed development in terms of its integration with existing traffic in the area. The extent of additional trips generated by the development was estimated and the resulting impact on operational performance of such trips on the local road network was assessed based on traffic counts undertaken on the local road network and modelling of the additional trips using standard industry programmes.

The Traffic and Transport Assessment makes the following conclusions:

- Link capacity analysis was carried out on L1309, and it was determined that all roads will continue to operate within capacity for each of the assessment years: 2025, 2026, 2027, 2032, and 2042;
- The results of the junction capacity analysis indicates that all junctions will operate within capacity for each of the assessment years: 2025, 2026, 2027, 2032, and 2042;
- The assessment therefore indicates that the development will have a negligible impact on traffic flows on the existing road network due to the low volumes of traffic being generated by the development;
- Visibility to the north and south of the quarry access is limited by the vertical alignment, the horizontal alignment of the local road, and vegetation. However, the geometric constraints, coupled with low traffic volumes on the local road, have passively controlled vehicle speeds at the access. There are no accident records indicating that there are existing incident patterns at the site entrance and the site operator has confirmed that no issues or concerns have been reported by staff. Traffic on the L1309 will largely be associated with the application site, or vehicles generated by local development. Therefore they will be aware of the site operation and existing access junction. All vehicles will access/egress the application site using a forward gear. Operational vehicles also benefit from a raised driver viewpoint and are positioned closer to the junction as HGVs tend not to have a bonnet. Adjacent hedgerows and vegetation are all under the control of the site operator and will continue to be maintained to ensure that visibility is maximised at the site access junction. Therefore, junction visibility at the site access junction is considered appropriate and fit for purpose; and
- The parking spaces within the site is considered sufficient for the number of staff working on site, and also for any miscellaneous trips that may occur.

4.12 Major Accidents and Disasters

A review was undertaken to establish both the vulnerability of the application site to major accidents and disasters (such as through flooding risk) and the potential for the proposed development to cause an increased risk of major accidents and disasters at the site.

A matrix analysis was used to identify the potential risks, their likelihood of occurrence and an evaluation of their consequences. The matrix approach was used to indicate the potential risks/vulnerabilities with greatest potential to occur at the project site. The potential risks identified in construction and operation related to severe weather/flooding incidents, collapse/damage of structures or industrial style accident / accidental spillage causing water contamination. The risk of introducing the potential for spread of infectious disease was identified during the operational stage due to the handling of biological animal waste.

For all potential risks, an assessment was made as either unlikely or very unlikely. The design and construction of the proposed development adheres to the best practices outlined in the planning application details and will be subject to internal Environmental Management

Systems as well as rigorous licencing procedures by the EPA and DAFM. Therefore, all risks were ultimately assessed as being a low risk scenario.

The proposed project does not introduce a significant risk of major accidents or disasters, nor is it vulnerable to potential disasters or accidents, including both natural and man-made incidents.

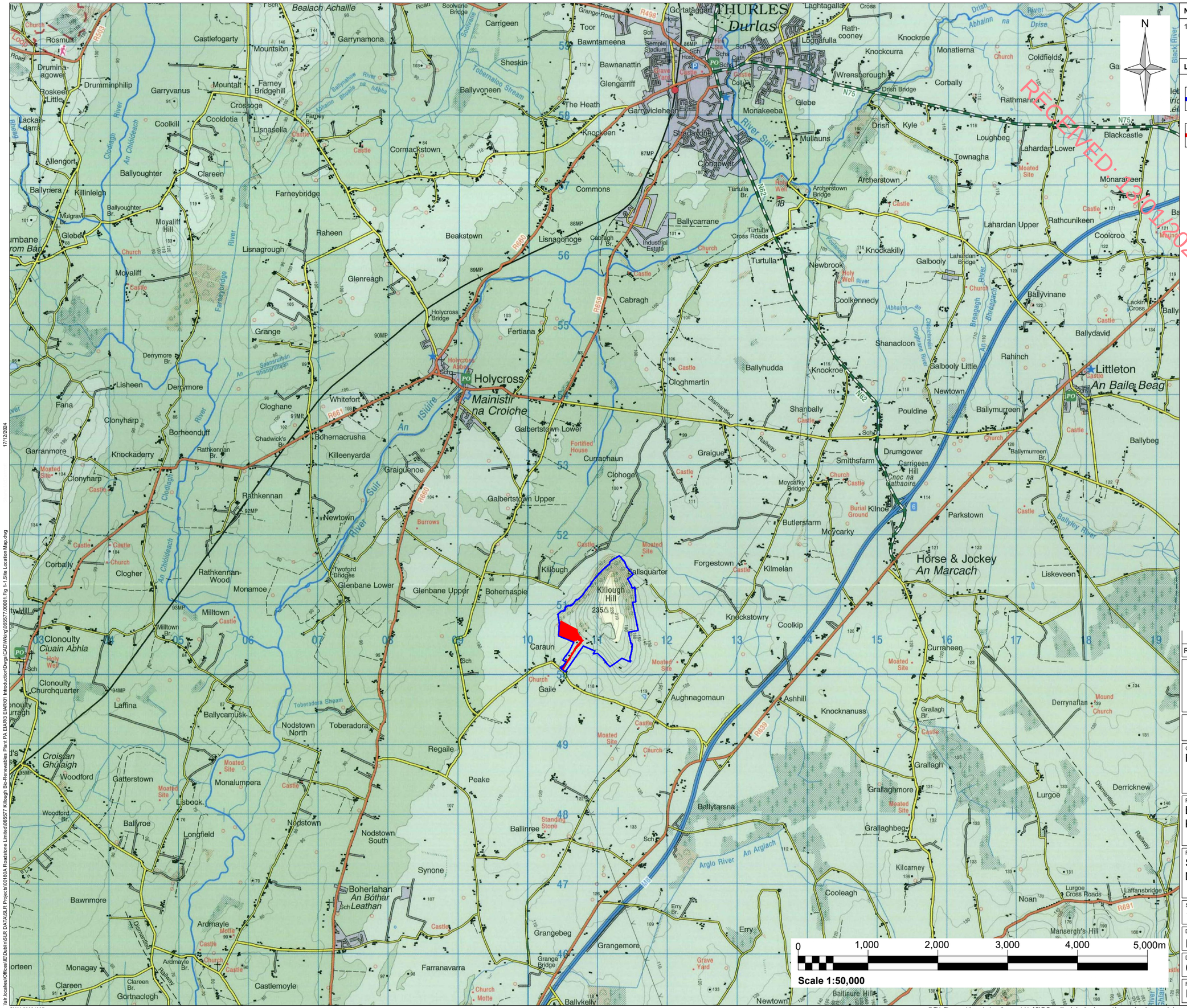
4.13 Interactions

A matrix and associated commentary is provided in Chapter 16 of the EIAR, which acts as a checking mechanism to ensure that there are no potential additional impacts from the interactions of impacts that are dealt with within the individual assessment chapters of the EIAR.

4.14 Mitigation and Monitoring

Chapter 17 of the EIAR provides a summary of mitigation and monitoring commitments set out within the technical chapters. This is intended to assist Tipperary County Council in determining the planning application and identifying any planning conditions that it may wish to impose on any future planning permission.

Figures



N

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Notes:

1. Extract from Ordnance Survey Map No. 66

Legend:

Applicants Land Interest Area (c.108.3 hectares)

Planning Application Area (c. 6.3 hectares)

0 1,000 2,000 3,000 4,000 5,000m

Scale 1:50,000

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Client
Roadstone Ltd.

Project
Bio-Renewables Production Facility at Killough Quarry, Holycross, Co. Tipperary

Figure Title
Site Location Map
Non-Technical Summary

Scale		SLR Project No.
1:50,000	@ A3	501.065577.00001

Designed	Drawn	Checked	Authorised
pmc	pmc	smcd	smcd
Date	Date	Date	Date
09/24	09/24	12/24	12/24

Figure Number
Figure NTS-1

Rev.
0

17/12/2024

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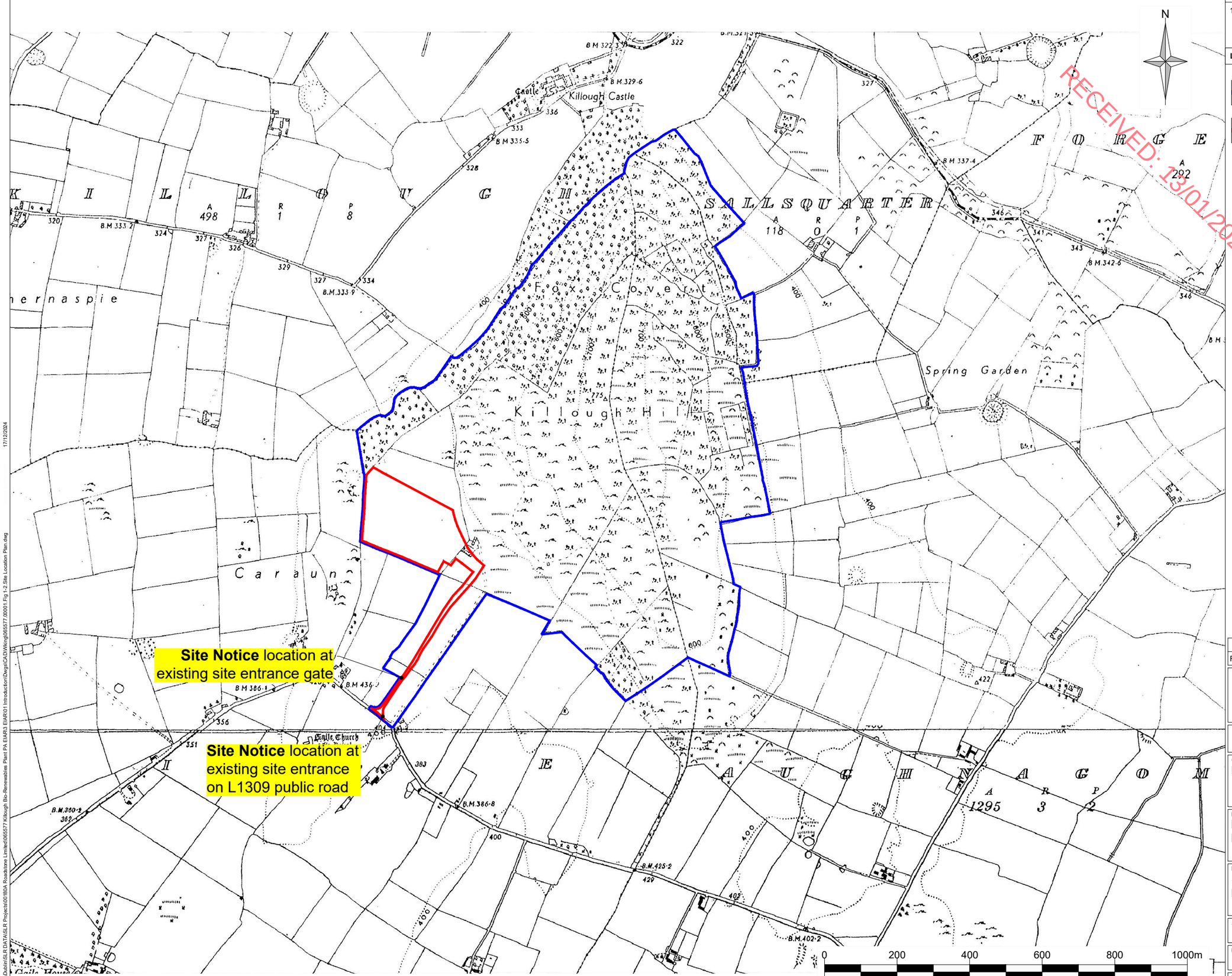
CYAL50381397



Notes:

1. Extract from Ordnance Survey Map 6 Inch Mapping: TY047 & TY053

Legend:

- Applicants Land Interest Area (c.108.3 hectares)
- Planning Application Area (c. 6.3 hectares)

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Client
Roadstone Ltd.

Project
Bio-Renewables Production Facility at Killough Quarry, Holycross, Co. Tipperary

Figure Title
Site Location Plan
Non-Technical Summary

Scale		SLR Project No.
1:10,000	@ A3	501.065577.00001

Designed	Drawn	Checked	Authorised
pmc	pmc	smcd	smcd
Date	Date	Date	Date
09/24	09/24	12/24	12/24

Figure Number
Figure NTS-2

Rev.
0

17/12/2024

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Glenstone Quarry Killough

2.59

16.50

20.88

1.31

0.60

0.72

4.76

1.25

1.56

0.81

0.95

1.49

0.37

0.40

0.74

9.13

8.45

Residence (**R4**)

Residence (**R3**)

Residence (**R1**)

Residence (**R2**)

Site Notice location at existing site entrance gate

Site Notice location at existing site entrance on L1309 public road

Gael Gaile

0 50 100 150 200 250m

Scale 1:2,500

N

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Notes:

1. Extract from Tailte Eireann Survey Maps 5,000 scale 4816; and 2,500 scale 4879-a, 4879-B, 4879-C and 4978-D

Legend:

- Applicants Land Interest Area (c.108.3 hectares)
- Planning Application Area (c. 6.3 hectares)
- Existing quarry facilities & site structures
- Residential Property
- Agricultural Shed / Other Building (non-residential)

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Client: Roadstone Ltd.

Project: Bio-Renewables Production Facility at Killough Quarry, Holycross, Co. Tipperary

Figure Title: Site Notice & Location Map
Non-Technical Summary

Scale	SLR Project No.
1:2,500 @ A3	501.065577.00001

Designed	Drawn	Checked	Authorised
pmc	pmc	smcd	scmd
Date: 09/24	Date: 09/24	Date: 12/24	Date: 12/24

Figure Number: **Figure NTS-3** Rev.: **0**

17/12/2024

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CYAL50381397

Asphalt Plant
Concrete Plant
Glenstone Quarry Killough
N
RECEIVED: 13/01/2025
2.59
16.50
20.88
Limestone Plant
Canteen
Store
Changing Room
Store
ESB Substation
Bunded Fuel Storage
Lime Plant
ESB Substation
Wheelwash
1.31
0.60
0.72
4.76
Store
Weighbridge & Office
Workshop / Maintenance Garage
1.56
1.25
Power Line
0.81
0.95
Site Office
Residence (**R4**)
Residence (**R3**)
0.37
0.40
Residence (**R1**)
0.74
Residence (**R2**)
9.13
Gael Gaile
Site Entrance
8.45
0 50 100 150 200 250m
Scale 1:2,500

Notes:

1. Extract from Tailte Eireann Survey Maps 5,000 scale 4816; and 2,500 scale 4879-a, 4879-B, 4879-C and 4978-D

Legend:

- Applicants Land Interest Area (c.108.3 hectares)
- Planning Application Area (c. 6.3 hectares)
- Existing quarry facilities & site structures
- Existing woodland and vegetation areas
- Residential Property
- Agricultural Shed / Other Building (non-residential)
- Contours (1m intervals)

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Client
Roadstone Ltd.

Project
Bio-Renewables Production Facility at Killough Quarry, Holycross, Co. Tipperary

Figure Title
Existing Site Layout
Non-Technical Summary

Scale		SLR Project No.
1:2,500	@ A3	501.065577.00001

Designed	Drawn	Checked	Authorised
pmc	pmc	smcd	smcd
Date	Date	Date	Date
09/24	09/24	12/24	12/24

Figure Number
Figure NTS-4

Rev.
0

17/12/2024

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CYAL50381397

Asphalt Plant

Concrete Plant

Glenstone Quarry Killough

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Limestone Plant

Canteen

Store

Changing Room

Store
(to be removed)

ESB Substation
Bunded Fuel Storage

Wheelwash

Lime Plant
ESB Substation

Store

Weighbridge & Office

Workshop / Maintenance Garage

Site Office

Power Line

Residence (**R4**)

Residence (**R3**)

Residence (**R1**)

Residence (**R2**)

Site Entrance

Gael Gaile

20.88
2.59
1.31
0.60
0.72
4.76
1.25
1.56
0.81
0.95
0.37
0.40
0.74
9.13
8.45

N

0 50 100 150 200 250m

Scale 1:2,500

Notes:

1. Extract from Tailte Eireann Survey Maps 5,000 scale 4816; and 2,500 scale 4879-a, 4879-B, 4879-C and 4978-D
2. Refer to WEW Enginerring Detailed Layout and Design Drawings: Drawings 1905-DG-**0001** to 1905-DG-**0023**

Legend:

- Applicants Land Interest Area (c. 108.3 hectares)
- Planning Application Area (c. 6.3 hectares)
- Proposed Develoment Works Area (c. 4 hectares)
- Existing quarry facilities & site structures
- Existing woodland and vegetation areas
- Residential Property
- Agricultural Shed / Other Building (non-residential)
- Contours (1m intervals)

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Client
Roadstone Ltd.

Project
Bio-Renewables Production Facility at Killough Quarry, Holycross, Co. Tipperary

Figure Title
Proposed Site Layout
Non-Technical Summary

Scale		SLR Project No.	
1:2,500	@ A3	501.065577.00001	
Designed	Drawn	Checked	Authorised
pmc	pmc	smcd	smcd
Date	Date	Date	Date
09/24	09/24	12/24	12/24

Figure Number
Figure NTS-5

Rev.
0

17/12/2024

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