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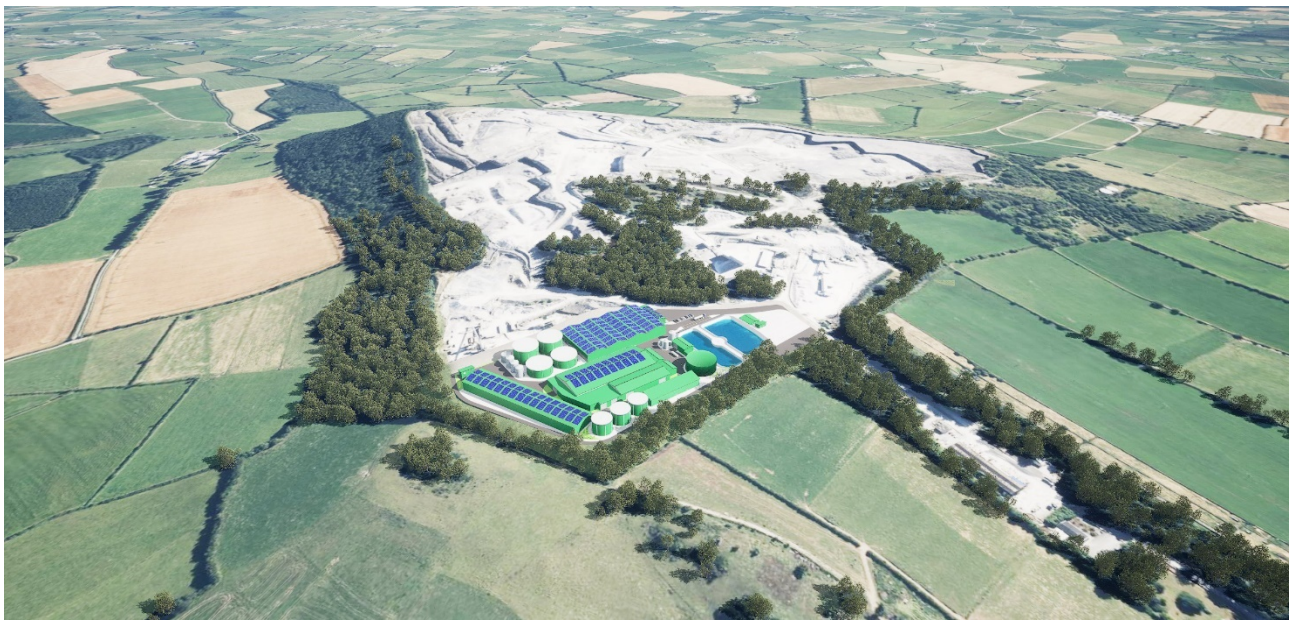
Existing Development

2.1 The overall planning application area (red line boundary) covers approximately 6.3 hectares (c. 15.6 acres) located within the southwest corner of the existing permitted Killough hard rock quarry. The existing site layout is shown on **Figure 2-1**.

2.2 The area is currently occupied by processed aggregate stockpiles which will be relocated elsewhere within the quarry site prior to any development works associated with the proposed bio-renewables facility being carried out.

2.3 An existing single storey block constructed store building (c. 158m²) lies partially within the red line boundary area as shown on **Figure 2-2**. It is proposed to demolish the store building to facilitate the proposed development, should planning permission be granted.

Plate 2-1: 3D Indicative Image of Proposed Development



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

2.5 Value added manufacturing facilities at the quarry include a concrete manufacturing facility, asphalt plant, a limestone production facility and an agricultural lime facility. Ancillary facilities at the quarry site include the offices, weighbridge & weighbridge office, canteen, toilets, wheelwash with overhead spray bar, bunded fuel storage areas and a garage / workshop.

2.6 Planning permissions associated with the existing quarry site are summarised below with further details provided in the accompanying Planning Report.

- **22/206** aggregate storage shed.
- **18/600579** the establishment and operation of an enclosed limestone processing facility (area 600 sq. metres and max. height 30 metres) and associated ancillary infrastructure on a 0.8 hectare site within the existing quarry landholding.
- **17/601436** retention and continued use of the semi-mobile asphalt/macadam mixing plant.

- **14/600501 (PL92.245693)** Construction and demolition waste recovery facility.
- **09/2543** (PL23.235990) Concrete Plant.
- **07/412** erect and operate semi-mobile asphalt/macadam mixing plant and associated covered aggregate storage bays on c. 6.6 ha of lands.
- **06/978** erection and operation of a semi-mobile asphalt/macadam mixing plant and wheel wash on 0.4 ha of land.
- **96/53** erect a 20m high telecommunications structure and a 2m post and wire fence.
- **P311360** erection of asphalt plant to ancillary services.
- **P310477** erection of single storey offices and septic tank.
- **QY/21** was registered under Section 261 of the Planning and Development Act and assigned the reference number QY/21. Tipperary County Council imposed a number of planning conditions on the quarry site.
- **23.SU.0050** (GEO ID159) Section 261A Quarry Review: was granted substitute consent by An Bord Pleanala.

Proposed Development

2.7 WEW Engineering Limited are the design engineers for the project. The detailed project design, procurement of equipment, control of sub-contract placements and project management will be provided by the Fingleton White Group of which WEW is a member company. Design will accord with Best Available Technology (BAT) regulations and will apply the Circular Economy Action Programme (CEAP) recommendations.

2.8 It is proposed that the permission for the Proposed Development is open ended with no time-limit attached, and therefore there is no requirement to include assessment of a decommissioning stage. The following EIAR chapters provide a detailed assessment of the construction and operational stages only.

2.9 Should this 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.

2.10 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.)

Development Overview

2.11 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.

2.12 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.

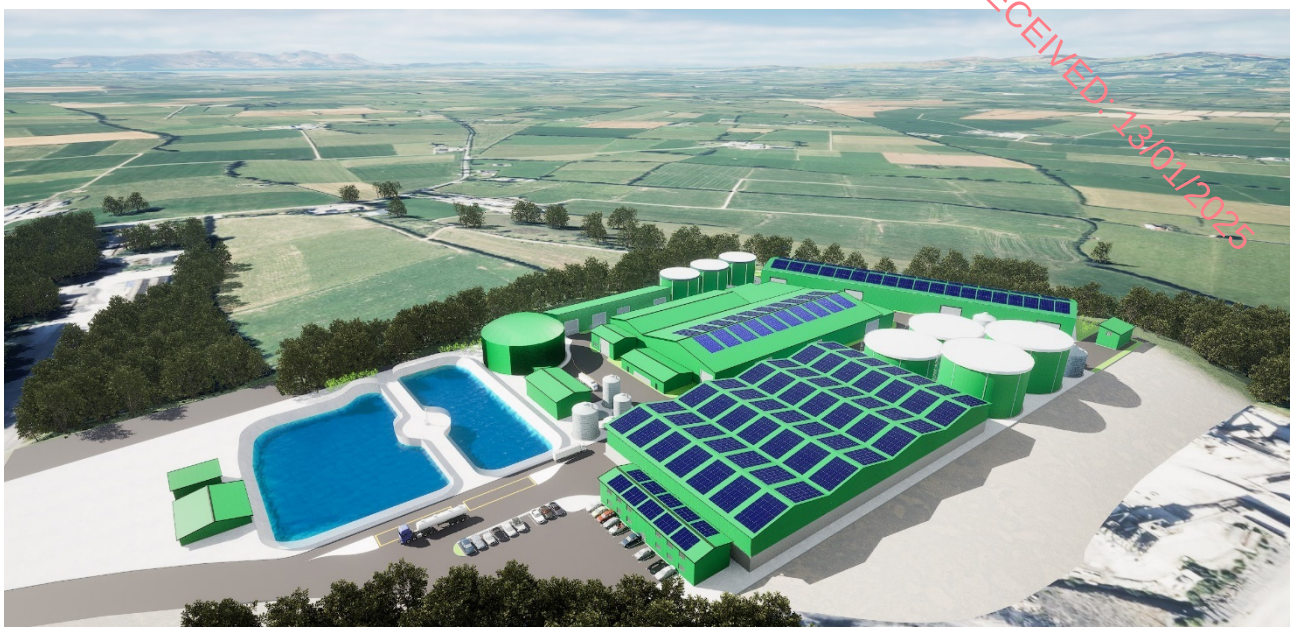
2.13 Ancillary facilities to be provided will include, a wheelwash; a weighbridge; surface water and fire water storage ponds; storage tanks for water, silage feed, cattle manure, pot ale and spent grain, maize, chicken litter and gas; effluent collection and storage tanks; staff and visitor car parking 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.

2.14 Details of the proposed site layout are shown on **Figure 2-2** and on **Plates 2-1** and **2-2**. Key aspects 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.

2.15 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 2-2: 3D Indicative Image of Proposed Development



Bio-Renewables Concept

2.16 The bio-renewables concept will include conversion of feedstock carbon to biofuels, CO2 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.

2.17 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.

2.18 The concept is based on the breakdown of organic volatiles using the anaerobic digestion process with offtake of biogas and digestate for further processing. CO2 will be captured and converted to methane for reuse. Digestate will be processed to produce solid fertilisers.

Best Available Technology (BAT) & Process Design

2.19 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.

2.20 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.

Contribution to Local & Regional Sustainability

2.21 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 kms approximately.
- 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. 12,170,000 m³
  - 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.

Plant / Facility Overview

2.22 The facility will consist of the following elements to be constructed as detailed in **Table 2-1** below. Detailed drawings showing the design, layout, finish and dimensions of each plant component are provided in the accompanying planning drawings prepared by WEW Engineering Limited.

Table 2-1: 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 (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
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

Administration Building

2.23 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.

2.24 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.

2.25 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

2.26 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.

Dry Matter Reception Building

2.27 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.

Workshop

2.28 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.

Bio-Conversion Building

2.29 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).

Pre-Treatment, Equalisation & Gas Upgrading Building

2.30 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).

Digestate Handling Building

2.31 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).

Warehouse Storage Building

2.32 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).

Bio-Filling Station Building

2.33 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).

Odour Abatement & Pumping Station Building

2.34 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).

2.35 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.

2.36 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.

Linear Generator Building

2.37 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).

2.38 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.

ESB Sub-Station Building

2.39 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.

2.40 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.

Wheelwash / Weighbridge

2.41 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.

2.42 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.

Storage Tanks & Silos

2.43 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).

Flare

2.44 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.

Piping System

2.45 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.

Compound Security

2.46 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**.

Lighting

2.47 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.

Landscaping

2.48 The overall development plan is shown in **Figure 2-2**, and entirely within the existing operational quarry site. There is no requirement to remove topsoil or overburden off site. While the site is within the aggregate stockpile storage area, 6 semi-mature trees (beech and pine), as well as 5 young pine and ca. 50 young willow, which have self-seeded throughout the site, will have to be removed to facilitate the development, refer to **Figure 2-3**.

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

Operational Hours and Employment

2.50 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.

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

Water Management

2.52 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.**

2.53 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.

Water Supply

2.54 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.

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

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

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

Water Storage

2.58 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.

Foul Wastewater Management

2.59 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.

2.60 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).

Surface Water Management

2.61 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.

Construction Phase

Construction & Commissioning Programme

2.62 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.

Construction Environmental Management Plan

2.63 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 following EIAR chapters and current construction industry guidelines.

2.64 As part of the preconstruction preparation a comprehensive Construction Environmental Management Plan (CEMP) and a Construction Traffic Plan (CTP) will be implemented.

2.65 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.

2.66 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.

2.67 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.

Construction Employment

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

2.69 Construction works will be restricted to normal working hours of between 0800 and 1800 Monday to Saturday with no construction works carried out on Sundays or Bank Holidays. Works outside these hours will only take place by exception.

Temporary Facilities

2.70 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.

Operational Phase (AD Life-Cycle Processes)

Feedstock

2.71 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 2-2** 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.

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

2.73 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.

2.74 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 2-2: 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

2.75 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 kms.

Feedstock Acceptance and Storage Procedures

2.76 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.

2.77 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.

2.78 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.

2.79 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.

Odour Abatement System

2.80 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 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.

Feedstock Conditioning

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

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

2.83 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.

2.84 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.

Anaerobic Digestion Process

2.85 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.

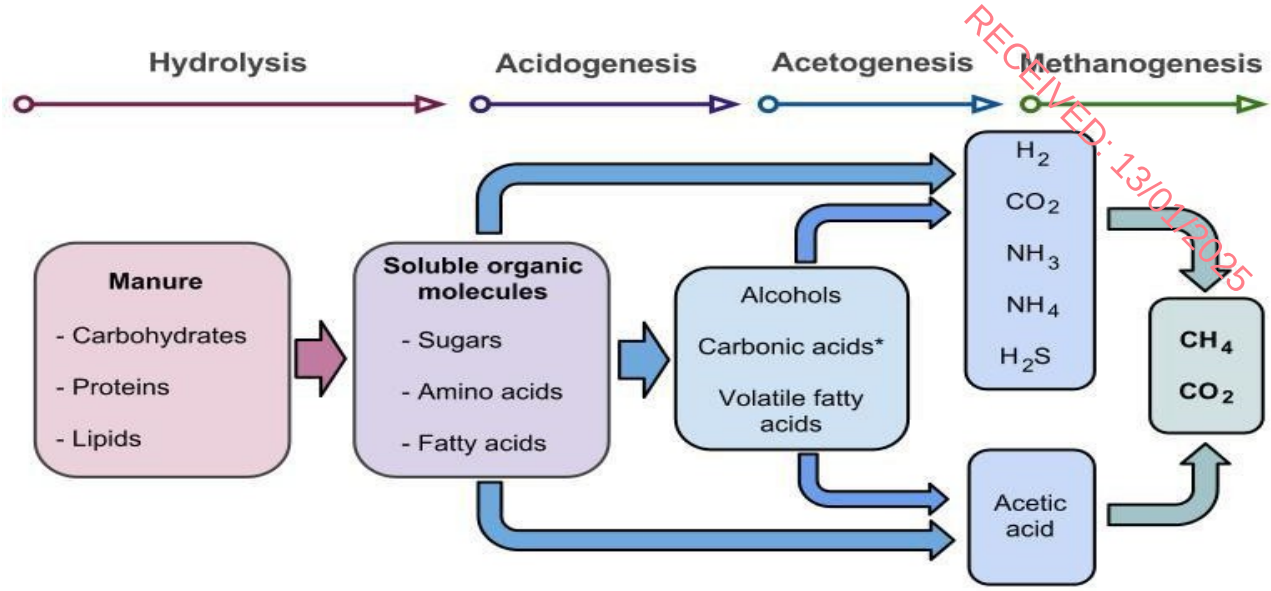
2.86 The AD process typically occurs in a closed vessel such as that shown in **Plate 2-3**. Produced biogas flows out to temporary storage and later on to the end-use applications. The main commercial applications of biogas are typically fuel, heat and electricity generation. After AD, the vessel will 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.

Plate 2-3: Typical Reactor Bank

2.87 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 2-4**:

- **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 (H2), carbon dioxide (CO2) and acetic acid (CH3COOH). 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 2-4: Stages of the Anaerobic Digestion Process



2.88 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.

2.89 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.

Bio-Renewables & Anaerobic Digestion Outputs

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

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

2.91 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.

2.92 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.

2.93 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.

Carbon Dioxide (CO_2)

2.94 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.

2.95 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.

2.96 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.

Electricity from bio-methane

2.97 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.

2.98 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.

2.99 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.

Organic Fertilisers

2.100 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.

2.101 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.

Water

2.102 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.

2.103 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.

2.104 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.

2.105 No excess waters will overflow from the site to a third-party outfall as the total water volume will be passed for use at the quarry site by agreement.

Environmental Controls

General

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

Pest Control

2.107 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.

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

2.109 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.

Bird Control

2.110 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.

Traffic Control

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

Litter Control

2.112 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.

Odour Control

2.113 As noted previously, 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 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.

Fire Control

2.114 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.

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

Environmental Management System (EMS)

2.116 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); and
- Accident prevention and emergency response procedures
- Complaints Register

Airborne Emission Control

2.117 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/m3.

2.118 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.

2.119 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.

Noise Generation and Control

2.120 The main noise generating sources will be housed indoors within the buildings listed in **Table 2-1** above. 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.

Licensing Requirements

Environmental Protection Agency

2.121 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.

2.122 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 2-3** below.

Table 2-3: 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.

2.123 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.

Department of Agriculture, Food, and Marine (DAFM)

2.124 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.

2.125 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.

2.126 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*.

2.127 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.

2.128 This application process will commence upon receipt of planning consent.

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

2.129 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").

2.130 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.

2.131 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.

2.132 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.

SEVESO/COMAH Assessment of the Proposed Development

2.133 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.

2.134 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 m^3.
  - 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

2.135 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.

2.136 A detailed Safety Risk Assessment (SRA) has been carried out for the development and is included in EIAR Chapter 15, refer to **Appendix 15-A**.

2.137 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).

2.138 RL have 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.

2.139 This initial SRA considers only the findings of the consequence modelling; future issues may include the application of sQRA principles.

2.140 The initial findings of the consequence modelling is that none of the modelled scenarios result in hazardous thermal radiation or overpressure levels being reached at the nearest residential properties, with a safety factor of over 200m. A negative LUP decision based on residential properties in the vicinity of the AD plant is therefore unlikely.

Figures

Refer to separate planning drawings prepared by WEW for detailed designs

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)

roadstone
A CRH COMPANY

Rev	Amendments	Date	By	Chk	Auth

SLR
www.slrconsulting.com

Client: Roadstone Ltd.

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

Figure Title: Existing Site Layout

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 2-1** Rev.: **0**

17/12/2024

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CYAL50381397

Asphalt Plant

Concrete Plant

Glenstone Quarry Killough

RECEIVED: 13/01/2025

Limestone Plant

Canteen

Store

Changing Room

Store
(to be removed)

ESB Substation

Bunded Fuel Storage

Lime Plant

ESB Substation

Wheelwash

Store

Weighbridge & Office

Workshop / Maintenance Garage

Site Office

Power Line

Residence (**R4**)

Residence (**R3**)

Residence (**R1**)

Residence (**R2**)

Site Entrance

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

Gael Gaile

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 Engineering 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)

roadstone
A CRH COMPANY

Rev	Amendments	Date	By	Chk	Auth

SLR

www.slrconsulting.com

Client: Roadstone Ltd.

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

Figure Title: Proposed Site Layout

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

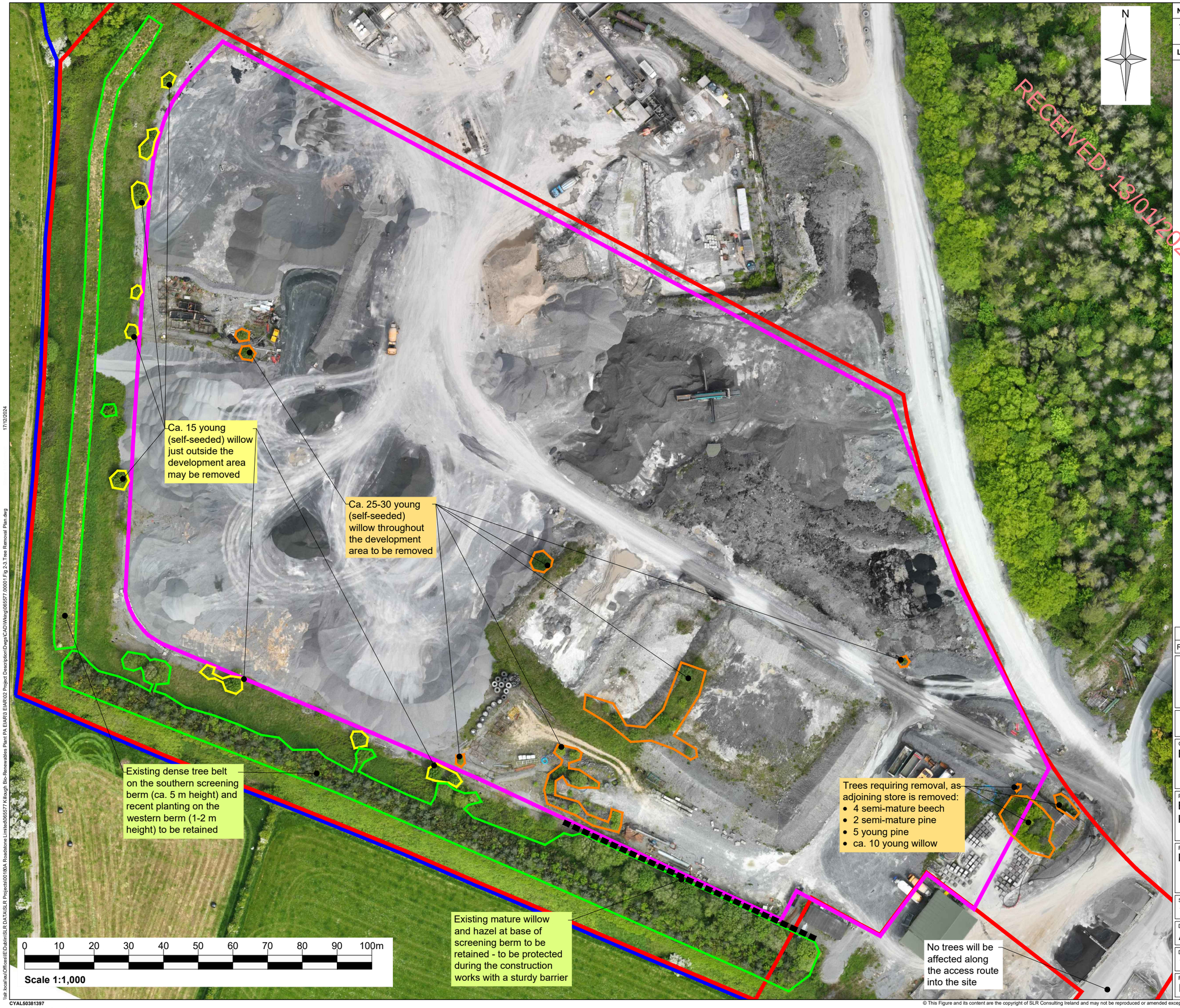
Designed	Drawn	Checked	Authorised
pmc	pmc	smcd	smcd
Date	Date	Date	Date
09/24	09/24	12/24	12/24

Figure Number: **Figure 2-2** Rev.: **0**

17/12/2024

\\dr.local\ex\Offices\IE\Dublin\SLR DATA\SLR Projects\00180A Roadstone Limited\065577 Killough Bio-Renewables Plant PA EIAR\3 EIAR\02 Project Description\Dwgs\CAD\Wking\065577.00001 Fig 2-2 Proposed Site Layout.dwg

CYAL50381397



Notes:

1. *Orthomosaic produced from Aerial Photography flown May 2023 by ASM Ireland*

Legend:

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

Tree Information

- Trees within the application area to be retained, as not affected by the proposed construction works / operational development
- Sturdy barrier to be installed along the edge of the mature trees along the southern boundary (e.g. large boulders) to prevent damage to these trees during the construction works
- Trees close to the development footprint that may need to be removed, as part of the construction works. If practicable these trees will be retained
- Trees that will have to be removed, to facilitate the development

Tree Removal Note:
Should planning permission be granted, the trees to be removed identified on this plan are deemed to be exempt from requiring a felling licence in line with the Forestry Act 2014.

roadstone
A CRH COMPANY

Rev	Amendments	Date	By	Chk	Auth

SLR
www.slrconsulting.com

Client: Roadstone Ltd.

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

Figure Title: Proposed Tree Removal Plan

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

Designed	Drawn	Checked	Authorised
AM	AM	SMcD	SMcD
Date 12/24	Date 12/24	Date 12/24	Date 12/24

Figure Number: **Figure 2-3** Rev. **0**

CYAL50381397
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17/12/2024