Attleborough AD
Environmental Management System Manual

Prepared on behalf of:

Eco Verde Energy Ltd

Prepared by:

Emily Shann Pitts BSc Hons, MIEMA, CEnv
Earthcare Technical Ltd.
Manor Farm
Chalton
Waterlooville
Hants PO8 0BG

Tel: 02392 290 488
Email: emily@earthcaretechnical.co.uk

Ref: ETL573/2022

4th March 2022

QUALITY CONTROL

Document Title:	**Attleborough AD** **Environmental Management System Manual**
Revision:	V2.0 Issue 1.0
Date:	4th March 2022
Document Reference:	**ATT-OD-01**
Prepared For:	**Eco Verde Energy Ltd**
Project Reference:	ETL573/2022
Copyright:	Earthcare Technical Ltd © 2022

Quality control sign off

Document Author	Emily Shann Pitts	
Quality Reviewer	Anna Becvar	

Contents

1 Scope of the EMS

1.1.1 The Environmental Management System (EMS) is written to cover the scope of operations for Attleborough anaerobic digestion (AD) plant (previously referred to as Crows Hall AD plant) at Ellingham Road, Attleborough, Norfolk, NR17 1AE (the site) operated by Eco Verde Energy Limited (EVE) (the Operator) on behalf of Attleborough Eco Electric Limited and Attleborough AD Plant Ltd, the owners of the existing Crop-AD plant and new Waste-AD plant areas of the site respectively. It has been written by Earthcare Technical Limited in collaboration with the Operator.

1.1.2 Whilst the existing site does not currently treat any waste feedstocks, it is a permitted site regulated by the Environment Agency under a Standard Rule permit (Standard Rules 2012 No 9 – On-farm anaerobic digestion facility using farm wastes only, including use of the resultant biogas) with permit reference EPR/BB3931RA. The existing site is referred to as the 'Crop-AD plant' throughout this document.

1.1.3 This version of the EMS Manual supports a permit variation application to build another AD plant adjacent to the existing AD plant which will be fed by food wastes and suitable liquid waste, to be processed within a new Reception Building. The proposed AD plant is referred to as the 'Waste-AD plant' throughout this document. Both the existing and proposed site infrastructure will be operated by EVE.

1.1.4 The biogas from the Waste-AD plant will be upgraded to biomethane and exported via a new connection to the national gas grid network.

1.1.5 The two AD plants, existing and proposed, will be separate in terms of feedstocks, gas and digestate management but will both be supplied with heat and electricity from the existing CHP run on biogas from the Crop-AD plant.

1.1.6 The secondary containment for the two AD plants will also be shared. However, the design all considers the requirements of Animal by Product Regulations such that any spillages within the area will treated within the Waste-AD process.

1.1.7 The combined heat and power engine (CHP) is classified as 'existing' under the Medium Combustion Plant Directive as it came into operation prior to December 2018. However, the engine will be required to be permitted by January 2029 to comply with the permit conditions including the stipulated emission limit values by January 2030.

1.1.8 The EMS is written with consideration to the site Environmental Risk Assessment (Appendix A) which has been developed to:

- Assess the potential environmental risks from the operations;
- Determine if existing control measures are sufficient; and
- Propose additional site-specific control measures where appropriate.

1.1.9 The EMS comprises a series of 'live' documents to be referred to during daily operations. This document, the EMS Manual, is an overarching document providing a foundation structure to the EMS which then references specific EMS documents including the Accident Management Plan (AMP), Odour Management Plan (OMP), Standard Operating Procedures (SOPs), maintenance schedules and template forms used for record keeping.

1.1.10 All the management system documents are listed on the Master Document Control List **(EVE-OD-03)** which is used as a complete reference to all management systems documents and includes version numbers and issue dates to ensure document control.

2 Environmental Policy

2.1.1 The organisations environmental policy outlines the environmental commitments of the Operator with respect to its operations, activities, and overall environmental performance.

2.1.2 The Environmental Policy **(EVE-OD-01)** is a management system document.

3 Organisation & Site Profile

3.1 Planning

3.1.1 The original planning permission for the Attleborough AD plant was obtained on 7th November 2012. The site was built and fully commissioned in 2013.

3.1.2 On the 10th of August 2020, Norfolk County Council granted permission for the expansion of the Attleborough AD plant to increase the maximum throughput to 129,000 tonnes per annum and to include additional tanks and gas upgrade equipment.

3.2 Permitting

3.2.1 In 2012 the original on-farm anaerobic digestion waste facility permit (SR2010No16) was issued under the company name SS Agri Ltd (EPR/BB3931RA). In 2015 the permit was varied to an on-farm installation facility (SR2012No9) with an increased treatment capacity of over 100 tonnes of waste per day. In May 2020 a permit variation notice was issued to reflect a change in company name to Attleborough Eco Electric Limited; (EPR/BB3931RA/V003).

3.2.2 In late June 2019, the facility ceased accepting and treating waste feedstocks namely cattle, pig, and poultry manures. The existing AD plant now exclusively treats energy crops comprised of maize and rye. The Crop-AD plant currently processes up to 30,000 tonnes per year.

3.2.3 This EMS supports a substantial permit variation application to include the new Waste-AD plant, adjacent to the existing Crop-AD plant, which will treat up to 91,000 tonnes per year of liquid and solid waste feedstocks including food waste. The waste feedstocks and the resulting digestate will be handled in a fully enclosed Reception Building benefitting from an odour abatement system. The resulting biogas from the Waste-AD plant will be upgraded to biomethane and injected into the national gas grid.

3.2.4 The two plants will be separate in terms of feedstock treatment, biogas and digestate management but will be supplied with heat and electricity from the CHP run on biogas from the Crop-AD plant. The secondary containment for the tanks will also be shared by the two plants but the drainage will be such that any spillages will be treated in the Waste-AD process by default.

3.3 Management Overview

3.3.1 The site will be operated by EVE, who manage several AD plants nationwide. There will be two Site Managers, one focussed on the Crop-AD, and one focussed on the Waste-AD but who will work together to manage four Site Operatives in addition to a Weighbridge Operator to assist in day-to-day operations. The Site Managers are responsible for the day-to-day operation of the AD plants and also acts as the Technically Competent Managers.

3.3.2 The Site Managers are managed and supported by the wider EVE team which includes the EVE Operations Director, Health, Safety and Environment Director and Manager, the Operations Support Manager and the Feedstock Manager. Roles and responsibilities are summarised in the Staff Organogram (Appendix F) and are detailed in Section 10.

3.3.3 There is a contract in place with Ellough Feedstocks Limited to supply all the crop feedstocks and off-take of all digestate produced to be applied to land for agricultural benefit.

3.4 Site Description

Address: Attleborough AD Plant, Ellingham Road, Attleborough, Norfolk, NR17 1AE

National Grid Reference: TM 03335 95629

Local Authorities: Breckland District / Norfolk County Council

3.4.1 The Site Location is shown in Figure 1 - Site Location Plan.

3.4.2 The existing Crop-AD site and associated on-site infrastructure is approximately 2.4 hectares (5.8 acres) in extent. The proposed permit variation is to extend the current site footprint to create a regulated facility with an area of 5.1 hectares (12.6 acres) to encompass all the new proposed infrastructure as detailed below.

3.4.3 The Waste-AD plant is located on an area of land that was occupied by one turkey shed from the adjacent turkey breeding farm and an open storage yard area.

3.4.4 The entire site is situated approximately 490m northwest of the town Attleborough, Norfolk. A tributary of the River Thet and the A11 trunk road run between the site and the town. The site is accessed via an approximately 600m trackway which runs adjacent to residential properties and St Luke's Hospital and enters the site from the north.

3.5 Infrastructure

3.5.1 The existing site infrastructure (Crop-AD) comprises:

- Access road
- Weighbridge
- 2 x silage clamps (30,000 tonnes capacity total).
- 2 x solids feeder (20 tonnes capacity each)
- Mixing pumps
- 2 x primary digesters (2,000m^3 each)
- 1 x secondary digester (1,500m^3)
- 1 x screw press separator, buffer tank and associated fibre storage bay
- Gas compressors
- 1 x carbon filter prior to combined heat and power engine (CHP)
- 1 x CHP (1,560kWe)
- 1 x boiler
- Emergency flare (for Crop-AD plant)
- Heat exchangers
- Control room / site office
- Dirty water lagoon
- Covered digestate storage lagoon (10,000m^3)

3.5.2 The proposed infrastructure comprises:

- 3 x Primary digesters (26.00mØ) 3,823m^3 working capacity

- 1 x Secondary digester (26.00mØ) 3,823m^3 working capacity
- Technical Building
- Pre-Storage Tank (10.00mØ) 424m^3 working capacity
- 3 x small pre-storage tank (3No. @ 3.50mØ) 67m^3 working capacity
- 3 x Pasteurisation tanks (30m^3 each.)
- Oxygen generator
- Switchboard room
- Weighbridge office
- Site office
- Weighbridge
- Very Small aperture terminal (VSAT) for satellite communication
- Grid Entry Unit (GEU)
- Propane tanks
- Gas upgrading unit
- Back-up boiler
- Heating Buffer Tank
- Switchboard Container
- Gas Processing Unit (GPU)
- Active Carbon Tanks (2No.)
- Reception Building (30.20m x 45.20m) containing:
    - CentriAir air handling and odour abatement system
    - depackaging bunker (30 m³)
    - depackaging plant
    - RUNI Packaging compactor
    - feeding system (60 m³)
    - mixing pit (8m x 6m x 3m (d)) 100 m³
    - water tank (Ø 3 m 7,70 m) 67 m³
    - storage bay (8m x 19m 3m(h)) 456 m³
    - storage bay (10m x 7.5m x 3m(h)) 225 m³
- Ferric chloride storage tank (20 m³)
- Dual Fuel Flare with 10.0m Exclusion Zone (for Waste-AD plant)
- Covered Waste-AD plant digestate Lagoon (10,000m³)
- Containment Sump (9No.)
- Bund Gate (1No.)
- LV Switchboard
- Emergency backup generator
- Condensate Pit
- 1 No. leachate tank (19.8m^3) with leak detection
- Replacement covered dirty water lagoon (175m^3)
- Surface water lagoon (936m^3)

3.5.3 Changes to the existing infrastructure as a result of ongoing site upgrade works:

- Dirty water lagoon taken out of service and replaced
- Mississippi dryer taken out of service

- Flare for Crop-AD to be repositioned
- CHP to be repositioned
- Pipework for existing plant (except services) to be repositioned above ground
- Shute from Crop-AD separator to storage to be covered
- Crop-AD fibre storage bay to contain a covered trailer

4 Environmental Sensitivities

4.1 Human Receptors

4.1.1 Human receptors within 1 km of the site are captured in Table 1 below and are shown in Figure 2 – Human Receptor Plan.

Table 1: Human Receptors within 1km

ID	Location	NGR X	NGR Y	Distance from Site boundary (m)	Direction from Site
H1	Crowshall Veterinary Services	603479	295790	64	NE
H2	Stuart House	603530	295863	135	NE
H3	Houses at Cakes Hill	603486	295927	200	NE
H4	Crowshall Lane	603463	296047	320	NE
H5	Ellingham Road	603296	296176	399	N
H6	Suggit Farm Services	603174	296152	402	N
H7	St Lukes Hospital	603013	296096	408	N
H8	Cades Hill Farm	602860	296089	492	NW
H9	Shrugg's Lane	602783	295883	440	NW
H10	Lyng Farm	602487	295286	830	SW
H11	WwTW	602861	295200	527	SW
H12	Houses along West Carr Road, Workhouse Common	603119	294819	720	SW
H13	Carver's Lane, Attleborough 1	603528	294910	623	S
H14	Carver's Lane, Attleborough 2	603583	295146	416	S
H15	Carver's Lane, Attleborough 3	603683	295248	343	S
H16	Chapel Road, Attleborough	603966	295468	375	SE
H17	Houses in Baconsthorpe	604061	295923	550	E
H18	Ash Farm	603151	296756	994	N

4.2 Geology & Hydrogeology

4.2.1 The site is on slightly acid loamy and clayey soils with impeded drainage.

4.2.2 The site is situated over a Secondary A superficial aquifer and a principal bedrock aquifer. Groundwater vulnerability is classified as medium risk.

4.2.3 The site is not within a Groundwater Source Protection Zone nor is it within a Drinking Water Protected Area or Safeguard Zone.[1]

4.2.4 The site is situated in a location which has a low probability of flooding.[2]

4.2.5 The site is within a Nitrate Vulnerable Zone.

[1] https://magic.defra.gov.uk/MagicMap.aspx Accessed 15th July 2021

[2] https://flood-map-for-planning.service.gov.uk Accessed 15th July 2021

4.3 Surface Water

4.3.1 There are watercourses within proximity to the site. There is a drain which runs to the west of the site access road and is within approximately 13m of the existing permitted site boundary. There is a small watercourse 35 metres to the southern boundary of the site. The River Thet runs approximately 200m south of the site in a south westerly direction.[1]

4.4 Air Quality Management Areas

4.4.1 Breckland District Council do have designated Air Quality Management Areas (AQMAs) however there are none in proximity to the site.[3]

4.5 Ecological Receptors

4.5.1 The only nature and heritage conservation site within the relevant screening distance to the site is Norfolk Valley Fens Special Area of Conservation, which is 2.7 km southwest of the site, within the 10km screening distance.

4.5.2 The following Sites of Special Scientific Interest (SSSi) fall outside the relevant screening distance of 2km:

- Swangey Fens SSSi 2.7 km southwest of the site; and
- Old Buckenham Fen SSSI 3.7km to the south of the site.[1]

4.5.3 Impacts from the regulated facility on designated nature and conservation sites are assessed in the Environmental Risk Assessment (Appendix A).

[3] https://uk-air.defra.gov.uk/aqma/list Accessed 15th July 2021

5 Process Description

5.1 Overview

5.1.1 This section provides a summary of the treatment process which should be read in conjunction with the Process Flow Diagrams, in Appendix B.

5.1.2 The site operations are split between that of the Crop-AD plant and the Waste-AD plant, but both sites are supplied with electricity and heat from the CHP on the Crop-AD plant. The two sides of the overall site operation are therefore described separately.

Crop-AD Plant Process Description

5.2 Crop- AD Overview

5.2.1 The operation of the AD plant is fully automated from an on-site central control panel located in the Control Room which monitors information transmitted from field instrumentation around the AD plant. This is known as the (Supervisory Control and Data Acquisition) SCADA system. This information can be viewed both on site and remotely to ensure optimisation and safe operation of the anaerobic digestion and associated processes.

5.3 Crop-AD Feedstocks

5.3.1 Table 2 below provides an overview of the feedstocks for the Crop-AD plant.

Table 2: Feedstock description, source, form, storage location and approximate annual throughput

Feedstock description	Source(s) of feedstock	Form	Storage location	Approximate tonnages accepted / treated per year
Maize	Grown under farm contracts	Solid	Silage clamp	27,375
Rye	Grown under farm contracts	Solid	Silage clamp	2,920
Approximate annual tonnage				**30,295**

5.4 Crop-AD Feedstock Acceptance & Storage

5.4.1 Maize and rye are grown under contract at local farms, ensiled within the silage clamps and covered with an impermeable cover.

5.4.2 When crop feedstocks are brought onto site, they are checked in accordance with the Crop Feedstock Acceptance & Rejection Procedure **(ATT-SOP-01).** Energy crops dry matter levels are tested to confirm their quality is acceptable. Feedstocks are visually checked for the presence of stones or other physical contaminants. If found, they are either removed by hand or the load may be rejected if deemed unsuitable for treatment.

5.5 Crop-AD Feedstock Loading

5.5.1 Twice daily a front loader, dedicated to the Crop-AD plant, is used to load the energy crops from the silage clamps into the two solids feeders. This is carried out in accordance with the Crop Feedstock Loading Procedure **(ATT-SOP-02).**

5.5.2 The quantities of the energy crops and dirty water to be fed into the AD plant daily (the feed plan) is determined by the Crop-AD Site Manager based on feedstock testing results.

5.5.3 There are weigh cells in each feed hopper which are used by the Operator to ensure that the correct tonnages of energy crops are added. The tonnages of feedstocks loaded into the feeder are recorded on the **Feeding Check** (Smartsheet).

5.5.4 The tonnages of feedstocks still to be used is recorded in the **Stock Sheet** (Smartsheet).

5.5.5 Dirty water from the Dirty Water Storage Lagoon is pumped to the mixing pumps and mixed with the solid feedstocks to make a pumpable mixture. The prepared feedstock is then pumped to the two primary digesters.

5.6 Crop-AD Digesters

5.6.1 There are two primary digesters (DG01 and DG02) which operate in parallel. The two primary digesters feed into the secondary digester (DG03). The construction type, mixing systems, gas storage and working capacities are detailed in Table 3 below:

Table 3: Details of Crop-AD Digester Tanks

Digester type	Reference	Construction type	Mixing type	Gas storage type	Gas storage capacity (m^3)	Average retention time (days)	Working digestion capacity (m^3)
Primary	DG01 & DG02	Concrete	2 x paddle mixers & 1 x submersible mixer on each tank	Double membrane gas storage roof	950	49	2,000 (each)
Secondary	DG03	Concrete	Paddle mixers & 2 x submersible mixer	Double membrane gas storage roof	660	21	1,500
Totals					1,966	70	5,500

5.6.2 The primary digesters have inspection windows which are checked once a day in accordance with Daily Checks within the Attleborough AD Maintenance Planner **(ATT-MP-01)**.

5.6.3 The SCADA system ensures that the digesters operate in the thermophilic temperature range at 50-55ºC.

5.6.4 The digesters all have pressure and vacuum relief valves (PRVs) which will release biogas or take in air in the event of an overpressure or under pressure biogas situation respectively.

5.6.5 The PRVs are a necessary safety feature for an AD plant; but will only be used as a contingency to maintain structural integrity of the tank and dome structures. During normal operation the PRVs will not operate.

5.6.6 The PRVs are water filled; glycol is added in winter months to prevent the water from freezing.

5.6.7 The PRVs will operate at -1mbar / +4 mbar. The seating of the PRVs and gas balls are checked daily in accordance with Attleborough AD Maintenance Planner **(ATT-MP-01).**

5.7 Crop-AD Gas Storage

5.7.1 The type of gas storage afforded by the digesters is detailed in Table 3 above.

5.7.2 The total biogas storage capacity above the digesters is approximately 1,966m^3 which approximates to 2-3 hours of production, depending on CHP load. This storage capacity allows for planned routine CHP maintenance events when the gas storage levels will be reduced prior to shut down.

5.8 Crop-AD Digestate Separation & Storage

5.8.1 Whole digestate from the Secondary digester (DG03) is pumped up to a separator buffer tank (0.5m^3) and from here passes to the screw press separator capable of separating up to 25m^3/hr of whole digestate.

5.8.2 Separated fibre will fall via a covered chute into a covered trailer below the separator and from there may be removed to the silage clamps for short term onsite storage or to destination field heaps on farm.

5.8.3 Separated liquor is stored within the existing digestate storage lagoon with working capacity of 10,000m^3. Based on the current feedstock tonnage of 30,295 tonnes per annum approximately 5,889 tonnes of solid fibre digestate and 22,945 tonnes of digestate liquor are produced per year. The digestate storage lagoon therefore affords between 5- and 6-months storage capacity for digestate liquor.

5.9 Crop-AD Digestate Use

5.9.1 The digestate liquor is a rich source of nitrogen, phosphorus, potassium, and trace elements which is stored and used to replace the use of manufactured fertiliser.

5.9.2 The digestate fibre is a very good source of organic matter as well as supplying valuable nutrients and is used as a soil improver. The liquor and fibre are used as an agricultural biofertiliser on nearby farms.

5.9.3 A digestate management plan **(ATT-OD-06)** for the Crop-AD plant is in place.

5.10 Crop-AD Biogas Treatment

5.10.1 As previously described, biogas is stored within the double membrane gas storage domes above the three digesters. The digesters tanks are equipped with desulphurisation nets and low-level oxygen injection to encourage microbial growth to reduce hydrogen sulphide (H_2S) levels and precipitate sulphur into the digestate below.

5.10.2 The biogas passes from the storage domes through a condensate pit to remove any moisture, through a chiller to reduce the temperature and then through a carbon filter to remove any excess hydrogen sulphide (H_2S).

5.10.3 The SCADA system manages the biogas treatment, gas distribution system and flare if required.

5.11 CHP Engine

5.11.1 The CHP (MVM V16, 1,560KWe, 3,786kWth) burns the treated biogas from the Crop-AD plant and converts the chemical energy of the gas into mechanical kinetic energy and heat energy. Mechanical energy is converted into electrical energy in the generator. The electricity produced is used to power both the Crop-AD and Waste-AD (parasitic load) and any excess electricity is exported to the national electricity grid.

5.11.2 Heat from the CHP engine is used to maintain the temperature of the Crop-AD thermophilic digesters and provide heat to the Waste-AD site to for the mesophilic digesters, pasteurisers, and the pre-storage tank, when required. The Heating Process Flow Diagram is provided in Appendix D.

5.12 Crop-AD Flare

5.12.1 The Crop-AD site has an existing emergency flare. Biogas may be burnt in the flare under certain operating conditions such as extended maintenance or due to a malfunction of the CHP. The flare ignites automatically and is sized appropriately; it can burn up to 1,000m^3/hr and maximum production for the Crop-AD site is around 700m^3/hr. See Section 7.2 Control of Gas Pressures.

Waste-AD Plant Process Description

5.13 Waste- AD Overview

5.13.1 The operation of the Waste-AD plant is fully automated from a separate on-site central control panel located in the Control Room for this site area, which monitors information transmitted from field instrumentation around the Waste-AD plant. This is the SCADA system. This information can be viewed on site and remotely to ensure optimisation and safe operation of the anaerobic digestion and associated processes.

5.14 Waste-AD Feedstocks

5.14.1 Table 4 below provides an overview of the feedstocks for the Waste-AD plant.

T*able 4: Waste description, form, storage location, maximum tonnage at any one time and approximate annual throughput*

Waste description	Form	Storage location	Maximum tonnage on site at any one time	Approximate tonnages accepted / treated per year
Packaged food waste	Solid	Reception Building –storage bay	204*	8,000
Kerbside collected food waste	Solid	Reception Building – storage bay	204*	33,000
Liquid food waste	Liquid	3 No. small pre-storage tanks	201	22,000
Bakery waste	Solid	Reception Building – storage bay	204*	17,000
Liquid wastes	Liquid	3 No. small pre-storage tanks	201	10,950
Total			**405**	**90,950**

* The sizing of the bays and mixing pit within the Reception Building dictate that there will be no more than a total of 204 tonnes of solid waste stored within the building at any one time. This is based on 681m^3 storage in bays (total), 100m^3 in mixing pit and a typical solid food waste density of 0.26 tonnes per m^3.[4]

5.15 Waste-AD Waste Acceptance & Storage

5.15.1 All waste accepted on site will be subject to pre-acceptance checks including waste sampling and verification where appropriate in accordance with the Waste Pre-Acceptance Procedure **(EVE-SOP-08).** These checks will be the responsibility of the Feedstock Manager, supported by the Site Manager when required.

[4] Source – Environment Agency Waste Conversion Rates spreadsheet

5.15.2 The Feedstock Manager is responsible for booking waste into site, in consultation with the Site Manager. Only waste that has passed pre-acceptance checks and is booked in will be accepted on site.

5.15.3 When waste is delivered to site further checks will be carried out in accordance with the Waste Acceptance and Rejection Procedure **(ATT-SOP-11)**. This includes paperwork checks by the Weighbridge Operator, visual checks by Site Operatives and verification waste sampling and analysis when necessary.

5.15.4 Vehicles containing solid waste will reverse into the Reception Building and tip their loads on the floor inside the Reception Building. The dedicated telehandler for the Waste-AD will move the waste into one of two storage bays with capacities of up to 456m^3 and 225m^3 respectively if the waste is stackable to 3m high (bays marked as points 12a and 12b respectively on the Reception Building – Figure 7).

5.15.5 Any sludges or waste not requiring pre-treatment may be tipped directly into the mixing pit (100m^3 capacity) inside the Reception Building.

5.15.6 Tankers containing liquid waste will reverse into the Reception Building and connect to the tanker discharge point for liquid wastes from which liquid waste will be pumped to one of the small pre-storage tanks within the secondary containment area. This will be carried out in accordance with Liquid Waste Reception Procedure **(ATT-SOP-10).**

5.16 Waste-AD Pre-treatment & Loading

5.16.1 Packaged food waste will be loaded using the dedicated Waste-AD telehandler into the bunker of the depackaging plant. The plant will de-package wastes to separate packaging material from organic food wastes suitable for anaerobic digestion treatment. From there de-packaged food waste will be fed directly into the large pre-storage tank (PST). There is also an option for this material to be fed directly into the primary digesters if required.

5.16.2 The packaging material waste will go into a RUNI screw compacter and then be discharged into a skip or dolav for removal off site.

5.16.3 Unpackaged solid food waste will be tipped into a separate area of the Reception Building and then loaded using a telehandler into the feeder. The feeder will macerate the food waste and from there it will be pumped to the pre-storage tank (PST). There will also be an option for this waste to be fed into the digesters if required.

5.16.4 Sludges will be tipped into the mixing pit, which will be fitted with a compulsory (or cyclone) mixer, and from there will either be pumped to the PST or the digesters.

5.16.5 Liquid waste will be stored in the three small pre-storage tanks and will be pumped from there to the main PST or fed directly to the digesters if required.

5.16.6 The waste in the PST will be mixed and heated then pumped to either of the primary digesters, operating in parallel.

5.16.7 The tonnages of waste entering the process from the Reception Building will be measured using weigh cells in the depackaging bunker, weigh cells in the feeder and flow meters between the pre-storage tanks and digesters. All measurements will be recorded on SCADA. In this way waste

tonnages received and treated can be tracked and recorded on the waste tracking spreadsheet (Smartsheet).

5.17 Waste-AD Digesters

5.17.1 There are three primary digesters (DG01 – DG03) which operate in parallel. The three primary digesters feed into the Post Fermenter (PF). The construction type, mixing systems, gas storage and working capacities are detailed in Table 5 below.

Table 5: Details of Waste-AD Digester Tanks

Digester type	Ref.	Construction type	Mixing type	Gas storage type	Gas storage capacity (m^3)	Average retention time (days)	Working digestion capacity (m^3)
Large pre-storage tank	PST	Monolithic reinforced concrete	2 x submersible mixers	Double membrane gas storage roof	80	2.5	424
Primary digesters	DG01, DG02 & DG03	Monolithic reinforced concrete	2 x paddle mixers and 2 x submersible mixers	Double membrane gas storage roof	1,190	46	3,823 (each)
Secondary digester/ post fermenter	PF	Monolithic reinforced concrete	2 x paddle mixers and 2 x submersible mixers	Double membrane gas storage roof	1,190	15	3,823
Totals					**4,840**	**63.5**	**15,716**

5.17.2 All the digesters have two inspection windows. The surface of each digester will be checked daily in accordance with Daily Checks within the Attleborough AD Maintenance Planner **(ATT-MP-01)**.

5.17.3 The SCADA system ensures that the digesters operate in the mesophilic temperature range (40 - 43^{o}C).

5.17.4 The digesters all have pressure and vacuum relief valves (PRVs) which will release biogas or take in air in the event of an overpressure or under pressure biogas situation respectively.

5.17.5 The PRVs are a necessary safety feature for an AD plant; but will only be used as a contingency to maintain structural integrity of the tank and dome structures. During normal operation the PRVs will not operate.

5.17.6 The PRVs are water filled and are connected to the tank heating systems and operate with warm water to eliminate the risk of freezing in the winter months.

5.17.7 The PRV on the PST will be electrically heated for the same reason.

5.17.8 The PRVs will operate + 3.5mbar for PST, DG01 and DG03, + 4.5mbar for DG02, 3.0 mbar for PR and all will operate at -1mbar. The seating of the PRVs is checked daily in accordance with Attleborough AD Maintenance Planner **(ATT-MP-01).**

5.18 Maceration & Pasteurisation

5.18.1 Digestate from the post fermenter will then be macerated and pass through a 10mm screen, to comply with Animal By-Product Regulations (ABPR) for waste to be screened to <12mm prior to treatment.

5.18.2 Screened digestate is then pasteurised in one of the three 30m^3 batch pasteurising tanks. Each batch will be heated to over 70^{o}C for a minimum of one hour prior to being cooled via a heat exchanger and then being pumped to the screw press separator.

5.19 Waste-AD Gas Storage

5.19.1 The gas storage type and volume afforded by the main pre-storage tank, digesters and post fermenter is detailed in Table 5 above.

5.19.2 The total biogas storage capacity above the tanks is approximately 4,840m^3 which approximates to 8 hours of biogas production. This storage capacity will cover routine periods of maintenance to the Gas Upgrading Unit before which in anticipation of downtime gas storage levels can be reduced to optimise the capacity available.

5.20 Waste-AD Digestate Separation & Storage

5.20.1 Digestate separation and the storage of fibre is fully contained within the Reception Building which benefits from an air handling and odour abatement system. Whole digestate from the pasteurisers is pumped to the screw press separator capable of separating up to 60m^3/hr of whole digestate.

5.20.2 Separated fibre falls into the concrete storage bay below the separator and will then be removed to destination field heaps on farms for use as a soil improver.

5.20.3 Separated liquor will be pumped from the separator to the 10,000m^3 dedicated on site covered digestate storage lagoon.

5.20.4 Based on the current maximum feedstock tonnage of 90,958 tonnes per annum producing 77,308 m^3 of whole digestate approximately 13,915 tonnes per year of fibre and 63,392 m^3 of digestate liquor will be produced per year. The onsite digestate storage lagoon therefore affords 1.9 to 2 months storage capacity for digestate liquor when the Waste-AD plant is operating at maximum feed tonnages. An additional onsite lagoon is planned for 2022 to provide 6 to 7 months onsite storage.

5.20.5 Digestate liquor will be removed from the onsite lagoon to be spread or to dedicated offsite storage on destination farms. The onsite storage of digestate will allow digestate to be quarantined in the event of a failure to comply with the BSI PAS110:2014 Specification[5] such that digestate requires either re-processing or that it should be handled as a waste.

5.21 Waste-AD Digestate Use

5.21.1 The digestate liquor is a rich source of nitrogen, phosphorus, potassium, and trace elements which is stored and used to replace the use of manufactured fertiliser.

[5] British Standards Institute PAS 110:2014 Specification for whole digestate, separated liquor and separated fibre derived from the anaerobic digestion of source-segregated biodegradable materials.

5.21.2 The digestate fibre is a very good source of organic matter as well as supplying valuable nutrients and is used as a soil improver. The liquor and fibre will be used on nearby farms.

5.21.3 The Waste-AD plant digestate will be initially classified as a waste and will therefore be spread under a standard rules SR2010No4 mobile plant permit for landspreading and deployments. The Operator is planning to produce digestate that is compliant with PAS 110:2014 Specification for whole digestate, separated liquor and separated fibre derived from the anaerobic digestion of source-segregated biodegradable materials[5] (PAS110) and spread to land in accordance with the Anaerobic Digestion Quality Protocol[6] (ADQP) and become a producer under the Biofertiliser Certification Scheme. The digestate will then be considered a product when stored and spread.

5.22 Waste-AD Biogas Treatment

5.22.1 See Gas Block Diagram in Appendix E.

5.22.2 As previously described, biogas is stored above the large pre-storage tank, digesters and post fermenter within the double membrane gas storage domes. The tanks are all equipped with desulphurisation nets and low-level oxygen injection to encourage microbial growth to reduce hydrogen sulphide (H_2S) levels and precipitate sulphur.

5.22.3 The raw gas from the gas holders will first pass through a gas washing and cooling unit which scrubs/removes ammonia using sulphuric acid (Gas Processing Unit). Then the gas will flow through a gas compressor to increase pressure up to 80 – 120 mbar. It will then flow through an active carbon VOC filter and two 'normal' active carbon filters to remove excess hydrogen sulphide (H_2S) and volatile organic carbons (VOCs) before it passes into the Gas Upgrade Unit (GUU).

5.22.4 The SCADA system manages the biogas treatment and gas distribution system.

5.23 Waste-AD Biogas Boiler

5.23.1 Treated biogas from the Waste-AD plant may be burnt in the back-up biogas boiler to provide heat for the AD process. The boiler will be used if the CHP is down for maintenance or repair or if additional heat is required due to unusually cold ambient temperatures. The boiler will provide heat to both the Crop-AD and the Waste-AD plant if required.

5.24 Waste-AD Gas Upgrading & Grid Entry Units

5.24.1 The upgraded biogas (compressed and filtered) will enter the Pentair Gas Upgrade Unit (GUU) comprising of a three-stage membrane filtration system. The GUU separates the biogas to methane and carbon dioxide. The carbon dioxide is vented, and the methane passed to the Orbital Grid Entry Unit (GEU).

5.24.2 Within the GEU the methane is upgraded to biomethane by the addition of an odorant and propane and then injected into the national gas grid.

[6] Anaerobic Digestion Quality Protocol

5.25 Waste-AD Flare

5.25.1 The Waste-AD flare is a BAT compliant ground enclosed dual fuel flare. Biogas may be burnt in the flare under certain operating conditions such as extended maintenance or malfunction of the GUU or biogas boiler. Off-specification biomethane may also be diverted from the GEU and burnt to the flare. There is also an option for rejected biomethane to be recirculated into the gas storage domes thus avoiding flaring of gas where possible.

5.25.2 The flare ignites automatically and is sized appropriately; it can burn between 425 – 1,850 Nm^3hr (variable) of biogas and 250 – 950 Nm^3hr of biomethane and a combined flow of 925Nm^3hr of biogas and 475Nm^3hr of biomethane.

5.25.3 The maximum production of biogas is 1,606Nm^3/h. The maximum production of biomethane from the GUU is around 923 Nm^3/h. The appropriate flare capacity has been calculated taking these figures into account and worst-case scenarios for production of off-specification biomethane and does not consider use of biogas by the biogas boiler. See Section 7.2 Control of Gas Pressures.

6 Control of Emissions to Water & Land

6.1 Primary Containment

Crop-AD Silage Clamps

6.1.1 The two silage clamps have a concrete base with dimensions of 30m x 95m and concrete walls running longitudinally. Leachate produced in the clamps drains to four underground sumps (coated internally with bitumen sealant on the bottom and sides) and from there it is pumped to the below ground 19.8 m^3 capacity leachate storage tank.

6.1.2 The silage clamps are pre-existing and permitted. Clamp surfacing and drainage are under improvement works as part of wider site improvements.

Crop-AD Leachate Tank

6.1.3 The leachate tank (19.8m^3) is below ground but has an opening at surface level. It is constructed of reinforced concrete with all internal walls lined with MDPE and leak detection monitoring points around the tank, extending 1.50m below the base. The design is shown on Plandescil drawing 24727/100 Rev C (Figure 8) and described within the Plandescil Drainage Report:[8]

- *The below ground level leachate tank is to be of in situ reinforced concrete construction, with a 19.8m^3 storage capacity. The tank is to be 18m X 1m in plan area, with depths varying between 1.2m (East) to 1.0m (West). The internal concrete tank walls are to be lined with a sealed 2mm MDPE membrane. The covered tank has been designed with a single vent, and 5 No. 63mm Ø MDPE monitoring points positioned externally 0.5m from the outer wall face of the tank. The monitoring points are to extend to a minimum of 1.5m below the underside of the tank foundation, with open ends. The monitoring points are to be manually tested regularly for any signs of contamination with a probe by the site operators.*
- *A high-level overflow leachate gravity pipe is to discharge water to the adjacent dirty water pond in circumstances where there is no requirement for the leachate water to be used in the process. Otherwise, the leachate tank will discharge via a pumped above ground route to the process area, to be utilised within the various storage tanks, where deemed applicable during site operations.*
- *To aid in cleaning of the solid material from the leachate tank, a fall on the base on the sum has been designed*.

6.1.4 Leachate is either used directly within the process or, in the event of a heavy rainfall event when additional storage capacity is required, pumped to the dirty water storage lagoon as a contingency measure.

Crop-AD Digesters

6.1.5 The three digesters are concrete construction tanks built by FLI Energy which were pressure tested upon commissioning.

Crop-AD Digestate Storage

6.1.6 The digestate storage lagoon is lined and has a floating cover. Recent maintenance and survey work has shown the lagoon capacity to be 10,000m^3. The digestate offtake

Dirty water storage lagoon

6.1.7 The new 175 m^3 capacity lined and covered dirty water lagoon contains dirty water collected from the Crop-AD feeders and surface run-off from the apron between the silage clamps and the feeders. Collected dirty water is contained for use within the process and as a contingency if extra capacity is needed may be pumped to the Crop-AD digestate storage lagoon.

Waste-AD Tanks

6.1.8 The three small Pre-Storage tanks (PST 2-4) are made of vinylester resin comprising a chemical barrier layer and structural layers and will be supplied complete with mixers.

6.1.9 The large main pre-storage tank (PST 1), the three primary digesters (DG1-3) and the post fermenter (PF) are all manufactured by Wolf and are made of monolithic reinforced concrete (in-situ) and will be supplied complete installed with mixers. The roofs are made from a double-membrane gas tight cover manufactured by Baur Folien GmbH***.***

Mixing Pit Waste-AD reception building

6.1.10 The mixing pit in the Reception Building will be a sub-surface pit constructed of in-situ reinforced concrete. In accordance with advice from drainage consultant Plandescil Ltd a chemical resistant coating will be applied to all internal mixing pit walls, base slab, and sump pit. Coatings and sealants will be inspected and reapplied periodically.

Waste-AD Digestate Storage

6.1.11 The digestate storage lagoon is lined, has leak detection and a floating cover with a storage capacity of 10,000m^3.

Surface Water lagoon

6.1.12 The surface water lagoon (936 m^3 capacity) stores clean surface water collected from the secondary containment bund, digester roofs, Reception Building roof and designated clean areas of the site for use within the process.

6.2 Secondary Containment

6.2.1 The Crop-AD plant did not previously benefit from secondary containment. As part of the current improvement and expansion works a concrete secondary containment system is being retrofitted around the Crop-AD plant and built around the new Waste AD plant.

6.2.2 The containment system is designed in accordance with CIRIA C736 and is detailed with the Containment Report produced by the drainage engineers Plandescil who designed the system.[7]

6.2.3 The containment capacity is designed in accordance with CIRIA C736, with the calculations demonstrating 25% of the combined volume to be a greater volume than 110% of the largest tank volume (shown on the calculation spreadsheet within the containment report). The proposed

[7] 24727 - Containment Bund Design Report - December 2021 Rev 0

footprint of the containment area allows for the walls to be constructed to a minimum height of 1.75m, which includes 250mm freeboard capacity as per page 85 of CIRIA C736.

6.2.4 All pipes, ducts and cables are fixed on cable trays and stanchions positioned above the concrete containment, to not penetrate the containment floor or walls. This has been designed in accordance with CIRIA C736 to ensure any potential leakages are visible to onsite, operational staff whilst carrying out daily inspections of the containment bund structure.

6.3 Drainage Description

Overview

6.3.1 The drainage system is designed by specialist drainage engineers Plandescil and described in their drainage report.[8]

6.3.2 This section provides a summary of the drainage which should be read in conjunction with the Drainage Process Flow Diagram, in Appendix C.

Dirty Areas

6.3.3 Under the current drainage arrangements for the Crop-AD plant all water on site is treated as dirty water and drains to an underground sump and then to the Dirty Water Lagoon (DWL).

6.3.4 As part of the Crop-AD site improvement works the existing dirty water lagoon is to be removed and clean and dirty water handling on site improved with the installation of a new leachate tank for silage leachate and a dirty water lagoon for surface water run-off from the apron between the clamps and the feeders. The construction of the leachate tank is described in Section6.1. Silage leachate can be fed directly to the process or may enter the dirty water lagoon if additional storage capacity above the 19.8 m^3 provided is required.

6.3.5 The digestate offtake point on the Crop-AD plant from the dedicated lagoon will be improved, with improvements made to the concrete apron and sump for collection of any spillages during digestate offtake.

6.3.6 For the Waste-AD plant, the entire drainage system for the Reception Building will be designated as ‘dirty’. All dirty water is collected to the mixing pit for use within the Waste-AD process.

6.3.7 The Waste-AD digestate off-take point by the new Waste-AD digestate lagoon will have a concrete apron and 0.4m^3 spill collection sump.

Secondary Containment Drainage

6.3.8 Water collecting within the secondary containment will be quality assessed daily in accordance with the Secondary Containment Checking & Emptying Procedure **(ATT-SOP-14).**

6.3.9 If the visual and olfactory checks confirm that there have been no spillages, then the water will be pumped out to the surface water lagoon as clean water. Should there be any doubt regarding water quality then the water will be pumped to the Waste-AD pre-storage tank for treatment in the Waste-AD process. The source of the contamination will be immediately investigated, and steps taken to resolve.

[8] 24727 - Drainage Design Report - December 2021 Rev 0

Condensate

6.3.10 Condensate from the Crop-AD and Waste-AD plants is collected separately in condensate pits and then recirculated for treatment within the primary digesters of the relevant digestion process.

Pipework

6.3.11 Underground tanks and pipes have been avoided in the design of the Waste-AD where possible. The majority of pipework will be above ground. The underground pipe carrying waste digestate liquor from the separator in the Reception Building to the waste digestate storage lagoon will be partially underground and, in this section, will have a pipe in pipe design. There will also be a flow meter installed on this pipe.

6.3.12 All underground pipework for gas or substrate will be pressure tested at 1.5 times the operating pressure prior to commissioning. After commissioning there will be pressure testing carried out every 5 years. There will be a programme of daily and weekly inspections in place for the leak detection systems onsite. Upon completion of current expansion and improvement works there will be an as built drawing showing the route of all sub-surface drains.

7 Control of Emissions to Air

7.1 Biogas Treatment

7.1.1 Biogas treatment to reduce hydrogen sulphide, VOCs and ammonia levels is described in the Process Description sections 5.10 and 5.22 for the Crop-AD and the Waste-AD respectively.

7.1.2 Reduction/removal of trace gases in the biogas reduces the potential emissions from burning biogas within the CHP and biogas flare (relevant to Crop-AD plant) and the back-up boiler and dual fuel flare (relevant to the Waste-AD plant). Biogas treatment at the Waste-AD plant will also reduce potential emissions of trace gases from the vent on the GUU and ensure biomethane is suitable for injection to the national grid via the GEU.

7.2 Control of Gas Pressures

Crop-AD

7.2.1 Biogas pressure is measured by gas pressure sensors and controlled by SCADA to ensure process parameters are optimised such that gas production meets demand, and storage capacity is not exceeded (see Section 12.2 Process Monitoring).

7.2.2 If, due to equipment or system failure, excess biogas is produced the emergency flare will automatically, immediately start, and burn the biogas to ensure it is not released to the atmosphere. The flare is sized is sized appropriately; it can burn up to 1,000m^3/hr and maximum production is around 700m^3/hr.

7.2.3 The control of the whole Crop-AD biogas plant and of the flare stack is interlocked on the dedicated SCADA system such that if the gas pressure reaches a trigger level of approximately +3.0 mbar in any one of the gas storage domes the flare will automatically start. This is below the set point at which the PRVs release biogas (4.0 mbar).

Waste-AD

7.2.4 The PRVs will operate at approximately + 3.5mbar and -1mbar. The set point for the flare is determined by the operator before the PRV critical pressure values. The setting on SCADA will dictate that the flare will automatically start before the PRVs will release gas, meaning that they are only in place for unforeseen emergency use.

7.2.5 The flare ignites automatically and is sized appropriately; it can burn between 425 – 1,850 Nm^3hr (Variable) of biogas and 250 – 950 Nm^3hr of biomethane and a combined flow of 925Nm^3hr of biogas and 475Nm^3hr of biomethane.

7.2.6 The maximum production of biogas is 1,606Nm^3/h. The maximum production of biomethane from the GUU is around 923 Nm^3/h. The appropriate flare capacity has been calculated considering these figures and worst-case scenarios for production of off-specification biomethane.

8 Hours of Operation

8.1.1 The normal operational hours will be 06:00 to 19:00, Monday to Sunday inclusive, thus avoiding night-time operations. The planning permission restricts deliveries or dispatch to:

- 07:30 - 19:30 during the period December to September.
- 06:00 – 22:00 Monday to Friday and 07:00 to 22:00 Saturday and Sunday during October / November.

9 Site Security

9.1.1 The site will benefit from perimeter fencing, a locked gate at entrance, entrance barrier, a CCTV system which can be remotely monitored and alarms in the office.

10 Roles & Responsibilities

10.1 Overview

10.1.1 This section of the Manual sets out the management structure of EVE relevant to site operations along with the roles and responsibilities placed on operational staff. Specific responsibilities are also set out in the accompanying operational procedures.

10.1.2 All members of staff should be clear on their role, responsibilities, and position within the management structure to facilitate effective environmental management. All roles and responsibilities will be reviewed no less than annually by the Operations Director.

10.1.3 An Organogram for Operational Staff is in Appendix F.

10.2 Operations Director

10.2.1 Operations Director is responsible for several sites operated by EVE. The Operations Director is a responsible for:

a) Overseeing the management of the site by the Site Managers;

b) Providing extra resources / contingency arrangements due to staff shortages; and

c) Providing the Site Managers with such support and guidance as necessary to fulfil the requirements of the EMS within the organisation.

d) Approving and endorsing the EMS including any amendments.

10.3 Health, Safety & Environment Director and Manager

10.3.1 The Health, Safety & Environment Director and Manager are responsible for:

a) Ensuring the EMS requirements are operationally maintained through a process of regular site visits and internal auditing.

b) Checking that relevant training and competencies are maintained for operational staff; and

c) Ensuring integration of the EMS within the business is achieved. The EMS as an overarching operational document will be integrated within overall site management systems alongside Health and Safety and Quality Management systems for the business.

10.4 Site Managers

10.4.1 There will be two Site Managers, one focussed on the Crop-AD, and one focussed on the Waste-AD.

10.4.2 The Site Managers takes day to day responsibility for the operation of the site including:

a) Document control and record keeping in relation to the EMS including responsibility for editing, updating or superseding of documents;

b) Reviewing the EMS procedures and processes ensuring any changes to the EMS are planned and implemented;

c) Fulfilling the specific role requirements of individual procedures;

d) Ensuring the site processes and procedures are implemented and upheld across all areas of operation;

e) Implementing and overseeing emergency response procedures as required;

f) Overseeing the implementation of corrective actions where required;

g) Observing trends in process management data and discussing process management decisions with the Operations Director and / or Biologist (external);

h) Establishing and reviewing the daily feed recipe for the AD plants;

i) Responding to SCADA alarms or delegating this responsibility to a Nominated Competent Person;

j) Implementing the planned preventative maintenance plan with respect to the AD plant and associated infrastructure;

k) Retaining inspection and maintenance records;

l) Managing external contractors carrying out planned or ad hoc maintenance tasks; and

m) Reporting site issues or incidents to Operations Director.

n) Management of Site Operatives and Weighbridge Operator.

10.5 Technically Competent Manager

10.5.1 The role of the Technically Competent Manager is fulfilled by the Site Managers.

10.5.2 The Technically Competent Manager has the responsibility for:

a) Maintaining technical competence including Continuing Competence assessments;

b) Ensuring that operations at the site comply with all relevant environmental and health and safety legislation and where possible relevant guidance; and

c) Recording attendance hours on site in the iPad sign in and out system.

10.6 Feedstock Manager

10.6.1 The Feedstock Manager is responsible for:

a) Fulfilling the specific role requirements of individual procedures;

b) Sourcing feedstocks for the Waste AD plant;

c) Carrying out pre-acceptance checks;

d) Advising the Site Manager on verification checks on waste feedstocks that are required;

e) Ensuring that there is always a good supply of feedstocks but that the supply doesn't exceed the storage or treatment capacity of the plant;

f) Diverting feedstocks to other sites if required; and

g) Following up waste rejection with the waste supplier and preventing unsuitable material being sent to site.

10.6.2 There is a contract in place with Ellough Feedstocks Limited to supply all the crop feedstocks and off-take of all digestate produced to be applied to land for agricultural benefit.

11 Implementation & Operation

11.1 Overview

11.1.1 This section of the EMS Manual outlines the procedures and processes for identifying and delivering training requirements, communications, emergency preparedness and response, operation controls and documentation in relation to the EMS.

11.2 Document & Record Control

Overview

11.2.1 The Operator is committed to maintaining document and record controls to provide an audit trail of evidence in support of the company's activities.

Control of Documents

11.2.2 The EMS requires that all documents are clearly identifiable and traceable through their version history, and that only the current versions of documents are in circulation throughout the company. The Operator will ensure that documents are appropriately organised, stored and archived in a place (physical or electronic) that is easily accessible to staff who may need to consult or edit documents.

11.2.3 The Health, Safety & Environment Manager is responsible for document management including responsibility editing, updating or superseding of documents.

11.2.4 The internally produced documentation associated with the EMS is presented in a consistent format including:

- Title of document
- Document reference in the format XXX-XXX-NN where:
    - XXX is either:
        - '**EVE**' for a companywide management system document which is used across all sites operated by EVE; or
        - **'ATT'** denoting a management system document specific to the Attleborough AD site.
    - XXX is:
        - OD denoting an Overarching Document for example a management plan
        - SOP is a Standard Operating Procedure
        - MP is a Monitoring and / or Maintenance Schedule
        - FT is a Standard form template used to make records in relation to the EMS and associated procedures.
    - NN is a unique number to identify the document.
- Document author / name of person who issued the document

- Version number
- Date of issue

11.2.5 To prevent the loss of documents the Operator uses cloud-based systems which are protected and backed up.

11.2.6 The process for creating and reviewing documents is detailed in the Document Control Procedure **(EVE-SOP-01**). The status of all management system documents is recorded within the Master Document Control File **(EVE-OD-03).**

Control of Records

11.2.7 Records are maintained to provide evidence of conformity with the requirements of the EMS.

11.2.8 All records are:

a) legible;
b) made as soon as reasonably practicable;
c) if amended, amended in such a way that the original and any subsequent amendments remain legible, or are capable of retrieval;
d) retained; and
e) stored and maintained to protect against damage, deterioration, or loss.

11.3 Competence, Training & Awareness

11.3.1 The Operator will ensure all persons performing tasks for the organisation or on its behalf, whose work may have a significant impact on the environment, are competent based on appropriate education, training and/or experience, and will retain associated records.

11.3.2 The Operator has established and implemented procedures to identify the training needs associated with the EMS, the operation of the site and the retention of staff competencies. Training requirements will be determined following the Training Procedure **(EVE-SOP-04).**

11.3.3 It is essential that all staff are fully aware of the EMS to ensure that procedures and controls are upheld. All new staff joining EVE will receive appropriate training using the EMS and documented procedures to understand and reduce environmental impact of the organisation's activities.

11.3.4 All formal training and Toolbox Talks received will be logged in Skills and Competency Matrix **(EVE-OD-02)**.

11.4 Communication

Internal & External Communications & Reporting

11.4.1 For internal communication, the Health, Safety and Environment Manager will ensure information regarding the EMS such as the environmental policy, EMS manual, management plans and Standard Operating Procedures (SOPs), including emergency response procedures, are readily available to all relevant employees and contractors.

11.4.2 It is essential that all personnel are fully aware of the EMS to ensure that procedures and controls are upheld. All new employees and contractors will receive appropriate training using the EMS documents and procedures to understand and reduce environmental impact of the organisation's activities.

11.4.3 For external communication, the Environmental Policy **(EVE-OD-01)** will be made available upon request. The Operator will seek to proactively communicate with its external stakeholders about its EMS.

Complaints

11.4.4 The Operator understands the importance of addressing both internal and external complaints in a prompt and comprehensive manner to resolve any issue as quickly as possible. All complaints will be dealt with following the Complaints Procedure **(EVE-SOP-02).**

11.5 Operational Controls & Emergency Response

Operational Controls

11.5.1 The Operator has established and implemented operational controls relevant to the operational processes and the organisation's significant environmental risks.

11.5.2 The management system documents relevant to operational control are Overarching Documents (ODs), including the Environmental Policy and overarching management plans, Standard Operating Procedures (SOPs), monitoring and maintenance schedules and the record keeping forms associated with the SOPs (Form templates).

11.5.3 The operational controls will be adhered to, by all employees and personnel working for or on behalf of the organisation. The Operator will therefore ensure that all relevant management system documents are communicated to the personnel to whom they apply.

11.5.4 Management system documents will be reviewed at planned intervals as stated within with the Master Document Control File **(EVE-OD-03)** and revised when necessary.

11.5.5 Table 6 below lists the management system documents relevant to operational control:

Table 6: Management System Documents (Operational Controls)

Document Reference	Document Title
EVE Overarching Documents	
EVE-OD-01	Environmental Policy
EVE-OD-02	Skills and Competency Matrix
EVE-OD-03	Master Document Control File
EVE Overarching Procedures	
EVE-SOP-01	Document Control Procedure
EVE-SOP-02	Complaints Procedure
EVE-SOP-03	Change Control Procedure
EVE-SOP-04	Training Procedure
EVE-SOP-05	Internal Auditing Procedure
EVE-SOP-06	Management Review Procedure
EVE-SOP-07	Spill Control Procedure

Document Reference	Document Title
EVE-SOP-08	Waste Pre-acceptance Procedure
EVE Form Templates	
EVE-FT-01	Accident and Incident Report Form
EVE-FT-02	Change Control Form
EVE-FT-03	Feedstock Rejection Form
EVE-FT-04	Supplier Assessment Form
EVE-FT-05	Odour Complaint Form
EVE-FT-06	Complaint Form
EVE-FT-07	Internal Audit Report Form
EVE-FT-08	Management Review Report Form
Attleborough Overarching Documents	
ATT-OD-01	Environmental Management System Manual (this document)
ATT-OD-02	Drainage Process Flow Diagram
ATT-OD-03	Process Flow Diagrams
ATT-OD-04	Odour Management Plan
ATT-OD-05	Accident Management Plan
ATT-OD-06	Digestate Management Plan
ATT-OD-07	DSEAR zoning plans & risk assessment
ATT-OD-08	Residues Management Plan
ATT-OD-09	Staff Organogram
Attleborough Procedures	
ATT-SOP-01	Crop Feedstock Acceptance and Rejection Procedure
ATT-SOP-02	Crop Feedstock Loading Procedure
ATT-SOP-03	Process Monitoring Procedure
ATT-SOP-04	Monitoring Procedure
ATT-SOP-05	Fugitive Emissions Plan
ATT-SOP-06	Digestate Handling Procedure
ATT-SOP-07	Sampling Procedure
ATT-SOP-08	Procedure for Dry Matter Testing
ATT-SOP-09	Odour Monitoring Procedure
ATT-SOP-10	Liquid Waste Reception Procedure
ATT-SOP-11	Waste Acceptance and Rejection Procedure

Document Reference	Document Title
ATT-SOP-12	Waste Loading & Management Procedure
ATT-SOP-13	Housekeeping Schedule
ATT-SOP-14	Secondary Containment Checking & Emptying Procedure
Attleborough Monitoring & Maintenance Schedules	
ATT-MP-01	Attleborough AD Maintenance planner
ATT-MP-02	Site Diary (Smartsheet)
ATT-MP-03	Stock Sheet
ATT-MP-04	Feeding Check (Smartsheet)
ATT-MP-05	Spares List
ATT-MP-06	Waste Tracking Spreadsheet
Form Templates	
ATT-FT-01	Odour Monitoring Form

Emergency Preparedness & Response

11.5.6 The Operator has established and implemented emergency procedures relevant to the operational processes and the organisation's significant environmental risks.

11.5.7 Emergency response procedures will always be adhered to, by all employees and personnel working for and on behalf of the organisation. The Operator will therefore ensure that all emergency response procedures are communicated to personnel to whom they apply. Emergency response procedures will be reviewed at planned intervals as stated within with the Master Document Control File **(EVE-OD-03)** and revised when necessary.

11.5.8 Table 7 below lists the Management System documents relating to Emergency Response that have been implemented.

Table 7: Management System Documents (Emergency Response)

Document Reference	Document Title
EVE Overarching Documents	
EVE-OD-02	Skills and Competency Matrix
EVE Overarching Procedures	
EVE-SOP-07	Spill Control Procedure
EVE Form Templates	
EVE-FT-01	Accident and Incident Report Form
Attleborough Overarching Documents	
ATT-OD-02	Drainage Process Flow Diagram

Document Reference	Document Title
ATT-OD-04	Odour Management Plan
ATT-OD-05	Accident Management Plan
ATT-OD-07	DSEAR zoning plans & risk assessment
Attleborough Procedures	
ATT-SOP-05	Fugitive Emissions Plan
ATT-SOP-09	Odour Monitoring Procedure
Form Templates	
ATT-FT-01	Odour Monitoring Form

12 Monitoring

12.1 Environmental Monitoring

12.1.1 The Operator monitors on an ongoing basis the environmental performance of the site through environmental monitoring as required to determine environmental performance and control environmental risks, as determined through the Environmental Risk Assessment (Appendix A).

12.1.2 Environmental monitoring procedures will be always adhered to, by all employees working for or on behalf of the organisation. The Operator will therefore ensure that all environmental monitoring procedures are communicated to personnel to whom they apply. Environmental monitoring schedules and procedures will be reviewed at planned intervals as stated within with the Master Document Control File **(EVE-OD-03)** and revised when necessary.

12.1.3 Table 8 below lists the environmental monitoring procedures and check lists that have been implemented.

Table 8: Management System Documents (Environmental Monitoring)

Document Reference	Document Title
Attleborough Procedures	
ATT-SOP-03	Process Monitoring Procedure
ATT-SOP-04	Monitoring Procedure
ATT-SOP-05	Fugitive Emissions Plan
ATT-SOP-09	Odour Monitoring Procedure
Attleborough Monitoring & Maintenance Schedules	
ATT-MP-01	Attleborough AD Maintenance planner
ATT-MP-02	Site Diary (Smartsheet)
Form Templates	
ATT-FT-01	Odour Monitoring Form

12.2 Process Monitoring

12.2.1 Process monitoring will be carried out in accordance with the Process Monitoring Procedure **(ATT-SOP-03)**.

12.2.2 Process monitoring is key to ensure a stable anaerobic digestion process, to minimise the risk of abnormal events which may lead to emissions. Process monitoring also enables the Operator to maximise the efficiency of the process in terms of biogas yield and resulting heat, electricity and digestate production.

12.2.3 Process monitoring can be sub-divided into:

- Feedstock analysis
- Visual checks
- Automated monitoring via SCADA
- On site testing
- Offsite testing at an external laboratory.

12.2.4 Relevant process management actions have been detailed here for ease of reference.

Feedstock Analysis

12.2.5 Crop-AD site: Crop feedstocks are tested for dry matter content as they come in during harvest. Crop feedstocks will also be seasonally tested for biochemical methane potential (BMP).

12.2.6 Waste-AD site: Waste feedstocks undergo pre-acceptance and acceptance checks including sampling and testing in accordance with the Waste Pre-Acceptance Procedure **(EVE-SOP-08).**

12.2.7 In addition, there will be an on-site laboratory to service both the Crop-AD and Waste-AD plant which will be used for feedstock analysis for operational test parameters to optimise the digestion process.

12.2.8 Test results are used to inform the feed plan for the AD plants which is determined by the Site Manager.

Visual checks

12.2.9 Every day a visual inspection is carried out through the inspection windows on all the digesters. Observations are made on the apparent mixing speed and the presence of crusting or foam as these are important indications of the health of the AD process. This check is recorded in the Attleborough AD Maintenance Planner **(ATT-MP-01).**

Automated monitoring via SCADA

12.2.10 SCADA is a software application program which collects and records data in real time from remote locations to control equipment and conditions within an anaerobic digestion plant. The monitoring data is fed back to the SCADA system which is visible to site operatives.

12.2.11 The Crop-AD plant and Waste-AD plant each have their own SCADA systems to detect any faults and show the Operator via a graphical interface where the fault is. Both systems can be operated remotely.

Gas production

12.2.12 Gas production is measured through monitoring the quantity of gas consumed by the CHP engine and the GUU and by the volume of biogas in storage across all tanks.

12.2.13 The daily biogas production is an important parameter because it shows immediately if there are changes in the biological process. As soon as the production drops in relation to the organic loading rate, then it indicates either reduced organic loading rate in the fermenter or potential inhibition within the digestion process.

12.2.14 If gas production drops in relation to organic loading rate, then the appropriate corrective action may be to increase the organic loading rate and / or investigate if there is inhibition of the process via sample analysis.

Gas Pressure

12.2.15 Gas pressure monitors are in all the gas holding tanks.

12.2.16 Gas pressure is monitored via SCADA and regulated via the use of biogas in the CHP engine on the Crop-AD plant, and on the Waste-AD plant through the GUU/GEU and biogas boiler.

12.2.17 The regulation of gas pressure is fully automated and SCADA links gas pressure readings with mixing within the tanks.

12.2.18 SCADA is set such that either of the two flares will automatically operate at a lower pressure than that at which the PRVs are set to release.

12.2.19 SCADA will alarm if:

- the flare is in operation
- CHP engine trips
- the gas upgrading unit trips
- the biogas boiler trips

12.2.20 The Site Manager or Nominated Competent Person is responsible for evaluating the root cause of the alarm and acting accordingly. This may require re-setting of equipment.

Gas Quality

12.2.21 Gas quality is a key parameter for process monitoring and will give a quick indication of potential issues with the anaerobic digestion process.

12.2.22 Gas quality is continuously via in-line analysers. The following parameters are measured:

- Methane (CH_4)
- Oxygen (O_2)
- Hydrogen sulphide (H_2S)
- Carbon dioxide (CO_2)

12.2.23 Gas quality is checked using a hand-held gas monitor. The hand-held gas monitor is calibrated annually or sooner if there is a significant difference between the in-line and handheld device readings.

12.2.24 A decreasing methane or increasing carbon dioxide trend may suggest that the feed rate needs to be reduced or that there is some level of inhibition in the process.

12.2.25 An increasing hydrogen sulphide trend suggest that there is a change in the feedstock make-up which should be checked by further analysis or that the oxygen addition needs checking.

Temperature

12.2.26 Temperature control is required to keep the temperature in the digesters as stable as possible.

12.2.27 The temperature probe in the process tanks continuously monitor temperature and the SCADA system keeps the temperature within thermophilic limits 50-55^{o}C for the Crop-AD plant and mesophilic limits 40^{o}C -43^{o}C for the Waste-AD.

On site testing

12.2.28 Three times a week a sample is taken from each digester and tested for pH, dry matter, ammonium, FOS/TAC, and conductivity in accordance with the Process Monitoring Procedure **(ATT-SOP-03)**. The data is logged in Smartsheet, and trends observed over time to inform process management.

12.2.29 The FOS TAC ratio and additional analyses are indicators for assessing fermentation processes. The FOS TAC ratio measures Volatile Organic Acids (FOS) in relation to Total Alkaline Carbonate (TAC); the TAC value is an estimation of the buffer capacity of the sample.

Offsite testing at an external laboratory

12.2.30 On a monthly basis a sample is taken from each of the digesters in accordance with the Sampling Procedure **(ATT-SOP-07)** and send off site for analysis at a UKAS Accredited laboratory for a minimum of:

- pH
- FOS/TAC
- Dry matter
- Volatile fatty acids
- Trace elements

12.2.31 This data will be used by the Site Manager to inform process decisions including the feed plan, mixing regime and the addition of trace elements.

12.3 Process Management

12.3.1 Process monitoring will determine process management. Process monitoring results are not looked at in isolation but reviewed to identify data trends to inform decisions about managing the process. By reviewing trends in the data rather than individual results, changes in the balance of the whole system are more easily identified. A typical range of results, that could be expected, are shown in the Table 9 below:

Table 9: Parameters of a stable biogas process fed with energy crops (source: Bioreact)

Parameter	Range
pH	7.4 - 8
Electrical conductivity	20 – 25 mS/cm
Ammonium	< 5 g/L
Dry Matter	6 - 12%
Volatile Fatty Acids (VFA)	< 5 g/L
Acetic / Propionic Acid	3:1
Propionic Acid	< 0.8 g/L
Iso - acids	< 0.05 g/L
FOS /TAC	0.1 – 0.3 g/L
Methane	> 50%

12.3.2 Further process monitoring will be carried out as appropriate to confirm or otherwise theories for trends observed. The expertise of a biologist will be used as necessary to help inform process management decisions made by the Site Manager.

12.3.3 It is the responsibility of the Site Manager to look at process monitoring data and make process management decisions in consultation with the Operations Director and the Biologist (external) to record decisions on either the Site Diary (Smartsheet) **(ATT-MP-02)** or for more major decisions a record will be made in the meeting notes of the weekly management meetings.

12.4 Digestate & Dirty Water Quality Monitoring

12.4.1 The separated fibre separated liquor and dirty water are sampled and analysed to determine their nutrient content and for a FACTS qualified advisor to then calculate an appropriate application rate to meet crop need as described in the digestate management plan **(ATT-OD-06).**

12.4.2 The samples are taken and dispatched to the laboratory in accordance with the Sampling Procedure **(ATT-SOP-07).** All samples are analysed at a UKAS accredited laboratory, (NRM Laboratories Ltd) prior to key periods of dispatch from the AD plant.

12.4.3 Typical minimum recommended testing frequencies for the Crop-AD plant will be:

- Digestate liquor will be tested quarterly
- Digestate fibre at least twice a year
- Dirty water will be tested at least twice a year

12.4.4 Digestate from the Waste-AD plant will be tested in accordance with sampling frequencies required to meet PAS110 and The Animal and Plant Health Agency (APHA) requirements to meet Animal by Product Regulation controls.

12.4.5 The analysis results will be supplied to the Farmer and his agronomist for the purposes of nutrient management planning prior to an application taking place.

12.5 Inspection & Maintenance of Equipment

12.5.1 The Operator will ensure that all monitoring and measuring equipment is fit for purpose, maintained, and calibrated to appropriate standards (UKAS approved where applicable). The following procedures and processes listed in Table 10 have been implemented to ensure continued maintenance of the site's infrastructure. A suitably qualified person will undertake all maintenance and calibration work.

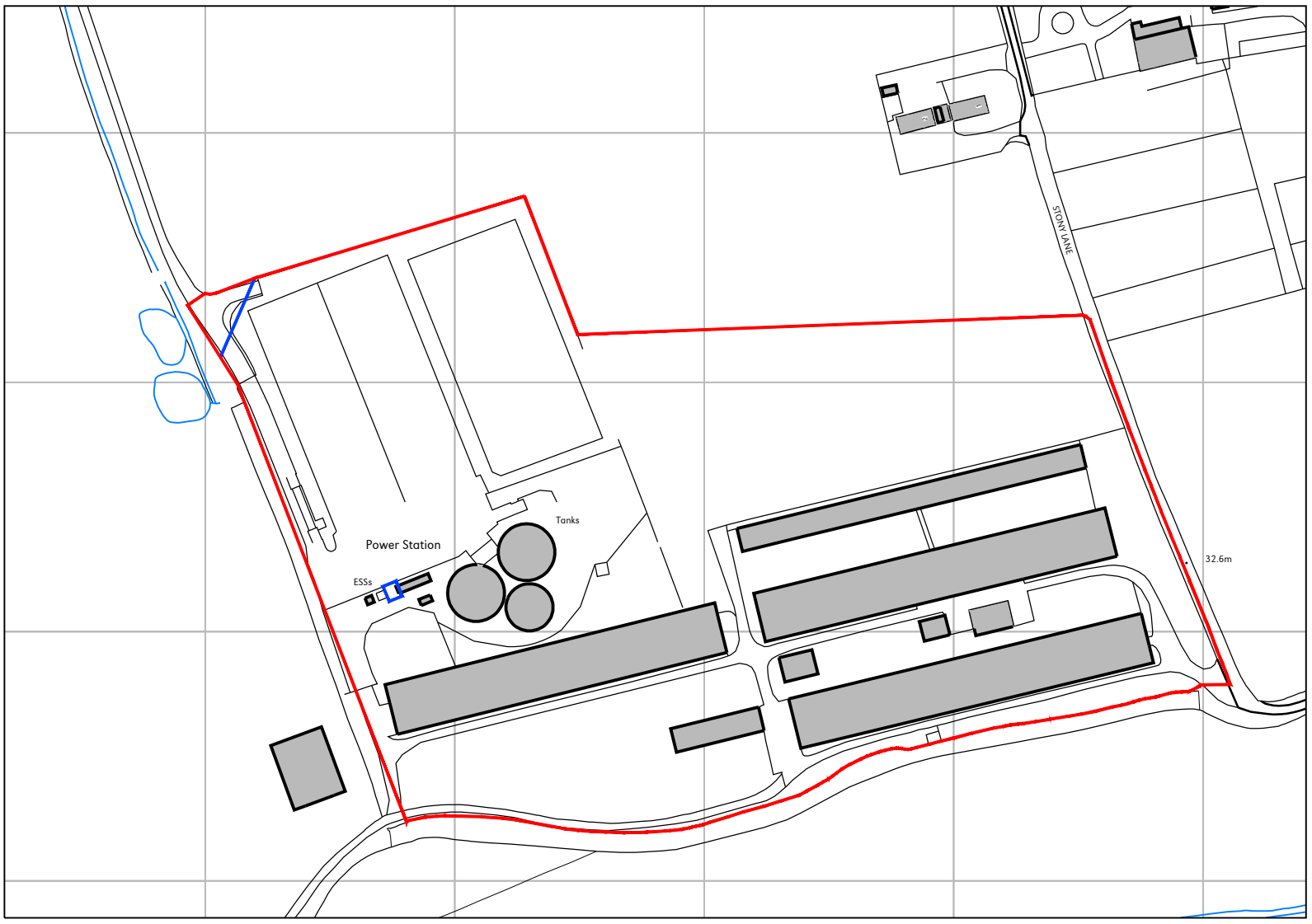
12.5.2 The Operator carries out all inspection and maintenance of plant and equipment in house except for the following plant and equipment which is maintained under contract:

- HoST – to carry out maintenance to the Crop-AD plant, Flare and pertinent specialist equipment;
- GenV - CHP which is maintained under contract;
- Supplier or specialist contractor to maintain:
  - Back-up generator;
  - Compressors;
  - Chiller; and
  - Carbon filters.

Table 10: Management System Documents (Monitoring & Maintenance)

Document Reference	Document Title
EVE Overarching Documents	
EVE-OD-02	Skills and Competency Matrix
Attleborough Monitoring & Maintenance Schedules	
ATT-MP-01	Attleborough AD Maintenance planner
ATT-MP-02	Site Diary (Smartsheet)
ATT-MP-05	Spares List

Figures



OS Location Plan
Scale 1:2500

Site Location Plan 1
Not to Scale

Site Location Plan 2
Not to Scale

1:2500 - DRAWING SCALE REFERENCE (m)

50 25 0 25 50 75 100 125

General Notes

1. All dimensions noted are in millimetres unless stated otherwise.
2. All levels to be above Ordnance Survey Datum defined levels (A.O.Dm) unless noted otherwise.
3. Do not scale from this drawing, if dimensions are not clear ask.
4. This document has been created in accordance with Plandescil Ltd. Terms & Conditions along with the scope of works provided by the client to Plandescil Ltd. Any use of this document other than for its original purpose is prohibited, Plandescil Ltd. accept no liability for any third party uses of this document.
5. Plandescil Ltd. to be immediately notified of any suspected omissions or discrepancies.
6. This drawing is to be read in conjunction with all other relevant documents relating to the project.
7. All setting out to be coordinated by the Contractor and to be checked onsite prior to construction.

N

Key

- Site Boundary (Area - 67,594.50m² / 6.75945 Ha)
- Land Registry Land Divisions

APPROVAL & COMMENT

Rev	Date	Rev By	Chkd	Description
E	22-07-21	AF	OAJ	Site Boundary Amended
D	13-07-21	AF	OAJ	Minor Amendments
C	30-04-21	JHB	OAJ	Minor Amendments
B	13-01-20	MJP	OAJ	Client Name Amended
A	10-01-20	MJP	OAJ	Second Issue
0	26-07-19	-	OAJ	First Issue

plandescil
consulting engineers

Connaught Road Attleborough Norfolk NR17 2BW
Telephone: (01953) 452001 Fax: (01953) 456955
E-mail: pdc@plandescil.co.uk www.plandescil.co.uk

civil / structural / environmental / surveying

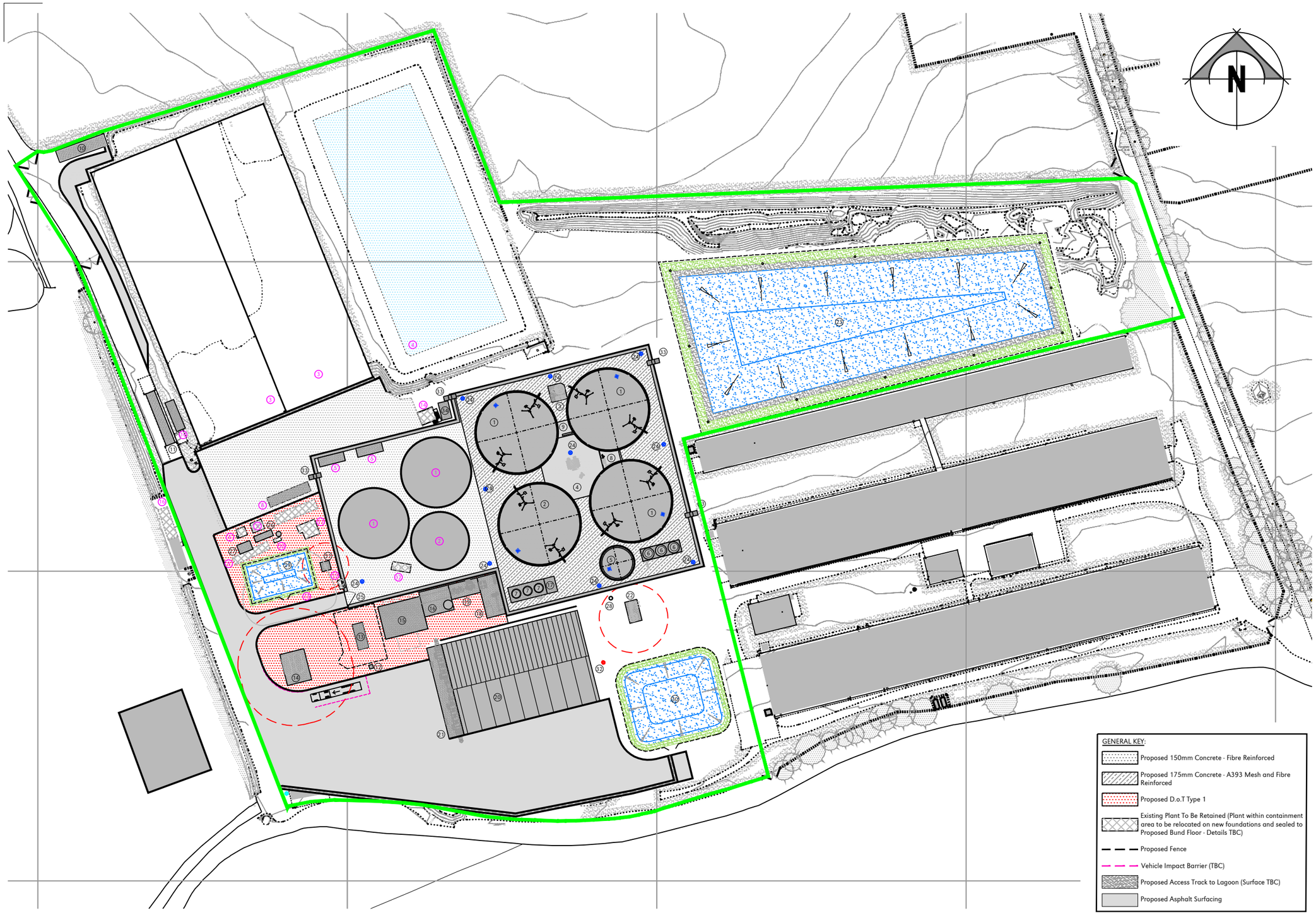
Client
Attleborough AD Plant Limited

Project
Attleborough AD Plant, Attleborough, Norfolk, NR17 1AE

Drawing Title
Site Location Plan

Scale	U.N.O.	Date	Drawn By
As Noted (A3)		July 2019	MJP

Drawing No. 24727/150 Rev E



EXISTING PLANT KEY:

1. Digester (2No.) (23mØ)
2. Fermenter (19mØ)
3. Silage Clamp (2No.) (30m x 95m)
4. Covered Lagoon
5. Feedhopper (2No.) - To Be Repositioned
6. Substation
7. Transformer
8. CHP Engine - To Be Repositioned
9. Storage Container - To Be Repositioned
10. Chiller & Oil Container
11. Technical Container
12. Boiler
13. Dirty Water Holding Lagoon - To Be Regraded/Relined
14. Separator
15. Flare - To Be Removed
16. Welfare Facility / Site Office - To Be Repositioned

PROPOSED PLANT KEY:

1. BioConstruct Fermenter (3No. @ 26.00mØ)
2. BioConstruct Post-Fermenter (26.00mØ)
3. Reception Tank
4. Technical Building
5. Pre-Storage Tank (10.00mØ)
6. Pre-Storage Tank (3No. @ 3.50mØ)
7. Pasteurisation Tank (3No.)
8. Oxygen Generator
9. Switchboard Room
10. Site Office
11. Weighbridge
12. VSAT
13. Grid Entry Unit
14. Propane Tanks
15. Gas Upgrading Unit
16. Boiler, Heating Buffer Tank
17. Switchboard Container
18. Gas Processing Unit
19. Active Carbon Tanks (2No.)
20. Reception Building (30.20m x 45.20m)
21. Odour Control Filter (1No.)
22. Flare - BioConstruct (10.00m Exclusion Zone)
23. Digestate Storage Lagoon (10,000m³ Storage)
24. Containment Sump (8No.) - TBC
25. Bund Gate (1No.)
26. LV Switchboard
27. Emergency Generator
28. Condensate Pit
29. Dirty Water Holding Lagoon (175m³ Storage)
30. Surface Water Attenuation Lagoon (936m³ Storage)
31. Flare - EVE (7.50m Exclusion Zone TBC By Client)
32. Borehole - Position TBC
33. Stair Access (4No.)
34. Leachate Tank (20,000l - Capacity TBC)

GENERAL KEY:

- Proposed 150mm Concrete - Fibre Reinforced
- Proposed 175mm Concrete - A393 Mesh and Fibre Reinforced
- Proposed D.o.T Type 1
- Existing Plant To Be Retained (Plant within containment area to be relocated on new foundations and sealed to Proposed Bund Floor - Details TBC)
- Proposed Fence
- Vehicle Impact Barrier (TBC)
- Proposed Access Track to Lagoon (Surface TBC)
- Proposed Asphalt Surfacing

General Notes

1. All dimensions noted are in millimetres unless stated otherwise.
2. All levels to be above Ordnance Survey Datum defined levels (A.O.Dm) unless noted otherwise.
3. Do not scale from this drawing, if dimensions are not clear ask.
4. This document has been created in accordance with Plandescil Ltd. Terms & Conditions along with the scope of works provided by the client to Plandescil Ltd. Any use of this document other than for its original purpose is prohibited, Plandescil Ltd. accept no liability for any third party uses of this document.
5. Plandescil Ltd. to be immediately notified of any suspected omissions or discrepancies.
6. This drawing is to be read in conjunction with all other relevant documents relating to the project.
7. All setting out to be coordinated by the Contractor and to be checked onsite prior to construction.

APPROVAL & COMMENT

Key

Permit Boundary (49,139m² / 4.9139 Ha)

1:1250 - DRAWING SCALE REFERENCE (m)

20 10 0 10 20 30 40 50 60

plandescil
consulting engineers
Connaught Road Attleborough Norfolk NR17 2BW
Telephone: (01953) 452001 Fax: (01953) 456955
E-mail: pdc@plandescil.co.uk www.plandescil.co.uk
civil / structural / environmental / surveying

Client: Attleborough AD Plant Limited

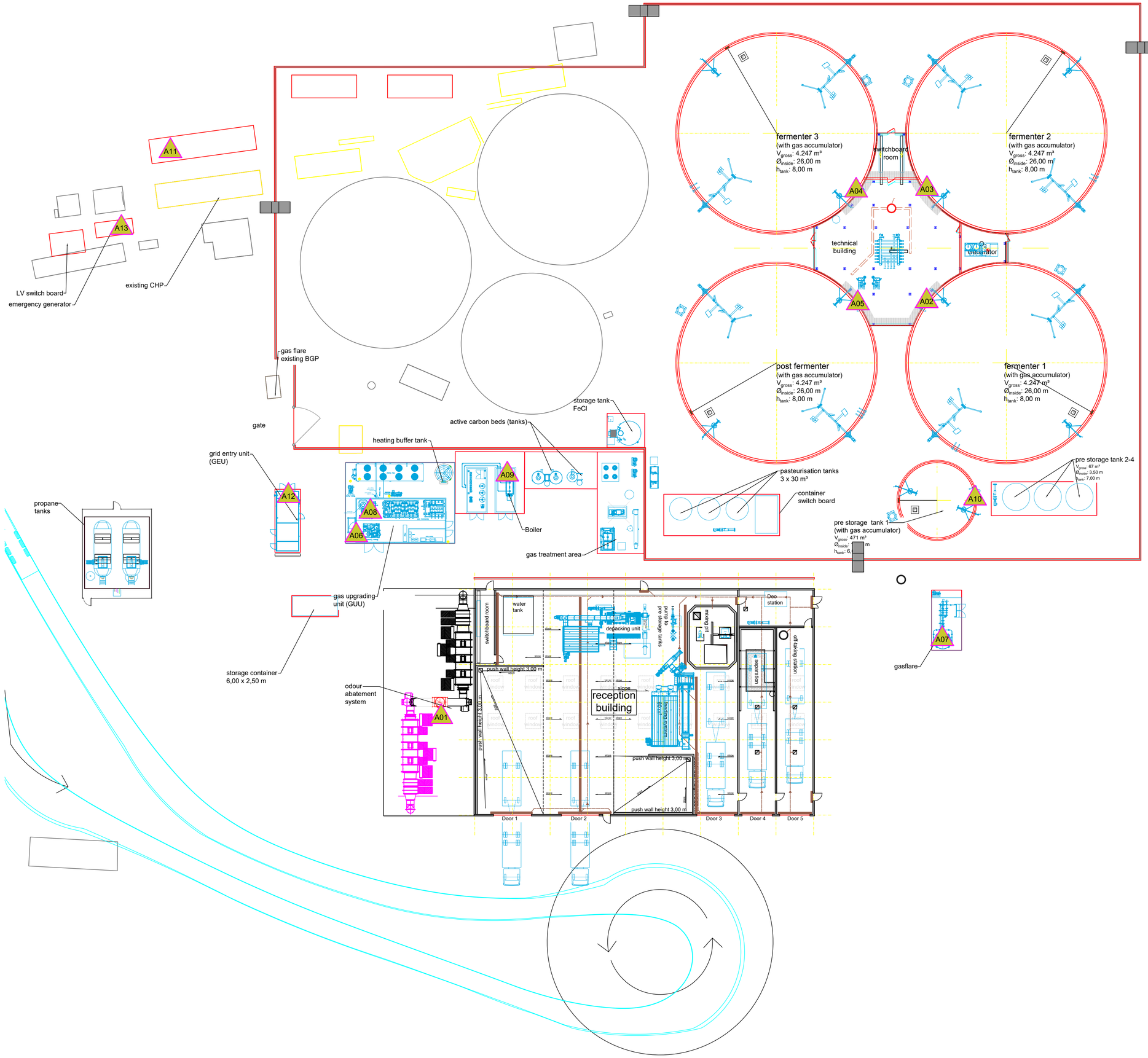
Project: Attleborough AD Plant, Attleborough, Norfolk, NR17 1AE

Drawing Title: Proposed Permit Boundary Site Layout Overlay

Rev	Date	Rev By	Chkd	Description
0	27-07-21	-	OAJ	First Issue

Scale: 1:1250 (A3) U.N.O. | Date: July 2021 | Drawn By: AF

Drawing No. 24727/600 | Rev 0



emission points

A01	exhaust stack odour abatement system
A02	emergency pressure relief valve on fermenter tank 1
A03	emergency pressure relief valve on fermenter tank 2
A04	emergency pressure relief valve on fermenter tank 3
A05	emergency pressure relief valve on post fermenter tank
A06	CO vent from gas upgrading unit
A07	emergency gas flare
A08	emergency pressure relief valve on gas upgrading unit
A09	exhaust stack Boiler
A10	emergency pressure relief valve on pre storage tank 1
A11	exhaust stack CHP (of existing AD-Plant)
A12	pressure relief valve GEU
A13	exhaust emergency generator

caption

	new building / equipment
	existing components
	components to remove
	access road

N
W
O
S

BIOCONSTRUCT

building owner:

Attleborough Eco Electric Limited
4th Floor
36 Spital Square
London
E1 6DY

plan drafter:

BioConstruct GmbH

Wellingstraße 66
D-49328 Melle
Tel.: +49 (0)5226 / 5932-0
Fax: +49 (0)5226 / 5932-11

place: Ellingham Road, Attleborough, NR17 1AE

Construction of a biogas plant in Attleborough (GB)

emission point plan

filename:
plant layout_Attleborough_JAS_210805.dwg

project-nr. / plan-nr.:	scale:	plan size:
B202103 / A15	1:250	DIN A1

	date:	name:
designed:	31.05.21	J. Schröder

change:

nr.	kind of change:	date:	name:
a	emergency generator	30.06.21	J. Schröder

Proposed position of 2No. relocated existing welfare and weighbridge office.

Proposed Weighbridge to have access platform installed and hand rails down the side.

Pipes

Existing Feedhoppers to be relocated as shown.

Existing CHP to be moved 6m northwards as shown. (Crash Barrier TBC)

Existing storage container to be replaced with a smaller container located further to the north.

Retained existing overhead pipework.

Proposed Ferric Choride Pump Pit

Existing lagoon to be regraded and re-lined.

Proposed Cadent Gas parking slip road access.

Cadent Gas designated parking space (Size TBC)

150mm High concrete step to ROV room

GEU access footpath

150mm High concrete step to RTU room

Proposed Retaining Wall (Design TBC)

Existing stop cock to be removed and new stop cock to be positioned outside of proposed kerb line.

Note:

1. All dimensions noted are in millimetres unless stated otherwise.
2. Do not scale from this drawing, if dimensions are not clear ask.
3. This document has been created in accordance with Plandescil Ltd. Terms & Conditions along with the scope of works provided by the client to Plandescil Ltd. Any use of this document other than for its original purpose is prohibited, Plandescil Ltd. accept no liability for any third party uses of this document.
4. Plandescil Ltd. to be immediately notified of any suspected omissions or discrepancies.
5. This drawing is to be read in conjunction with all other relevant documents relating to the project.
6. Refer to Plandescil Ltd Drg 24727 - 001 Rev 0 - Topographical Survey undertaken in April 2021.
7. Proposed Site Layout received from BioConstruct. Refer to EXPORT-pipe system_Attleborough_JAS_210825.dwg

EXISTING PLANT KEY:

1. Digester (2No.) (23mØ)
2. Fermenter (19mØ)
3. Silage Clamp (2No.) (30m x 95m)
4. Covered Lagoon
5. Feedhopper (2No.) - To Be Repositioned
6. Substation
7. Transformer
8. CHP Engine - To Be Repositioned
9. Storage Container - To Be Replaced and Repositioned
10. Chiller & Oil Container
11. Technical Container
12. Boiler
13. Dirty Water Holding Lagoon - To Be Regraded/Relined
14. Separator
15. Flare - To Be Retained (EVE)
16. Welfare Facility / Site Office - To Be Repositioned

PROPOSED PLANT KEY:

1. BioConstruct Fermenter (3No. @ 26.00mØ)
2. BioConstruct Post-Fermenter (26.00mØ)
3. Ferric Chloride Tank
4. Technical Building
5. Pre-Storage Tank (10.00mØ)
6. Pre-Storage Tank (3No. @ 3.50mØ)
7. Pasteurisation Tank (3No.)
8. Oxygen Generator
9. Switchboard Room
10. Site Office
11. Weighbridge
12. VSAT
13. Grid Entry Unit
14. Propane Tanks
15. Gas Upgrading Unit
16. Boiler, Heating Buffer Tank
17. Switchboard Container
18. Gas Processing Unit
19. Active Carbon Tanks (2No.)
20. Reception Building (30.20m x 45.20m)
21. Odour Control Filter (1No.)
22. Flare - BioConstruct (10.00m Exclusion Zone)
23. Digestate Storage Lagoon (10,000m³ Storage)
24. Containment Sump - Size Varies
25. Bund Gate (1No.)
26. LV Switchboard
27. Emergency Generator
28. Condensate Pit
29. Dirty Water Holding Lagoon (175m³ Storage)
30. Surface Water Attenuation Lagoon (936m³ Storage)
31. Leachate Tank (20m³ Storage)
32. Borehole
33. Stair Access (4No.)
34. BioConstruct Container
35. Digestate Pump
36. Leachate and Clean Water Pumps (2No.)
37. Digestate Removal Station

GENERAL KEY:

- Proposed 150mm Concrete - Fibre Reinforced
- Proposed 175mm Concrete - A393 Mesh and Fibre Reinforced
- Proposed D.o.T Type 1
- Existing Concrete Apron and Ancillary Equipment Plant Foundations to be Retained / Reinstated (TBC)
- Proposed Fence
- Proposed Asphalt Surfacing

1:200 - DRAWING SCALE REFERENCE (m)

10 5 0 5 10 15 20 25

APPROVAL & COMMENT

Rev	Date	Rev By	Chkd	Description
0	01-12-21	-	OAJ	First Issue

plandescil consulting engineers

Connaught Road Attleborough Norfolk NR17 2BW
Telephone: (01953) 452001 Fax: (01953) 456955
E-mail: pdc@plandescil.co.uk www.plandescil.co.uk

civil / structural / environmental / surveying

Client

Attleborough AD Plant Limited

Project

Attleborough AD Plant, Attleborough, Norfolk, NR17 1AE

Drawing Title

Proposed Site Layout

Scale U.N.O.	Date	Drawn By
1:200 (A0)	November 2021	TOH

Drawing No. 24727/550 Rev 0

Note:

1. All dimensions noted are in millimetres unless stated otherwise.
2. Do not scale from this drawing, if dimensions are not clear ask.
3. This document has been created in accordance with Plandescil Ltd. Terms & Conditions along with the scope of works provided by the client to Plandescil Ltd. Any use of this document other than for its original purpose is prohibited, Plandescil Ltd. accept no liability for any third party uses of this document.
4. Plandescil Ltd. to be immediately notified of any suspected omissions or discrepancies.
5. This drawing is to be read in conjunction with all other relevant documents relating to the project.
6. Refer to Plandescil Ltd Drg 24727 - 001 Rev 0 - Topographical Survey undertaken in April 2021.
7. Proposed Site Layout received from BioConstruct. Refer to EXPORT-pipe system_Attleborough_JAS_210825.dwg

EXISTING PLANT KEY:

1. Digester (2No.) (23mØ)
2. Fermenter (19mØ)
3. Silage Clamp (2No.) (30m x 95m)
4. Covered Lagoon
5. Feedhopper (2No.) - To Be Repositioned
6. Substation
7. Transformer
8. CHP Engine - To Be Repositioned
9. Storage Container - To Be Replaced and Repositioned
10. Chiller & Oil Container
11. Technical Container
12. Boiler
13. Dirty Water Holding Lagoon - To Be Regraded/Relined
14. Separator
15. Flare - To Be Retained (EVE)
16. Welfare Facility / Site Office - To Be Repositioned

PROPOSED PLANT KEY:

1. BioConstruct Fermenter (3No. @ 26.00mØ)
2. BioConstruct Post-Fermenter (26.00mØ)
3. Ferric Chloride Tank
4. Technical Building
5. Pre-Storage Tank (10.00mØ)
6. Pre-Storage Tank (3No. @ 3.50mØ)
7. Pasteurisation Tank (3No.)
8. Oxygen Generator
9. Switchboard Room
10. Site Office
11. Weighbridge
12. VSAT
13. Grid Entry Unit
14. Propane Tanks
15. Gas Upgrading Unit
16. Boiler, Heating Buffer Tank
17. Switchboard Container
18. Gas Processing Unit
19. Active Carbon Tanks (2No.)
20. Reception Building (30.20m x 45.20m)
21. Odour Control Filter (1No.)
22. Flare - BioConstruct (10.00m Exclusion Zone)
23. Digestate Storage Lagoon (10,000m³ Storage)
24. Containment Sump - Size Varies
25. Bund Gate (1No.)
26. LV Switchboard
27. Emergency Generator
28. Condensate Pit
29. Dirty Water Holding Lagoon (175m³ Storage)
30. Surface Water Attenuation Lagoon (936m³ Storage)
31. Leachate Tank (20m³ Storage)
32. Borehole
33. Stair Access (4No.)
34. BioConstruct Container
35. Digestate Pump
36. Leachate and Clean Water Pumps (2No.)
37. Digestate Removal Station

EXISTING DRAINAGE KEY:

- Surface Water Filter Drain (SW)

PROPOSED DRAINAGE KEY:

- Leachate Drainage Pumped Pipe (LD)
- Leachate Gravity Drainage (LD)
- Leachate Manhole (LD)
- Proposed Leachate Sump (LD)
- Surface Water Gravity Drainage (SW)
- Surface Water Perforated Pipe (SW)
- Surface Water Pumped Pipe (SW)
- Surface Water Manhole (SW)
- Surface Water Inspection Chamber (SW)
- Surface Water Downpipe (SW)
- ACO Drainage Channel (SW)
- Pumped Containment Water Pipe
- Pumped Dirty Water Pipe
- Dirty Water Gravity Drainage
- S100 Channel Drain
- Dirty Water Manhole
- Dirty Water Gully
- Pumped Digestate Pipe
- Pumped Clean Water
- Hydro-Brake Flow Control
- Lagoon Pumped Recirculation Pipework
- Foul Water Drainage (FW)

GENERAL KEY:

- Proposed 150mm Concrete - Fibre Reinforced
- Proposed 175mm Concrete - A393 Mesh and Fibre Reinforced
- Proposed D.o.T Type 1
- Existing Concrete Apron and Ancillary Equipment Plant Foundations to be Retained / Reinstated (TBC)
- Proposed Fence
- Proposed Asphalt Surfacing

1:200 - DRAWING SCALE REFERENCE (m)

10 5 0 5 10 15 20 25

APPROVAL & COMMENT

Rev	Date	Rev By	Chkd	Description
0	01-12-21	-	OAJ	First Issue

plandescil
consulting engineers

Connaught Road Attleborough Norfolk NR17 2BW
Telephone: (01953) 452001 Fax: (01953) 456955
E-mail: pdc@plandescil.co.uk www.plandescil.co.uk

civil / structural / environmental / surveying

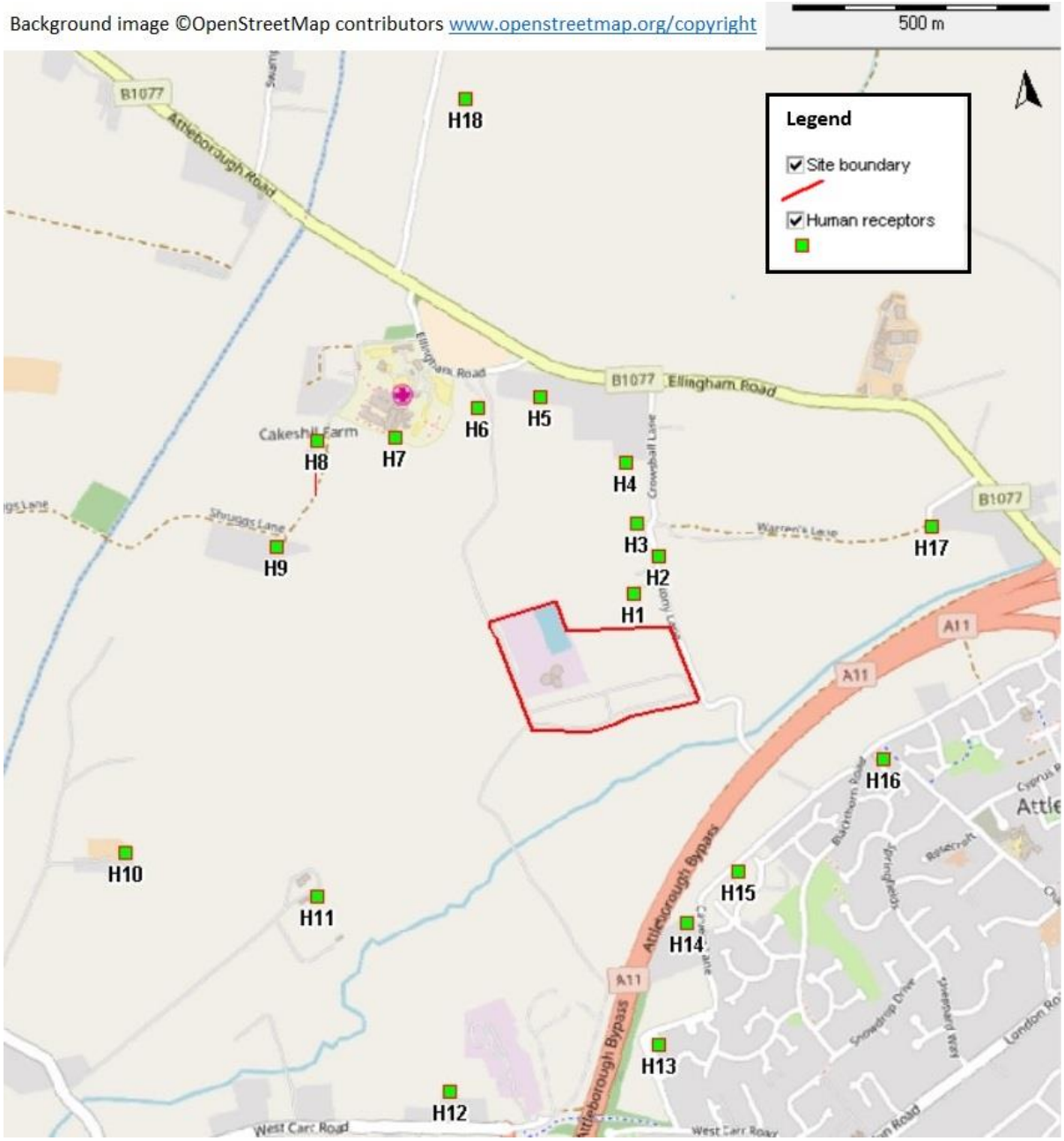
Client
Attleborough AD Plant Limited

Project
Attleborough AD Plant, Attleborough, Norfolk, NR17 1AE

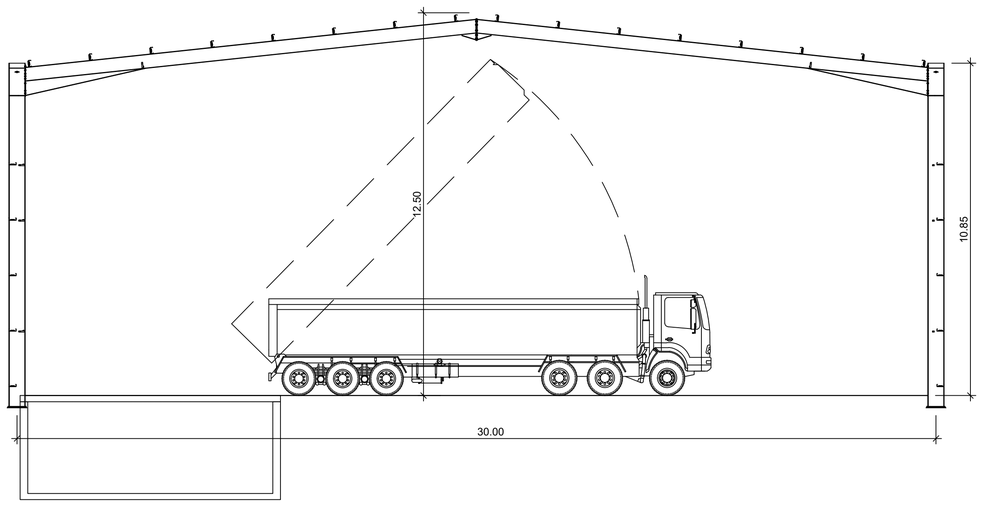
Drawing Title
Proposed Drainage Layout

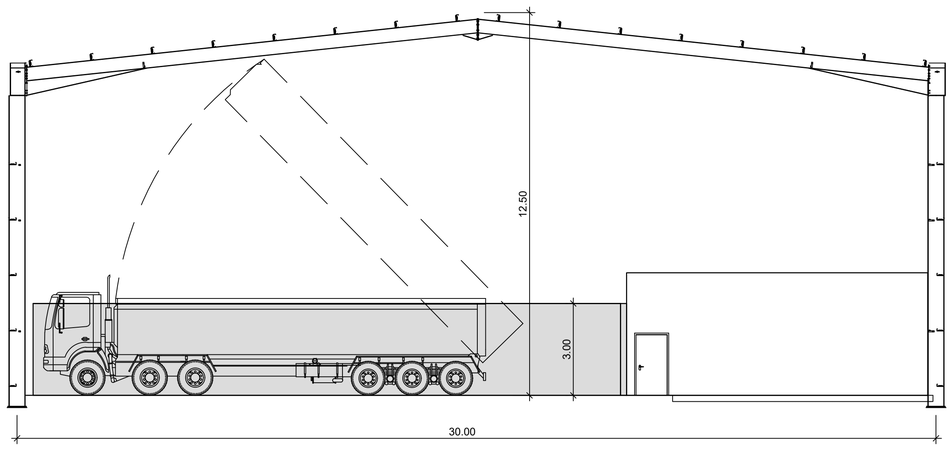
Scale U.N.O.	Date	Drawn By
1:200 (A0)	November 2021	TOH
Drawing No. 24727/552		Rev 0

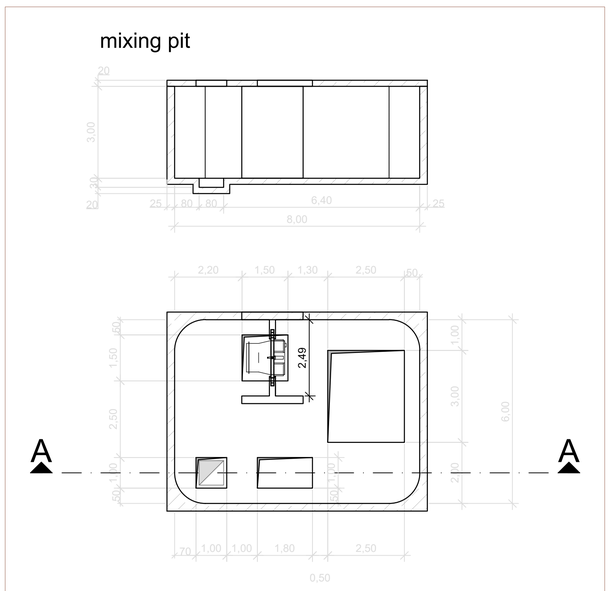
ETL573/EPR02/ Human Receptors (1km)

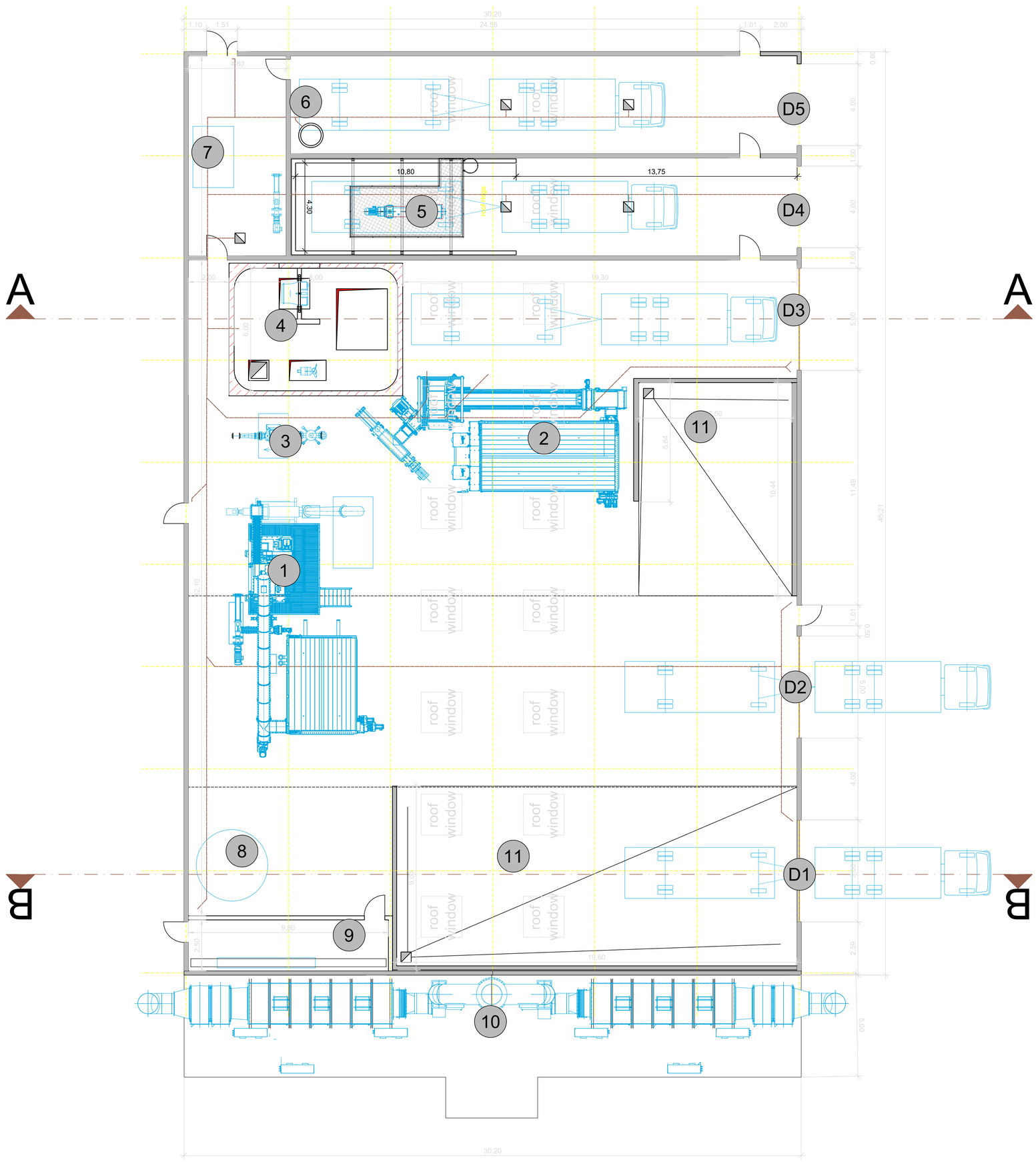


ID	Location	NGR X	NGR Y	Distance from OCU (m)	Direction from Site
H1	Crowshall Veterinary Services	603479	295790	276	NE
H2	Stuart House	603530	295863	365	NE
H3	Houses at Cakes Hill	603486	295927	401	NE
H4	Crowshall Lane	603463	296047	507	NE
H5	Ellingham Road	603296	296176	619	N
H6	Suggit Farm Serv	603174	296152	614	N
H7	St Lukes Hospital	603013	296096	624	N
H8	Cades Hill Farm	602860	296089	709	NW
H9	Shrugg's Lane	602783	295883	636	NW
H10	Lyng Farm	602487	295286	885	SW
H11	WwTW	602861	295200	589	SW
H12	Houses along West Carr Road, Workhouse Common	603119	294819	768	SW
H13	Carver's Lane, Attleborough 1	603528	294910	678	S
H14	Carver's Lane, Attleborough 2	603583	295146	484	S
H15	Carver's Lane, Attleborough 3	603683	295248	471	S
H16	Chapel Road, Attleborough	603966	295468	643	SE
H17	Houses in Baconsthorpe	604061	295923	818	E
H18	Ash Farm	603151	296756	1,211	N









1	depackaging unit
2	feeding system
3	liquids for pre storage tanks
4	mixing pit (V: ca. 144 m³)
5	separation
6	off-taking station
7	deo station
8	buffer tank (water)
9	switchboard room
10	odour abatement system
11	storage area
D1	door storage for unpacked waste
D2	door storage for packed waste
D3	door storage for pretreated waste
D4	door off-taking for separated solid digestate
D5	door off-taking for liquid digestate

BIOCONSTRUCT

building owner:	plan drafter:
Attleborough Eco Electric Limited 4th Floor 36 Spital Square London E1	BioConstruct GmbH Wellingstraße 66 D-49328 Melle Tel.: +49 (0)5226 / 5932-0 Fax: +49 (0)5226 / 5932-11

place: Ellingham Road, Attleborough, NR17 1AE

Construction of a biogas plant in Attleborough (GB)

reception hall

filename: reception hall_Attleborough_JAS_21.05.16.dwg

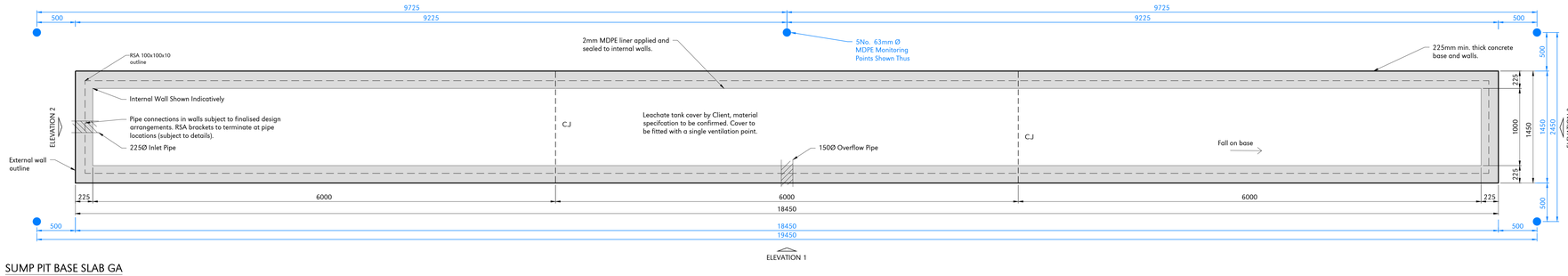
project-nr. / plan-nr.:	scale:	plan size:
B202103 / A06	1:100	DIN A0

	date:	name:
designed:	10.05.21	J. Schroeder

change:

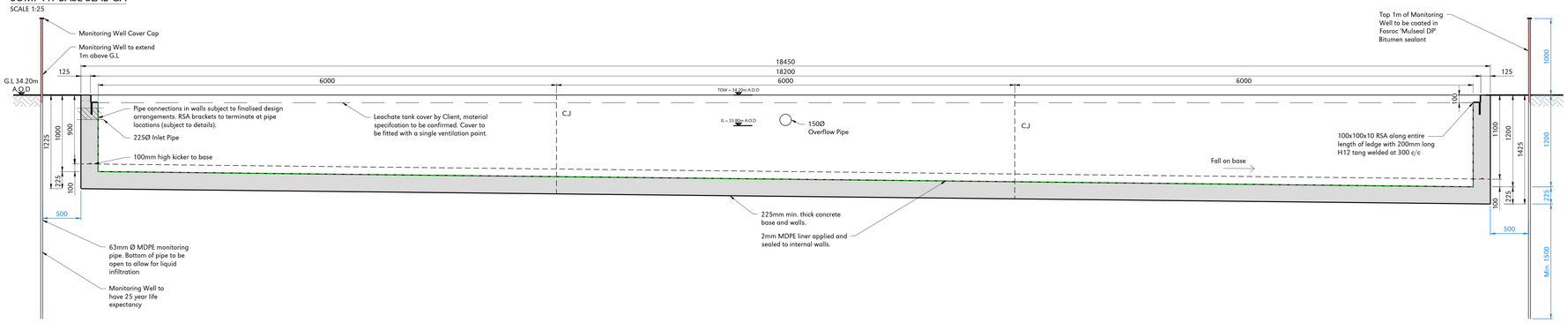
nr.	kind of change:	date:	name:

preliminary



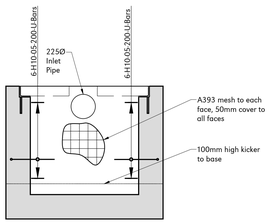
SUMP PIT BASE SLAB GA

SCALE 1:25



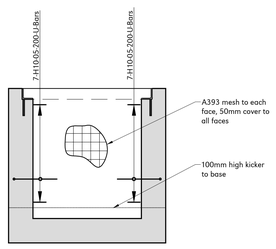
SUMP PIT RETAINING WALL GA (ELEVATION 1, 2No. THUS)

SCALE 1:25



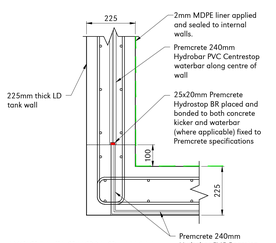
ELEVATION 2 RC (1No. THUS)

SCALE 1:10



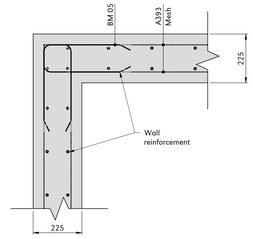
ELEVATION 3 RC (1No. THUS)

SCALE 1:10



TYPICAL SECTION OF WALL WATERPROOFING DETAIL

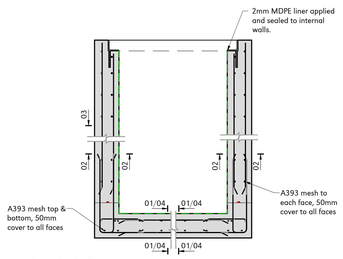
Scale 1:10



TYPICAL WALL CORNER REINFORCEMENT DETAIL PLAN (4No. THUS)

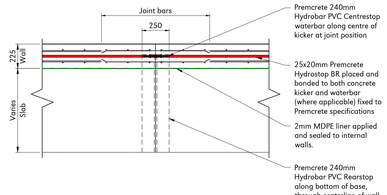
SCALE 1:10

Note: Base Reinforcement to be cut to suit at corner location



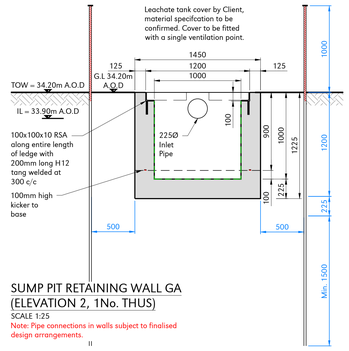
TYPICAL PIT SECTION

SCALE 1:20



TYPICAL PLAN OF WALL WATERPROOFING THROUGH CONTRACTION JOINT (C.J)

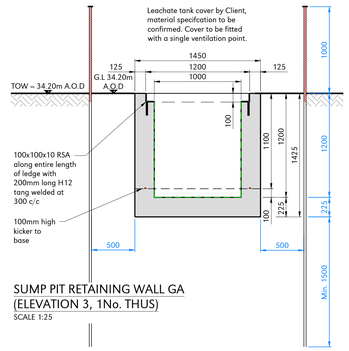
Scale 1:20



SUMP PIT RETAINING WALL GA (ELEVATION 2, 1No. THUS)

SCALE 1:25

Note: Pipe connections in walls subject to finalised design arrangements.



SUMP PIT RETAINING WALL GA (ELEVATION 3, 1No. THUS)

SCALE 1:25

NOTES:

1. All dimensions noted are in millimetres unless stated otherwise.
2. All levels to be above Ordnance Survey Datum defined levels (A.O.Dm) unless noted otherwise.
3. Do not scale from this drawing, if dimensions are not clear ask.
4. This document has been created in accordance with Plandescil Ltd. Terms & Conditions along with the scope of works provided by the client to Plandescil Ltd. Any use of this document other than for its original purpose is prohibited, Plandescil Ltd. accept no liability for any third party uses of this document.
5. Plandescil Ltd. to be immediately notified of any suspected omissions or discrepancies.
6. This drawing is to be read in conjunction with all other relevant documents relating to the project.
7. All setting out to be coordinated by the Contractor and to be checked onsite prior to construction.
8. To be read in conjunction with the following Plandescil Drawings, schedules and documents:
   24727/550 - Proposed Site Layout
   24727/100/01 BS - Bar Bending Schedule
9. Pipe connections in walls subject to finalised design arrangements.

REINFORCED CONCRETE:

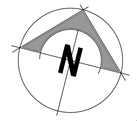
10. Insitu Concrete to be RC40/50 with max w/c ratio 0.45, 360kg/m³ cement/combination content (III-A), with 20mm max. aggregate, chloride content class 0.4cl and minimum slump of class S3 (90mm Slump).
11. Insitu Concrete to be in accordance with BS 8110 & BS 8500-1.
12. Reinforcement to be Grade H 500N/mm² High Yield, Deformed Type 2 Bar detailed in accordance with BS 4449 and BS 8666.
13. Walls nominal 225mm thick, 50mm cover to bottom, sides and top.
14. Slab nominal 225mm thick, 50mm cover to bottom, sides and top.
15. Floor Classification to meet FM3 standard for Flatness and Level ±5mm. Construction tolerance to be in accordance with the NSCS for Building Structures.
16. Slab to have brushed finish to exposed surface and fair face shutter finish to sides.
17. Walls to have fair faced shuttered finish to sides and top.

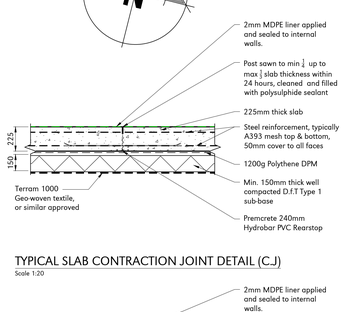
CONCRETE JOINT NOTES:

18. All joint dowel/reinforcement shall be set level and perpendicular to the joint face prior to casting. Damage or bent dowels are to be re-aligned or replaced prior to casting.
19. All formed joints are to be cleaned of concrete overruns to ensure accidental restraint is not created
20. All joints are to be sufficiently cured and cleaned of all contaminations prior to sealing.
21. All sealants are to be installed as per manufacturers specification and must be suitable for the joint type.

FOUNDATION NOTES:

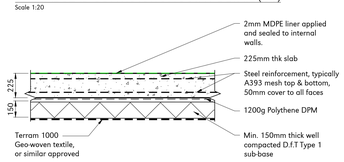
22. Assumed GBP value of 225kN/m² has been used. Value provided by O'Brien Moran Ltd, following an initial ground treatment Confirmation of minimum GBP of 225kN/m² required prior to construction.
23. Any soft spots or deleterious material is to be removed & taken down to virgin ground level & replaced with compact D.f.T Type 1 or suitable hogging material.
24. Overdig to be made up in compacted D.f.T. Type 1 or lean mix concrete.





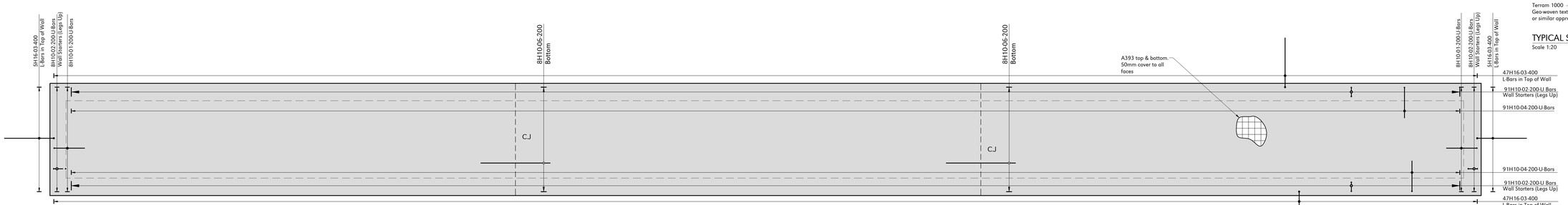
TYPICAL SLAB CONTRACTION JOINT DETAIL (C.J)

Scale 1:20



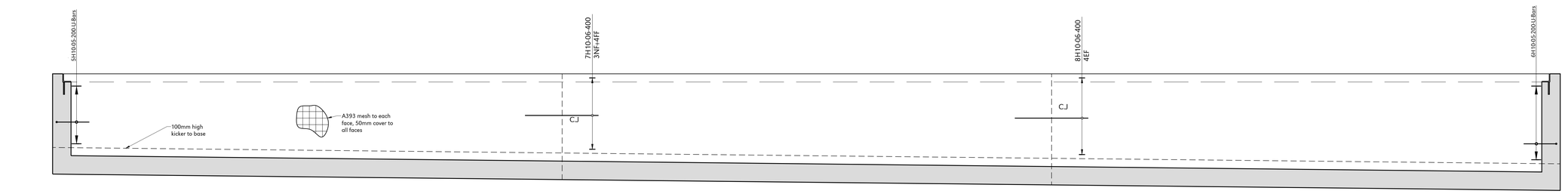
TYPICAL SLAB CONSTRUCTION

Scale 1:20



SLAB REINFORCEMENT PLAN

SCALE 1:20



ELEVATION 1 RC (2No. THUS)

SCALE 1:20

Reinforcement specification subject to final detailing. Bars only shown for provisional purposes.

APPROVAL & COMMENT

PROVISIONAL

Rev	Date	Chkd	Description
C	01-12-21	OAJ	Tank Design Amended
B	27-10-21	OAJ	Tank Design Amended
A	13-01-20	OAJ	Client Name Amended
0	10-01-20	OAJ	First Issue

plandescil
consulting engineers
Connaught Road Attleborough Norfolk NR17 2BW
Telephone: (01953) 452001 Fax: (01953) 456955
E-mail: pdc@plandescil.co.uk www.plandescil.co.uk
civil / structural / environmental / surveying

Client

Attleborough AD Plant Limited

Project

Attleborough AD Plant, Attleborough, Norfolk, NR17 1AE

Drawing Title

Leachate Tank GA & RC Details

Scale U.N.O.	Date	Drawn By
As Noted (A0)	January 2020	JHB

Drawing No.	Rev
24727/100	C

Appendix A – Environmental Risk Assessment

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
Local human population	Releases of particulate matter (dusts)	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Low	High	Medium	The entire site will benefit from an impermeable surface which will limit dust raising from vehicles. There will be a 5 mile per hour speed limit in place. The crop feedstocks will not be dry when taken out of the clamp however loose silage may dry. All waste will be stored and treated within the dedicated Reception Building which will have fast acting roller shutter doors and an air handling system. There is potential for exposure to anyone living close to the site. Crowshall Veterinary Services is the closest sensitive receptor and is located 64m away from the permitted boundary and 260m to	Ensure housekeeping schedule is adhered to therefore avoiding loose material around site. Enforce site speed limit.	Low

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
							the north-east of the centre of the site.		
Local human population	Releases of particulate matter (dusts)	Nuisance - dust on cars, clothing etc.	Air transport then deposition	Low	Medium	**Low**	As above	As above	**Low**
Local human population, livestock and wildlife.	Litter	Nuisance, loss of amenity and harm to animal health	Air transport then deposition	Medium	Medium	**Medium**	All waste storage and treatment will be carried out inside the Reception Building which will benefit from fast acting roller shutter doors. Very low risk of litter arising from Crop-AD. Local residents may be sensitive to litter. Crowshall Veterinary Services is the closest sensitive receptor, Crows Hall Veterinary Surgery and is located 64m away from the permitted boundary260m to the north-east of the centre of the site.	EMS procedures and staff training to ensure that roller shutter doors are only opened to allow vehicles in and out of Reception Building	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
Local human population	Waste, litter and mud on local roads	Nuisance, loss of amenity, road traffic accidents.	Vehicles entering and leaving site.	Low	Medium	Low	Mud is very unlikely because the entire site will benefit from an impermeable surface. All waste vehicles will be washed down prior to exiting the Reception Building. All vehicles delivering waste will be covered.	EMS procedures and staff training to ensure that vehicles delivering waste are washed down prior to leaving the Reception Building.	Low
Local human population.	Releases of NO2 and SO2, CO and Total Volatile Organic Compounds (VOC)	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Medium	High	Medium	There is potential for exposure to anyone living close to the site. Crowshall Veterinary Services is the closest sensitive receptor and is located 64m away from the permitted boundary and 260m to the north-east of the centre of the site. An Air Quality Impact Assessment (AQIA) has been carried out to assess the potential impact on human health from all point source emissions on site including the CHP, flares and back-up boiler.	Activities are managed and operated in accordance with a management system which includes inspection and maintenance of equipment, including engine management systems (under contract to GenV for CHP maintenance). Annual emissions testing in accordance with permit requirements and the Monitoring	Low

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
							The AQIA concludes that the long-term impacts at all human receptors can therefore be screened out as insignificant and there is no need for further assessment. Emission limits for stack gases are specified. Emission test results are within permitted limits.	Procedure **(ATT-SOP-04).** Operator to take action to reduce emissions as required. The activities are not carried out within an AQMA zone.	
Local human population.	Point source emissions to air	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Medium	High	**Medium**	As above	As above	**Low**
Local human population	Release of unburnt biogas	Harm to human health - respiratory irritation and illness. Release of potent climate change gases.	Air transport	Medium	High	**Medium**	Potential for release in emergency and maintenance via pressure relief valves (PRVs) and through fugitive emissions.	For both AD plants, the respective flares will automatically start to burn any excess biogas at a lower set pressure than that at which the PRVs will release therefore minimising release of unburnt biogas. Process monitoring is in place to ensure	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
								that under normal operating conditions gas pressures are controlled before the pressure is such that the flare ignites. Both flares are appropriately sized such that maximum gas production can be burnt if required. Continuous process monitoring and management of gas pressures reduce likelihood of excess biogas being produced. A leak detection and repair programme will be initiated.	
Local human population.	Release of microorganisms (bio-aerosols) (Crop-AD)	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Medium	High	**Medium**	There is potential for exposure to anyone living close to the site. Crowshall Veterinary Services is the closest sensitive receptor and is 64m from the permitted boundary	Keep face of silage clamps tidy in accordance with operational procedures	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
							and 260m to the north-east of the centre of the site Potential for release from silage clamps, during loading of crop feedstocks. There is a lower risk from the digestate separator fibre digestate storage (covered) and digestate lagoon (covered). Once feedstocks are loaded the treatment process is an enclosed system.		
Local human population.	Release of microorganisms (bio-aerosols) (Waste-AD)	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Low	High	**Medium**	There is potential for exposure to anyone living close to the site. Crowshall Veterinary Services is the closest sensitive receptor and is 64m from the permitted boundary and 260m to the north-east of the centre of the site. All feedstocks handling, digestate separation and fibre storage is carried out	Procedures in place to ensure that roller shutter doors are closed when not in use. Planned Preventative Maintenance of the CentriAir air handling system in accordance with EMS.	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
							within the Reception Building which benefits from an air handling system and fast acting roller shutter doors. Once feedstocks are loaded the treatment process is an enclosed system.		
Local human population	Scavenging animals	Harm to human health - from waste carried off site and faeces. Nuisance and loss of amenity.	Air transport and over land	Low	Medium	**Low**	Solid food waste may attract scavenging animals. Birds will not be attracted as all waste is stored and treated inside the dedicated Reception Building.	EVE will employ the services of a specialist pest control contractor who will carry out regular pest control inspections on site and control measures will be employed as required	**Low**
Local human population	Pests (e.g., flies)	Harm to human health, nuisance, loss of amenity	Air transport and over land	Low	Medium	**Low**	Permitted wastes may attract pests however contact is unlikely due to the storage and treatment of waste within the Reception Building.	As above	**Low**
Local human population and local environment	Flooding of site	If waste is washed off site, it may contaminate buildings / gardens / natural	Flood waters	Low	Medium	**Low**	The site is situated in a location which has a low probability of flooding.	No appropriate control measures are available to	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
		habitats downstream.						reduce risk of flooding.	
Local human population	Odour (Crop-AD)	Nuisance, loss of amenity	Air transport then inhalation.	Medium	Medium	**Medium**	Local residents often sensitive to odour. The nearest sensitive receptor is Crowshall Veterinary Services 64m away from the permitted boundary and 260m to the north-east of the centre of the site. Feedstock types/odours are typical to those already used on agricultural premises. The digestate separator is open.	An odour management plan is in place covering both plants. Procedures are in place to ensure that the silage clamp face will be kept tidy. Digestate fibre will fall from a covered chute into a covered trailer for storage prior to removal off site for storage prior to spreading. Process monitoring to ensure production of stable digestate with low odour potential.	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
Local human population	Odour (Waste-AD)	Nuisance, loss of amenity	Air transport then inhalation.	Medium	Medium	Medium	Local residents often sensitive to odour. The nearest sensitive receptor is Crowshall Veterinary Services 64m away from the permitted boundary and 260m to the north-east of the centre of the site. All waste handling, digestate separation and fibre storage is carried out within the Reception Building which benefits from an air handling system and fast acting roller shutter doors.	An odour management plan is in place covering both plants. Procedures in place to ensure rejection of highly odorous wastes and first in first out procedure for waste followed. Ensure planned preventative maintenance of CentriAir air handling and odour abatement system. Procedures to ensure that roller shutter doors are only opened to allow vehicles in and out of Reception Building. Process monitoring to ensure production of stable digestate with low odour potential.	Low

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
Local human population.	Noise and vibration.	Nuisance, loss of amenity, loss of sleep.	Noise through the air and vibration through the ground.	Medium	Medium	Medium	Local residents often sensitive to noise and vibration. The nearest sensitive receptor is Crowshall Veterinary Services 64m away from the permitted boundary and 260m to the north-east of the centre of the site. A Noise Impact Assessment has been carried out which concluded that the predicted the noise level contribution from the AD facility site on the nearest residential receptors, and with proposed operational parameters observed, will adhere to the low impact criteria set out in BS 4142 for weekday daytime, weekday night and weekend daytime hours between 07.00 and 23.00. Proposed site operational night-time hours of 23.00 to 07.00	Planned preventative maintenance programme in place for all equipment including the CHP and the dome fans which are potential sources of noise emissions. A noise and vibration management plan will be prepared if required	Low

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
							will result in one low to adverse impact at 'Arcadia' during the weekend night-time period, however with an increase of +3.6 dB above background level at this property, this magnitude of impact is considered within the limits of audible subjectivity. Operating hours are limited to 06:00 to 19:00, Monday to Sunday inclusive, thus avoiding night-time operations. The planning permission restricts deliveries or dispatch to: 07:30 - 19:30 during the period December to September. 06:00 – 22:00 Monday to Friday and 07:00 to 22:00 Saturday and Sunday during October / November.		

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
Local human population and / or livestock after gaining unauthorised access to the installation.	All on-site hazards: machinery.	Bodily injury.	Direct physical contact.	Low	Medium	Low	Direct physical contact is minimised by site security measures. Treatment equipment is contained within the Reception Building and the digestion vessels.	Activities are managed and operated in accordance with a management system includes site security measures to prevent unauthorised access.	Low
Local human population and local environment.	Arson and / or vandalism causing the release of polluting materials to air (smoke or fumes), water or land.	Respiratory irritation, illness and nuisance to local population. Injury to staff, fire fighters or arsonists/vandals. Pollution of water or land.	Air transport of smoke. Spillages and contaminated firewater by direct run-off from site and via surface water drains and ditches.	Medium	High	Medium	Although biogas is flammable, risk of direct physical contact is reduced by activity being carried out within enclosed systems. Security measures in place.	As above. An accident management plan forms part of management system (includes fire and spillages).	Low

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
Local human population and local environment.	Accidental explosion and fire causing the release of polluting materials to air (smoke or fumes), water or land.	Respiratory irritation, illness and nuisance to local population. Injury to staff, fire fighters or arsonists/vandals. Pollution of water or land.	Air transport. Spillages and digestate direct run-off from site and via surface water drains and ditches.	Low	High	Medium	Unlikely to happen - reduced by effective management systems. Secondary containment to CIRIA C736 standard will be in place around both AD plants.	DSEAR assessment has been carried out. Appropriate controls in place to reduce explosion risk. An accident management plan is plan forms part of management system (includes fire and spillages)	Low
Local human population and local environment.	Accidental fire causing the release of polluting materials to air (smoke or fumes), water or land.	Respiratory irritation, illness and nuisance to local population. Injury to staff or fire fighters. Pollution of water or land.	As above.	Low	High	Medium	Risk of accidental combustion of feedstocks is low due to nature of feedstocks. Small risk of fire from spent carbon. This is taken off site immediately.	As above	Low

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
All surface waters close to and downstream of site.	Spillage of liquids, including oil.	Acute effects: fish kill.	Direct run-off from site across ground surface, via surface water drains, ditches etc.	Low	High	Medium	Potential for spillage from digestions tanks and storage vessels. The site is in close proximity to watercourses. Digestion tanks built to appropriate standard. Secondary containment to CIRIA C736 standard will be in place around both AD plants.	No point source emissions to water. All biogas condensate is discharged into a sealed drainage system. Feedstocks stored on concrete within dirty water drainage area. All staff and contractors are trained in the site written accident management plan and spillage procedures.	Low
All surface waters close to and downstream of site.	As above	Chronic effects: deterioration of water quality.	As above. Indirect run-off via the soil layer.	Low	High	Medium	As above	As above	Low
Abstraction from watercourse downstream of facility (for agricultural or potable use).	As above	Acute effects, closure of abstraction intakes.	Direct run-off from site across ground surface, via surface water drains, ditches etc. then abstraction.	Low	High	Medium	Watercourse must have medium / high flow for abstraction to be permitted, which will dilute contaminated run-off.	As above	Low

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
Groundwater	As above	Chronic effects: contamination of groundwater, requiring treatment of water or closure of borehole.	Transport through soil/groundwater then extraction at borehole.	Low	High	Medium	Potential for spillage from digestions tanks and storage vessels. Secondary containment to CIRIA C736 standard will be in place around both AD plant. The site is not located within a Groundwater Source Protection Zone nor within a Drinking Water Protected Area or Safeguard Zone. However, the site is situated upon a Secondary A superficial aquifer and a principal bedrock aquifer. Groundwater vulnerability is classified as medium. Underground pipework avoided except one run which benefits from pipe in pipe design and leak detection. The leachate tank is below ground but has been constructed to withstand degradation	As above. Leak detection for underground pipe run and leachate tank part of planned preventative maintenance programme.	Low

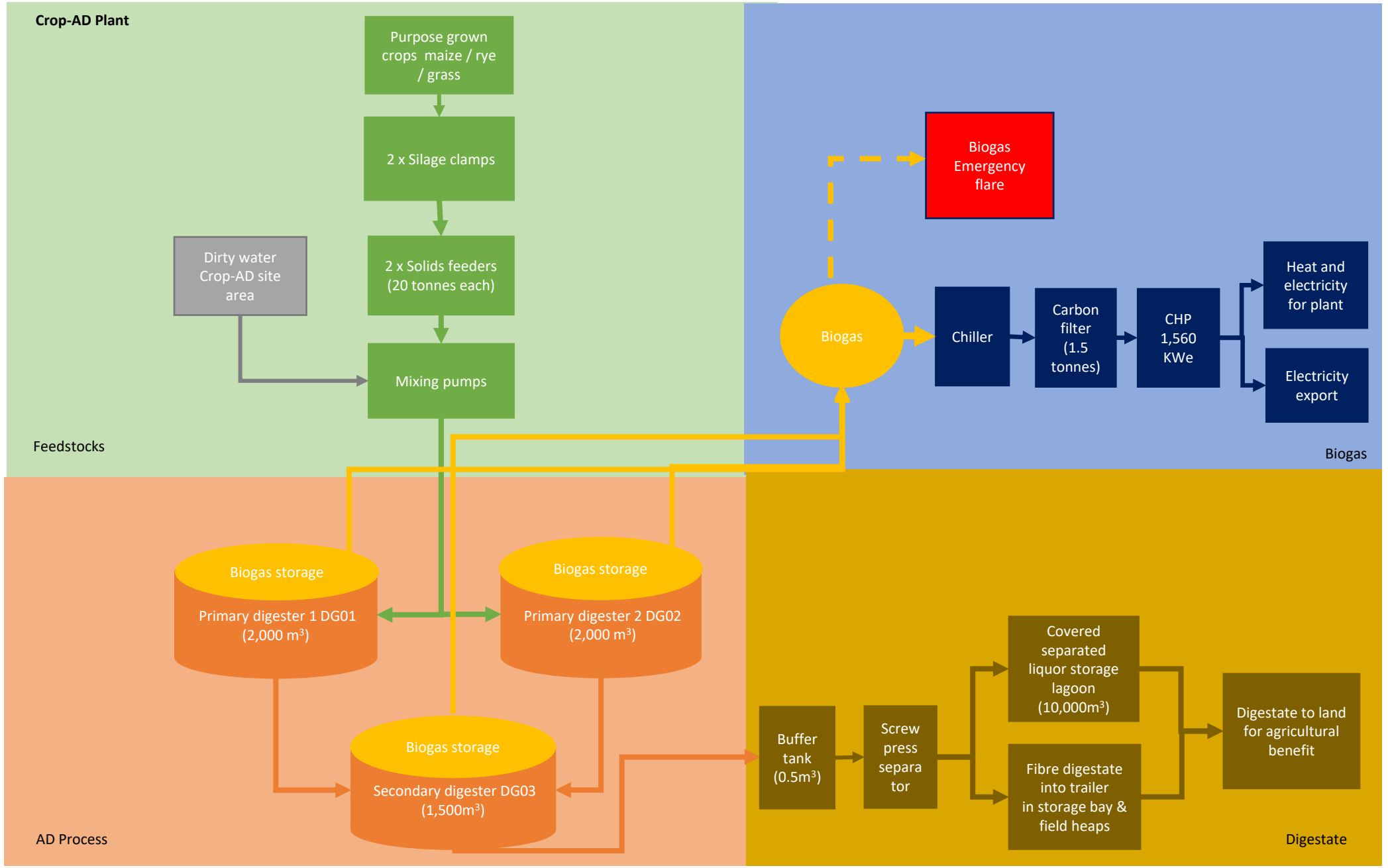
Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
							and benefits from leak detection.		
Protected nature conservation sites - European sites and SSSIs.	Any, but principally NOx.	Harm to protected site through toxic contamination, nutrient enrichment, disturbance etc.	Any	Low	Medium	**Low**	Emissions to air may cause harm to and deterioration of nature conservation sites. The closest offsite designated environmentally sensitive receptor is Swangey Fens Site of Special Scientific Interest (SSSi) and Norfolk Valley Fens Special Area of Conservation 2.7 km southwest of the site. At 500 metres or above, the potential hazards from the permitted activities pose a low risk to the broad sensitivity of species and habitats groups present at these designated sensitive receptors. An Air Quality Impact Assessment (AQIA) has been carried out to assess the potential impact on ecological	Activities are managed and operated in accordance with a management system which includes inspection and maintenance of equipment, including engine management systems (under contract to GenV for CHP maintenance). Annual emissions testing in accordance with permit requirements and the Monitoring Procedure **(ATT-SOP-04)**. Operator to take action to reduce emissions as required.	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management?**
							receptors from all point source emissions on site including the CHP, flares and back-up boiler. The AQIA concludes that while the Predicted environmental concentration for ammonia concentration and the Critical load for acid deposition are exceeded at all the ecological receptors, the exceedances are due to existing high background levels and would not be due to the Site operation which will comply with BAT. The only emissions to water from the site are rainwater and therefore no further assessment of impacts of emissions to water upon designated sites is deemed appropriate.		

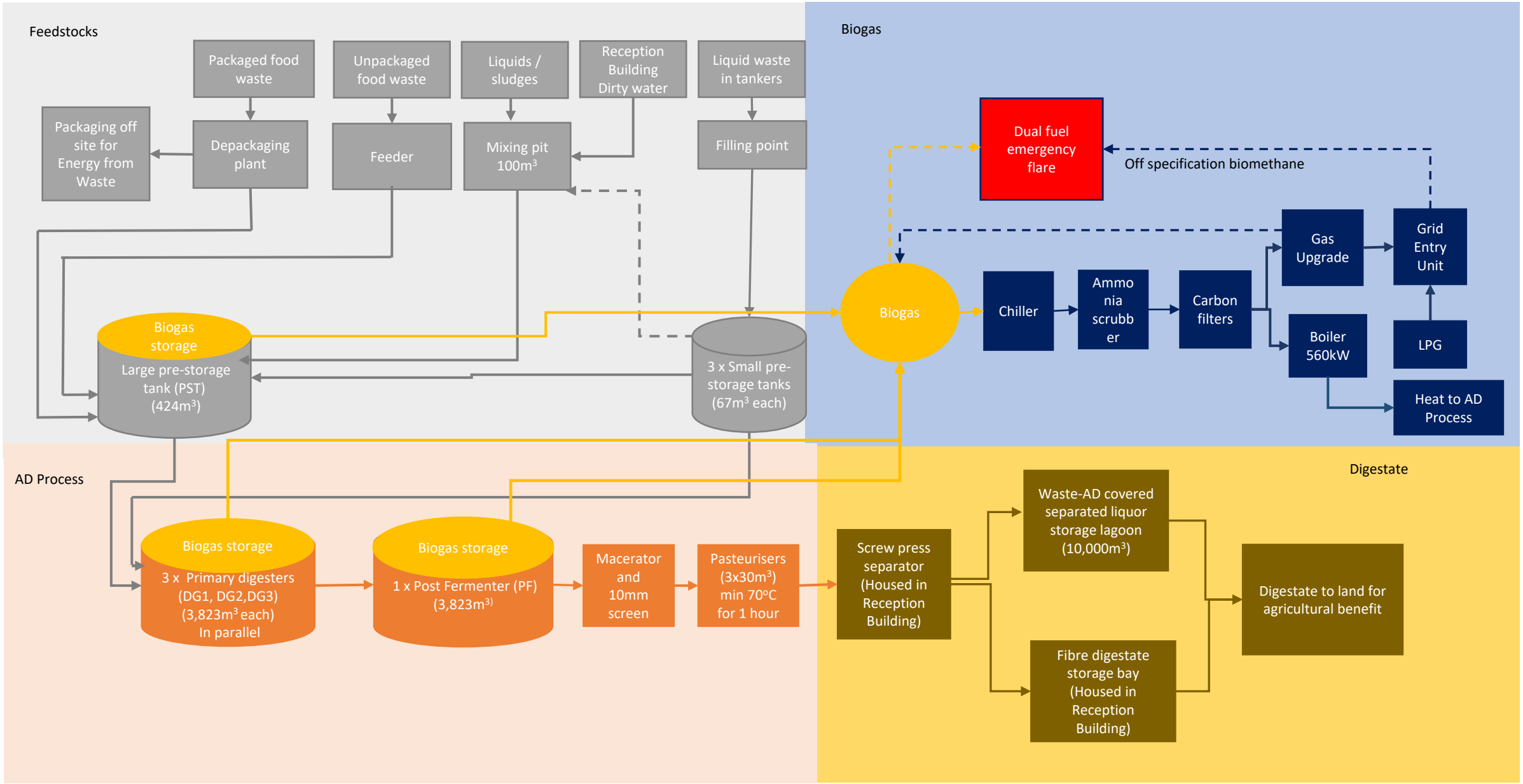
Magnitude of Risk	Consequence		
Probability of Exposure	**Low**	**Medium**	**High**
Low	**Very Low**	**Low**	**Medium**
Medium	**Low**	**Medium**	**Medium**
High	**Medium**	**Medium**	**High**

Appendix B - Process Flow Diagram

Attleborough AD Plant, Process Flow Diagrams (ATT-OD-03) V2.0

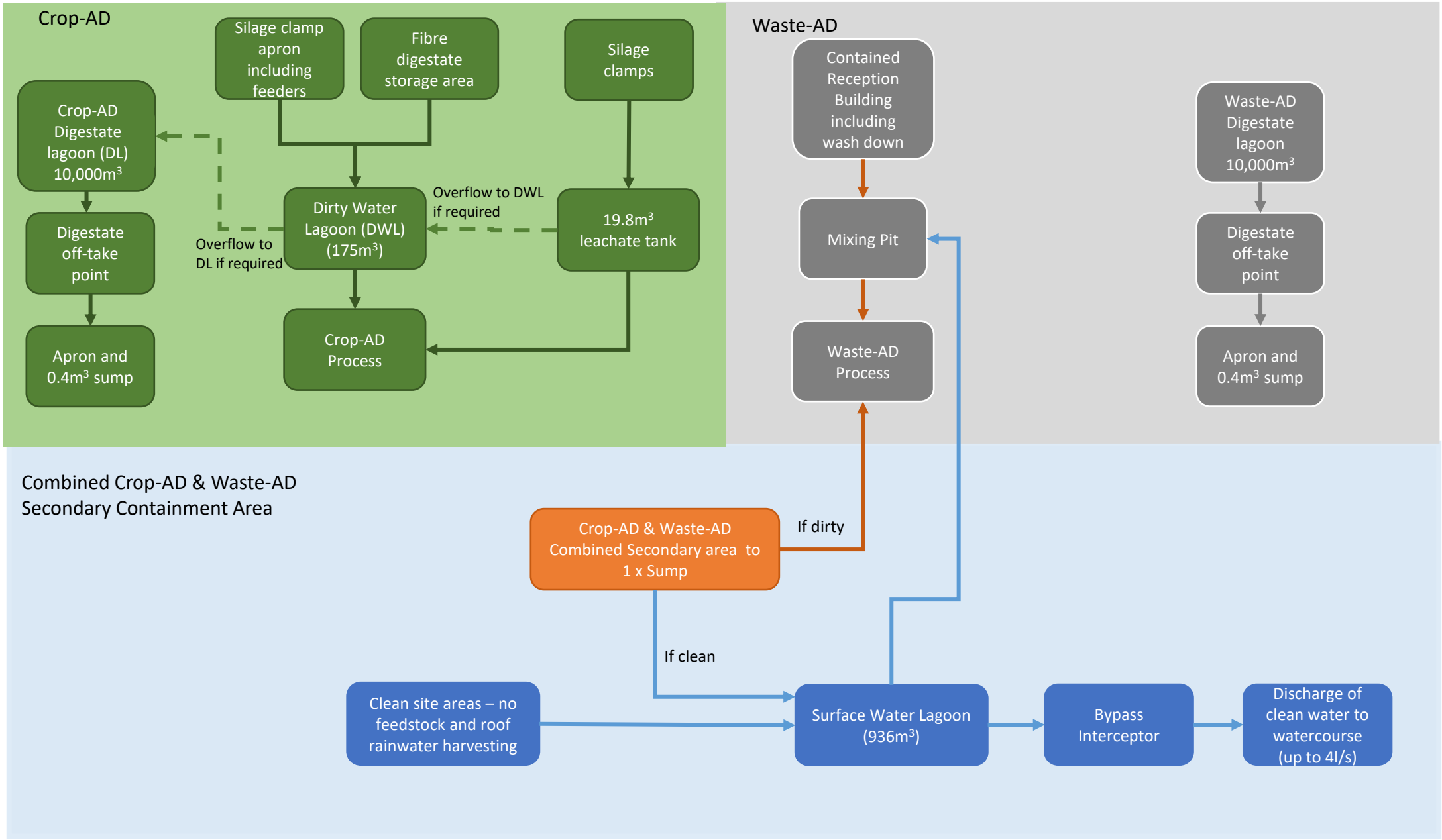


Waste-AD Plant

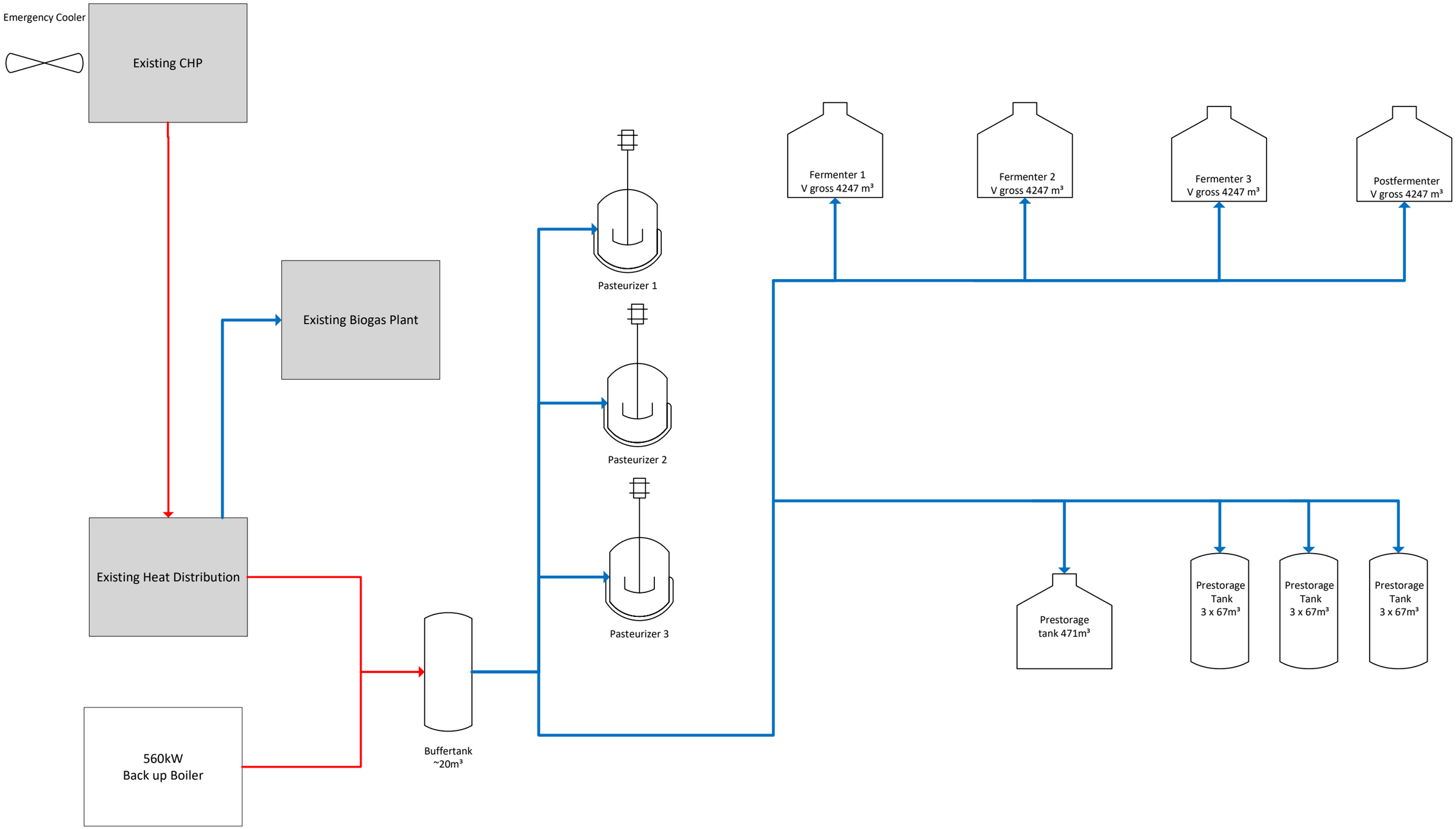


Appendix C – Drainage Process Flow Diagram

ATT-OD-02 Attleborough AD, Drainage Process Flow Diagram V1.1



Appendix D - Heating Process Flow Diagram



			date:	31.05.2021	project: Attleborough	BIOCONSTRUCT	page discription: PFD Heating System	project number: X	
			reviser:	AF					
			tested:					project:	blade: 1
modification:	date:	name:							total: 1

Appendix E - Gas Block Diagram

Block Diagram
Attleborough
01.06.2021

New biogas plant

Cooling

Biogas
Max 1645 Nm³/h

H2S & VOC
Removal

Boiler
560 kW

Biogas
Max 100 Nm³/h

condensate pit

Biogas
T=10-25 °C
Max 1545 Nm³/h
CH4 min: 60 Vol %

Flare

Gas Upgrading
Unit

Existing – not in scope of Bioconstruct

Existing CHP

cooling &
cleaning

existing
Biogasplant

Biomethane
Max 1000Scm/h
p=100 mbar
Minimum CV = 36 MJ/m³

BioConstruct

Customer

DN100 PN16

Customer

BioConstruct

DN50 PN16

LPG

Orbital

Grid

Biomethane
Max 1000 Scm/h

Appendix F – Staff Organogram

Attleborough AD
Staff Organogram - ATT-OD-10