Site Capacity Assessment

GWE Biogas Permit Variation

Report produced for GWE Biogas Ltd

Provided by Walker Resource Management Ltd (WRM)

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Author	John Cordall
Reviewer	James Hay

Version No.	Date	Description of change
0.1	25/10/2022	Initial draft
0.2	31/10/2022	Internal review
0.3	12/05/2023	Reformatting and recalculating AD capacity
0.4	25/08/2023	Second internal review
1.0	25/08/2023	First Issue

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1.0 INTRODUCTION

GWE Biogas Ltd (hereon referred to as 'GWE') operates an Anaerobic Digestion (AD) facility located at Sandhill, Driffield. The facility processes a combination of feedstock material including liquid, solid and solid (clean) biodegradable waste streams through the AD process and use the subsequently produced biogas for injection into the gas grid and for powering the on-site CHP units. The facility produces separated fibre and liquid digestate for use as organic fertiliser on farmland.

GWE is seeking permission to vary their existing bespoke permit to incorporate the following changes:

- To construct an Agricultural Silage Clamp;
- To construct and operate two additional primary digesters, D6 and D7;
- To install an additional low temperature flare and desulphurisation plant;
- To install vehicle refuelling equipment;
- To install a Modular Carbon Capture and upgrade System (CCUS) including storage; and,
- To increase the site's maximum throughput to 211,000 tonnes per annum (tpa).

GWE will operate the Anaerobic Digestion activity with the capacity to treat up to 211,000 tonnes per annum of the permitted waste materials at the facility (Table 1).

Table 1 - Process Summary

Process Type	Stage	Annual Receipt
Anaerobic Digestion	Anaerobic digestion of non-hazardous organic waste	211,000 tpa

1.1 Demonstrating Operational Capacity

This document sets out the site operational capacity and infrastructure in order to demonstrate adequate capacity to process the annual tonnage of material proposed to be treated at the facility. This will consist of an assessment of the AD design capacity.

2.0 AD DESIGN & ASSESSMENT

The following section outlines the designed capacity of the AD system against the proposed annual tonnage allowance for material reception and treatment.

2.1 Waste Reception

All incoming vehicles delivering feedstock will enter via the existing site entrance, and report to the weighbridge. The site can receive waste Monday to Saturday. This provides 280 days of waste receipt (excluding Sundays and Bank Holidays). However, given that the digestion process is continual, material can be held in process 365 days per annum. Wastewater from the adjacent vegetable processing and freezing plant is piped underground to the GWE Biogas site so can be accepted as required.

2.2 AD Design Capacity

The facility consists of seven primary digester tanks and one secondary digestion dual purpose tank. The digestors are split into the dirty processing line and the clean processing line.

Digesters D3, D4, D5, D7 and the secondary dual-purpose tank process packaged materials (dirty processing line); and digestors D1, D2 and D6 process unpackaged materials (clean processing line).

Two of the seven primaries (D1 and D2) have fill volumes of 3,000m^3 each. The dual-purpose secondary tank has a maximum fill volume of 2,500m^3.

D3 and D4 have fill volumes of 4,000m^3 each, D5 has a fill volume of 5,500m^3, and the new digesters (D6 and D7), have a fill volume of 4,700m^{3}each. This equates to a volumetric capacity of:

- 20,700m^3 (dirty processing line); and,
- 10,700m^3 (clean processing line).

Therefore, the total digestion volumetric capacity at any time is 31,400m^3 of feedstock materials.

Given the composition of the substrate, a ratio of 1m^3 to 1 tonne has been applied and has been taken forward into the treatment capacity calculations.

2.3 AD Capacity Assessment

A calculation is provided below demonstrating the maximum capacity of material that could be treated per annum based upon the overall system design. This assessment has been split into two separate calculations, as follows:

- 20,700 tonnes (dirty processing line) cumulative capacity of D3, D4, D5, D7 and the secondary dual-purpose tank / 52-day retention time = ~398.1 tonnes per day.
- ~398.1 tonnes per day * 365 = **145,298** tonnes per annum.

- 10,700 tonnes (clean processing line) cumulative capacity of D1, D2 and D6/ 59-day retention time = 181.4 tonnes per day.
- 181.4 tonnes per day * 365 = **66,211** tonnes per annum.

The overall assessment therefore identifies that the AD operation is able to treat a straight-line throughput at maximum capacity in any given year of c. 211,509tpa, provided the two retention times above are maintained. The designed capacity is therefore considered appropriate for the proposed annual tonnage receipt of 211,000tpa.

3.0 STORAGE AT ANY ONE TIME

The total theoretical amount of material to be held on site at any one time is outlined below. This includes material at all stages of the process from reception, temporary storage awaiting processing and digestate storage after processing.

- The intake reception tanks can hold 430 tonnes of feedstock material at maximum.
- The reception hall can hold 250 tonnes of food waste material at maximum.
- The reception hall will hold 250 tonnes of clean food waste at maximum.
- The buffer/hydrolysis tank can hold 560 tonnes of feedstock material at maximum.
- The original pasteurisation tanks can hold 42 tonnes of feedstock material at maximum.
- The newer pasteurisation tanks can hold 30 tonnes of feedstock material at maximum.
- The primary digesters can hold 28,900 tonnes of feedstock material at maximum.
- The secondary digester can hold 2,500 tonnes of feedstock material at maximum.
- The lagoon on site can hold 40,000 tonnes of wastewater from the pea washing process at maximum.

The theoretical maximum amount of material which can be stored on site at any one time is therefore 72,962 tonnes.

3.1 Vehicle Movements

There will be an increase in vehicle movements on site as a result of the increased annual throughput. The site currently has no issue in dealing with the current level of movements so GWE should experience no problems in relation to vehicle movements.

18 Manor Square, Otley, LS21 3AY

01943 468138
www.wrm-ltd.co.uk

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