

DESIGN AND ACCESS STATEMENT

Proposed De-Sulphurization Tank

at

**ROTHWELL LODGE FARM
ROTHWELL ROAD
KETTERING**

For





Report Status

4.6.2013 – Planning Submission issue

13.6.2013 - Rev A; Planning Policy Statement added

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1. PROJECT DESCRIPTION

1.01 This application relates to the proposed construction of an additional de-sulphurizing tank at an established segregated food waste Anaerobic Digestion Plant. The application proposes the installation of an additional 12m high cylindrical tank, which will clean biogas produced by the digester tank before being piped to the CHP which ultimately generates electricity

1.02 DEFINITION AND OVERVIEW OF THE PROCESS

Anaerobic digestion (AD) is a process in which micro-organisms break down bio-degradable material in the absence of oxygen. The products of the process are biogas (a mixture of approximately 60% methane, carbon dioxide and traces of other gases such as hydrogen sulphide) and digestate.

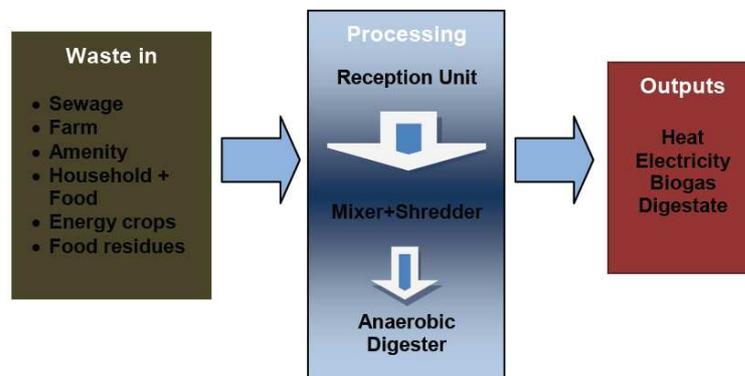


Figure 1 – The Anaerobic Digestion process

Anaerobic digestion takes place in a warmed sealed container which creates ideal conditions for the bacteria to ferment the organic material. The process can be undertaken at two different types of temperature range mesophilic and thermophilic with advantages and disadvantages for each type.

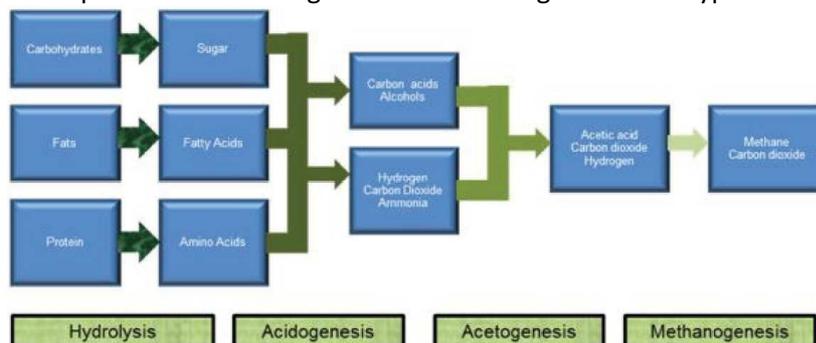


Figure 2 – The four stages of Anaerobic Digestion

Anaerobic digestion is a four stage process. During hydrolysis, the organic waste is broken down into simple low molecular weight compounds by enzymes. Through

acidogenesis, these are then fermented into volatile fatty acids (VFAs), and organic acids. During the third process of acetogenesis, the VFAs are broken down into acetic acid, carbon dioxide and ammonia. In the fourth stage of methanogenesis the bacteria produce biogas and have an optimum pH range of 7.0-7.5.

1.03 ANAEROBIC DIGESTION TECHNOLOGY IN THE UK

The UK trails behind the rest of Europe in its development of AD technology. Sweden and Denmark currently have well developed infrastructure allowing biogas to be pumped to a central processing area where the biogas can be used as a transport fuel. Germany has been leading Europe with the development of renewable energy technologies since the 1980s and by 2012 will boast over 7000 AD plants.

Due to the implementation of the Renewable Energy Directive whereby the UK has to produce 15% of its energy from renewable sources by 2020, the UK government is now investing in such technologies. 2010 saw the introduction of the Feed In tariff and 2011 the Renewable Heat Incentive.

2. Historical Context of Grange Farm / Proposed Diversification

2.01 Planning Context

NCC - 11/00067/WAS- *Variation of condition 3 of planning permission
10/00076/WAS to increase total annual throughput to
49,000 tonnes per annum*

KBC - KET/2011/0657

NCC - 11/00066/WAS- *Erection of new digester tank and plastics recycling building*
KBC - KET/2011/0656

NCC - 10/00076/WAS- *Variation of planning permission 09/00033/WAS to remove
condition 16*

KBC - KET/2010/0751

NCC - 09/00033/WAS- *Anaerobic digestion plant*

KBC - KET/2009/0295

DESIGN

3. SITE CONTEXT

- 3.01 The existing site is located within the site curtilage of a working farm known as Rothwell Lodge Farm. It is located directly off Junction 5 of the A14 trunk road. The dedicated access road loops round to the farmyard access and the site is located immediately west of the site entrance.



Anaerobic Digestion Plant during construction - 2010

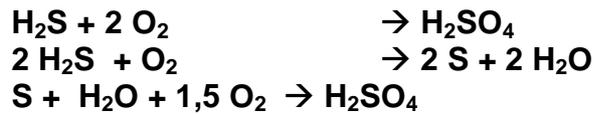
- 3.02 Under Environmental Permitting Regulations the existing tanks are located within a protection bund. Within this bund the main Digesters, Digestate storage tank, feedstock buffer storage tanks, and de-sulphurization equipment are located as detailed below. This equipment was designed, supplied and installed by the original technology provider – Weltec Biopower



- 3.03 De-sulphurization is a pre-treatment process that removes hydrogen sulphide (H₂S) from the biogas produced in the Anaerobic Digestion biological process. Not only does its removal assist in the smooth running of the CHP engine and reduces servicing costs, but it also assists with odour control.
- 3.04 As referred to in paragraph 3.02 the plant already makes provision for de-sulphurization, but the equipment provided was the standard solution provided by Weltec Biopower. The current cleaning process utilises activated carbon to remove H₂S. Fernbrook Bio Ltd has made continuous attempts to strive to enhance the performance of the Anaerobic Digestion facility from an environmental perspective. They have spent considerable time in researching an improved solution for removing hydrogen sulphide from the Biogas produced on site and this application supports the structure that will be required to enable this improved process to take place.

4 RESPONSE TO SITE / BUILDING DESIGN STRATEGY AND BUILDING FORM

4.01 This application proposes the installation of a single 3m diameter Polypropylene tank structure 12m tall, which is capped with a conical roof. The tank structure is filled with approximately 75m³ of pall rings. The bio bed reactor plant is inoculated with selected micro-organisms which are immobilised on the filling material within the tank. Micro-organisms of the Thiobacillus (e.g. Thiooxidans) type are used. These bacteria are chemolithotrophs and use carbon dioxide as their carbon source. Their metabolism degradation can be represented generally by the following equations:



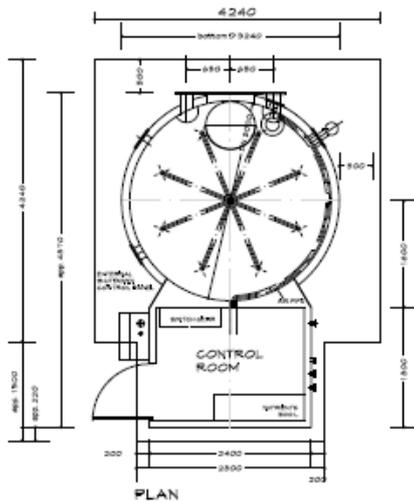
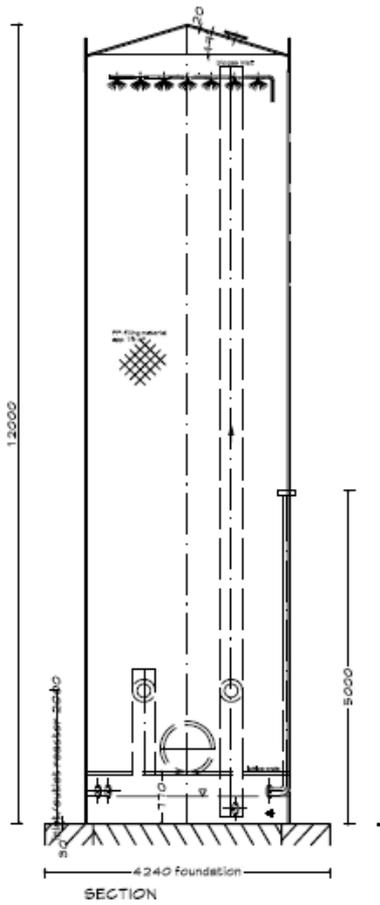
Oxygen in the form of air is needed for this. The addition is regulated via biogas volume flow, which is controlled from the control panel in the roof adjoining the main tank.



Example of Pall Rings

Air is provided by a fan, which can be controlled by frequency with a frequency converter.

A stable thermal environment needs to be maintained within the tanks and this is enabled through waste heat from the AD Plant CHP. The tempering is through heating coils made of synthetic material in the container. A heating pump and a magnetic ventilator are also provided within the tank.



Details of tank

- 4.02 The application site area is 0.07 hectares.
- 4.03 The amount of development involves the construction of a concrete base to support a 3m diameter x 12m high polypropylene tank structure and control room.

5. PLANNING CONSIDERATIONS

5.01 TRANSPORT

The tank and control room are pre-fabricated off site and delivered complete. Only 2 HGV movements are anticipated to facilitate the construction of the de-sulphurization plant. Thereafter access is only required for routine maintenance.

5.02 NOISE

There are few moving parts associated with the de-sulphurization tank. Paragraph 4.01 describes the process and indicates that the tank will contain a fan and a pump which will generate noise. However in the context of the working AD plant the additional noise output is minimal and it must be recognised that any noise generation is minimal in the context of equipment being located in close proximity to the A14. Condition 11 of the original planning permission already controls noise pollution and stipulates:-

“The noise at the nearest residential properties should not breach background levels by more than 5dB(A) when measures as a 15 minute LAeq or exceed 5LA(MAX) above 82 dB(A) in any one hour period and, except as may otherwise be agreed in writing by the Waste Planning Authority in consultation with the Environmental Protection Officers at the Local District Councils”.

It is therefore argued that no further controls are required as a result of this minor development.

5.03 ODOUR

There are currently no statutory standards in the UK covering the release and subsequent impacts of odours. This is due to complexities involved with measuring and assessing odours against compliance criteria, and the inherent subjective nature of odours. It is recognised that odours have the potential to pose a nuisance for residents living near to an offensive source of odour. Determination of whether or not an odour constitutes a statutory nuisance in these cases is usually the responsibility of the local planning authority or the Environment Agency. The Environmental Protection Act 1990 (EPA, 1990) outlines that a local authority can require measures to be taken where any:

“dust, steam, smell or other effluvia arising on an industrial, trade and business premises and being prejudicial to health or a nuisance...” or

“fumes or gases are emitted from premises so as to be prejudicial to health or cause a nuisance..”

The Environment Agency has produced new horizontal guidance on odour assessment and management, H4 (Environment Agency, 2011). The H4 guidance document is primarily aimed at process operators looking to control and manage the release of odours, but also contains a series of recommended assessment methods.

Defra released Odour Guidance for Local Authorities in March 2010 (Defra, 2010). This is a reference document aimed at environmental health practitioners and other professionals engaged in preventing, investigating and managing odours. The purpose of the guide is:

“...to support local authorities in their regulatory roles in preventing, regulating and controlling odours...”

It states that the Local Authority is required to establish whether the odour is prejudicial to human health or a nuisance. Conditions where an average person would experience interferences with their personal comfort can be classified as a statutory nuisance. Both residential and business properties are applicable, and the exposure can include visitors to a premises. In order to prove prejudice to human health, convincing scientific evidence is required. As such evidence is rarely available, proceeding as a nuisance case is more likely, and better reflects the reality of the situation. In this particular instance the Anaerobic Digestion Plant is regularly monitored for air quality by Environmental Health / the Environment Agency. Controls are already in place and the application documents have already stated that the installation of the de-sulphurization plant will improve the potential for odour removal as the plant will have the ability to remove hydrogen sulphide more efficiently from the Biogas.

5.04 Construction Impacts

The proposal will only involve minor construction works of re-routing pipework and the placing of a small area of concrete for the base of the new tank. The tank structure itself is pre-fabricated and the proposal will have virtually no impact on its immediate neighbours.

ACCESS

6 STATEMENT

- 6.01 No buildings are proposed as a result of this planning application and therefore Disabled Access provision is not appropriate.
- 6.02 Vehicular site access as a result of the proposal is limited to the general construction activities of relocating pipework and placing a small area of concrete slab along with handling the placement of the prefabricated tank. The proposal will have no significant impact on the local highway network.

7 CONCLUSION

- 7.01 The proposal would produce no significant transport or noise issues. Odour control would be improved as a result of the proposal. The proposal will therefore provide an improvement to the operation of an existing Anaerobic Digestion plant and should be supported.

PLANNING STATEMENT

8. BACKGROUND

- 8.01 The following planning statement has been prepared in support of this planning application for installation of a replacement de-sulphurization tank at the working segregated food waste anaerobic digestion plant at Rothwell Lodge Farm.
- 8.02 The statement assesses the planning policy framework and its interpretation in relation to the proposed development. It addresses matters of policy principle only: detailed policy matters such as those relating to design are addressed in the main section of the Design & Access Statement.
- 8.03 Section 38(6) of the Planning and Compulsory Purchase Act 2004 requires that planning applications are decided in accordance with the development plan unless material considerations indicate otherwise. The development plan in this case currently comprises the East Midlands Regional Plan, Northamptonshire Core Strategy (minerals and waste development framework) and the Northamptonshire Control and Management of Development DPD. However the Regional Plan has recently been revoked and therefore we do not have regard to it in this statement. The Control and Management of Development DPD is more focussed towards the overall strategy of waste and minerals development. Although this application is part of an existing waste facility the application is only concerned with a re-placement element of the overall process. This document is not therefore considered relevant to the application.
- 8.04 The National Planning Policy Framework is not considered relevant to this application. Whilst the NPPF is supportive of the principle of renewable energy this particular application is submitted for a replacement de-sulphurization process, which forms but a small part of the overall anaerobic digestion process.

9. POLICY

- 9.01 **Policy CS9 – Encouraging Sustainable Transport Movements**
The document has previously described that Biogas needs to be cleaned prior to be used as the fuel source for powering the CHP engine. The reasons for this are two-fold. Firstly the gas needs to be cleaned to ensure the clean running of the engine, thereby reducing maintenance, and secondly the process removes odour. The current de-sulphurization plant utilises activated carbon to filter the gas. Fernbrook Bio are not satisfied with the performance of the filtration, and believe that it is contributing to unnecessary maintenance of the CHP. The activated carbon filtration also requires regular replacement. Maintenance of the CHP and replacement filters contribute to transportation movements to and from site. The proposal forming part of this application utilises a biological cleaning process. Overall transportation movements to the site will reduce as a result of reduced CHP maintenance and reduced need of maintenance / part replacement to the de-sulphurization equipment.

9.02 **Policy CS14: Addressing the impact of proposed minerals and waste development**

Since opening the Anaerobic Digestion plant at Rothwell Lodge Farm, Fernbrook Bio has actively co-operated and engaged with the public and Local Authorities. Whilst complications have been experienced there has always been a continuous drive to make improvements to the plant in order to ensure that the plant is a “good neighbour”. The proposed de-sulphurization plant forming part of this application will replace the existing installation, and it is believed will perform better in the removal of odour in the form of Hydrogen Sulphide (H₂S). It is a major investment on behalf of the company and will reduce the impact of the AD plant in the context of wider environment.

