Site:	Enfield Farm Ana	erobic Digester
TITLE:	Environment Manag	ement System
Doc Ref:	EC-EMS-E	
	•	
Site Address:	Enfield Farm	
	Oil Mill Lane, Clyst St. Mary	
	Exeter,	
	EX5 1AF	
Environmental Permit reference: E		PR/PP3903BY

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Acronyms

AD - Anaerobic Digestion

CHP - Combined Heat and Power Engine

EMS - Environment Management System

EWC code – European Waste Catalogue code (for waste)

IE – Ixora Energy

MCERTS - Environment Agency's Monitoring Certification Scheme

OMP - Odour Management Plan

PRV - Pressure Release Valve

PVC - Polyvinyl Chloride

SCADA - Supervisory Control and Data Acquisition (software application program for process control / the gathering of data in real time from remote locations in order to control equipment and conditions)

SSAFO - – The Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England) Regulations 2010 and as amended 2013.

WAMITAB - Waste Management Industry Training and Advisory Board

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1. Introduction

On 24th July 2014 East Devon District Council granted planning permission for the construction of an agricultural anaerobic digestion plant for the production of renewable energy at Enfield Farm, Clyst St Mary, Exeter – reference 14/0858/MFUL.

On 19th May 2015 IE Gorst Energy Ltd was issued with a Standard Rules Installation Environmental Permit (SR2012 number 9) for the purpose of operating an anaerobic digester plant at Enfield Farm, Oil Mill Lane, Clyst St Mary, Exeter EX5 1EL.

On 9th May 2017, a variation was issued which moved the site to a bespoke permit, incorporating 2 surface water discharges and the addition of Glycerol to the list of acceptable wastes. The permit was transferred to Gorst Energy Ltd on 4th December 2019.

Ixora Energy operate and maintain the plant under contract to and on behalf of Gorst Energy Ltd.

This Environment Management System has been written to determine the site-specific environmental risks from the Anaerobic Digestion plant at Enfield Farm and to detail how these risks will be minimised. This document reflects existing and proposed site activities. It is a live document that will be reviewed and amended as necessary.

2. Regulatory Controls

The site planning permission has conditions which are regulated through the Local Authority (East Devon District Council).

The Environmental Permit and any amenity issues are regulated by the Environment Agency. The Environmental Permit for the operation is issued under the Environmental Permitting Regulations 2010. As the plant has a treatment capacity in excess of 100 tonnes per day (waste and non- waste) inputs, the operation is also a 'listed activity' under the Industrial Emissions Directive and as such must comply with Best Available Techniques.

All waste entering and leaving the facility is subject to controls under Duty of Care legislation (Environment Protection Act 1990, Section 34).

The site will be subject to all Health and Safety regulation that covers industry from a national perspective and will endeavour to operate within the constraints of the said regulations.

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3. Site Location and Sensitivities

The site is:

- Not located on a groundwater aquifer
- In a groundwater Nitrate Vulnerable Zone
- In the Grindle Brook catchment a watercourse which is currently classified as having bad ecological status and good chemical status.
- There are no designated European habitats sites within the vicinity of the site
- Not in a flood zone
- Not in an Air Quality Management Area

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4. Site Activities

Overview

The purpose of the AD plant is:

- to manage waste arising from existing farm practices in a sustainable manner
- to produce renewable energy
- to produce digestate to be used as a fertiliser and soil conditioner on Enfield Farm and surrounding farms

The renewable energy produced is helping the UK to meet the 2020 emissions target of 10% of our primary energy needs coming from bioenergy.

The digestate produced is rich in valuable nutrients including nitrogen, potassium and phosphate, helping to increase crop yields. Digestate has several advantages over manure and slurry as the nutrients are more freely available to the crops and, because organic elements have been digested, it is more stable hence it is less odorous and less potentially polluting than manure and slurries. The use of digestate reduces the need for purchasing inorganic fertilisers, the manufacture of which is environmentally damaging.

The waste management operations undertaken at the site are classified as waste recovery operations by the Waste Framework Directive and are:

- Treatment of waste including mixing and maceration.
- Digestion of wastes including chemical addition
- Gas storage and drying
- Gas cleaning
- Treatment of digestate including pressing and drying
- The use of combustible gases produced as a by-product of the anaerobic digestion process as fuel
- Burning of biogas in gas engines
- Use of an auxiliary flare required only for short periods of breakdown or maintenance of the facility
- Use of pressure release valves to protect the integrity of the plant; not used routinely to vent unburnt biogas.

Anaerobic Digester

The anaerobic digester tank has a total maximum capacity of 10,204 m3. The digester tank uses power ring concept technology. This consists of two digesters; a primary digester or outer ring (6,753m3 capacity) and a secondary digester or inner ring (3,451m3). The system allows for the optimal agitation and mixing of the digesting material.

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Once in the primary digester, the substrate is stirred in the stirring channel in the same direction, (counter clockwise). The system ensures a temperature of 40 to 50 degrees Celsius is maintained.

The anaerobic digestion process is semi-continuous. Feedstock is fed into the digester when required via the feeding system attached externally to the primary digester tank. The feedstock will enter the secondary digester from the primary digester via an overflow. The hot water for the heat exchanger will be provided by the Combined Heat and Power (CHP) unit. Hot water is re-circulated through the heat exchanger via a dedicated circulation pump from the CHP hot water header.

Digester Mixing System

The stirrers for the digester tanks are placed on the digester roof. These consist of propeller mixers, distributed in such a way as to avoid "dead zones". This ensures that the substrate is mixed efficiently, and maximum biogas production is obtained.

Hydrogen Sulphide Removal

Biogas is cleaned in the digester head space by means of sulphate reducing bacteria. The bacteria require a source of oxygen, at low concentrations, to reduce hydrogen sulphide in the biogas to sulphur. The solid sulphur then precipitates out as part of the digestate. Air is injected into the head space of the digesters, at controlled, low concentrations, to provide suitable conditions for the bacteria to carry out this function.

Mechanical Press (separator)

The liquid digestate is moved from the secondary digester to the final storage tank storage via a Mechanical Press (or solids separator) and the pre-tank.

To prevent overfilling, there is a sensor in the final store. Once a level of 6,6meters is reached the pump at the pre-tank will stop pumping. Once the liquid within the pre-tank reaches 2.5 meters, the separator will shut off so that no more liquid enters the buffer tank. This is all controlled through the Scada system.

The mechanical press separates the fibre from the liquid digestate. The solid fraction of the digestate is discharged into the onsite digestate drier. Some digestate will remain unseparated.

Digestate drier

The drier is a continuous flow drier; and is similar in set up to a traditional agricultural grain drier, the main difference being that the hot air used as the drying 'media' is heated with a heat exchanger by hot water from the adjacent digester rather than by the use of imported oil or gas as the heating fuel.

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Storage Tank 1

During storage, the digestate is mixed by radial mixers in the storage tank to aid any final digestion and to prevent solids settlement.

The storage tank has a maximum capacity of 4,552m3.

Storage Tank 2

To accommodate for winter digestate storage and for contingency in case of unforeseen issues with storage tank 1, a second storage tank is in place. During storage, the digestate is mixed by radial mixers in the final storage tank to aid any final digestion and to prevent solids settlement.

The storage tank has a maximum capacity of 5,629m3.

Winter storage

The total on site storage is currently 10,181 tonnes. In addition to this, a purpose-built satellite store has been constructed nearby which can accommodate 9,000 tonnes.

The total storage available to us is therefore 19,181 tonnes which allows for 4 months of digestate storage. This allows some contingency in excess of the 3.5 months necessary to cover the NVZ closed period.

Gas Holders

Biogas generated as a product of the AD process flows from the sealed primary and secondary digesters and the storage tanks to the integral gas holders on top of the storage tanks.

The gas holders consist of double-membranes. Both the inner and outer membranes are fabricated from PVC-coated polyester fabric. The outer membrane is permanently inflated, using an air blower, to maintain a positive pressure on the inner membrane. The inner membrane provides containment for the biogas and will inflate or deflate according to biogas production and demand. A level controller is installed to control the operation of the CHP unit, surplus gas burner and gas mixing system.

Digestate is held in the storage tanks before being tankered out to be spread to land or sent to satellite storage. For those tankers without integrated treatment for displaced air, the tanker is connected to an existing mobile carbon-based odour abatement unit.

Pressure and Vacuum Release Valves

The plant is equipped with a pressure release system which, during the unlikely event of excess gas build up, will allow for the excess biogas to be released. Such an occurrence would

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only take place should all alternatives be unavailable. On and around the digester there are three types of pressure release valves.

- 1- At the connection between the digester and the final storage tanks there is a pressure release valve which will release at 7.5mBar pressure.
- 2- The digester has two pressure release valves; one for primary digester and one for the secondary digester, there is water safety valve inside max pressure/vacuum protection is set up at 30-35mBar.
- 3- In addition, the digester has his own extra emergency openings on top of the roof again one for the primary digester and one for the secondary digester, set up at100mBar for foam.

The pressure release valves operate as both an overpressure and an under-pressure safety feature. The under-pressure feature will be enabled once a negative pressure is present within the digesters. During normal operating circumstances the pressure relief valve will not be used. The pressure and vacuum release valves will only be used as a contingency to maintain structural integrity of the plant.

Combined Heat and Power (CHP) Unit

The biogas will be upgraded and exported to the grid, while one 500 kW CHP unit on site will also be utilised to power the site.

In the event of CHP plant shut down (e.g. for maintenance operations) the biogas is diverted to a gas flare, which will only be operated in compliance with the permit conditions.

Control System

The operation of the biogas plant is fully automated from an on-site SCADA System, with a central control panel, which monitors information transmitted from field instrumentation around the plant. This information can be viewed on site and remotely. IE and Biogest can provide a remote monitoring service via an internet connection as a back-up to site-based operators; advice is given over the telephone to ensure optimisation of the AD process.

5. Energy and Raw Material Usage

Energy Efficiency

Appropriate measures are taken to ensure the efficient use of energy. As much as possible, heat and electricity are provided by the CHPs on site from the biogas produced in the AD process. This limits the amount of energy imported to the site.

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All heat and power provided by the CHPs is either used on site to power the plant or is exported to the grid, ensuring there is no wastage. All plant is serviced in line with manufacturers' requirements to ensure optimal performance and energy usage as a result.

In terms of improving energy efficiency, at the end of each year, energy input figures are checked to ensure that import figures are not increasing and that we are not importing more electricity from the grid than is necessary, given the presence of the CHPs on site.

Raw Materials

Appropriate measures are taken to ensure the efficient use of raw materials and water on site. Appendix C is our raw materials inventory which shows the quantities of various materials are consumed by the plant.

The raw materials inventory is checked each year but does not vary a great deal given that the plant has specific capacities.

Water is in part provided by a borehole and consumption by the plant is recorded annually. In reality, very little is used as the site benefits from a surface water lagoon. Water from the surface water lagoon is incorporated into the diet of the plant.

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6. Feedstocks

The total quantity of waste or a combination of waste and non-waste including solids and liquids accepted at the site amounts to approximately 67,000 tonnes a year and will exceed 100 tonnes per day. This is split fairly equally between waste and non-waste feedstocks – around 31,000 tonnes of waste and 36,000 tonnes crop and other non-waste inputs.

The AD plant currently uses the following feedstocks. If the feedstock is classified as a waste, then the European Waste Catalogue (EWC) code is put in brackets after the waste type description.

Cow manure, poultry manure and slurry (02 01 06)
Crop residues (02 01 03)
Glycerol (19 02 10)
Maize silage (non-waste)
Agricultural and dairy by-products, e.g. Lactose, whey (non-waste)

All waste entering and leaving the facility is subject to controls under Duty of Care legislation. No wastes other than those listed in the permit detailed below shall be accepted on site.

Table S2.2 Permitted was	te types and quantities for anaerobic digestion
Maximum quantity	Annual throughput shall not exceed 7,000 tonnes
Waste code	Description
02	Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing
02 01	wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing
02 01 01	sludges from washing and cleaning – vegetables, fruit and other crops
02 01 03	plant tissue waste
02 01 06	animal faeces, urine and manure (including spoiled straw) only
02 05	wastes from the dairy products industry
02 05 01	materials unsuitable for consumption or processing
02 05 02	sludges from on-site effluent treatment
19	Wastes from waste management facilities, off-site waste water treatment plants and the preparation of water intended for human consumption and water for industrial use
19 02	wastes from physico/chemical treatments of waste (including dechromatation, decyanidation, neutralisation)
19 02 10	glycerol not designated as hazardous i.e. excludes EWC code 19 02 08

Unacceptable wastes which are inadvertently delivered to site will be returned to the waste producer or, if safe and practical to do so, separated from the waste to be treated and disposed of at an appropriately permitted facility. A record of any rejected wastes will be made. Waste producers shall also be contacted and notified that said wastes are not accepted at Gorst Energy Ltd.

Waste Acceptance, Control Procedures and Management

All wastes shall be received, inspected, accepted or rejected, and recorded in accordance with the standards specified below.

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Waste Pre-acceptance

The AD process requires specific wastes types, in particular those that are free of contaminants, and produce a good quality biogas. To achieve this, it is vital to secure feedstock by way of a formal contract. The contract is agreed following a visit to the feedstock provider to check the waste available. Waste is tested prior to any contract being set up to ensure that it is suitable for use in the AD. Once checked by a Technically Competent Manager against the permit conditions and other restrictions imposed on the AD site, a contract will be signed off and issued.

Feedstock being delivered to the site should be free of contaminants. The responsibility for confirming the quality of the waste will lie with the suppliers. All paperwork concerning the contents of the waste load will be made available to the operator prior to acceptance on site.

A suitably qualified sales person is in charge of setting up and arranging feedstock contracts. However, all finalising and contract confirmation will be carried out in association with a Technically Competent Manager.

All contracts relating to pre- acceptance will be stored and maintained on site for the cross-reference and verification at the waste acceptance stage.

Waste Acceptance

Wastes will be accepted during normal operating hours only.

All feedstock, except pig slurry which comes into site via a pipe, enters the site over a weighbridge. The tonnages, EWC Codes, Source and time of delivery of all materials entering and leaving site are logged.

The waste will only be accepted if there is enough storage on site as well as the site being adequately manned. Only prearranged deliveries will be accepted. Any unexpected deliveries will be rejected.

All loads being delivered to the site will undergo a visual inspection for contaminants and diversion away from contractually agreed waste types prior to acceptance and/or unloading on site. All unloading areas will be specified by the site operative to the delivery driver.

Manures are stacked and stored on the silage clamp. Poultry manure will be used within 3 weeks, FYM will be processed within a week.

The glycerol will be bought onto site in a sealed tanker and stored in the sections of the pretank before being pumped across to the digester.

The slurry is pumped onto site from the adjacent pig farm is kept in the buffer tank (maximum capacity 220m3) until transferred to the anaerobic digester through a positive displacement pump. The slurry is kept in the buffer tank for a maximum of 7 days. The buffer tank is a sealed unit and benefits from a carbon-based odour abatement unit.

A record shall be kept of all wastes received on site, and shall include:

• Date and Time of delivery.

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- Waste Types (EWC).
- Origin of waste (from which farm or company).
- Waste Rejection.
- Vehicle Registration/Driver ID.
- Weight in and out.

A record shall be kept in the site diary of all rejected wastes.

The feedstock clamps on site will be used to house crops to be incorporated into the AD plant, (silage). The agricultural feedstock is put into the digester via the external solids feeder; any solid manure is fed directly into the external solids feeder.

7. Process Monitoring & Regulation

Process monitoring is key to regulating the system and minimising the risk of any polluting emissions.

The SCADA system records:

- Gas quality (composition)
- Gas pressure
- Temperature
- Feeding rate

The sample from the digester is taken monthly and analysed by a suitably accredited laboratory for the following parameters:

- Various intermediate acidic compounds
- Ammoniacal Nitrogen
- pH
- Alkalinity
- Volatile fatty acids

This process monitoring data is used to determine the health of the digester and alter the feeding rate and / or other parameters as necessary

The potential for foam production is very low given the feeding menu for this plant. If foam does start to become a problem, it will be detected during daily visual inspections through the digester windows and preventative measures taken. The first measure will be alteration of feedstock to reduce foaming potential.

If foam persists antifoam oil will be added in measured amounts to the feedstock in the feeder and fed to the digester as part of the feed. If it is decided to temporarily stop feeding the plant, the anti-foam agent can be added via one of the multifunctional covers on top of the digester. More frequent visual checks will be undertaken to determine the effect of the antifoam additions and the quantities increased or decreased accordingly.

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8. Fugitive Emissions and Identifying and Minimising Risks of Pollution

The anaerobic digestion operation at Gorst Energy Ltd has the potential to cause pollution through emissions to air (including odour and noise), emissions to surface water and groundwater and contamination of land.

There shall be no point source emissions to air, water or land, except from the sources and emission points agreed within the Environmental Permit.

An environmental risk assessment has been carried out see Appendix A. Fugitive Emissions to air, land and water are discussed further below.

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9. Emissions to Air

Biogas emissions

As feedstocks enter the digester, they enter a closed system of tanks and pipes. The digestate store is covered and connected to the biogas system ensuring capture of any residual biogas, in accordance with Best Available Techniques. The final storage tank will be open topped. We do not anticipate odour complaints from the storage of digestate because the digestate is stable at this point and residual biogas has been harvested. Odour complaints will be fully investigated in line with the OMP.

The whole AD plant infrastructure including all tanks and pipes were fully tested during commissioning and are part of an ongoing inspection and maintenance programme. In addition to this any leaks in the system would be detected through pressure changes noted through the SCADA system and / or observation of a biogas type odour. Any losses of biogas from the system will be repaired as soon as practicably possible.

During normal operations, losses of biogas from the system will be minimal. Process monitoring of the system will ensure that gas production is regulated through an appropriate feeding rate such that the PRVs will not be routinely used. There is a daily visual check of the PRVs to check that they are sealed. It is in the interests of IE Gorst Energy Ltd to carefully regulate the organic loading rate and other parameters to ensure that biogas production and use is maximised. The AD plant has a consistent feedstock helping to regulate the process.

Flare

The auxiliary flare will only be used during times of DMT, CHP maintenance and breakdown. The operating hours will be recorded and be available for inspection.

CHP

The emissions from the CHP stack will be monitored annually by an MCERTS accredited or MCERTS certified contractor, in accordance with permit condition 3.1.2, for the parameters in the table below. If any of the limits are exceeded, a plan of action to bring the emission within limits will be decided and submitted to the Environment Agency.

Parameter	Limit (including units)
Oxides of nitrogen	500 mg/m3
Carbon monoxide	1400 mg/m3
Sulphur dioxide	350 mg/m3
Total volatile organic compounds including methane	1000 mg/m3

Emissions from drier

Dust and particulates may be generated by the process, particularly during filling and emptying of the drier when the digestate is agitated. The drier will be equipped with a "Super Cyclonfan" which is designed to abate emissions of particulates.

Hydrogen Sulphide (H2S) Reduction

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As previously described, the hydrogen sulphide level in the biogas is regulated via the use of a biological desulphurisation net on the digesters supported by air injection. In reducing the levels of hydrogen sulphide in the biogas, this protects the function of the CHP but also reduces emissions of sulphur dioxide through the stack and reduces the odour potential of any release of biogas from PRVs.

9a. Control of Odour

It is recognised that the AD operation has the potential to create odour nuisance. As such an Odour Management Plan has been drawn up. This document identifies all the processes in the permitted area that have the potential to generate odour and the receptors that may be affected by odour by windblown emissions. The plan also details what odour mitigation measures are already in place. If the operation causes substantiated odour reports then the operator will provide a more detailed OMP and include additional mitigation if necessary. Reference Odour Management Plan for Enfield Farm Anaerobic Digester.

9b. Control of Noise

It is recognised that the AD operation has the potential to create noise nuisance. As such a Noise Management Plan has been drawn up (*this accompanies the permit variation application, ref – EPR/SP3030JF/V003).

In the event of a complaint being received either via the Environment Agency, or directly from a member of the public, that complaint will be investigated. The operator will use the Noise Monitoring Form to record any noise detected during the monitoring and investigation.

10. Emissions to Surface Water and Groundwater

There shall be no point source emissions to land or water from operational activities with the exception of the 2 surface water discharge points (A & B outlined below).

Operational activities all take place on areas of impermeable surfacing comprised of concrete. Daily checks on the integrity of the site surfacing and bunding is undertaken by site operatives and any need for maintenance is reported and escalated to the Maintenance Team.

Appendix B is a site plan showing the drainage. The site operates a sealed drainage system with the drainage from all areas associated with waste activities being recirculated back to the AD process. Biogas condensate is collected and pumped into the buffer tank for processing in the AD.

The AD plant operator is responsible for ensuring that every year, when the silage clamps are empty, that they are inspected and repaired as necessary. The silage clamps will be maintained in accordance with SSAFO Regulations.

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Effluent and dirty water from silage clamp, apron and area around feeder is drained into an underground sump from where it is automatically pumped into a buffer tank, which feeds into the AD.

Clean water drains to the small ditch which runs alongside site. The ditch enters the Grindle Brook. Every day the AD Plant Manager checks the clean water run off coming off site for any signs of pollution. If any malodour, discoloration or fungus is found then the Environment Agency will be notified, the source of the pollution will be investigated and appropriate remedial action taken.

There are 2 drainage points into the ditch which are described below:

Point A – this surface water discharges into the ditch that runs parallel to the site which later meets the Grindle Brook. The surface water discharged here is collected from the access road onto the site and is out of the containment zone of the site. It is released via an interceptor and silt trap to remove any oil and sediment as vehicles will use this area to access the site. There is a chamber which we are able to inspect daily for any visible contamination from oil or silt. The interceptor will be inspected every 6 months; in line with the manufacturer's recommendations. A daily visual inspection of the ditch will also be undertaken by the operators to ensure there is no pollution.

Point B – this is the surface water discharge from the surface water lagoon. The water will discharge into the same ditch as point A which again meets the Grindle Brook. The area that drains into the lagoon is not used for the storage of waste but is located within the containment zone. Consequently, should the site ever have a significant tank failure the lagoon would become contaminated with digestate and would not be fit for discharge. Instead it would be recirculated back into the AD process or tankered off site to a suitable disposal facility. The operators carry out daily checks on bund and tank integrity and any loss of digestate would be noted immediately.

Because of the additional risk associated with this area, the lagoon is fitted with a penstock which will be left closed at all times to ensure that the site is contained. Surface water would be released following completion of the daily checks and conformation that there has been no loss of digestate. The water will be checked for visual contamination from oils and sediment and then will be released at a slow controlled rate under observation to ensure there is no damage to the bed of the ditch. The area that drains to the lagoon will be trafficked and as a result we have again installed an interceptor with a silt trap to prevent oils and silt entering the lagoon. The interceptor will be inspected every 6 months; in line with the manufacturer's recommendations. A daily visual inspection of the ditch will also be undertaken by the operators to ensure there is no pollution.

The valve to allow the positive discharge to the ditch is padlocked for security purposes. The storage of oils, fuels or chemicals will be minimised and if necessary for operations, will be stored in a lockable container.

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11. Other Amenity Impacts

11a. Control of Mud

The site access road and main access areas will be finished with stone or scrapings to provide vehicles with easy access and minimise the spread of mud. During construction and some maintenance activities there is the potential for mud to be tracked out of the site by vehicles, in this case a vehicle wheel wash is available for use beside the access road and in any event the farm access is regularly swept using a mechanical sweeper to avoid mud being tracked onto the public road.

11b. Control of Pests

Silage is covered to limit the risk of pest problems.

Rat bate is deployed at key locations on the site to minimise pest numbers and a contract is in place with a local pest control company.

A pest control contract in place with local company for regular visits and reporting. Any increase in pest activity would trigger an increase in the frequency of pest control visits. Any incident will be recorded in the site diary.

11c. Control of Litter

Litter associated with feedstock is not expected. Any waste arising will be stored securely and disposed of appropriately.

In the event that litter does escape the site, action shall be taken to retrieve the litter by the end of each working day.

12. Operations and Maintenance

The operator is responsible for carrying out daily, weekly and monthly checks on the AD plant and associated infrastructure and any emissions. All checks are available on site for management to review and for the completion of any required actions (Reference daily / weekly and monthly checklist).

The plant is operated in accordance with the operating manuals provided by Biogest. These will be incorporated into the site operating manuals which will also detail safety instructions and hazard warnings for each element of the infrastructure including the silage clamps, drainage, weighbridge and drier all of which were not provided by Biogest.

There is a Planned Preventative Maintenance procedure in place in line with Biogest recommendations. Maintenance logs are held in the site office. Critical spares are held by the company. Some of these are located on site.

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The CHP and Gas upgrade equipment is currently serviced and maintained by a third party under contract to IE Gorst Energy Ltd will extend this contract or contract a similarly qualified specialist contractor after Acceptance of the plant from Biogest.

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13. Accident Management Plan

The Environmental Risk Assessment (Appendix A) assesses the risks associated with vandalism, arson, fires, explosions and spillages.

Vandalism / arson

The risks from vandalism and / or arson are deemed to be low. The site entrance comprises of a gateway that will be locked during hours of non-operation. The site will be contained within a fence.

Fire / explosion

The risks from fire and explosions are deemed to be low due to management systems in place. Fires shall be prohibited on site.

In the event that a fire occurs on site:

- Raise the alarm and contact the local Fire and Rescue Service
- Attempt to suppress the fire with fire extinguishers or water, if safe to do so
- Evacuate the site
- Contact the Environment Agency and Fire Service

So far as practical, efforts will be made to contain contaminated fire water to prevent drainage into the ground and / or surface water.

Reference IE HSPOLI1 Incident Plan Major and HSREFI1 Incident Response Process.

Spillages

The risk from spillages is deemed to be low due to management systems in place.

In the event that a loss of containment occurs from the buffer or digester tanks, the control system will alarm. The AD Plant Manager or deputy cover receiving the alarm will immediately action the Spill Response Procedure. Immediate action shall be taken to contain and remediate the spill, and the Environment Agency informed immediately on Incident Hotline number 0800 80 70 60. Standard Operating Procedures are in place for dealing with digestate, oil and chemical spills.

Depending on the cause of the spillage, it may be possible for the material to be processed in the AD plant or if there was damage to AD infrastructure the material could be put into the farm dirty water lagoon or tankered off site if necessary.

In the event that an oil spill or leak occurs, the onsite spill kit will be used. The area will be cleaned by using an absorbent material which will be disposed of as Hazardous Waste with a contractor at an appropriate facility. Reference ENOPSW1 AD Site Waste Management Procedure.

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Power Failure

A backup generator is in place to operate critical plant in the event of power loss to the site. This will ensure that the dome blower and the flare remain operational.

Overview

If an accident does happen, whatever else is necessary to minimise environmental consequences will be carried out provided that the health and safety of both employees and external people is not compromised.

Following any accident an investigation will be carried out to find out why the accident happened and take action to stop it happening again.

The Accident Management Plan and relevant related procedures will be reviewed as soon as possible after any accident. Any changes will be put into an updated Accident Management Plan and relevant related procedures as soon as possible. If no changes are needed, then the date of the review and the fact that no changes were needed will be recorded. Reference QMSPOLD1 Document Control Procedure.

14. Complaints

It is important to IE Gorst Energy Ltd to be a good neighbour and to ensure that the farm operations including the AD plant do not have an adverse effect on the local community. All complaints will be recorded on RECOPC5 Complaint Record Form and fully investigated. Action will be taken to rectify the situation as necessary and to let the complainant know what this action has been. Reference CPR3CP Complaints Procedure.

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15. Staff Training and Competence

Operational Training

The technology providers Biogest have provided a program of operational training through commissioning and start up phases. IE have a program of training set up for all AD Plant Managers and Operatives which includes all necessary training for health and safety and environmental compliance. The training matrix also includes dates for refreshing and updating training where necessary.

A log will be kept in the site office with a training record for each staff member.

Environmental Compliance Training

Staff undergo training before commencing employment to be sure that they are aware of all requirements of the Permit Conditions and of the procedures laid out in the Environment Management System, and specifically in the aspects which are relevant to their duties. Specific training on managing pollution incidents is also undertaken by Plant Operators.

There will be at least one supervisory staff member that is suitably trained and fully conversant with the requirements of the permit conditions at all times the site is staffed.

A copy of the Environmental Permit is available to all staff members on site for reference purposes.

Technical Competence Training

At least one member of staff holds the appropriate WAMITAB Certificate of Technical Competence. All Technically Competent Managers will complete Continuing Competence test at the required time every 2 years. The site will be manned by a Technically Competent Manager for at least the minimum attendance period assigned by 'How to Comply with your Environmental Permit.'

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16 Site Records

15a. Records of Waste Movement

In the event that farm wastes are delivered by a third party, a record shall be kept of all wastes delivered to the site. The record shall include the following details:

- Date and time of delivery
- Origin of waste
- Nature of waste received including EWC code
- Quantity of waste (measured on weighbridge)
- Driver name
- Vehicle registration
- Waste Carriers Registration

The operator will submit quarterly waste tonnage returns to the Environment Agency within one month of the end of the quarter. The waste return will specify tonnages of waste accepted and removed from the site.

16b. Records of Waste Treatment

All operations are recorded by data loggers and are regularly downloaded to the plant computer kept on site and sent to IE.

16c. Dispatch of Product

Digestate is primarily applied to land used to produce feedstock for the AD facility, with a portion being sold on to third parties, again for use on land. The digestate, being comprised of only agricultural feedstocks and manures/ slurry is considered a non-waste when applied to land being compliant with the Environment Agency's position statement on the subject.

Where digestate is sold onto a third party, a record shall be kept of all product despatched from the site. The record shall include the following details:

- Quantity and weight of product
- Intended delivery location
- Date and time of despatch
- Driver's name
- Vehicle registration

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16d. Site Diary

A site diary is kept secure and will be available for inspection when required by an authorised officer of the Environment Agency. The diary shall include a record of the following events:

- Maintenance
- Breakdowns
- Emergencies
- Any problems with feedstocks and action taken
- Site inspections
- Attendance of Technically Competent Management
- Despatch of records to the Environment Agency
- Complaints about the site operation and actions taken
- Environment problems and remedial actions
- Daily weather conditions

17. Environmental Compliance Review

The IE Compliance Team carry out internal audits of environmental compliance and will be regularly reporting the results of these audits to the Board of Directors. All required actions will be minuted and closed out through this process. If any changes are made to operational procedures as a result, the relevant procedure(s) will be amended and reissued in accordance with the QMSPOLD1 Document Control Procedure.

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18. Related & Supporting Documents

Environmental Policy Statement

Environmental Permit EPR/DP3337WU.

Odour Management Plan for Enfield Farm Anaerobic Digester

ENOPSA1 Procedure for Annual Inspection of Silage Clamp

ENOPSW1 AD Site Waste Management Procedure

Daily / Weekly / Monthly checklist

HSPOLI1 Major Incident Plan

HSREFI1 Incident Response Process

RECOPA1 Incident Report Form (Non-Environmental)

RECOPE4 Environmental Incident Report Form

ENOPSG1 Gas Leak Response Plan

ENOPSS1 Spill Response Procedure

QMSPOLD1 Document Control Procedure

CPR3CP Complaints Procedure

RECOPC5 Complaint Record Form

SOPGR1 River Check Procedure

SOPGS3 Managing Digestate Spills

SOPGS4 Managing Oil Spills

SOPGS6 Managing Chemical Spills

IE Standard Operating Procedures; Index of Controlled Documents (including all listed documents)

Red File for AD Operations; Index of Controlled Documents (including all listed documents) – File 1

Red File for AD Operations; Index of Controlled Documents (including all listed documents) – File 2

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20. Appendices

Appendix A: Environmental Risk Assessment

Data and information				Judgement			Action		
Receptor	Source	Harm	Pathway	Probability of exposure	Consequenc e	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 consequenc es if things go wrong?	How might the receptor come into contact with the source?	How likely is this contact?	How severe will the consequence s 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 magnitud e of the risk after managem ent? (This residual risk will be controlled by Complian ce Assessme nt)
Local human population.	Releases of NOx	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Low	Medium	Medium	There is potential for exposure to anyone living close to the site or at locations where members of the public	Activities shall be managed and operated in accordance with a management system (will include inspection and maintenance of equipment, including engine management	Low

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							might be regularly exposed.	systems), point source emissions to air with emission limits for NOx (annual emissions to air monitoring to be carried out by MCERTS accredited contractor). The site is not located in an Air Quality Management Area.	
Local human population.	Releases of CO and other gases.	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Low	Medium	Low	Monitoring of CO levels in biogas driven CHP plants has shown CO to be typically present at below benchmark levels as indicated in Agency Guidance LFTGN08.	As above and point source emissions to air with emission limits for CO.	Low
Local human population.	Release of dust and microorganis ms (bioaerosols).	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Medium	High	Medium	Potential for release at waste reception/tr eatment	Silage clamps will be covered unless being filled or emptied. Feedstocks fed into feed hopper then	Low

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							and maturation.	contained in anaerobic digestion plant. Liquid and solid digestate stores undercover. Digestate drier fitted with emission abatement technology 'super cyclofan.'	
Local human population.	Odour	Nuisance, loss of amenity.	Air transport then inhalation.	Medium	Medium	Medium	Local residents often sensitive to odour. Waste types/odour s are typical to those already used on agricultural premises.	The operation is run in accordance with an odour management plan. Using appropriate measures (e.g. regulation of AD process through process monitoring) emissions of biogas are minimised. Silage is sheeted and odour abatement fitted to the buffer tank and tankers.	Low
Local human population.	Noise and vibration.	Nuisance, loss of amenity, loss of sleep.	Noise through the air and vibration through the ground.	Low	Low	Low	Local residents often sensitive to noise and vibration but there is low potential for exposure.	Noise and vibration shall be minimised and not cause nuisance. A noise and vibration management plan will be written and actioned if necessary.	Low

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Local human population and / or livestock after gaining unauthoris ed access to the installation.	All on-site hazards: machinery.	Bodily injury.	Direct physical contact.	Low	Medium	Low	Direct physical contact is minimised by activity being carried out within enclosed digesters, so a low magnitude risk is estimated.	Activities are managed and operated in accordance with a management system (will include site security measures to prevent unauthorised access).	Low
Local human population and local environme nt.	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/va ndals. 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.	As above. An accident management plan is required as part of management system (includes fire and spillages).	Low
Local human population and local environme nt.	Accidental explosion of biogas.	Respiratory irritation, illness and nuisance to local population. Injury to staff, fire	Air transport. Spillages and digestate direct run-off from site and via surface water drains and ditches.	Low	High	Medium	Unlikely to happen - reduce by effective manageme nt systems.	Management systems in place to ensure regulation of process. Monitoring and telemetry to give early warming of any issues.	Low

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		fighters or arsonists/va ndals. Pollution of water or land.									
Local human population and local environme nt.	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		Medium	Mediu	ım	Risk of accidental combustion of waste is moderate.	All staff and contractors trained in Health and Safety procedures.	Low
All surface waters close to and downstrea m 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		Medium	Low		Potential for spillage from digestions tanks and storage vessels.	Digestion tanks built to appropriate standard, all biogas condensate shall be discharged into a sealed drainage system. Impervious surface for storage of all wastes with sealed drainage system.	Low
All surface waters close to and downstrea m of site.	As above.	Chronic effects: deterioration of water quality.	As above. Indirect run- off via the soil layer. Date of issue:	Low	Issue	Medium	Low Rev 0		As above	As above	Low

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Abstraction from watercours e downstrea m 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	Medium	Medium	As above	As above	Low
Groundwat er	As above.	Chronic effects: contaminatio n of groundwater , requiring treatment of water or closure of borehole.	Transport through soil/groundw ater then extraction at borehole.	Low	Medium	Low	Potential for spillage from digestions tanks and storage vessels.	Site not within a source protection zone or within 50 metres of any well, spring or borehole used for the supply of water for human consumption. Potentially polluting materials retained in pressure tested and impermeable structures.	Low
Protected nature conservatio n sites - European sites and SSSIs.	Any, but principally NOx.	Harm to protected site through toxic contaminatio n, nutrient enrichment, disturbance etc.	Any	Low	Medium	Low	Emissions to air may cause harm to and deterioratio n of nature conservatio n sites.	Site is more than 200 metres from any protected nature conservation sites; potential hazards from the permitted activities pose a low risk to the broad sensitivity of species and habitats groups. Emission to air limits for stack	Low

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				gases are specified.	

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Appendix B

See separate document 'Enfield Drainage Plan.pdf'

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Appendix C

Raw materials inventory

	GFLE Enfield O&M Limited Enfield AD Plant Inventory of Raw Materials								
Equipment	Description	Manufacturer	Туре	Media	Plant Amount	Annual Consumption			
	Glycol in Cooling System	Brenntag Nordic AB	Zitrec-20 FAT 205kg/Etyleneglycol (35%)	Liquid, % mixed with water	100 Ltrs	Trace			
	Antifoam	Dow Sverige AB	Ucarsol GT-10 Antifoam	Liquid	50 Ltrs	Trace			
Gas upgrade unit	Activated Carbon	Chemviron Carbon	SOLCARB KS3	Beads	1000 Kg	1000 Kg			
	Salt tablets	Inowroclawskie Kopalnie	Salt tablets	Tablets	100 Kg	50 Kg			
	Solid material for drying of gases PSA	GRACE Gmbh & Co. KG	Sylobead MS 564C	Granular	0.3M ³	Change Every 5 years			
	Compressor Oil	Gardner Denver	Gear Lube 150	Oil	160 Kg	160 Kg			
CHP	Engine Oil			Oil	450 Ltrs	2700 Ltrs			
(MAN)	Glycol Inhibitor			Liquid	200 Ltrs	Change Every 2 Years			
	Nitrogen			Gas	50 Ltrs	50 Ltrs			
	Propane			Liquid	13,800 Water Litres	200,000 M ³			
	Helium			Gas	100 Ltrs	100 Ltrs			
Gas Entry Unit (Elster)	OFGEM Calibration Gases			Gas	50 Ltrs	50 Ltrs			
	C6+ Cal Gas			Gas	10 Ltrs	10 Ltrs			
	BIO ELCal Gas			Gas	10 Ltrs	10 Ltrs			
	Gas Oderrent			Gas	50 Ltrs	20 Ltrs			
	Ferric Chloride 20%				2000 Ltrs	2000 Ltrs			
AD Plant	General Oil				50 Ltrs	50 Ltrs			
	General Greases				60 Ltrs	60 Ltrs			

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DOCUMENT CHANGE RECORD

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Issue Number: 1

Reason for issue/Changes to document

Amendment to reflect permit variation application to increase tonnages.

Amendment to tonnage figures, waste breakdown and additional storage.

Fodder beet references removed, and permit variation added.

Addition of acoustic fence controls around energy centre (Section 8).

Addition of Storage Tank 2. Expanded Feedstocks section. Fugitive Emissions added to section 7. Addition of ref to Red Files and Index of controlled documents in section 17. Addition of new GfLE logo

Change to document format and reference number. Additional documents and revised document references added.

Changes made following review by Environment Agency 25.2.2016.

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