GWE Biogas Ltd

Integrated Management System

Controlled Document

Fugitive Emissions Management Plan	
Approved by:	Tom Megginson
Issue date:	August 2023
Version:	08

Version History

Version	Date	Amendment/Change
02	22/02/2018	Revision of initial FEMP.
03	22/05/2019	Addition of section focussing on flies.
04	30/09/2019	Annual review. Brought in line with annual audit cycle.
05	22/06/2020	Annual review.
06	04/05/2022	Annual review.
07	31/02/2022	Reviewed in line with permit variation for new digesters, capacity increase, CCUS installation and silage clamp erection.
08	25/08/2023	Further detail provided on the drainage arrangements for the silage clamp.

CONTENTS

1. Introduction

The Fugitive Emissions Management Plan will identify sources and potential sources of fugitive emissions, and will consider the risk to sensitive receptors. The Fugitive Emissions Management Plan has been produced with the intention to reduce the frequency and effects of fugitive emission causing activities to be as low as practically possible.

This Fugitive Emissions Management Plan in collaboration with the associated documents referenced in the section below contain:

- An assessment of the risks of fugitive emissions problems, from normal and abnormal situations, including worst case scenarios, for example of weather, temperature or breakdowns and accidents.
- The appropriate controls (both physical and management) needed to manage those risks.
- Suitable monitoring.
- Actions, contingencies and responsibilities when problems arise.
- Regular review of the effectiveness of fugitive emissions control measures.

Potential fugitive releases from the plant are:

- Dust, mud and litter
- Biogas release
- Particulates
- VOCs
- Pests
- Fugitive emissions to groundwater

These are detailed in the Environmental Risk Assessment (A03). The risks are reduced through implementing this fugitive release management plan. This plan has been written in accordance with the guidance given in the Environment Agency document Getting the Basics Right.

2. Sensitive Receptors

Minimising fugitive emissions has been taken into account in both the location and the design of the plant. The site is constructed in a rural location, over low permeability clay. In addition, impermeable lined bunded pads are constructed where needed.

There are no surface waters on or in the near vicinity of the site. The site is also located within a medium groundwater vulnerability zone.

The checks, contingency actions and other procedures involved in the fugitive emissions plan are set out in the operating procedures documentation for the site. GWE shall also ensure:

- That all the neighbouring buildings know how to contact the site if they consider fugitive emissions to be a problem (contact details will be clearly visible on the site sign along with the Environment Agency details); and

- That any complaints are recorded and that problems, where possible, are dealt with promptly.

2.1. Personnel on Site

Personnel/ operatives working on site are the closest receptors to any fugitive emissions produced on site, however due to consistent working conditions it would be unlikely that operatives would be particularly sensitive to fugitive emissions or to changes/ fluctuations in fugitive emissions. All operatives will be fully trained and familiarised with the contents of the Site Management System and the Fugitive Releases Management Plan.

2.2. Neighbours

The plant is in a rural location and only two potential sensitive receptors are within 1300 m of the plant (at 400m and 500m from the plant, as described in the odour management plan).

3. Dust, mud and litter

The nature of the waste delivered to site is not dusty.

Roadways are concrete and are maintained and kept clean to prevent dust or mud arising from vehicle movements. Vehicle wheels are washed and the road dampened if required during very dry conditions.

All waste is delivered in sealed or covered containers to prevent windblown material. All waste handling including depackaging is undertaken within the sealed building. The packaging removed is stored in such a way as to ensure that no litter is blown from that waste.

Air extracted from the building is treated in the biofilter.

The site is surrounded by hedging, newly planted trees and a security fence. Daily checks are undertaken for litter and where necessary litter picking undertaken. These checks are recorded in the Permit Daily Check Sheet.

4. Biogas release

The process tanks are gas tight and therefore under normal operating conditions there are no releases to atmosphere. The pipework and tanks are fitted with over-pressure valves; these only kick in during emergency operation.

The provision of more than one CHP unit and a flare for emergency operation prevents the venting of biogas during CHP downtime.

Daily checks are undertaken to assess for any leaks which may be damaging to the environment.

Gas pressures are monitored.

5. Particulates

Biogas has negligible amounts of particulates and therefore this is not considered a risk.

6. VOCs

VOCs are minimised through good combustion control.

Fugitive emissions are prevented by gas tight process tanks and covered digestate storage tanks. In any case the storage tanks contain treated and therefore stabilised material.

The provision of adequately sized CHP units and a flare for emergency operation prevents the venting of biogas during CHP downtime.

Oil tanks on site are integrally bunded; natural venting is minimal.

7. Fugitive emissions to groundwater

The site is situated on an impermeable surface with a sealed drainage system to provide emissions to groundwater. See drainage plan for a visual representation.

Digestate will be stored in the dual-purpose tank which is situated in its own bund to prevent groundwater pollution or rainwater ingress.

7.1. Site design

The site at Sandhill was chosen as it is physically remote from any watercourse so that any emission from site could not physically flow to such a watercourse. The site also sits upon a band of impermeable clay. This clay acts as an effective barrier to prevent material entering the chalk aquifer below. Where the thickness of the clay band has been reduced by site excavations, impervious pads have been constructed where impermeability is required.

The site is not within any flood zone. There is no risk of property damage either on or off site that could be caused by any severe flood event.

The main water protection features of the plant design are:

- The main liquids stored on site are biodegradable and non-persistent.
- Impermeable surfaces and bunding to contain 110% of the largest tank volume and at least 25% of the total tank volumes.
- Rainwater collection from building roofs.
- A contained drainage system across site.
- A water storage and attenuation pond and sustainable drainage system designed to retain any fugitive emissions and treat minor spillages using an engineered reedbed.

7.2. Inside the building and waste delivery

All floor surfaces in the building, including the waste reception and handling area, are angled towards an internal drainage system leading to a sump from which any liquids are pumped out and fed into the AD process.

Hence all leaks, spills and washdown water, including vehicle washdown water remain within the confines of the building and are safely treated.

Liquids are delivered by tanker at the receiving station to the east of the reception hall using a universally acknowledged system of sealed pipework. To ensure that there are no minor spillages, the area around the tanks is separately drained to ensure that any minor spillage flows back into a sealed tank from where it can be introduced back into the building's internal drainage system for treatment through the process.

Vehicles that have unloaded within the building may have picked up waste material in their wheels. Therefore, all vehicles are washed down prior to their departure from the building.

7.3. External tanks and external surfaces

The external tanks and associated pipe work are sealed and situated on impermeable concrete bases within impermeable bunds and therefore any spills/leaks would be contained.

The concrete forming the base of the large tanks and the associated bunded areas are engineered to the new German concrete standards DIN EN 206-1 and DIN EN 1045-2. In addition, as secondary protection, an impermeable membrane is laid below the concrete layer. This membrane is arranged so that any liquid reaching its surface flows to a small inspection sump, as a leak detection and mitigation measure. This sump is checked as part of the regular site inspections.

The bunds are constructed from clay excavated during the plant's construction. Permeability tests and the thickness of these earth walls have demonstrated that for the purposes of retaining any major spillage then they would be impermeable. The bunded areas are designed to hold a minimum of 25% of the total tankage and 110% of the capacity of the largest tank.

In addition to the site bunding, small tanks on site used to contain chemicals used in the digestate process are contained within their own additional bunds or are double skinned tanks.

All tanks are protected from accidental impact damage.

In the event of a spill/leak the area would be pumped out and hosed down as necessary. The liquid would be fed into one of the raw waste reception tanks for onward treatment in the AD process, or otherwise treated as required.

The CHP units are sited within their own containerised units which are designed to act as self-bunded units to contain any oil spills, etc.

Frequent inspections for tank and bund integrity are carried out to ensure they remain fit for purpose.

Rainwater falling onto the ground in low risk areas of the site soaks into the topsoil.

7.4. Rainwater

Clean roof water from the plant is collected in the central drainage system for use within the process.

Rainwater falling on bunded external surfaces is collected within the bunds and released to the contained drainage system.

Rainwater falling on other external surfaces, soaks into the soil and evaporates or generally

migrates to the attenuation pond due to the gradients of the site.

7.5. Attenuation pond and reed bed

The storage and attenuation pond is designed to hold water generated from the excess rain water collected from the bunded area surrounding the digestion tank situated in its own bund. The pond also serves as storage for water for emergency firefighting.

Only clean, uncontaminated water enters the pond.

The pond has been sized by GWE's consulting engineers in accordance with standard procedures and has been designed to more than adequately contain both the normal water run-off from the plant and any extreme storm water event. The pond is clay-lined and designed to be watertight.

Water normally leaves the pond through evaporation and through controlled extraction for use in the plant or for irrigation of local farmland.

In the event of water overflowing from the pond, another fail-safe penstock has been constructed leading into an engineered reed bed, as a sustainable drainage system. This further penstock is also controlled by the plant's operators who ensure that discharges will only occur when there have been no fugitive emissions to the pond.

The reed bed is designed to further clean the water prior to discharge to a purpose built soakaway and silt trap. The soakaway chamber is covered and constructed at a level to ensure no fugitive emissions can bypass the pond and reed bed.

7.6. Silage Clamp

The silage clamp, in which agricultural silage is stored, measures approximately 160m by 50m, and has the capacity to hold a maximum of approximately 15,000 tonnes of whole crop silage (based on a maximum fill height of 6m from the base). The feedstock clamp will possess an impermeable base, walls and perimeter drains.

Surface runoff of rainfall and/or the leachate from the silage will drain away and be captured by a dedicated underground tank, which will have a capacity of 30m3 or 30,000 litres. The tank will be equipped with 2 pumps – one duty and one standby. When the level in the underground tank rises, the pumps will be activated and the captured rainwater/effluent will be pumped into the lagoons, which have the following volumes:

- Storage lagoon 40,758 m3 (47,615 m^3 with freeboard)
- Settlement lagoon 1,999 m3 (2,977 m^3 with freeboard)

The pumps have a pump rate of 150m^3 per hour each. With an area of approximately 8,000m^3, this equates to a rainfall event of 37.5mm per hour. Any rainfall that is in excess of this drains to a low area of site, where it will be discharged to the soakaway.

7.7. Sewage

The foul drainage from the single toilet in the main building is disposed of by pumping it into the AD system. Hence, this relatively small volume of material will be pasteurised and be subjected to higher pathogen reduction than by other forms of sewage treatment. This arrangement has been sanctioned as satisfactory under the Environment Agency / WRAP AD Quality Protocol.

The foul drainage from the single toilet at the site offices drains into its own biodisc treatment unit located by the offices. The outflow from this unit then flows through the reed bed for further treatment.

7.8. Oil storage

Diesel for fuelling the loader equipment is held within a purpose built integrally bunded tank (110% capacity) which is locked when not in use. A drip tray is in place during fuelling to catch any spillages.

Minimal quantities of diesel are stored for emergency use in the back-up generator, this is located within a water-tight container and therefore any leak would be contained.

Lubrication and waste lubrication oil for the CHP units are stored in an integrally bunded tank (110% capacity).

The integrity of these tanks is inspected daily.

8. Odour

Odour has been identified and accounted for separately within the site-specific Odour Management Plan

9. Vermin Control

The site implements and maintains a series of measures to control and monitor the presence of pests. Risk of vermin activity on site is controlled by:

- Mowing the grass as necessary,
- litter picking activities,
- Pest control to control rodents every month by vermin control contractor,

- Keeping the reception building doors closed whenever possible.

On detection or notification of pest infestations, or evidence of such, immediate action shall be taken to secure the attendance of a professional pest control contractor, to eliminate the pest infestation. The incident and the remedial action shall be recorded in the vermin control record folder which is kept in the weighbridge office.

10. Fly Control

Common house flies and bluebottles have always been associated with putrescible waste (this includes food waste) particularly during warmer weather. Infestation typically starts at the point of waste generation, when eggs are laid on waste in domestic or trade waste bins. The longer the period of time before the waste reaches its final disposal point (landfill, composting, incineration) the greater the opportunity for fly problems to develop.

The risk of fly infestation will be high during periods of hot weather, as the incoming waste is likely to be infested and fly development will be rapid. Parts of the site where the process generates elevated temperatures may be at risk of infestation throughout the year. Management techniques employed include:

- Daily monitoring of adult fly and larval numbers across site with results recorded in the Permit Daily Check Sheet,
- Ensure swift processing of waste and avoid extended storage of unprocessed waste,
- Reduction of fly movements out of the reception building with fast acting roller shutter doors maintaining negative air-pressure within the reception area to reduce fly egress,
- Use of fly lights across the site,
- Fly chainmail installed at certain key entry points to minimise the passage of flies.

Even if proactive fly prevention measures are in place, it is likely that some flies will still occur and need to be controlled. In the event that the Site Manager deems a fly infestation to be occurring, GWE will contract an appropriately licensed service provider to undertake emergency fly control methods. Control methods are varied, and choice of method will be determined by external contractor but would consider internal and external methods such as insecticide baits and Ultra-Low Volume (ULV) sprays.

11. Adverse Weather Conditions

Adverse weather conditions are seen to have no significant impact on the operations at GWE. However, extreme weather conditions are covered below:

Heavy rainfall: Waste is stored within the waste reception hall to await processing with operations taking place within a completely seal process.

Strong winds: Winds will not affect onsite activities, as they take place indoors and material is also treated within an enclosed process. Strong winds may blow dust across the site access road if strong winds occur in conjunction with high temperatures.

High temperatures: High temperatures are likely to affect dust emissions on the site access road if strong winds occur in conjunction with high temperatures. The site has reactive measures in place as outlined above, in the event dust emissions are observed on site.

Snow, Frost & Ice: Snowfall, frost and ice are unlikely to affect Fugitive Emissions.

12. Lagoon Pipe System Leak

Leak detection was installed by Alpha Plus Ltd. This organisation installed the pipe work and are fully qualified to undertake the piping work. They are experienced within the Waste Water sector. There is one pressure gauge at each end of the pipe. The pressure gauges are digital and are calibrated annually by a UKAS accredited company. The pressure gauges are linked to the site's SCADA system, which will alert operators should a difference in pressure be detected.

The minimum detectable pressure difference is 0.1 bar or 100 litres/hour.
The pressure/level difference threshold that will trigger the alarm is 0.1 bar. This threshold has been selected because it is the minimum that can be detected. Therefore, we have set the lowest possible threshold, at which to trigger the alarm.

Leaks are detected by monitoring the pressure gauges. If the pressure gauges at the AD end of the pipe show a pressure difference greater than 0.1 bar when compared to the pressure gauge at the Vegetable facility end of the pipe, then a leak will be assumed. The pressure gauges are linked to the SCADA system which automatically notify operators via an automated alarm should the pressure difference threshold be exceeded.

In the event that a leak is detected by the SCADA system, the transfer of effluent from the vegetable processing facility to the on-site lagoon will be stopped immediately by site operatives (the GWE Site Manager or site supervisor shall close the receiving valves at the plant and alert the relevant person at Yorkshire Green to shut down the transfer system) and the location of the leak shall be investigated. Surface puddling will be looked for initially, as this will indicated the approximate location of the leak. The emergency contact at the pipe installer company will then be contacted in order to arrange an inspection and/or maintenance of the pipework within 24 hours of the leak/pressure loss being detected. Subsequently, a CCTV camera shall be inserted into the pipe. This camera will be moved from one end of the pipe to the other, in order to ascertain the exact location of the leak.

Following the detection of a leak in the underground pipework system and the immediate cessation of effluent transfer, the transfer of effluent will not be resumed until the following points have been addressed:

- The source and cause of the leak has been ascertained.
- The required pipe repair/replacement works have been undertaken.
- An inspection of the underground pipework has been undertaken by a competent person to ensure the integrity of the underground pipework is not compromised and the pipework is fit-for-purpose.

12.1. Maintenance

The leak detection system is monitored on a daily basis. The digital pressure gauges are calibrated annually by a UKAS-accredited third party. These frequencies are in line with the manufacturer's recommendations.

The above ground sections of the pipework shall be officially inspected on a monthly basis. In addition to this, site operatives and management tour the site on a daily basis, and if anything untoward is detected then a formal inspection can be triggered. The Site Manager or site supervisor shall also perform a weekly check of the area containing the underground pipes for any potential leaks.

The underground pipework shall not be inspected at a regular frequency. Should the digital pressure gauges detect the minimum pressure difference, then the underground pipework shall be inspected. Frequent inspection is not practicable owing to the cost and time implication to dig up the ground above the pipes. Furthermore, the pipework is constructed SDR17 welded piping which is specifically designed to be maintenance free. Please note, it is HDPE SDR 17 pipe which is standard for the chemical, fertiliser and waste water industries. The pipe is certified to 17 bar pressure. The pumps are set at maximum 5 bar so there is a buffer pressure zone. The pipes have 1000mm cover and are sanded in line with applicable installation standards.