Best Available Techniques Assessment

Variation to Bespoke Installation

Herriard Bio Power Limited Anaerobic Digestion (AD) Plant

Herriard Bio Power Limited, Bushywarren Lane, Herriard, Basingstoke, RG25 2NS

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Abbreviations

ACPH	Air changes per hour
AD	Anaerobic Digestion/er
ADQP	Anaerobic Digestate Quality Protocol
AMfBT	Biological waste treatment: appropriate measures for permitted facilities
AQOIA	Air Quality & Odour Impact Assessment
BAT	Best Available Techniques
BREF	BAT reference documents
BSC	Biofertiliser Certification Scheme
BSI	British Standards Institution
BUP	Biogas upgrading plant
CHP	Combined heat and power
CO_2	Carbon dioxide
DSEAR	The Dangerous Substances and Explosive Atmospheres Regulations 2002
EA	Environment Agency
ELV	Emission Limit Value
EMS	Environmental Management System
EWC	European Waste Catalogue
HAZOP	Hazard and operability study
HBP	Herriard Bio Power
H_2S	Hydrogen sulphide
MCPD	Medium Combustion Plant Directive
NH_3	Ammonia
PVRV	Pressure and vacuum relief valve
REA	Renewable Energy Association
TPA	Tonnes per annum
UV	Ultra violet

1. Introduction

A Best Available Techniques (BAT) Assessment has been prepared by Earthcare Technical Limited (ETL) on behalf of Herriard Bio Power Limited (HBP) to support an application for a substantial variation permit application to vary the existing bespoke waste operation permit to a bespoke installation permit for the anaerobic digestion (AD) plant at Herriard Bio Power Limited, Bushywarren Lane, Herriard, Basingstoke, RG25 2NS herein termed 'the Site'.

The application has been prepared by ETL in conjunction with and on behalf of the Operator HBP.

This report comprises a review of the operation, activities, infrastructure, management systems, etc. for the site, in comparison to the requirements of indicative BAT as stated in the BREF document 'Best Available Techniques Reference Document for Waste Treatment'[1] to ensure that all relevant areas are included.

The BAT Assessment has been cross referenced against relevant appropriate measures in the Environment Agency Technical Guidance Biological waste treatment: appropriate measures for permitted facilities (AMfBT) (Sept 2022)[2]. References to this guidance are included in the relevant sections of the BAT Assessment.

Compliance with the Medium Combustion Plant Directive (MCPD) and the Specified generator regulations as summarised in the gov.uk online guidance page Medium combustion plant and specified generators: environmental permits[3] has been considered in a separate section.

The aim of this report is to demonstrate that HBP has both considered the requirements of BAT and operates the site in compliance with the requirements of indicative BAT.

The report is structured in table format in the same order as set out in 2018 Best Available Techniques (BAT) Reference Document for Waste Treatment to ensure a logical review of the requirements of indicative BAT. Next to each relevant requirement there is a comparison against indicative BAT.

The final section comprises conclusions and recommendations.

[1] Best Available Techniques (BAT) Reference Document for Waste Treatment, European IPPC Bureau, 2018
[2]https://www.gov.uk/guidance/biological-waste-treatment-appropriate-measures-for-permitted-facilities
[3]https://www.gov.uk/guidance/medium-combustion-plant-and-specified-generators-environmental-permits

2. BAT Assessment for Herriard Bio Power Limited AD

Environmental Management System

BAT 1	**BAT 1. In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features**	
I	Commitment of the management, including senior management;	Senior management of HBP have committed to the establishment and further development of an environmental management system (EMS). Ref: EMS Manual **(HBP-OD-01)**
II	Definition, by the management, of an environmental policy that includes the continuous improvement of the environmental performance of the installation;	The Environmental Policy includes a commitment to continual improvement in environmental performance. Ref: Environmental Policy **(HBP-OD-03**)
III	Planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment by the management;	Management system procedures are in place and are summarised within the EMS Manual **(HBP-OD-01)** and the Master Document Control File **(HBP-OD-02).** The Environmental Risk Assessment (Appendix A of the EMS Manual) describes the environmental risks and the required control measures including management system controls. The EMS has been developed and approved by senior management who are also responsible for financial planning and investment decisions.
IV	Implementation of procedures paying particular attention to: • structure and responsibility, • recruitment, training, awareness and competence, • communication, • employee involvement, • documentation, • effective process control, • maintenance programmes,	There are management system documents and procedures covering all of these elements as detailed in the Master Document Control File **(HBP-OD-02)** and the EMS Manual **(HBP-OD-01).** • Staff structure is shown in the Staff Organogram **(HBP-OD-04)** which forms Appendix B of the EMS Manual **(HBP-OD-01)** • Roles and responsibilities are detailed within the EMS Manual **(HBP-OD-01)** and individual Standard Operating Procedures. • The management of Competence and Awareness is detailed in Section 12.3 of the EMS Manual **(HBP-OD-01)** and training is documented in the Training Matrix **(HBP-OD-10).**

BAT 1	**BAT 1. In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features**	
	• emergency preparedness and response, • safeguarding compliance with environmental legislation;	• The Environmental Policy **(HBP-OD-03)** and relevant parts of the EMS are communicated to all staff and interested parties via induction, emails, meetings and presentations. • There are standard operating procedures and relevant training of these procedures to ensure effective process monitoring and control e.g. Process Monitoring Procedure **(HBP-SOP-09)**. • Document control is in place and all documents benefit from version control which is managed through the Document Control Procedure **(HBP-SOP-14)** and recorded in the Master Document Control File **(HBP-OD-02)**. • All plant and equipment are subject to a planned preventative maintenance programme in accordance with the Computerised Maintenance Management System (CMMS) and as detailed under BAT 14; • There is a site-specific Accident Management Plan Manual **(HBP-OD-08)** and associated procedures. • Procedures are written in line with environmental guidance, law and permit conditions to safeguard compliance with environmental legislation.
V	Checking performance and taking corrective action, paying particular attention to: • monitoring and measurement, • corrective and preventive action, • maintenance of records, • independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained.	The management system incorporates: • Monitoring and measurement e.g., Process Monitoring Procedure **(HBP-SOP-09)**, Environmental Monitoring Procedure **(HBP-SOP-12)** • Corrective and preventative actions are incorporated into Procedures. • Control of records in accordance with Section 12.2 of the EMS Manual **(HBP-OD-01)** • There is an Internal Auditing Procedure **(HBP-SOP-31)** for digestate quality management for which there is some cross over with the EMS.

BAT 1	**BAT 1. In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features**	
VI	Review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness;	HBP senior management are integral in the EMS development and continual review as to its suitability, adequacy and effectiveness.
VII	Following the development of cleaner technologies;	The Environmental Policy **(HBP-OD-03)** includes a commitment to ensure that new investments in plant and operations will incorporate the best environmental techniques that are commercially viable. HBP are members of the Renewable Energy Association (REA) trade body and have a network of contacts within the industry to keep well informed of industry developments. HBP will take the opportunity to adopt cleaner technologies where possible.
VIII	Consideration for the environmental impacts from the eventual decommissioning of the plant at the stage of designing a new plant, and throughout its operating life;	The EMS includes a Site Decommissioning Plan **(HBP-OD-13)** which meets the requirements of BAT.
IX	Application of sectoral benchmarking on a regular basis;	The Environmental Policy **(HBP-OD-03)** includes an objective to meet relevant legislative, regulatory and environmental codes of practice. Through industry connections and networking including as members of the Renewable Energy Association (REA), HBP compare environmental performance with other operators and strive to improve their performance through environmental objectives.
X	Waste stream management (see BAT 2);	See BAT 2
XI	An inventory of waste water and waste gas streams (see BAT 3)	See BAT 3
XII	Residues management plan - A residues management plan is part of the EMS and is a set of measures aiming to:	There is a site-specific Residues Management Plan **(HBP-OD-12)** in place. The Residues Management Plan **(HBP-OD-12)** formalises the decisions regarding the fate of residues including packaging in line with the waste hierarchy. The

BAT 1	**BAT 1. In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features**	
	• minimise the generation of residues arising from the treatment of waste, • optimise the reuse, regeneration, recycling and/or recovery of energy of the residues, and • ensure the proper disposal of residues.	resultant biogas and digestate produced from the treatment of waste materials are fully recovered. All residues will be handled in line with environmental permitting and duty of care legislation.
XIV	Odour management plan	See BAT 12.
XV	Noise and vibration management plan	See BAT 17.
AMfBT 5.1 Management System point 10	You consider the risks a changing climate presents to your operations and have appropriate contingency plans in place to assess and manage future risks.	Climate change impacts and mitigation controls are considered in a Climate Change Risk Assessment **(HBP-OD-19)** which forms part of the EMS.
AMfBT 5.1 Management System point 13	You have and maintain a site condition report for installations. For waste facilities the Environment Agency recommends that you carry out a site condition assessment during the life of the site. You would need to carry out this assessment on surrender. Please read the guidance Environmental permitting: H5 site condition report.	A Site Condition Report is included in the December 2023 permit application to vary the site permit to an Installation site. This document is part of the EMS for the site and has been given a management system document reference **(HBP-OD-24).**[4]

[4] Site Condition Report, V1.0, Earthcare Technical Limited, December 2023 (ETL813/HBP/SCR/V1.0 December 2023)

Waste Management Measures

BAT 2	**In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques given below.**	
Waste pre-acceptance		
a	Set up and implement waste characterisation and pre-acceptance procedures.	There are agreements in place with Herriard Estates for growing non-waste energy crop feedstocks (and taking digestate). HBP carry out pre-acceptance checks on all wastes prior to receipt in accordance with the Waste Pre-acceptance Procedure **(HBP-SOP-01).** Wastes are only accepted from approved account holders. Quality requirements or waste acceptance criteria are clearly set out within agreements with account holders. All contractual agreements contain acceptance criteria which ensures a greater level of control over inputs. Should the material fail to meet these criteria, it will be rejected in accordance with the Waste Acceptance and Rejection Procedure **(HBP-SOP-02)**.
Waste acceptance		
b	Set up and implement waste acceptance procedures	There is a Waste Acceptance & Rejection Procedure **(HBP-SOP-02)** in place.
Waste tracking		
c	Set up and implement a waste tracking system and inventory. A waste tracking system and inventory aims to track the location and quantity of waste in the plant. It holds all the information generated during waste pre-acceptance procedures (e.g., date of arrival at the plant and unique reference number of the waste, information on the previous waste holder(s), pre-acceptance and acceptance analysis results, intended treatment route, nature and quantity of the waste held on site including all identified hazards), acceptance, storage, treatment and/or transfer off site.	The waste tracking system is designed to control the types and tonnages of waste accepted on site as it is designed to track all waste accepted, rejected, stored, treated, and dispatched. The function of the waste tracking system is to ensure that: • waste will not be booked in unless there is sufficient appropriate storage capacity for that waste stream within the Waste Reception Building bay or Raw Waste Buffer Tank as appropriate; • the correct types of waste are available to produce the optimum pre-treated waste blend for the AD plant; and

BAT 2	**In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques given below.**	
		• waste is handled in accordance with a first-in first out procedure to minimise the odour potential of waste stored pre-treatment and during treatment in the Waste Reception Building. Inputs to the waste tracking system are: • Overall site capacity for permitted types and tonnages of waste and waste storage capacities for each waste category (set by the permit and the site infrastructure); • Wastes sources and types which have met pre-acceptance checks and therefore able to be accepted and booked in as required; • Actual individual received waste details including: - a unique identifier reference number (generated at weighbridge). - date and time received; - tonnage / volume received; - producer details and all previous holders of the waste; - a link to all pre-acceptance information on this waste stream; - identification of on-site storage- Waste Reception Building or Raw Waste Buffer Tank (this information will be entered into waste tracking system by plant operatives in the Waste Reception Building). • Waste that is then pre-treated within the Waste Reception Building to prepare blended feedstock ready for digestion. • Rejected waste, whether this is at pre-acceptance stage, at the weighbridge or once it has been tipped. Note: All the above information will be held providing full traceability on waste materials.

BAT 2	**In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques given below.**	
		Outputs from the waste tracking system are: • The type and amount of all waste on site at any one time and where it is being stored. • The type and amount of waste that has been pre-treated in any given period. • Daily feed recipe for pre-treated waste production based on optimum balance of feedstocks and first in – first out for waste. • The remaining storage capacity for all waste types at any point in time. • Informed decisions on the tonnages of waste streams under supply contracts that are required. • Tracking against permitted limits and production of figures for quarterly waste return submissions to the Environment Agency (EA). **Data Entry Responsibilities** The **Commercial Manager** is responsible for ensuring that the following data is entered into the waste tracking system: • Pre-acceptance information The **Weighbridge Operator** is responsible for ensuring that the following data is entered into the waste tracking system: 1. For each load: o Type of material (description) o European Waste Catalogue (EWC) code o Source o Waste Transfer note reference

BAT 2	**In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques given below.**	
		○ Net weight of waste ○ Date and time received ○ Haulier ○ Haulier's license number ○ Origin of waste ○ Time and date ○ Record declaration of previous load acceptable and wash out certificate provided if required (e.g., ABP waste) ○ Vehicle registration number 2. For each load rejected at the weighbridge: ○ Type of material ○ EWC code ○ Source ○ Waste Transfer note reference ○ Tonnage ○ Date & time rejected ○ Reason for rejection / potential hazard as appropriate ○ Rejected by (name of staff member) ○ Destination of rejected material For each load rejected in the Waste Reception Building the **Plant Operative** is responsible for recording the following into the waste tracking system for each load / part load rejected upon visual inspection: ○ Type of material ○ EWC code ○ Source ○ Waste Transfer note reference ○ Tonnage ○ Date & time rejected ○ Reason for rejection / potential hazard as appropriate

BAT 2	**In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques given below.**	
		○ Rejected by (name of staff member) ○ Destination of rejected material The **Plant Manager** is responsible for checking the following data is entered into the waste tracking system correctly: • Waste that has been booked in • Waste that is rejected
Output quality		
d	Set up and implement an output quality management system	<u>Digestate quality</u> HBP is a registered producer under the Biofertiliser Certification Scheme[5] (BCS) for BSI PAS110:2014 certified digestate liquor and certified digestate fibre achieving end of waste status under the Anaerobic Digestate Quality Protocol (ADQP); Process registration reference: BCS1214C59. <u>Biomethane quality</u> Biomethane is produced in accordance with the Biomethane from waste Quality Protocol[6]. The quality of the biomethane is controlled within the biogas upgrading plant which monitors and controls gas quality and which will reject any biomethane of insufficient quality, which will be diverted to the flare.
Waste segregation		
e	Ensure waste segregation. Waste is kept separated depending on its properties in order to enable easier and environmentally safer storage and treatment. Waste segregation relies on the physical separation of waste and on procedures that identify when and where wastes are stored.	Liquid food waste, delivered in tankers, is currently dispatched directly into the Raw Waste Buffer Tank (452m^3) within the secondary containment area. The dispatch point is to be moved to within the Waste Reception Building such that any off gas from tankers will be contained and abated by the buildings odour abatement system.

[5] Biofertiliser Certification Scheme, https://www.biofertiliser.org.uk/
[6] Biomethane from waste Quality Protocol, March 2014, Environment Agency https://www.gov.uk/government/publications/quality-protocol-biomethane-from-waste

BAT 2	**In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques given below.**	
		Solid food waste is tipped inside a single bay inside the Waste Reception Building. In addition, there is a quarantine bay for rejected wastes that have already been tipped.
f	Ensure waste compatibility prior to mixing or blending of waste	Due to the nature of the feedstocks and waste pre-acceptance checks there is no potential for issues with waste compatibility.
g	Sort incoming solid waste	Sorting of incoming solid wastes is carried out as described above (e).
AMfBT 6 Waste pre-acceptance, acceptance and tracking point 9	You cannot accept waste containing animal by-products unless your facility has been validated following the regulations and approved by the Animal and Plant Health Agency (APHA). You must monitor your process in line with animal by-products regulations where required to do so.	Herriard Bio Power Limited hold the relevant approval of biogas plant issued and regulated by the Animal and Plant Health Agency (APHA) (Approval reference: 15/068/8002 ABP/BIO).
AMfBT 6.3 Waste acceptance and rejection point 21	If you are permitted to accept animal by-products you must: • segregate these from other waste • keep liquors and leachate separate and provide wheel-wash facilities for disinfecting delivery vehicles on exit from the reception building You may need additional cleaning methods, for example steam cleaning. You must carry this out in an enclosed area.	Category 3 catering waste is tipped, stored and processed inside the Waste Reception Building. The site is cleaned in accordance with a Cleaning & Disinfection Regime. Vermin control is logged and there is a Pest Management Plan **(HBP-OD-09)** in place. Any wash waters or liquor are collected within the sealed drainage system and treated within the AD process.
AMfBT 6.3 Waste acceptance and rejection point 22	You must characterise wash-down water containing cleaning chemicals, for example disinfectants, and dispose of them appropriately.	Disinfectants used are suitable for treatment in the AD process. Dilution rate is 1-part Vanadox to 250 parts waters.

Inventory of Waste Water and Waste Gas

BAT 3	**In order to facilitate the reduction of emissions to water and air, BAT is to establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:**	
i	Information about the characteristics of the waste to be treated and the waste treatment processes, including: • simplified process flow sheets that show the origin of the emissions; • descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances;	Origin of Emissions / Emission Points The Process Flow Diagram (Appendix A) shows inputs and outputs including the origin of any emissions. Emissions to air are: • EP1 Odour abatement plant (carbon filter) outlet • EP2 Combined Heat and Power Engine Stack 1 (Duty) • EP3 Combined Heat and Power Engine Stack 2 (Standby) • EP4 Flare stack 1 (1,000Nm^3/h) • EP5 Flare stack 2 (500Nm^3/h) • EP6 Emergency diesel generator stack • EP7 Carbon dioxide vent stack on biogas upgrading plant • EP8 Combined lagoon gas carbon filter vent • EP9 PVRV on Raw Waste Buffer Tank • EP10 PVRV on Digester 1 • EP11 PVRV on Digester 2 • EP12 PVRV on Digester 3 • EP13 PVRV on Post digester • EP14 PVRV on Pasteuriser There are no emissions to water. Treatment Techniques There is no waste water treatment. Waste gas treatment is described below:

BAT 3	**In order to facilitate the reduction of emissions to water and air, BAT is to establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:**	
		Biogas treatment Ferric Hydroxide powder may be added to the feedstock feeder(s) if digester analysis or inline gas quality monitors indicate that the hydrogen sulphide (H_2S) levels in the biogas need to be reduced. Once out of storage the biogas either: • passes through a gas cooling system to reduce moisture and then through a carbon filter to reduce H_2S and then to one of the CHPs (duty in preference to standby); or • passes through two carbon filters in series then into the biogas upgrading plant for conversion to biomethane. Currently waste carbon dioxide (CO_2) is released to atmosphere via a vent but there are plans to capture and store the CO_2 pending removal off site for beneficial use. There will be carbon filters utilised to treat channelled emissions from the digestate storage lagoons. The floating covers on the lagoons will each have 6 No. vents which will join a system of pipework leading to a single two stage carbon filter treatment process; the first filter for ammonia removal and the second stage for residual odour removal including volatile organic compounds and H_2S. *Odour Abatement Plant (Carbon filter)filter* The existing UV odour abatement system serving the Waste Reception Building has been replaced with a carbon filter. A specification of the carbon filter unit is provided in Appendix B. The current set flow of this unit is –16,000-18,000 cubic metres per hour
ii	Information about the characteristics of the wastewater streams	There is no wastewater as all dirty water generated is used in the AD process.

BAT 3	**In order to facilitate the reduction of emissions to water and air, BAT is to establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:**	
iii	Information about the characteristics of the waste gas streams, such as: • average values and variability of flow and temperature; • average concentration and load values of relevant substances and their variability (e.g., organic compounds, POPs such as PCBs); • flammability, lower and higher explosive limits, reactivity; • presence of other substances that may affect the waste gas treatment system or plant safety (e.g., oxygen, nitrogen, water vapour, dust).	Once ramp up of the new infrastructure is complete, it is anticipated that biogas production will be in the range of 24,350Nm^3/d or 1,015Nm^3/h but may be higher due to process efficiencies. Biogas quality is generally between 55- 57% methane but may be higher. Hydrogen sulphide is generally kept below 50ppm. The biogas is stored in the domes above the raw waste buffer tank and the four digesters. Biogas has a lower explosive limit of approximately 6% by volume and a higher explosive limit of approximately 12% by volume. After storage the biogas from Digester 1 and Post Digester passes through a carbon filter prior to use in one of the CHPs (there is an existing CHP which will become the 'standby' CHP and a new proposed CHP which will become the 'duty' CHP). The biogas from Digester 2 and Digester 3 pass through 2 No. carbon filters in series and is then utilised in the biogas upgrading plant. There is a cross valve between the two systems to balance biogas supply to minimise flaring of biogas. Waste gas may arise in the form of biogas or biomethane during periods of extended breakdown and maintenance. Waste gas is burnt in a flare. There are 2 No. flares; one serving the CHPs and one serving the biogas upgrading plant (BUP). The flares are only used during period of abnormal operating conditions. There is a cross valve between the two gas storage systems such that biogas can move from an area of higher pressure to an area of lower pressure to reduce flaring events and duration, and preventing any release of raw biogas. .

Waste Storage

<table>
<tr><td>BAT 4</td><td colspan="2">In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques given below.</td></tr>
<tr><td>a</td><td>Optimised storage location. This includes techniques such as:

• the storage is located as far as technically and economically possible from sensitive receptors, watercourses, etc.;
• the storage is located in such a way so as to eliminate or minimise the unnecessary handling of wastes within the plant (e.g., the same wastes are handled twice or more or the transport distances on site are unnecessarily long).</td><td>Solid waste feedstock is stored in the dedicated Waste Reception Building which benefits from a fast-acting roller shutter doors and an odour abatement system (carbon filter). Solid food waste is tipped inside the Waste Reception Building, which minimises handling of the waste.

Liquid waste including pre-prepared food waste in tankers is transferred via pipework from the Waste Reception Building to the Raw Waste Buffer Tank where the treatment process commences.</td></tr>
<tr><td>b</td><td>Adequate storage capacity. Measures are taken to avoid accumulation of waste, such as:

• the maximum waste storage capacity is clearly established and not exceeded taking into account the characteristics of the wastes (e.g., regarding the risk of fire) and the treatment capacity;
• the quantity of waste stored is regularly monitored against the maximum allowed storage capacity;
• the maximum residence time of waste is clearly established.</td><td>The current permit stipulates a maximum permitted tonnage of 36,500 tonnes a year. The permit variation application which this BAT assessment supports includes an application to increase the maximum permitted quantity of waste to 40,000 tonnes per annum in line with the current planning permission.

The maximum storage capacities and residence times are detailed in Table 1 below.
Table 1 – Waste Storage
<table>
<tr><th>Type of waste</th><th>Storage location within Waste Reception Building</th><th>Maximum tonnage at any one time (tonnes)</th><th>Maximum residence time</th></tr>
<tr><td>Loose or packaged food waste</td><td>Concrete bay with 2.5m concrete retaining wall</td><td>315</td><td>72 hours</td></tr>
<tr><td>Liquid waste</td><td>Raw Waste Buffer Tank</td><td>452</td><td>1 week</td></tr>
<tr><td>Plastic rejects</td><td>1. No. Storage bay</td><td>30</td><td>1 week</td></tr>
<tr><td colspan="2">Total storage capacity</td><td>797</td><td></td></tr>
</table></td></tr>
</table>

BAT 4	**In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques given below.**	
c	Safe storage operation. This includes measures such as: • equipment used for loading, unloading and storing waste is clearly documented and labelled; • wastes known to be sensitive to heat, light, air, water, etc. are protected from such ambient conditions; • containers and drums are fit for purpose and stored securely.	There is a dedicated telescopic handler for loading and handling solid food waste. The wastes streams accepted for processing are not sensitive to heat, light, air, water etc. and therefore do not need to be protected from ambient conditions. Occasionally waste in drums or IBCs may be accepted. These are stored securely in an area of low vehicle impact risk within the Waste Reception Building which benefits from an impermeable surface and sealed drainage.
d	Separate area for storage and handling of packaged hazardous waste. When relevant, a dedicated area is used for storage and handling of packaged hazardous waste.	Hazardous waste is not accepted in accordance with Waste Acceptance and Rejection Procedure **(HBP-SOP-02).**

Waste Handling & Transfer

BAT 5	**In order to reduce the environmental risk associated with the handling and transfer of waste, BAT is to set up and implement handling and transfer procedures.**	
	Handling and transfer of waste are carried out by competent staff.	All waste handling and transfer activities are carried out by trained staff in accordance with Standard Operating Procedures; Liquid Waste Reception Procedure **(HBP-SOP-03)** & Waste Management & Loading Procedure **(HBP-SOP-04)**.
	Handling and transfer of waste are duly documented, validated prior to execution and verified after execution;	Waste is only accepted in line with a supplier agreement. All feedstocks coming into site are recorded on the weighbridge and the data stored on the weighbridge computer. This includes feedstock type, tonnage, date, and time. Pre-treated waste entering the AD process via the Raw Waste Buffer Tank (RWBT) is measured through SCADA and verified through monitoring of levels within the RWBT.
	Measures are taken to prevent, detect and mitigate spills;	The Standard Operating Procedures include measures to prevent spillages occurring. However, in the case of a spillage occurring, it will be managed in accordance with the Spill Control Procedure **(HBP-SOP-20).**
	Operation and design precautions are taken when mixing or blending wastes (e.g., vacuuming dusty/powdery wastes).	Waste is only mixed within the enclosed waste treatment infrastructure within the Waste Reception Building and within the sealed tank infrastructure.

Monitoring

BAT 6	**For relevant emissions to water as identified by the inventory of waste water streams (see BAT 3), BAT is to monitor key process parameters (e.g., waste water flow, pH, temperature, conductivity, BOD) at key locations (e.g., at the inlet and/or outlet of the pre-treatment, at the inlet to the final treatment, at the point where the emission leaves the installation).**
	There are no emissions to water. Dirty water from the Waste Reception Building, other dirty areas and the secondary containment sump is collected and reused in the process.

BAT 7	**BAT is to monitor emissions to water with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.**
	Not applicable, see BAT 6.

Monitoring of Point Source Emissions to Air

BAT 8	**BAT is to monitor channelled emissions to air with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.**	
H_2S	Once every six months. No EN standard available. See BAT 34	H_2S and NH_3 monitoring of the odour abatement plant stack will be carried out every 6 months as per BAT 34.
NH_3	Once every six months. No EN standard available. See BAT 34	H_2S and NH_3 monitoring of the odour abatement plant stack will be carried out every 6 months as per BAT 34.
Odour concentration	Once every six months EN 13725. The monitoring of NH_3 and H_2S may be used as an alternative to the monitoring of the odour concentration. See BAT 34	H_2S and NH_3 monitoring of the odour abatement plant stack will be carried out every 6 months in lieu of odour concentration monitoring as per BAT 34.

BAT 9 Not Applicable

BAT 10	**BAT is to periodically monitor odour emissions.**	
	Odour emissions can be monitored using: • EN standards (e.g., dynamic olfactometry according to EN 13725 in order to determine the odour concentration or EN 16841-1 or -2 in order to determine the odour exposure); • when applying alternative methods for which no EN standards are available (e.g., estimation of odour impact), ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality. The monitoring frequency is determined in the odour management plan (see BAT 12).	An Odour Management Plan forms part of the Environmental Management System **(HBP-OD-07)**. The distance to sensitive receptors reduces the likelihood of any significant amenity impacts because of odour. Daily olfactory qualitative monitoring checks are carried out as part of daily checks and recorded within the Odour Monitoring Form **(HBP-FT-06)**. If there are no odour issues detected then this frequency may be reduced. Quantitative odour concentration monitoring is not proposed. H_2S and NH_3 monitoring of the odour abatement plant stack will be carried out every 6 months as per BAT 8 and BAT 34.

Material Efficiency

BAT 11	**BAT is to monitor the annual consumption of water, energy and raw materials as well as the annual generation of residues and waste water, with a frequency of at least once per year.**	
	Monitoring includes direct measurements, calculation or recording, e.g., using suitable meters or invoices. The monitoring is broken down at the most appropriate level (e.g., at process or plant/installation level) and considers any significant changes in the plant/installation	HBP maintains a log of: • Wastes accepted for treatment via weighbridge computer and Waste Transfer Notes • Any residual waste removed off site (Waste Transfer Notes / Quarterly Waste Returns). • Water usage is measured via a flow meter. • Energy used is measured via a meter which measures mains electricity imports. This is recorded weekly from the meter. • Electricity export. • Raw materials used: oil, diesel, ferric hydroxide powder, anti-foam • Digestate produced • Biogas production • Biomethane production Waste production is recorded and audited in accordance with the Residues Management Plan **(HBP-OD-12).** HBP will report the following to the EA on an annual basis, or as stipulated in the Environmental Permit. • Waste in and out (waste returns) on a quarterly basis (tonnes) • Water usage (tonnes or m^3) • Energy usage (MWh) • Raw material usage (tonnes or m^3) • Emergency flare operations (hours) • Electricity exported (MWh)

		• Biomethane exported (tonnes or m^3) • CHP engine usage (hours) • CHP engine efficiency (%) There is no waste water produced on site as dirty water is recirculated through the AD plant for treatment.

Fugitive Emissions to Air

BAT 12	**In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:**	
	A protocol containing actions and timelines;	An Odour Management Plan (OMP) **(HBP-OD-07)** has been developed as part of the Environmental Management System and includes a protocol containing actions and timelines.
	A protocol for conducting odour monitoring as set out in BAT 10;	The OMP contains a section on odour monitoring as described in BAT 10. Point source emission monitoring from the odour abatement plant stack will be carried out periodically and in accordance with EN standards (e.g., dynamic olfactometry according to EN 13725 in order to determine the odour concentration).
	A protocol for response to identified odour incidents, e.g., complaints;	The OMP contains a section detailing the protocol for responding to odour incidents including complaints.
	An odour prevention and reduction programme designed to identify the source(s); to characterise the contributions of the sources; and to implement prevention and/or reduction measures.	The OMP includes an odour prevention and reduction programme designed to identify the source(s); to characterise the contributions of the sources; and to implement prevention and/or reduction measures.

BAT 13	**In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to use one or a combination of the techniques given below.**	
a	Minimising residence times	See BAT 4 b – Table 1 which includes maximum waste storage residence times.
b	Using chemical treatment	This technique is not used.
c	Optimising aerobic treatment	This technique is not used.

BAT 14	**In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour, BAT is to use an appropriate combination of the techniques given below.**	
a	Minimising the number of potential diffuse emission sources. This includes techniques such as: • appropriate design of piping layout (e.g., minimising pipe run length, reducing the number of flanges and valves, using welded fittings and pipes); • favouring the use of gravity transfer rather than using pumps; • limiting the drop height of material; • limiting traffic speed; and • using wind barriers.	Vehicles are restricted to 10 miles per hour on site as a health and safety measure; this also reduces potential noise and dust emissions. Fugitive emissions of odour are monitored daily in accordance with the Odour Monitoring Procedure **(HBP-SOP-10)** and recorded in the Odour Monitoring Form **(HBP-FT-06).** Materials that are liable to release diffuse emissions to air are stored appropriately to minimise emission release: • Solid waste is stored and treated in the Waste Reception Building with air handling and an odour abatement plant (carbon filter). • Silage is stored in covered silage clamps and kept with a tidy cutting face in accordance with the Crop Loading Procedure **(HBP-SOP-06).** • Digestate liquor is stored within digestate storage lagoons which will be covered in 2025 and the emissions will be treated in a carbon filter. • Digestate fibre falls from the separators into the bay (a covered structure is proposed) and is regularly removed from site to destination field heaps in accordance with the Digestate Handling Procedure **(HBP-SOP-08)**.
b	Selection and use of high- integrity equipment. This includes techniques such as: • valves with double packing seals or equally efficient equipment; • high-integrity gaskets (such as spiral wound, ring joints) for critical applications; • pumps/compressors/agitators fitted with mechanical seals instead of packing;	All equipment and systems on site are supplied as per vendors original specification and are maintained to that standard thereafter when replacing. There are examples within the site infrastructure of all of the techniques listed. For example, the low pressure and high pressure compressors in the biogas upgrading plant are fitted with mechanical seals.

BAT 14	**In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour, BAT is to use an appropriate combination of the techniques given below.**	
	• magnetically driven pumps/ compressors/agitators;	
c	Corrosion prevention	Materials are selected for suitability and longevity.
d	Containment, collection and treatment of diffuse emissions	Odour emissions from the Waste Reception Building are minimised by the building being under negative pressure and the air being treated in the odour abatement system (carbon filter). The digestate separators and fibre storage bay is not in a building with collection and treatment of diffuse emissions. Improvement work to cover the separators and the fibre storage bay is underway to abate emissions at the time of writing, although no treatment of emissions is proposed. See Section 3 Conclusions and recommendations which describes the proposals and the justification for the derogation from BAT. The digestate storage lagoons are to be covered. The installation of floating covers, with channelled emissions treated by a carbon filter to remove H_2S, NH_3 and odorous compounds is scheduled for 2025.
e	Dampening	Following current site improvement work, dust raising will be minimal due to the hard surfaces throughout the site. However, if there were any emissions of dust observed as part of daily site inspections (Daily Checks **(HBP-RC-03)**) then dust suppression would be carried out with a water bowser (Dust Procedure **(HBP-SOP-11)**).
f	Maintenance	All plant and equipment are subject to a planned preventative maintenance programme in accordance with: • Daily Checks **(HBP-RC-03)** • Planned preventative maintenance programme according to the CMMS.

BAT 14	**In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour, BAT is to use an appropriate combination of the techniques given below.**	
g	Cleaning of waste treatment and storage areas	Disinfection of the vehicle wheels as they leave the Waste Reception Building after tipping solid food waste is carried out in accordance with the Waste Acceptance & Rejection Procedure **(HBP-SOP-02)**. There is a Cleaning & Disinfection Regime in place.
h	Leak detection and repair (LDAR) programme	There is an annual Leak Detection and Repair (LDAR) programme in place and a Leak Detection and Repair Plan **(HBP-OD-22)** forms part of the management system.

Emissions from Flaring

BAT 15	**BAT is to use flaring only for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns) by using both of the techniques given below.**	
a	Correct plant design. This includes the provision of a gas recovery system with sufficient capacity and the use of high-integrity relief valves.	There is 340m^3 of biogas storage in the Raw Waste Buffer Tank in addition to 1,250m^3 of biogas storage above each digester so 5,340m^3 in total. The total variable volume of biogas in the vessels is 5,340m^3 which is approximately 5.3 hours of the daily volume of biogas produced and therefore provides short term storage of approximately 3 hours at full feeding which results in full gas production. As it is proposed that there are 2 No. CHPs (one duty and one standby) planned maintenance can be staggered to reduce flaring. In the case of maintenance of the biogas upgrading plant feed rates are reduced ahead of planned maintenance to reduce gas production. In this instance both CHPs could be utilised in the short term to manage any excess biogas until the reduction in feed rate effectively reduces the biogas production rate. The existing CHP will become the 'standby' CHP and a new proposed CHP which will become the 'duty' CHP. The new CHP provides surety of electricity supply given that the existing CHP is over 10 years old and becoming less reliable and also allows capacity to burn biogas should the gas upgrader unit and export of biomethane be compromised. If this happens feeding will be markedly reduced or stopped to reduce gas production levels, but in the interim any biogas can be effectively used to generate electricity from both CHPs. Though only enough biogas will be produced to fuel both CHPs at 80% capacity due to the treatment/production capacity of the AD plant. The site has a capacity to export 2 MW of electricity to the grid. Each CHP can produce 1.2 MW of electricity. There is capacity to use 2.4 MW of electricity from both CHPs to supply the grid and the Pentair gas upgrade unit, but it is preferable to run one CHP as the 'duty' CHP at

BAT 15	**BAT is to use flaring only for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns) by using both of the techniques given below.**	
		100% and use the second CHP as standby. All heat produced from the CHPs can be used on site at certain times of the year dependent on ambient temperature at the time of production. Biogas is not routinely flared to atmosphere. There are 2 No. flares; one serving the CHPs and one serving the biogas upgrading plant (BUP). The flares are only used during period of abnormal operating conditions should the biogas storage become full. There is a cross valve between the two gas storage systems such that biogas can move from an area of higher pressure to an area of lower pressure to reduce flaring events and duration. Therefore the settings on SCADA will dictate that the flare(s) will automatically start before the PVRVs will release gas, meaning that they are only in place for unforeseen emergency use. The PVRVs serve as a contingency to protect the integrity of the AD plant. Venting is used only in extreme circumstances as a precautionary approach to prevent catastrophic pressure build up within the system. Both flaring and venting are minimised as much as possible by monitoring and efficient operation of the site. There are 6 No. PVRVs on the tanks. These are checked on a daily basis (Daily Checks **(HBP-RC-03))** and maintained annually in line with the CMMS. Additional maintenance will be carried out if daily checks identify any issues with operation.
b	Plant management. This includes balancing the gas system and using advanced process control.	See above Gas pressure is measured at 4 No. points within the raw biogas storage system; RWBT, D2, D3 and Pasteuriser. Gas pressure is measured within the lines leading

BAT 15	**BAT is to use flaring only for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns) by using both of the techniques given below.**	
		to the CHP and the BUP which allows for usage of the gas consumers to be regulated. Gas holder levels are also measured in all the biogas storage domes. SCADA uses gas level readings to dictate the load of the BUP and CHP(s). The CHP operates from 50 to 100% gas level and the BUP operates from 20 to 100% gas level and gas pressure. The BUP will smoothly change the load automatically, while CHP requires manual intervention. Gas level readings also dictate flare usage.

BAT 16	**In order to reduce emissions to air from flares when flaring is unavoidable, BAT is to use (both of) the techniques given below.**	
a	Correct design of flaring devices. Optimisation of height and pressure, assistance by steam, air or gas, type of flare tips, etc., to enable smokeless and reliable operation and to ensure the efficient combustion of excess gases.	The flares are Uniflare High Temperature Enclosed Biogas Flares: • UF-10-1000-BGF Build No. 1837 Jan 2022 (maximum flowrate 1,000Nm^3/h) • UF-10 500-BGF Build No. 1836 Jan 2022 (maximum flowrate 500Nm^3/h) Both flares start automatically and have stack heights of 7.67m.
b	Monitoring and recording as part of flare management. This includes continuous monitoring of the quantity of gas sent to flaring. It may include estimations of other parameters (e.g., composition of gas flow, heat content, ratio of assistance, velocity, purge gas flow rate, pollutant emissions (e.g., NO_X, CO, hydrocarbons), noise). The recording of flaring events usually includes the duration and number of events and allows for the quantification of emissions and the potential prevention of future flaring events.	The number of operating hours for the flares is recorded on the SCADA System and this information will be submitted to the Environment Agency annually in accordance with the varied Environmental Permit. Emissions monitoring of either or both flares in the event that the emergency flare has been operational for more than 10 per cent of a year (876 hours) and / or in accordance with the varied environmental permit. It is in economic interests of HBP to reduce the amount of biogas lost to flaring and to conduct a root cause analysis to reduce the potential for future flaring events.
AMfBT 8.12 Biogas treatment and storage – AD plants point 12	You should use enclosed (ground) design flares on all new plants. They should be capable of achieving a minimum of 1,000°C with 0.3 seconds retention time at this temperature.	The flares both burn at >1,000°C for in excess of 0.3 seconds and are ground enclosed flares.

Noise & Vibration

BAT 17	**In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and vibration management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:**	
	A protocol containing appropriate actions and timelines;	The applicability of BAT 17 is restricted to cases where a noise or vibration nuisance at sensitive receptors is expected and/or has been substantiated. Planning applications to date have not required a quantitative Noise Impact Assessment. The fact that there are no residential receptors within 750m have meant that a qualitative assessment was deemed to be sufficient during Planning. In addition, the Operator has confirmed that no noise complaints have previously been received. A Noise and Vibration Management Plan will be developed if noise and / or vibration is substantiated off-site.
	A protocol for conducting noise and vibration monitoring;	As above.
	A protocol for response to identified noise and vibration events, e.g., complaints;	As above.
	A noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures.	As above.

BAT 18	**In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of the techniques given below.**	
a	Appropriate location of equipment and buildings. Noise levels can be reduced by increasing the distance between the emitter and the receiver, by using buildings as noise screens and by relocating building exits or entrances.	The closest residential receptor to the site is Manor Farmhouse 751m to the south east. There are workplace receptors adjacent to the site at Bushy Warren Composting Facility and at The Herriard Estate office 690m to the south east. It was deemed that the composting site is a noisy work environment that is unlikely to be impacted by noise from the AD operation and that other receptors are too remote from the operations to be affected by any noise emissions.
b	Operational measures. This includes techniques such as: • inspection and maintenance of equipment; • closing of doors and windows of enclosed areas, if possible; • equipment operation by experienced staff; • avoidance of noisy activities at night, if possible; • provisions for noise control during maintenance, traffic, handling and treatment activities.	Operational measures to reduce noise emissions include: • Planned preventative maintenance of plant and equipment including the flares and the CHPs. • Only trained staff are able to operate equipment. • The planning permission restricts delivery of waste to the site such that there can be up to 18 waste deliveries per day. Waste can only be delivered to the site between the hours of 07:00 and 18:00 Monday to Friday, between 07:00 and 12:00 on Saturday mornings and between 7:00 and 15:00 on Bank Holidays except Christmas Day and Easter Sunday. • There is a 10mph speed limit on site.
c	Low-noise equipment. This may include direct drive motors, compressors, pumps and flares	This technique is not used.
d	Noise and vibration control equipment. This includes techniques such as: • noise reducers; • acoustic and vibrational insulation of equipment;	The CHPs are housed in sound proofed containers and are fitted with exhaust silencers to reduce the overall average noise level of each CHP to approximately 75 dB(A) measured one metre from the enclosure and at 1.2 metres above ground level. The biomethane compressor is housed in an acoustic enclosure.

BAT 18	**In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of the techniques given below.**	
	• enclosure of noisy equipment; • soundproofing of buildings.	
e	Noise attenuation. Noise propagation can be reduced by inserting obstacles between emitters and receivers (e.g., protection walls, embankments and buildings).	This technique is not used.

Emissions to Water

BAT 19	**In order to optimise water consumption, to reduce the volume of waste water generated and to prevent or, where that is not practicable, to reduce emissions to soil and water, BAT is to use an appropriate combination of the techniques given below.**	
a	Water management. Water consumption is optimised by using measures which may include: • water-saving plans (e.g., establishment of water efficiency objectives, flow diagrams and water mass balances); • optimising the use of washing water (e.g., dry cleaning instead of hosing down, using trigger control on all washing equipment);	Approximately 50m^3 per day of water is required for the AD process; the vast majority of this water is sourced from water collected on site. Proposed drainage improvements to fully segregate dirty and clean water will allow all dirty water to be used in the process and for this to be supplemented by collected and stored clean water (proposed clean water storage lagoon). Any additional water required on site for e.g. cleaning down of Waste Reception Building is metered. Water is used to wash down vehicles which have dispatched solid waste inside the Waste Reception Building. This water use is minimised via the use of trigger control hoses. All of the water collecting within the sump in the Waste Reception Building is pumped to the RWBT for use in the AD process.
b	Water recirculation	As described above the recirculation of clean and dirty water is optimised.
c	Impermeable surface. Depending on the risks posed by the waste in terms of soil and/or water contamination, the surface of the whole waste treatment area (e.g., waste reception, handling, storage, treatment and dispatch areas) is made impermeable to the liquids concerned.	The whole site, both clean and dirty areas, benefit from an impermeable concrete surface. The Waste Reception Building benefits from a sealed drainage system from which dirty water is collected, stored in the RWBT and reused in the process.
d	Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels. Depending on the risks posed by the liquids contained in tanks and vessels in terms of soil and/or water contamination, this includes techniques such as: • overflow detectors;	All the tanks benefit from high level sensors and are connected to SCADA such that further filling of the tank will be stopped and an alarm will be sent via telemetry: • A high level alarm in the Raw Waste Buffer tank inhibits the feed from the Mavitec depackaging system. • A high level alarm in a primary digester stops feeding to that tank.

BAT 19	**In order to optimise water consumption, to reduce the volume of waste water generated and to prevent or, where that is not practicable, to reduce emissions to soil and water, BAT is to use an appropriate combination of the techniques given below.**	
	• overflow pipes that are directed to a contained drainage system (i.e., the relevant secondary containment or another vessel); • tanks for liquids that are located in a suitable secondary containment; the volume is normally sized to accommodate the loss of containment of the largest tank within the secondary containment; • isolation of tanks, vessels and secondary containment (e.g., closing of valves).	• A high level alarm in the Post Digester stops transfer from any of the primary digesters. The secondary containment system is being extended around the Raw Waste Buffer Tank and Digesters 2 and 3 as part of the current improvement and expansion works. The extended secondary containment lining work was carried out by Enviroseal Lining Solutions and at the time of writing is undergoing a construction quality assurance review by Plandescil Consulting Engineers which includes checking compliance with the relevant guidance (CIRIA C736). Any recommendations arising from this report will be actioned without delay. The sump within the secondary containment bund is isolated and can only be emptied via actively pumping out.
e	Roofing of waste storage and treatment areas	All waste storage and treatment are carried out in the enclosed Waste Reception Building or within the enclosed AD plant infrastructure thus reducing production of dirty water.
f	Segregation of water streams	At the time of writing, the site drainage design is being improved to ensure segregation of clean and dirty water.
g	Adequate drainage infrastructure. The waste treatment area is connected to drainage infrastructure. Rainwater falling on the treatment and storage areas is collected in the drainage infrastructure along with washing water, occasional spillages, etc. and, depending on the pollutant content, recirculated or sent for further treatment.	As previously described the waste storage and treatment area benefits from a building and an appropriate drainage arrangement; all dirty water is reused in the process.
h	Design and maintenance provisions to allow detection and repair of leaks. Regular monitoring for potential leaks is risk-	The majority of pipework is above ground however there are two stretches of underground pipework which are surveyed every 5 years:

BAT 19	**In order to optimise water consumption, to reduce the volume of waste water generated and to prevent or, where that is not practicable, to reduce emissions to soil and water, BAT is to use an appropriate combination of the techniques given below.**	
	based, and, when necessary, equipment is repaired. The use of underground components is minimised. When underground components are used, and depending on the risks posed by the waste contained in those components in terms of soil and/or water contamination, secondary containment of underground components is put in place.	• Pipe from crop feeder and associated mixing pump to Digester 1. • Pipe between Digester 1 and the Post Digester. Pipework installed as recent site expansion work is run above ground allowing regular visual inspection as per Daily Checks **(HBP-RC-03)**. The underground silage effluent tank (126m^3) doesn't currently benefit from secondary containment or leak detection. At the time of writing a review of the primary containment infrastructure is being undertaken by a suitably qualified engineer. The Operator is committed to undertaking any required improvements such that the tank will meet BAT.
i	Appropriate buffer storage capacity is provided for waste water generated during other than normal operating conditions using a risk-based approach (e.g. taking into account the nature of the pollutants, the effects of downstream waste water treatment, and the receiving environment). The discharge of waste water from this buffer storage is only possible after appropriate measures are taken (e.g., monitor, treat, reuse).	Waste water generated during abnormal operating conditions would be stored within the secondary containment system, the sizing and suitability of which have been described in preceding sections.

BAT 20 – not applicable (waste water treatment)

Emissions from Accidents and Incidents

BAT 21	**In order to prevent or limit the environmental consequences of accidents and incidents, BAT is to use all of the techniques given below, as part of the accident management plan (see BAT 1)**	
a	Protection measures. These include measures such as: • protection of the plant against malevolent acts; fire and explosion protection system, containing equipment for prevention, detection, and extinction; and • accessibility and operability of relevant control equipment in emergency situations.	The site is manned 24 hours by site operators. The site is encompassed with metal fencing and the gates are locked from 7pm to 7am. There are 7 No. CCTV cameras onsite with 24hr monitoring. The plant can be operated remotely via a secure remote login in system. A Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) assessment was carried out in 2019 for the existing plant. This has been updated in 2024. There is a Hazardous Area Classification Drawing for the new tanks so explosive zones have been identified such that the correct control measures can be implemented. There is an updated hazard and operability study (HAZOP) in place. An updated Fire Risk Assessment **(HBP-OD-23)** was carried out in 2024.
b	Management of incidental/accidental emissions. Procedures are established and technical provisions are in place to manage (in terms of possible containment) emissions from accidents and incidents such as emissions from spillages, firefighting water, or safety valves	An Accident Management Manual **(HBP-OD-08)** and associated Emergency Procedures will be trained out to operational staff and include: • Incident Reporting Procedure **(HBP-SOP-19)** • Spill Control Procedure **(HBP-SOP-20)** • Control Panel Alarm Response **(HBP-SOP-21)** • Fire & Explosion Response Procedure **(HBP-SOP-22)** • Biogas Leak Response Procedure **(HBP-SOP-23)** • Foam Response Procedure **(HBP-SOP-24)** • Main Power Outage Response Procedure **(HBP-SOP-25)** • Safe Shutdown Procedure **(HBP-SOP-26)** • Mechanical Failure Procedure **(HBP-SOP-27)** • Flood Response Procedure **(HBP-SOP-28)** • Reduced Gas Grid Demand Contingency Plan **(HBP-SOP-29)** • Discharge of Flood Water Procedure **(HBP-SOP-30)**

		• Waste Contingency Plan **(HBP-OD-22)**
c	Incident/accident registration and assessment system. This includes techniques such as: • a log/diary to record all accidents, incidents, changes to procedures and the findings of inspections; and • procedures to identify, respond to and learn from such incidents and accidents.	In accordance with the Incident Reporting Procedure **(HBP-SOP-12)**), it is the responsibility of the **Plant Manager** to report any incidents to the Environment Agency incident hotline (0800 807060) as soon as practicably possible and in all cases within 12 hours of the incident or breach of permit to include: • Damage or danger to the natural environment; • Pollution to water or land; and • Any incident which is causing or may cause significant pollution including breakdowns or failure of equipment or techniques and accidents. It is the responsibility of the **Plant Manager** to carry out the following steps after the incident: • Use the Accident & Incident Report Form **(HBP-FT-01)** to record the details of the incident, the consequences (pollution/ damage/ breaches etc.), people involved and immediate response activities that were carried out. • Conduct an investigation using the Accident & Incident Report Form **(HBP-FT-01)** for incidents with an impact (or potential impact) on the environment finding the root cause(s) of the incident and identifying corrective action(s). • Ensure that a regular review of outstanding actions is undertaken, to ensure that the corrective actions are followed through to completion. • On completion of the corrective actions (where identified), update the form with completion dates and file the form for future reference. • Provide written confirmation to the Environment Agency of all pollution incidents and breaches of emissions within 24 hours , completing Part A of the Schedule 5 Notification form. Further details arising from further investigation into the incident are to be included within Part B of the Schedule 5 when available.

		Corrective actions to be logged and tracked in the Non-conformance & Corrective Action Log **(HBP-RC-18).**

Material Efficiency

BAT 22	**In order to use materials efficiently, BAT is to substitute materials with waste.**	
a	Waste is used instead of other materials for the treatment of wastes (e.g., waste alkalis or waste acids are used for pH adjustment, fly ashes are used as binders).	Raw material use is minimised where possible and use will be reported annually to the Environment Agency in line with permit conditions as required. Opportunities will be sought to use waste materials in place of raw materials where appropriate.

Energy Efficiency

BAT 23	**In order to use energy efficiently, BAT is to use both of the techniques given below.**	
a	Energy efficiency plan. An energy efficiency plan entails defining and calculating the specific energy consumption of the activity (or activities), setting key performance indicators on an annual basis (for example, specific energy consumption expressed in kWh/tonne of waste processed) and planning periodic improvement targets and related actions. The plan is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.	Heat and electricity are provided by the CHP engines except in the case of power failure. Power will then be provided by the on-site stand-by generator (414kW). Under normal operations only one CHP will operate, such that the other CHP can be operated if the duty CHP is not operating for maintenance or due to breakdown. The existing CHP will become the 'standby' CHP and a new proposed CHP which will become the 'duty' CHP. The new CHP provides surety of electricity supply given that the existing CHP is over 10 years old and becoming less reliable and also allows capacity to burn biogas should the gas upgrader unit and export of biomethane be compromised. If this happens feeding will be markedly reduced or stopped to reduce gas production levels, but in the interim any biogas can be effectively used to generate electricity from both CHPs. Though only enough biogas will be produced to fuel both CHPs at 80% capacity due to the treatment/production capacity of the AD plant. The site has a capacity to export 2 MW of electricity to the grid. Each CHP can produce 1.2 MW of electricity. There is capacity to use 2.4 MW of electricity from both CHPs to supply the grid and the Pentair gas upgrade unit, but it is preferable to run one CHP as the 'duty' CHP at 100% and use the second CHP as standby. All heat produced from the CHPs can be used on site at certain times of the year dependent on ambient temperature at the time of production. All of the heat required for the process i.e., warming of digesters for mesophilic digestion and heating of the pasteuriser to >70^{0}C is provided by on-site heat generation (CHPs). Energy production and usage is monitored and reported annually.

BAT 23	**In order to use energy efficiently, BAT is to use both of the techniques given below.**	
b	Energy balance record. An energy balance record provides a breakdown of the energy consumption and generation (including exportation) by the type of source (i.e., electricity, gas, conventional liquid fuels, conventional solid fuels, and waste). This includes: • information on energy consumption in terms of delivered energy; • information on energy exported from the installation; • energy flow information (e.g., Sankey diagrams or energy balances) showing how the energy is used throughout the process. The energy balance record is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.	A Sankey Diagram has been developed and forms Appendix C of this document.

Waste Reduction

BAT 24	**In order to reduce the quantity of waste sent for disposal, BAT is to maximise the reuse of packaging, as part of the residues management plan (see BAT 1).**	
	Packaging (drums, containers, IBCs, pallets, etc.) is reused for containing waste, when it is in good condition and sufficiently clean, depending on a compatibility check between the substances contained (in consecutive uses). If necessary, packaging is sent for appropriate treatment prior to reuse (e.g., reconditioning, cleaning).	Packaging removed from packaged waste feedstocks is washed in the process to ensure maximum removal of organic materials. The resulting packaging material is compacted and sent off site to be used in an energy from waste plant which is currently the best option for this waste stream in line with the waste hierarchy. If waste in IBCs or drums is accepted, the packaging is returned to the producer for reuse where possible. Ref: Residues Management Plan **(HBP-OD-12).**

BAT 25-32 Not Applicable (mechanical treatment of waste when it is not combined with biological treatment)

General BAT conclusions for the biological treatment of waste

BAT 33	**In order to reduce odour emissions and to improve the overall environmental performance, BAT is to select the waste input.**	
	The technique consists of carrying out the pre-acceptance, acceptance and sorting of the waste input (see BAT 2) so as to ensure the suitability of the waste input for the waste treatment, e.g., in terms of nutrient balance, moisture or toxic compounds which may reduce the biological activity.	The EMS procedures for waste pre-acceptance and acceptance (see BAT 2) ensure that waste is only accepted at the facility if it is suitable for treatment within an anaerobic digester. The AD plant is fed in accordance with a daily feedstock input schedule which is informed by feedstock supply planning, process monitoring and process management by balancing dry matter content and digestibility to maximise plant efficiency and reduce odour emissions from both the AD facility and the resulting digestate.

BAT 34	**In order to reduce channelled emissions to air of dust, organic compounds and odorous compounds, including H_2S and NH_3, BAT is to use one or a combination of the techniques given below.**		
a	Adsorption	There are a number of carbon filters used to clean gas: • Carbon filter for odour abatement of air extracted from the Waste Reception Building • Carbon filter prior to the CHPs • Carbon filters in series as part of the biogas upgrading plant (to reduce NH_3 and H_2S levels) • Two carbon filters in sequence to treat the channelled emissions from the two digestate lagoons. The floating covers on the lagoons will each have 6 No. vents which will join a system of pipework leading to a two stage carbon filter treatment process; the first filter for NH_3 removal and the second stage for residual odour removal including volatile organic compounds and H_2S.	
b	Biofilter	Not applicable.	
c	Fabric filter	Not applicable.	
d	Thermal oxidation	Not applicable.	
e	Wet scrubbing	Not applicable	
BAT-associated emission levels (BAT-AELs) for channelled NH_3, odour, dust and TVOC emissions to air from the biological treatment of waste			
Ref	**Parameter**	**BAT-AEL (Average over the sampling period)**	
Table 6.7	NH_3 - mg/Nm^3 *	0.3 - 20	Either the BAT-AEL for NH_3 or the BAT-AEL for the odour concentration applies. It is proposed that NH_3 and H_2S monitoring will be carried out every 6 months in accordance with BAT 8.

	Odour concentration - ou_E/Nm^3 *	200 - 1,000	Either the BAT-AEL for NH_3 or the BAT-AEL for the odour concentration applies. It is proposed that NH_3 and H_2S monitoring will be carried out every 6 months in accordance with BAT 8.

* Either the BAT-AEL for NH_3 or the BAT-AEL for the odour concentration applies.

BAT 35	**In order to reduce the generation of waste water and to reduce water usage, BAT is to use all of the techniques given below.**	
a	Segregation of water streams	This is detailed within the response to BAT 19.
b	Water recirculation	This is detailed within the response to BAT 19.
c	Minimisation of the generation of leachate	Leachate may be produced from stored food waste stored in the Waste Reception Building, but this is minimised through the short storage times; maximum of 72 hours. Silage liquor is produced from silage within the silage clamps. All leachate and dirty water are used in the AD process as a feedstock.

BAT 36-37 Not Applicable (BAT conclusions for aerobic treatment of waste)

BAT conclusions for the anaerobic treatment of waste

Process Monitoring

BAT 38	**In order to reduce emissions to air and to improve the overall environmental performance, BAT is to monitor and/or control the key waste and process parameters.**	
	Implementation of a manual and/or automatic monitoring system to: • ensure stable digester operation, • minimise operational difficulties, such as foaming, which may lead to odour emissions, • provide sufficient early warning of system failures which may lead to a loss of containment and explosions. This includes monitoring and/or control of key waste and process parameters, e.g.: • pH and alkalinity of the digester feed; • digester operating temperature; • hydraulic and organic loading rates of the digester feed; • concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate; • biogas quantity, composition (e.g., H_2S) and pressure; • liquid and foam levels in the digester.	The following process monitoring takes place: ***Continuous monitoring (recorded on SCADA):*** ***Daily Qualitative Process Monitoring:*** 1. Odour at site boundary and main potential odour sources. 2. Visual check on appearance and level of digesters (crust, foam, mixing speed) ***Feedstock Process Monitoring:*** 3. Silage dry matter and organic dry matter (weekly) 4. Food waste dry matter and organic dry matter (twice weekly) ***Digester Process Monitoring:*** 5. Feed rate (tonnes per hour) (daily) 6. Temperature (SCADA continuous) 7. Dry matter and organic dry matter (daily) 8. pH and FOS/TAC (daily) 9. Volatile Fatty Acid -laboratory sample (monthly) 10. Trace elements addition rate (weekly) ***Gas process monitoring (All continuous on SCADA):*** 11. Gas quality – methane, hydrogen sulphide and carbon dioxide 12. Gas holder level 13. CHP flow and electrical output 14. Biogas upgrading plant (input and output / flow and quality) 15. Gas holder pressure 16. Flare operation 17. Buffer capacity for compressed biomethane 18. Filling rate of trailer(s)

BAT 38	**In order to reduce emissions to air and to improve the overall environmental performance, BAT is to monitor and/or control the key waste and process parameters.**	
		Frequency of testing is increased if required to enhance process monitoring around abnormal operation events. Process monitoring data is used by the **Plant Manager** to inform process decisions including the feed plan, mixing regime and the addition of trace elements.

BAT 39-53 Not applicable (other waste treatment activities)

Compliance with Medium Combustion Plant Directive (MCPD) and Specified Generator Regulations

<table>
<tr><th colspan="2">MCPD & Specified Generator requirements [3]</th></tr>
<tr><td>Identification of Medium Combustion Plant (MCP). MCPD controls apply to all in-scope MCPs with a rated thermal input of each unit equal to or greater than 1MWth and less than 50MWth, regardless of the type of fuel used or the number of hours of operation.</td><td>The 2 No. CHPs are in scope (they are not excluded).

The thermal input of the CHPs (existing and proposed) and the emergency generator has been calculated in accordance with Annex B of the AMPS Technical Committee document – Determination of the thermal input power of an engine driven generator.[7]

$P_{th} = P_{(r)} * 100/n_e$

Where:

P_{th} = thermal input power

$P_{(r)}$ = rated power (mechanical or electrical, whichever is available)

n_e = effective efficiency (relevant for mechanical or electrical power)

Table 5 Thermal input calculation
<table>
<tr><th>Combustion plant / Generator</th><th>Rated power (electrical) kW</th><th>Effective efficiency (electrical) (%)</th><th>Thermal input power kWthi</th></tr>
<tr><td>CHP (existing)</td><td>1,200</td><td>42.1 (at full load)</td><td>2,850</td></tr>
<tr><td>CHP (proposed)</td><td>1,200</td><td>42.1 (at full load)</td><td>2,850</td></tr>
<tr><td>Emergency generator</td><td>414</td><td>33*</td><td>1,254</td></tr>
<tr><td colspan="3">Aggregated thermal input</td><td>6,954</td></tr>
</table>
</td></tr>
</table>

[7] Determination of thermal input power of an engine driven generator, Association of Manufacturers of Power generating Systems (AMPS) Technical Committee, 2016

MCPD & Specified Generator requirements [3]	
	* Used suggested efficiency from AMPS guidance for a <1MW compression ignition generator using liquid fuel. Th emergency generator is not a combustion plant in terms of MCPD as it is not a device that burns fuel to generate heat
MCP 'new' or 'existing'	The existing CHP engine is a MWM TCG2020V12 TG 2020-3-1191 with a rated power (electrical) of 1,200kWel. The thermal input power is 2,850kWthi. The CHP engine was put into operation before 20th December 2018 and is therefore classified as 'existing' with respect to the Medium Combustion Plant Directive (MCPD) and associated emission limit values. The new proposed CHP is an updated version of the existing also with a rated power (electrical) of 1,200kWel. The thermal input power is 2,850Wthi. The CHP is 'new' with respect to the MCPD and associated emission limit values.
Compliance with Emission Limit Values (ELVs) - Part 2 of Annex II of	The duty CHP (new) will meet an ELV of 40mg/Nm3 of SO2 (dry gas, 273K, 15% O2); The standby CHP is existing under MCPD and will meet the limit set in the current permit of 130mg/Nm3 of SO2 (dry gas, 273K, 15% O2) which is equivalent to 350mg/Nm3 (dry gas, 273K, 5% O2).
Identifying specified generators.	A generator is a combustion plant that generates electricity and therefore the 2 No. CHPs are specified generators. The emergency generator is excluded.
Identify if specified generator controls apply	Specified generator controls, unless excluded, apply to generators with a rated thermal input between 1MWth and 50MWth. Therefore specified generator controls apply to both CHPs.

3. Conclusions and Recommendations

The BAT assessment has found that the existing and proposed operations in the main comply with indicative BAT as stated in Best Available Techniques Reference Document for Waste Treatment.[1] Areas for improvement have been identified in line with indicative BAT. However many of these improvements are already underway or being addressed by HBP at the time of writing.

In accordance with BAT 14d in order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour, BAT is to contain, collect and treat diffuse emissions. The improvements in line with BAT 14d are listed below:

- Replacement of the current UV treatment system with a carbon filter system for treatment of air extracted from the Waste Reception Building. The air handling system delivers at least three air changes per hour (acph) which will maintain a negative pressure in the building, thereby reducing the potential for fugitive emissions to be emitted from the door when it is open for vehicles entering and leaving.
- The digestate separators and digestate fibre storage bay are not in a building with collection and treatment of diffuse emissions. The fibre digestate from the two screw press separators falls into a bunker (4.5m x 5.3m x 1.85m high). The separator will be enclosed in a tented structure to abate emissions, open on one side to allow easy access for vehicles to remove fibre digestate which will be removed from the Site to farm destination field heaps. This approach has been modelled using detailed dispersion modelling which is presented in the Air Quality and Odour Impact Assessment (AQOIA)[8] which supports the current permit variation application. The AQOIA findings demonstrate that potential ammonia and odour emissions are sufficiently abated by this technique with regards to both environmental and human receptors.
- The digestate storage lagoons are being covered in 2025. The floating covers on the lagoons will each have 6 No. vents which will join a system of pipework which will channel emissions through a two-stage carbon filter treatment process; the first filter for NH_3 removal and the second stage for residual odour removal including volatile organic compounds and H_2S.

In accordance with BAT 19 to optimise water consumption, to reduce the volume of waste water generated and to prevent or, where that is not practicable, to reduce emissions to soil and water the site secondary containment and drainage is being reviewed by suitably qualified engineers (Plandescil Consulting Engineers). A number of improvements are scheduled the detail of which will be provided by Plandescil within a revised drainage strategy document for the site. Areas identified for improvement include:

- BAT 19d specifies techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels. Depending on the risks posed by the liquids contained in tanks and vessels in terms of soil and/or water contamination. The secondary containment system has been extended to incorporate the Raw Waste Buffer Tank and the 2. No new Primary Digesters. This work has been carried out by Enviroseal Lining Solutions Limited. A survey was carried out by Plandescil Consulting Engineers which included checking compliance with the relevant guidance (CIRIA C736).

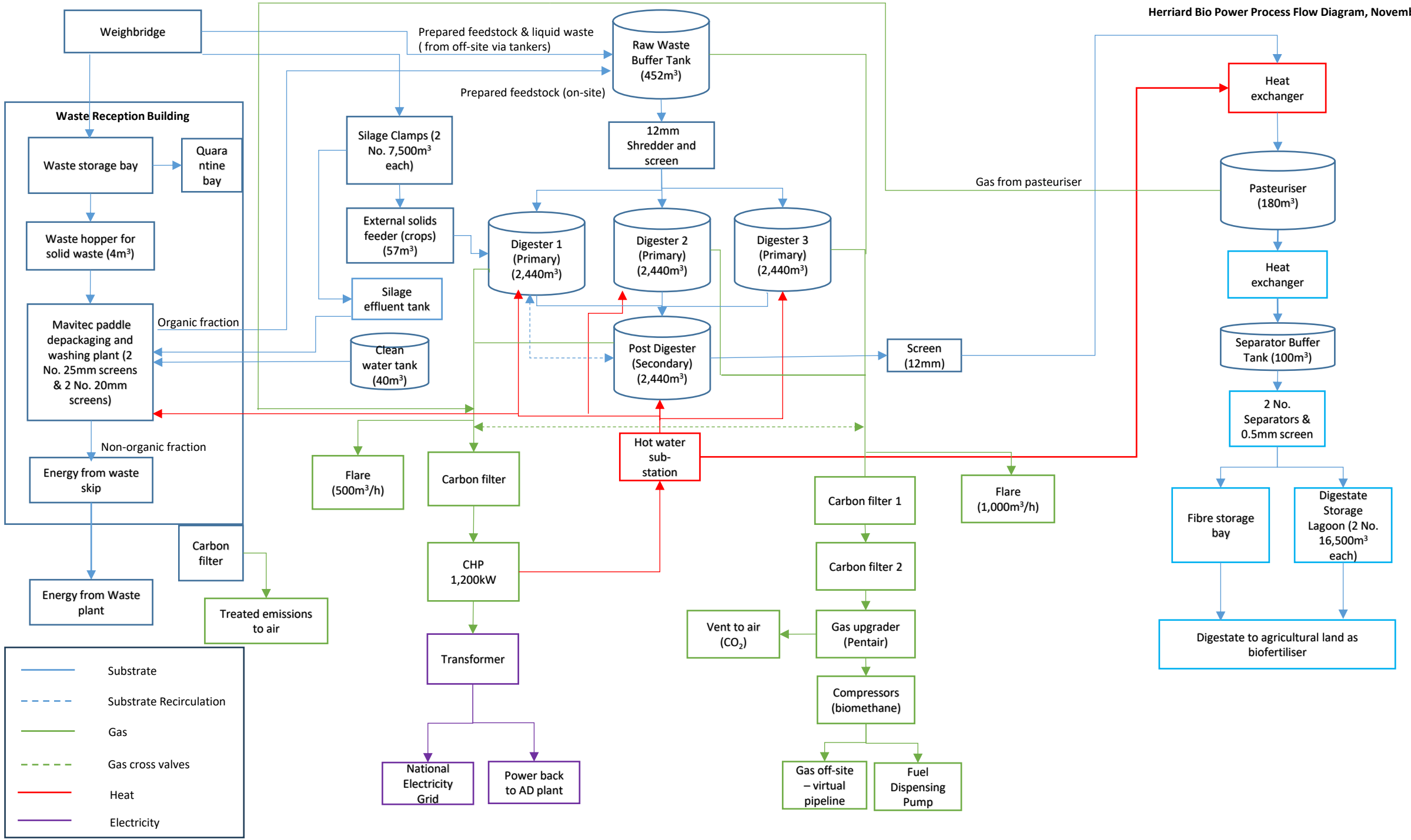
[8] ETL813/AQOIA/Final/V1.0 December 2023

Recommendations arising from this report have been actioned and final sign off will be supplied in due course.

- BAT 19f requires the segregation of water streams; the site drainage design is being reviewed and any recommendations for improvement will be carried out, to ensure effective segregation of clean and dirty water on site.
- BAT 19h requires that when underground components are used and (depending on the risks posed by the waste contained in those components in terms of soil and/or water contamination), secondary containment of underground components is put in place. The underground silage effluent tank (126m^3 storage capacity) doesn't currently benefit from secondary containment or leak detection. The Operator is committed to undertaking any required improvements.

Appendix A - Process Flow Diagram

Herriard Bio Power Process Flow Diagram, November 2024, V3.0



Appendix B – Odour abatement plant – Carbon filter specification

DESOTEC

AIRCON® H

The AIRCON® is a mobile replaceable adsorption filter which has been specially developed for air and gas treatment and purification.

H x W x D: 2.6 m x 2.6 m x 7.4 m

The filter colour may differ from what is shown on this page and reflects either our old or new brand design.
For more information, please contact your Desotec representative.

Key features

- Quick and easy to install and connect (plug & play)
- Can be rented without investment & maintenance cost (via daily contracts)
- No handling of activated carbon on-site
- Combined transport vessel and filter
- Option to test and evaluate new applications without capital investement
- Efficient design (low pressure drop/high kinetics), can be installed in series or in parallel

Special features

- Easy to place horizontally, even on uneven surfaces
- Sampling point for saturated activated carbon
- High flowrate per filter module
- Hoisting with spreader bar and straps

AIRCON® H

This filter is protect by a EU registered community design right, reference 001723511-0002.
This filter is protect by a UK registered community design right, reference 90008982670001.

SAFETY

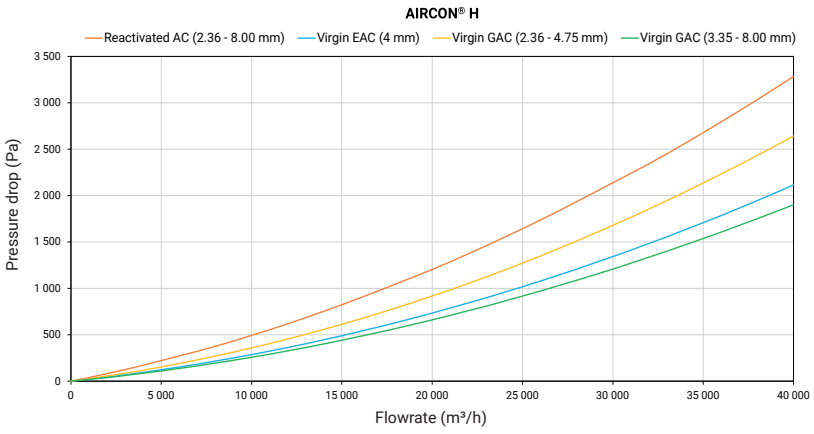
Wet activated carbon preferentially removes oxygen from air. In closed or partially closed containers and vessels, oxygen depletion may reach hazardous levels. If workers are to enter a vessel containing activated carbon, appropriate sampling and work procedures including local requirements for potentially low-oxygen spaces should be followed. For certain groups of chemical products, the reaction with or adsorption by the activated carbon surface can be accompanied by the release of a large quantity of exothermic heat, which could give rise to hotspots in the activated carbon bed. In the event of the generally rare occurrence of such hotspots, it is recommended that the activated carbon bed be inertised with a gas such as nitrogen.

PRESSURE DROP CURVE

You can use the pressure-drop graph to calculate and predict the pressure drop (extra info on demand). The pressure drop is dependent on the particle size and the design of the filter itself, and should only be used as a guideline. For PF5 products, please add a 15% security compared to the impregnated virgin products. For dimensioning, please always take a 30% security into account.

MAXIMUM FLOW RATE	40 000 m³/h
MINIMUM FLOW RATE	4 000 m³/h
[1] MATERIAL	Steel
COATING	Finliner
DIMENSIONS (H x W x D)	2.6 m x 2.6 m x 7.4 m
TOTAL VOLUME	40.0 m³
MAXIMUM FILL VOLUME	13.5 m³
MAXIMUM WEIGHT, DRAINED	17.5 tonnes
MAXIMUM FULL LOAD	17.5 tonnes
TARE	4 700 kg
MAXIMUM ALLOWABLE WORKING PRESSURE	100 mbar
EXCESS PRESSURE PROTECTION	To be provided by the customer
MAXIMUM NEGATIVE PRESSURE	100 mbar
NEGATIVE PRESSURE PROTECTION	To be provided by the customer
OPERATING TEMPERATURE	40°C
[2] MAXIMUM DESIGN TEMPERATURE	60°C
[3] INLET	800 diameter
[3] OUTLET	800 diameter
[3] DRAIN	1" brass/PTFE ball valve
SEALS	EPDM
PIPEWORK	-
SHUT-OFF VALVE	-
WATER / AIR SAMPLING CUSTOMER	-
EARTHING	Yes
VENTING	-
VENTING DATA TYPE	-
SIPHON BREAKER	-
PED 2014/68/EU	-

It is the customer's responsibility to determine the suitability of the filter materials for the process flow.
Air tightness is not tested before shipment.
1. Filtration internals are made of standard stainless steel 304.
2. A higher temperature should always be discussed upfront with the sales department and requires extra safety measures by the customer.
3. Connections available according to customer requirements.



DESOTEC
Sustainable mobile filtration solutions

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Appendix C - Sankey Diagram

Herriard Bio Power Limited AD – Sankey Diagram, December 2023