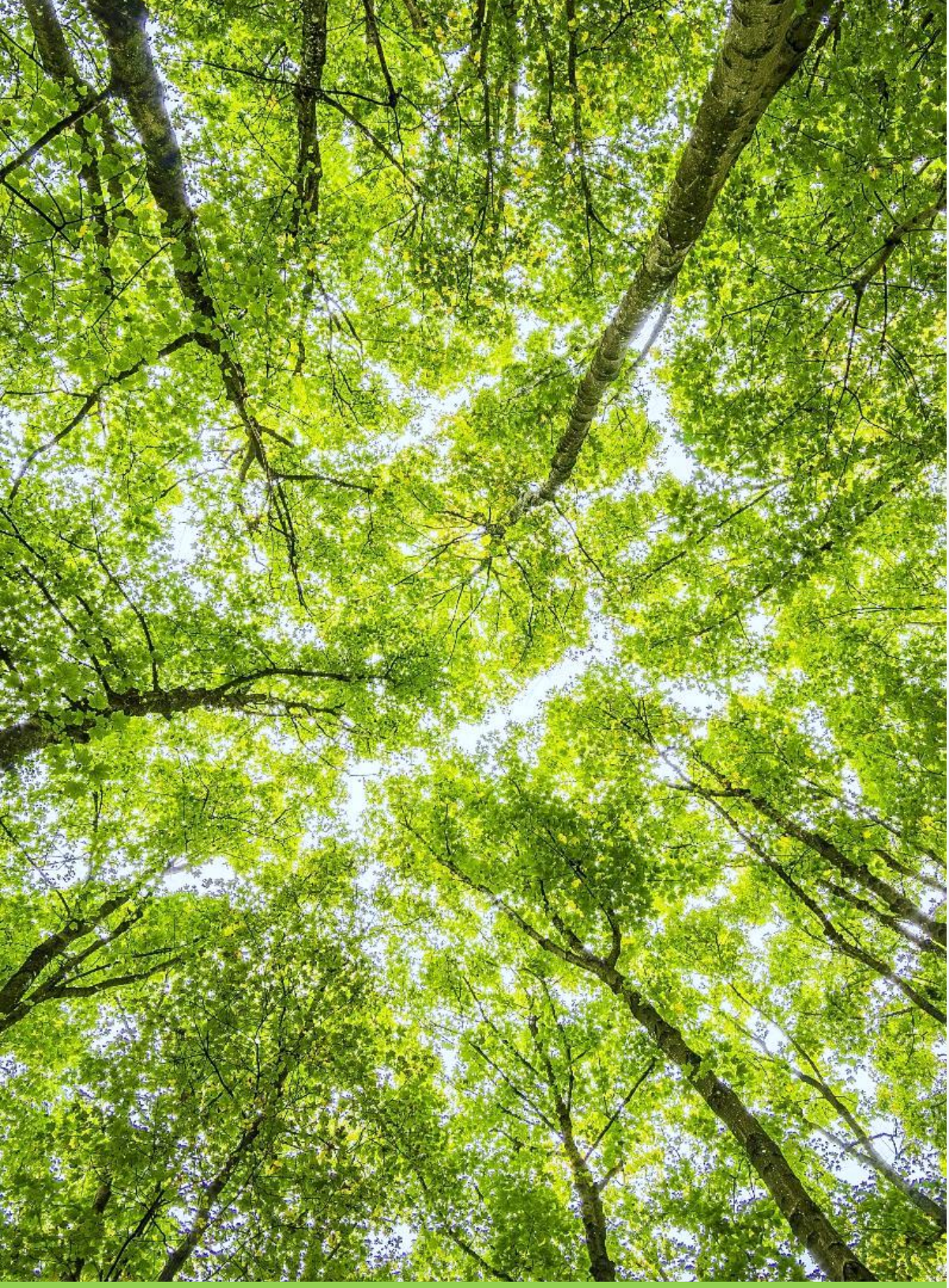

BAT Assessment

High Hedley Biogas

Report produced for **W J Drennan Ltd**

Provided by Walker Resource Management Ltd (WRM)

Document Title	BAT Assessment
Revision	V1.0
Date	11/08/2022
Document Reference	HHB-A03
Project Reference	1055/W04
Author	William Grant
Reviewer	Martin Ropka

Version No.	Date	Description of change
0.1	23/09/2021	Initial draft
0.2	30/09/2021	Internal review
0.3	11/08/2022	Final Draft

CONTENTS

1.0 INTRODUCTION

WRM have been tasked by W J Drennan Limited (hereon referred to as "HHB") with undertaking a Best Available Techniques Assessment (BAT) of their High Hedley Biogas Plant anaerobic digestion facility at High Hedley Hope Farm, East Hedleyhope, Durham, DL13 4PR. This forms part of HHB's environmental permit variation application to increase the permitted capacity of the facility from <36,500 to <55,000 tonnes of waste material per year and change from a Standard Rules to a Bespoke Installation permit. The new BAT standards contained within the Best Available Techniques (BAT) Reference Document for Waste Treatment 2018 (BREF) document, as well as the Commission Implementing Decision (EU) 2018/1147, have been consulted in order to ensure this BAT Assessment meets the requirements of legislation.

1.1 Legislative Background

The latest Best Available Techniques (BAT) Reference Document for Waste Treatment 2018 (BREF) previously underwent a review across the European Union before being published in 2018. All new and existing waste installations are required to meet the standards as stated by BAT.

The Environmental Permitting (England and Wales) Regulations 2016 (as amended) require that activities identified under Schedule 1 be subjected to an assessment to demonstrate that the technology/technique proposed can be considered to be the 'Best Available' at the time the permit application is being made.

In order to undertake this BAT Assessment, guidance from the Environment Agency (EA) has been consulted with, in conjunction with the BREF document to ensure the site meets the required standards of compliance. These documents are displayed below and have been produced by the EA from IPPC regulations to give guidance to site operators in accordance with the BREF document:

- *Best Available Techniques (BAT) Reference Document for Waste Treatment 2018 (BREF).*

1.2 Definition of Best Available Technique

The IED (Directive 2010/75/EU) define BAT as:

"the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and where that is not practicable, generally reduce emission and the impact on the environment as a whole".

Article 2 of the Integrated Pollution Prevention and Control Directive 2008 (as amended) and Article 3 of the IED further defines the component parts of BAT as:

- "Best" – means the most effective techniques for achieving a high level of protection of the environment as a whole.
- "Available" – means techniques developed on a scale which allows them to be used in the relevant industrial sector, under economically and technically viable conditions, taking into account the costs and advantages.

- "Techniques" – includes both the technology and the way the installation is designed, built, maintained, operated and decommissioned.

BAT may be demonstrated by either:

- Compliance with the sector-level, indicative BAT performance described in the Sector Guidance Notes (SGNs) produced by the Environment Agency and in the European Commission 'Reference Documents on BAT' (BREFs); or
- By conducting an installation-specific options appraisal of candidate techniques.

2.0 SITE DETAILS

2.1 Site Address

High Hedley Biogas Plant,
High Hedley Hope Farm,
East Hedleyhope,
Durham,
DL13 4PR

2.2 Operational Location

Site Grid Reference: Easting 415008, Northing 541013.

2.3 Site Description

The anaerobic digestion facility is located in County Durham, approximately 0.79km northwest of the village of East Hedleyhope, approximately 0.77km south of the village of Hedley Hill and approximately 11.79km west of the city of Durham. The facility is located in a rural setting surrounding by agricultural land. The site's main access point is located off Commercial Street via the B6301.

The site, wholly owned by W.J. Drennan Limited, is situated next to High Hedley Hope Farm (also owned by Mr W.J. Drennan) and contains a weighbridge, site office, reception hall, two primary digesters, one pasteurisation tank, negative aeration system, biogas cleaning system, one combined heat and power (CHP) unit and a gas to grid entry system.

2.4 Plans

Reference Drawing: HHB01 - Site_Layout_Plan

2.5 Permits and Licences

The site currently holds the following environmental permit:

- Standard Rules SR2012 No12 under reference EPR/LB3536AZ.

This permit allows for an Anaerobic Digestion facility including combustion of biogas. The permit was granted on 28/07/2014. HHB is seeking permission to vary their existing environmental permit to incorporate an increase in the site's throughput capacity to 55,000 tonnes per annum. This will enable the site to realise its full processing potential following the installation of a gas to grid unit.

3.0 BAT REVIEW

The following sections shall review BAT guidance criteria produced by the EA for each phase of waste processing relevant to HHB. Due to the nature of the guidance and the fact it covers non-hazardous and hazardous waste as well as a variety of treatment or disposal options, this document has been produced purely to analyse the information related to the site applicable processes. All non-site-specific information contained within the guidance has been scrutinised but is not mentioned within this document to eliminate any potential confusion.

Each table below compares information from BAT guidance with information from the relevant section of the management system or other site documents. The relevant section of the management system or other site documents is referenced in the right-hand column.

When compared against the guidance the phases applicable to HHB are as follows:

- Pre-Acceptance of Waste
- Waste Acceptance Procedures
- Waste Reception and Storage
- Treatment – General Principles
- Biogas Treatment & Storage
- Energy Requirements – Consumption and Generation
- Energy Requirements – Energy Efficiency
- Further Energy Efficiency Requirements
- Digestate Treatment and Storage
- Point Source Emissions to Air
- Fugitive Emissions to Air
- Odour Control
- Point Source Emissions to Surface Water, Sewer and Water Usage
- Point Source Emissions to Groundwater
- Emissions of Substances not Controlled by Emission Limits to Surface Water, Sewer and Groundwater
- Management
- Monitoring
- Accidents

The management system (Document Reference: HHB-B01) as well as other key documents forming the permit application have been consulted with in order to undertake this BAT Assessment.

4.0 ASSESSMENT

The first phase of the process is to assess site activities and the associated permit management system against general BAT conclusions. Following this, section 4.1.2 and 4.1.3 contains the assessment against BAT conclusions for the biological treatment of waste as well as the BAT conclusions for the anaerobic treatment of waste. The following tables have been produced from the Annex contained within the Commission Implementing Decision (EU) 2018/1147. Areas which don't apply to the operations at the facility due to site specific reasons have been excluded from the table. Please note, as stated within the Commission Implementing Decision (EU) 2018/1147, the scope (e.g. level of detail) and nature of how the site addresses the BAT conclusions will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have (determined also by the type and amount of wastes processed).

4.1.1 General BAT Conclusions

Overall Environmental Performance		
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**	**HHB Biogas Permit Documents**
01	In order to maintain a high level of environmental performance, BAT is to implement and adhere to an Environmental Management System (EMS) incorporating all of the following features (where applicable): I. commitment of the management, including senior management; II. definition, by the management, of an environmental policy that includes the continuous improvement of the environmental performance of the installation; III. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment; IV. implementation of procedures paying particular attention to: (a) structure and responsibility, (b) recruitment, training, awareness and competence, (c) communication, (d) employee involvement,	HHB demonstrate a proactive approach to maintaining a high environmental performance. The company is PAS110 certified, possessing a full quality management system which is recertified on an annual basis. As this is the case, a number of elements such as maintenance schedules/records overlap with permit and animal health requirements. **Senior Management Commitment** As part of continual improvement of the business and compliance towards PAS110, an annual management review will take place covering the implementation and overall compliance against PAS110 regulations, as well as Environmental Permitting and Animal By-Products Regulations. In addition, all permit management system documents are produced or at least reviewed and authorised by a Director of HHB or their delegate, to ensure there are commitments written into the document can be implemented on site. **Continual Improvement**

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	(e) documentation, (f) effective process control, (g) maintenance programmes, (h) emergency preparedness and response, (i) safeguarding compliance with environmental legislation; V. checking performance and taking corrective action, paying particular attention to: (a) monitoring and measurement (see also the JRC Reference Report on Monitoring of emissions to air and water from IED installations – ROM), (b) corrective and preventive action, (c) maintenance of records, (d) 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; VI. review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness; VII. following the development of cleaner technologies; 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; IX. application of sectoral benchmarking on a regular basis; X. waste stream management (see BAT 2); XI. an inventory of waste water and waste gas streams (see BAT 3); XII. residues management plan (see description in Section 6.5); XIII. accident management plan (see description in Section 6.5); XIV. odour management plan (see BAT 12); XV. noise and vibration management plan (see BAT 17).	HHB are committed towards the continual improvement of their environmental performance of the business. The Environmental Management System and environmental performance are reviewed by the Technically Competent Manager (TCM). **Improvement Programmes** To guide improvements across the business, the Operator has an external complaint procedure, which is detailed in Section 5.2.2 of the EMS Manual. The objective of this procedure is to ensure that all customer complaints, complaints about the site operations and/or its impact on the environment made by third parties are dealt with in a manner that ensures the operator acts in a responsible way and maximises customer satisfaction (customer complaint only). Also, to ensure that, as far as is practical, corrective and preventive action is taken to eliminate the causes and the potential causes of customer complaints, complaints about the site operations and/or its impact on the environment made by third parties. All complaint are recorded with the *Complaint Record Sheet* (Version 5). **Corrective Action** In line with the requirements of the PAS110 standard, HHB has also developed a procedure to help facilitate corrective and preventative actions. This details how the Company determines actions to eliminate the causes of potential batch failures and non-conformities in order to prevent their occurrence. As a result, HHB can implement any required improvements to the business in order to facilitate high quality digestate and continual improvement of the onsite operations. Corrective actions in relation to the PAS110 standard are recorded on the *Accidents or Incidents Affecting Quality* form (Version 3). This recording is completed by the TCM. The effectiveness, or otherwise of corrective and preventive actions taken will always be evaluated, normally at management review.

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		Organisation Structure, Training & Competency HHB have a clearly defined organisational structure to maintain control over the environmental permit management system. Each procedure in the management system defines the key roles and responsibilities for tasks that must be undertaken at different levels of the organisation. Each person, whose duties affect the process are trained, instructed and supervised commensurate with those duties, such that they are competent. Training records for personnel who affect site procedures, operations, and quality are maintained. This is detailed in the section 3.3 *Staff Training* of the EMS manual. Action is taken to ensure that personnel are aware of the importance of their activities, and they are competent. The key mechanisms within the training and competence process will be the company appraisal system, with the effectiveness of training to be reviewed within the annual Management Review. **Communication and Employee Involvement** Clear and coherent communication is fundamental to the effective process operation on site. Directors and Managers are responsible for ensuring that internal communications take place. HHB communicate information using a variety of media, including, but not limited to team meetings, toolbox talks, training records and notice boards. **Effective Process Control** HHB are able to maintain high levels of process control through the combination of various different operational procedures and monitoring of the SCADA system. The regular monitoring and measurement of site processes and any environmental impacts such as gas, water, odour, noise, litter and pests will be recorded and available

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		for inspection, should it be requested. HHB also conduct daily site checks to assess a number of variables including within the environmental permit documents, including, but not limited to site security, odour, litter, pests and drainage systems. The effectiveness of individual site procedures will be regularly evaluated through meetings and management reviews. **Maintenance** As detailed within the EMS, HHB operate a strict preventative maintenance schedule and equipment to be used is of sufficient capacity to allow down time for routine maintenance, calibration and servicing as recommended by the manufacturer. Daily checks of various parts of the plant are undertaken across the site by the maintenance staff/site manager. The results of these checks are recorded on the daily check sheet. It is the responsibility of the Site Maintenance Staff to implement the Planned Preventative Measures programme. Logs of the maintenance on site will be kept for the duration of the plant. **Emergency Preparedness and Response** HHB's diligent approach to managing accidents onsite is documented within the operator's *Accident Management Plan*. This document lists key emergency contact details and has comprehensively evaluated a range of hazards and how they should be monitored and mitigated on site. The Accident Management Plan is supported by a range of procedures, such as the Odour Management Strategy and Environmental Risk Assessment to minimise the potential occurrence of accidents on site. **Safeguarding Compliance with Environmental Legislation**

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		It is recommended that HHB shall develop an Environmental Legislation Register, to record all of their statutory obligations. The register shall include the following subject groups: Air Pollution; Waste; Water; Planning; Health and Safety; Transport; Statutory Nuisance and Quality & Product Certification. This register will be reviewed annually by Site Management.
02	In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques given below. **a) Set up and implement waste characterisation and pre-acceptance procedures -** These procedures aim to ensure the technical (and legal) suitability of waste treatment operations for a particular waste prior to the arrival of the waste at the plant. They include procedures to collect information about the waste input and may include waste sampling and characterisation to achieve sufficient knowledge of the waste composition. Waste pre-acceptance procedures are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s). **b) Set up and implement waste acceptance procedures -** Acceptance procedures aim to confirm the characteristics of the waste, as identified in the pre-acceptance stage. These procedures define the elements to be verified upon the arrival of the waste at the plant as well as the waste acceptance and rejection criteria. They may include waste sampling, inspection and analysis. Waste acceptance procedures are risk- based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental	Hazards that may affect the safety and quality of digestate have been reviewed within the Hazard Analysis and Critical Control Plan (HACCP) as part of the PAS110 system. The HACCP assessment is reviewed as part of the annual management review. This is to ensure it stays up to date with customers' needs, processing technologies, input materials, and any new hazards that emerge. HHB operate the plant using an approach whereby no materials are accepted onto site unless an input supply agreement has been entered into and the delivery of materials has been pre-booked to the site. As detailed within the PAS110 SOPS document, HHB have implemented the following process that will control the likelihood of any non-permitted wastes from entering the site. The procedure is summarised below: 1. The supplier is asked for details of the waste and any analysis results that the supplier has. HHB then consult FM Bio for advice on its suitability as an input material. 2. Where the waste is deemed suitable, a contractual arrangement (input materials supply agreement) is made with each waste supplier including criteria for acceptance/rejection of loads delivered to the facility. Any additional acceptance/rejection criteria specific to a certain waste

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	impact, as well as the information provided by the previous waste holder(s). **c) Set up and implement a waste tracking system and inventory -** A waste tracking system and inventory aim 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 risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s). **d) Set up and implement an output quality management system -** This technique involves setting up and implementing an output quality management system, so as to ensure that the output of the waste treatment is in line with the expectations, using for example existing EN standards. This management system also allows the performance of the waste treatment to be monitored and optimised, and for this purpose may include a material flow analysis of relevant components throughout the waste treatment. The use of a material flow analysis is risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s). **e) Ensure waste segregation -** Waste is kept separated depending on its properties in order to enable easier and environmentally safer	feedstock is also indicated in the input materials supply agreement. 3. Each feedstock load delivered shall enter the site via the weighbridge. Details of the waste type, EWC code, ABP Category, client/source, quantity of waste, delivery date and delivery location on site shall be recorded within the electronic *Waste Movements Log* and electronically generated weighbridge ticket. 4. Providing the hauler has a valid input supply agreement and is delivering a material as described within the agreement, the weighbridge operator shall then notify the driver to proceed to the appropriate reception area, where a site operative shall ensure the vehicle is directed to the correct offloading point. A summary of the Waste Acceptance Procedure is provided below: **Waste Acceptance** The site TCM shall ensure that there are the correct number of operatives onsite and the site has the capacity to store and treat any incoming waste. All vehicles will enter the site and proceed to the weighbridge. Documentation will be checked by the weighbridge operator, to ensure that the waste complies with the waste types permitted by the Planning Permission, Environmental Permit Regulations, Site Environmental Risk Assessment or any subsequent updates. The weighbridge operator will then check and sign the relevant documentation to confirm the acceptance/receipt of the waste prior to the driver being allowed to proceed to the designated reception area depending on load.

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	storage and treatment. Waste segregation relies on the physical separation of waste and on procedures that identify when and where wastes are stored. f) **Ensure waste compatibility prior to mixing or blending of waste -** Compatibility is ensured by a set of verification measures and tests in order to detect any unwanted and/or potentially dangerous chemical reactions between wastes (e.g. polymerisation, gas evolution, exothermal reaction, decomposition, crystallisation, precipitation) when mixing, blending or carrying out other treatment operations. The compatibility tests are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s). g) **Sort incoming solid waste -** Sorting of incoming solid waste aims to prevent unwanted material from entering subsequent waste treatment process(es). It may include: — manual separation by means of visual examinations; — ferrous metals, non-ferrous metals or all-metals separation; — optical separation, e.g. by near-infrared spectroscopy or X-ray systems; — density separation, e.g. by air classification, sink-float tanks, vibration tables; — size separation by screening/sieving.	During this process, the weighbridge operator will also weigh the load using the weighbridge and records the following information about the waste load: • Date and time of waste delivered; • Type of material; • Weight of load; • Duty of care transfer note; • Consignment note; • Vehicle registration number; • Haulier and waste carrier registration number; • SIC code; and • European Waste Code (EWC). Packaged waste is tipped across the reception halls, where it is visually inspected by a site operative to further ensure that it conforms to the acceptable waste types and conditions specified in the permit. The driver will then return to the site office where the weighbridge ticket and consignment note are completed. **Waste Rejection** Any load may be rejected prior to acceptance for the following reasons (non-exhaustive list): i. Non-permitted, or non-conforming in relation to the permit. ii. Non-allowable under the Anaerobic Digestion Quality Protocol. iii. Insufficient capacity (physical or permitted) within the facility to receive the load. iv. Content is undesirable for the AD process. An operative will contact the Site Manger prior to the rejection of material to inform of the decision to reject a load. If an operative decides to reject a load following the initial confirmatory check at the

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		offload point due to the load meeting the rejection criteria, the whole load, will be rejected. If the waste has passed through reception, but upon further inspection concerns are raised, an incident report will be raised that will be recorded in the facility diary. This will include the following details: • Description of waste • Source • Waste Transfer Note/Delivery Reference • Quantity of waste • Date rejected • Non-conforming elements of the waste • Plant staff member responsible for the rejection • Actions agreed and taken The non-conforming wastes shall be isolated in the quarantine area in the reception area. The load will be removed from site as soon as is practical and taken to a suitably permitted facility. An investigation will be undertaken, and the customer contacted as appropriate. Any resulting actions will be documented. The Site Manager will notify the Environment Agency where a rejected load has occurred. The rejected waste load will be recorded on a Waste Rejection Records form by the weighbridge operator or Site Manager. **Traceability** In line with the requirements of the environmental permit, HHB keep a record of the location and quantity of waste on site and the destination and quantities of waste dispatched offsite. This information is supplied in the quarterly/annual waste returns. Weighbridge tickets are also archived. The waste carriers licenses, weighbridge tickets, rejected

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		waste forms, destination of outgoing products and quarterly waste returns are recorded and stored in the site office.
03	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: a) simplified process flow sheets that show the origin of the emissions; b) descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances; (ii) information about the characteristics of the waste water streams, such as: a) average values and variability of flow, pH, temperature, and conductivity; b) average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, priority substances/micropollutants); c) data on bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge)) (see BAT 52);	**Water** HHB do not discharge any of the generated wastewater into a watercourse, therefore this section of the BAT conclusion is not considered relevant. All surface waters generated on the impermeable site surface are drained via falls into a gulley then an internal drainage channel and collected within a sump. From here the waters are pumped into one of the liquid waste storage tanks for use within the AD process. Direct precipitation that lands on the reception building roof will be collected via gullies, spouting and downpipes. The rainwater will then be captured via the surface water system described above. Surface waters originating from the bunded operational area will be drained to a sump within the bund, where the water is inspected. If inspection determines that the water is clean then the water will be pumped to the clean water storage tank; if it is determined that the water is "dirty," then the water will be pumped to the one of the liquid waste storage tanks. The latter will only occur in the event of a tank failure. The operator's sewage requirements will be managed via a septic tank which will be emptied at set intervals by a licenced contractor.

Commented [WG1]: Please confirm the sewage arrangements for the site welfare facilities

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	(iii) information about the characteristics of the waste gas streams, such as: a) average values and variability of flow and temperature; b) average concentration and load values of relevant substances and their variability (e.g. organic compounds, POPs such as PCBs); c) flammability, lower and higher explosive limits, reactivity; d) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, nitrogen, water vapour, dust).	Daily site inspections will be made to ensure that no drains are blocked by loose material. Where identified, material will be swept up immediately and re-processed as soon as practicably possible. **Air** At the facility, air from the process is treated via certain abatement technologies. These can be summarised as follows: • Biofilter system connected to the reception building • Negative pressure ventilation system The condition of the biofilter is monitored through daily visual inspections of the media for clefts, cracks and lumps to ensure humidity critical limits are still appropriate. Biogas produced by the process is continuously monitored by the SCADA system for volume and composition as per requirements of an anaerobic digestion facility. Some of the biomethane produced on site is combusted in the CHP on site. The emissions of NOX, SO2, CO and VOCs will be monitored annually from the CHP. A flare is also present on site to flare off the biogas in cases of emergency. Daily checks will be undertaken to assess for any leaks which may be damaging to the environment. As part of the PAS 110 management system, there is a process flow within the HACCP plan. This element is seen to provide the descriptions of the process-integrated techniques. As this is the case the operator is of the view that a number of elements in this BAT conclusion are not required.

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04	In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques given below. a) **Optimised storage location (**Generally applicable to new plants) - 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). b) **Adequate storage capacity** (Generally applicable) - 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. c) **Safe storage operation** (Generally applicable) - 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. d) **Separate area for storage and handling of packaged hazardous waste** (Generally applicable) - When relevant, a dedicated area is used for storage and handling of packaged hazardous waste.	With regards to Technique A, it is of the view of the Operator that it is not applicable, as the site is well established and has been operating for a number of years. Storage durations for waste materials are clearly defined within the Odour Management Strategy as well as other documents of the management system as follows: **Scheduling of Deliveries:** All deliveries must be scheduled in advance and be from licensed waste carriers only, to ensure that vehicles are not waiting on or near site for longer than necessary, to reduce the risk of odour from deliveries. Waste carriers will be made aware of their duty to reduce odour and new drivers will be required to read and sign site rules. All relevant staff will be trained in the waste acceptance procedures. In the event that an unscheduled delivery arrives, or the waste delivered exceeds the amount agreed upon, HHB reserves the right to decline and return waste deliveries. Any non-conforming wastes will be rejected immediately upon detection. However, due to rigorous pre-acceptance checks, procedures will be in place to minimise the risk of non-conforming wastes entering the site. The site only accepts input materials in line with allowable inputs as defined on the site Environmental Permit and Appendix 2 of the Anaerobic Digestate Quality Protocol. **Waste Pre-Acceptance:** HHB shall ensure the site has the required number of qualified staff on site prior to the waste acceptance and rejection procedures. Personnel shall ensure that the site has capacity to store and treat any incoming waste. Personnel shall ensure that the site will not exceed Permit conditions when accepting any incoming wastes.

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		Prior to the delivery of any loads, the operator shall obtain and agree a written supply agreement for the input materials. The agreement shall provide the following: • The waste type and specified source location(s) of the material; • What the criteria of the incoming waste should be to allow acceptance of deliveries (e.g. visual assessment or testing samples); • The quantity of waste that will be delivered per week; • The delivery schedule; • The quality of the material, including limits for specific parameters; • The sampling process required on delivery; • The Gate fee and payment terms; This process should occur for all new waste streams and new suppliers introduced to site. In the case of long-term supply arrangements with clients / suppliers, the above details are only required to be obtained once for each particular waste stream received, except the quantity of waste which must be recorded in the Waste Movements Spreadsheet per individual delivery and the relevant Duty of Care documentation (Waste Transfer Notes). Quarterly sampling of the waste shall be conducted as part of the site sampling plan and PAS110 HACCP to test for variation and ensure feedstock is consistent with the supply agreement. **Waste Reception** Wastes are to be delivered to site by road tanker or bulk carrier, depending on the type of load, and transferred to the relevant reception area. On arrival at the site, drivers will report to the weighbridge office. Site operatives will check all relevant documentation to ensure that the delivery has an EWC which is

Overall Environmental Performance		
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		acceptable. Following this, details of the waste type, EWC code, ABP Category, client/source, quantity of waste, delivery date and delivery location on site shall be recorded and a weighbridge ticket will be produced. Providing the hauler has a valid input supply agreement and is delivering a material as described within the agreement following sampling, the weighbridge operator shall then notify the driver to proceed to the appropriate reception area, where a site operative shall ensure the vehicle is directed to the correct off-loading point. **Waste Storage** Liquid wastes are delivered by a sealed tanker and pumped directly into the waste storage tanks (4x60m^3 and 2x90m^3). Packaged food waste is tipped into one of three reception bays within the enclosed reception hall, where it will be transported via a telehandler into an Atritor de-packaging unit. **Digestate Storage** Following the completion of the pasteurisation stage, pasteurised whole digestate is pumped to a digestate storage lagoon. The digestate storage lagoon is 12,000-15,000m^3. Digestate is then removed from site by tanker and spread to land owned by the operator for agricultural benefit. **Oils** Oils are kept in a double bunded tank within the reception building. Staff trained and equipment regularly maintained to ensure no spillages. Spill kits are available on site and will be able to contain any spillages. The site has in place a full drainage system, so any release is captured via a sump and appropriately contained.

Overall Environmental Performance		
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		The site does not accept or process hazardous waste; therefore, Technique D is not applicable.
05	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 procedures aim to ensure that wastes are safely handled and transferred to the respective storage or treatment. They include the following elements: — handling and transfer of waste are carried out by competent staff; — handling and transfer of waste are duly documented, validated prior to execution and verified after execution; — measures are taken to prevent, detect and mitigate spills; — operation and design precautions are taken when mixing or blending wastes (e.g. vacuuming dusty/powdery wastes). Handling and transfer procedures are risk-based considering the likelihood of accidents and incidents and their environmental impact.	**Staff Competence** The overall site procedures including those associated with the handling and transfer of waste are managed by a technically competent person, Craig Botterill the COTC. Craig is certified to WAMITAB Level 4. Site operatives will receive training covering all areas of the process (please note wider training requirements have been discussed in BC01). **Documentation** All waste received onto and removed from site are fully documented. The following information is recorded: • Date and time of waste delivered; • Type of material; • Weight of load; • Duty of care transfer note; • Consignment note; • Vehicle registration number; • Haulier and waste carrier registration number; • SIC code; and • European Waste Code (EWC). The processing of the waste is recorded on the SCADA system to ensure compliance with critical limits.

Overall Environmental Performance		
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		Site Inspection All areas of impermeable pavement, sealed drainage systems, digestate tanks, covered buildings, roofed areas, other containers and storage areas shall be inspected by site staff on a regular basis. All defects must be logged in the relevant area and actioned appropriately. In addition to this, site operatives and management shall tour the site on a daily basis, and if anything untoward is detected then a formal inspection can be undertaken. In the event of any damage occurring which breaches the integrity of the engineered containment so that it no longer meets the specified standards, the licence holder shall cease importing waste into or treating waste in the affected area, shall notify the EA immediately, and shall not recommence importing waste into or treating waste in the affected area until it has been repaired to a standard at least as good as the original specification. **Fugitive Emissions** In order to manage the fugitive emissions from activities on site, HHB operate in line with their PAS100 SOPs, Fugitive Emissions Procedure and Accident Management Plan. The Accident Management Plan contains procedures for how to deal with fugitive emissions from both major and minor leaks and spillages of fuel/oil, chemicals, slurry and digestate. The Accident Management also contains control measures for dealing with potential sources of fugitive emissions, including Mechanical Breakdown and Pests. The PAS110 SOPs covers control measures that are in place for mitigating fugitive emissions from mobile plant, processing equipment, pests and vehicles.

Overall Environmental Performance		
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		The Fugitive Emissions Procedure contains the following information in order to control fugitive emissions from the site: • The appropriate control measures (both physical and management) needed to manage risks. • Suitable monitoring regimes. • Actions, contingencies and responsibilities when problems arise. • Regular review of the effectiveness of fugitive emissions control measures. HHB ensure, by the implementation of a daily inspection, that fugitive emissions from the site are limited and where possible stopped and that by effective mitigation the impacts of any fugitive emissions shall be reduced. Operatives shall be fully conversant with the contents of the Permit and the Management System and will be relied upon to remain observant and to draw attention to any non-conformances, adverse operating conditions and any mitigation or management failure. **Spillages** HHB shall manage any spills or leakages in a prompt and efficient manner. The procedure has been documented within the operator's *Spillage Procedure*. All spillages will be dealt with immediately. All vehicles, plant and equipment used on site will be operated and maintained with the objective of preventing environmentally harmful leaks and spills.

Overall Environmental Performance		
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		In the event of any potentially environmentally harmful leaks or spillages, control and remediation actions will be implemented immediately as per the Accident Management Plan. A record will be made of the issue and actions taken. HHB shall Inform the EA of any significant spillages and the fire services if required. Spill kits are located at strategic points around the site to deal with the types of spillage likely to occur in the vicinities of each area of the site. **Accidents** The site implements a full Accident Management Plan detailing potential accident and emergency situations that could occur on site, control measures to minimise potential occurrence and procedures should accidents occur on site. All near misses will be reported as well as identifying corrective actions and follow up. Identified potential hazards are split into higher risk and lower risk aspects and include: • Fugitive emissions via leaks and spillages • Fire • Foaming • Breach of critical control points • Mechanical breakdown • Odour • Pests • Unauthorised access and vandalism All accidents and their individual corrective actions will be evaluated annually. **Monitoring Records**

Overall Environmental Performance		
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		HHB shall keep records of site inspections, monitoring, maintenance and calibration of monitoring equipment. Any adverse operating conditions, non-conformances, complaints and mitigation/management failure resulting in an accident or non-compliance with the Permit shall be recorded in the appropriate check sheet.

Monitoring		
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06	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).	**Drainage and containment** HHB do not discharge any of the generated wastewater into a watercourse, therefore this section of the BAT question is not considered relevant. Drainage is detailed within the site's Drainage and Spillage Procedure. The site is largely concreted with areas of hardstanding and has a closed drainage system with a series of surface drains and underground drains directing liquids through the system. All surface waters generated on the impermeable site surface are drained via falls into a gulley then an internal drainage channel and collected within a sump. From here the waters are pumped into one of the liquid waste storage tanks for use within the AD process. Direct precipitation that lands on the reception building roof will be collected via gullies, spouting and downpipes. The rainwater will then be captured via the surface water system described above.

Monitoring		
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		Surface waters originating from the bunded operational area will be drained to a sump within the bund, where the water is inspected. If inspection determines that the water is clean then the water will be pumped to the clean water storage tank; if it is determined that the water is "dirty," then the water will be pumped to the one of the liquid waste storage tanks. The latter will only occur in the event of a tank failure. The operator's sewage requirements will be managed via a septic tank which will be emptied at set intervals by a licenced contractor.
07	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. See section 1.2 of *Commission Implementing Decision (EU) 2018/1147* for full BAT conclusion 7 table containing frequency and standards and the waste treatment processes they are to be monitored against.	As per the above, the BAT criteria have been assessed and it is of the view that these parameters do not need to be monitored. Please see BC06 for details of drainage. All liquids (such as fuels) are provided with secondary containment and managed in accordance with the site's management procedures.
08	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. See section 1.2 of *Commission Implementing Decision (EU) 2018/1147* for full BAT conclusion 8 table containing frequency and	There are several channelled emissions to air throughout the process at HHB. They are as follows: **Biofilter** Extracted air from the main reception building is delivered via sealed ducts and pipework to a biofilter employed for odour abatement. As 'dirty' air is extracted, clean air is drawn into the building from outside, to control the potential for fugitive odour emissions.

Commented [WG2]: Please confirm the sewage arrangements for the site welfare facilities

Monitoring		
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	standards and the waste treatment processes they are to be monitored against.	**CHP Engine Exhaust and Flare** The exhaust stack from the CHP is 9m high. This will provide suitable dispersion for any odours which may be present in the CHP exhaust fumes. If the CHP is offline for any reason or there is another failure of the plant resulting in biogas pressure increase, the gas flare will automatically burn the excess biogas until the point at which the pressure drops below a specified level. The gas flare is designed to be a last resort option to protect the plant from potential damage, rather than to be run regularly. HHB have an emissions monitoring schedule for point source emissions as detailed within section 7.2.2 of the EMS. This includes the monitoring parameters, frequency and monitoring standards used to ensure compliance with Permit Condition Schedule S4.2.2. Process records shall be maintained on the SCADA system and inspection and maintenance of CHP engines take place as per manufacturers recommendations and recorded on the maintenance schedule.

<table>
<tr><th colspan="3">Monitoring</th></tr>
<tr><th>BAT Conclusion No</th><th>BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas</th><th>HHB Biogas Permit Documents</th></tr>
<tr><td>09</td><td>BAT is to monitor diffuse emissions of organic compounds to air from the regeneration of spent solvents, the decontamination of equipment containing POPs with solvents, and the physico-chemical treatment of solvents for the recovery of their calorific value, at least once per year using one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a</td><td>Measurement</td><td>Sniffing methods, optical gas imaging, solar occultation flux or differential absorption. See descriptions in Section 6.2 of Commission Implementing Decision (EU) 2018/1147.</td></tr>
<tr><td>b</td><td>Emissions factors</td><td>Calculation of emissions based on emissions factors, periodically validated (e.g. once every two years) by measurements.</td></tr>
<tr><td>c</td><td>Mass balance</td><td>Calculation of diffuse emissions using a mass balance considering the solvent input, channelled emissions to air, emissions to water, the solvent in the process output, and process (e.g. distillation) residues.</td></tr>
</table></td><td>These BAT techniques are not considered relevant as HHB do not process or have on site any solvents.</td></tr>
</table>

Monitoring		
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**	**HHB Biogas Permit Documents**
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).	Odour emissions have been carefully managed in order to reduce the impact on the local population. HHB have an Odour Management Strategy (OMS) and associated Environmental Risk Assessment developed as part of the Permit Management System. All vehicles delivering waste to the site will be scheduled in advance and the digestion process will be enclosed which mitigates against odour issues. The Operator shall have control over odour abatement technologies, which are monitored to limit odour generation and the subsequent impact of odour in the surrounding area. **Monitoring** Odour monitoring shall be carried out on a daily basis by either site staff or office staff. To ensure that staff have not become accustomed to certain odours on site, staff must spend a minimum of 30 minutes away from site and its vicinity before carrying out odour monitoring. This measure is taken to ensure that odour monitoring is carried out as accurately as is possible.
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.	The following information is recorded by the operator for each calendar year in the relevant check sheets: • Annual total energy generation (MWh). • Annual total energy usage (MWh). • Annual total fuel/oil usage (litres). • Annual total propane usage (M^3).

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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; - a protocol for conducting odour monitoring as set out in BAT 10; - a protocol for response to identified odour incidents, e.g. 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.	HHB have an Odour Management Strategy written in line with Environment Agency's Technical Guidance Note H4 standard. Aspects covered within the OMS include the following: • Feedstock Inventory, including Odorous Materials Inventory; • Process management; • Odour Benchmark Levels • Odour Impact Assessment Methodology; • Management Plan • Dispersion; • Sensitive Receptors; and, • Incidents and Emergencies. **Source of Odour** The OMS provides an assessment of each potentially odorous material to be accepted by HHB on a regular basis, identifying the typical and abnormal compositions of those waste types and providing an overall odour potential of that feedstock based upon the likelihood of abnormal compositions being encountered at site. Additionally, the OMS outlines the waste recovery processes operated onsite for the production of biogas and digestate. **Odour Monitoring** Olfactory odour monitoring shall occur daily at designated monitoring points and is to be recorded on the Daily Check Sheet. The Operator will utilise odour treatment techniques to manage any odour arising from the process, please see BC 10 for further details on these techniques. **Odour Complaints**

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		Section 9.0 of the OMS details the procedures the Operator shall implement when odours arise. All external complaints will be taken seriously and managed by the Site Manager, who will record the details on an Incident Report Form. Once the complaint has been taken, the Site Manager will investigate the complaint using the *Odour Complaint Form*. All complaints will be fully investigated within 24hrs of receipt of a complaint during the working week. The follow up actions and any remedial works required will be agreed in an action plan, including timescales, with the EA. The action plan, if required, will be submitted to the EA within 24hrs of the complaint being received. Upon identification of the source of the odour issue, the activity that has been identified as causing the odour release is immediately stopped, whilst the action plan is approved and implemented. The complaints procedure, including a survey of the complaints to date will be re-assessed by the Site Manager on a yearly basis, unless the number of complaints warrants additional reviews. Complaints will be logged in the complaints register within the site diary. The receipt of a single odour complaint during normal AD operations shall be treated as an exceedance of control levels. The primary response shall be detailed in line with the site's complaints procedure. An investigation into the cause of the complaint will be undertaken. This will involve as necessary: • An olfactory survey as outlined below; • An examination of the site activities at the time of the complaint;

Emissions to Air		
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		• An examination of the meteorological conditions at the time of the complaint; and, • A review of the effectiveness of the operational and odour control processes. The outcome of the investigation will determine the corrective actions that will be implemented. If the complaint is validated, it will be treated as an exceedance of the control level. Detection of a 'distinct odour' or stronger (3-6 on odour scale,) will initiate a more extensive olfactory survey to determine the extent of the odour plume. The Site Manager will be notified immediately upon detection, and the Manager will attempt to determine the scope and extent of the odour plume using the survey as follows: • A suitable location downwind of the site at which the odour plume is unlikely to extend will be selected for assessment; • Survey will continue toward the AD facility until an AD associated odour is perceived; • Assessment points perpendicular to the plume axis and equidistant from the AD site will then be monitored, subject to access requirements. An investigation will be initiated into the cause of the odour. This shall involve as necessary: • A review of the site activities at site and other nearby potential sources at the time of the olfactory survey; • A review of the meteorological conditions at the time of the olfactory survey; and • A review of the effectiveness of process operations and odour control procedures.

<table>
<tr><th colspan="4">Emissions to Air</th></tr>
<tr><th>BAT Conclusion No</th><th colspan="2">BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas</th><th>HHB Biogas Permit Documents</th></tr>
<tr><td>13</td><td colspan="2">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.

<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Minimising residence times</td><td>Minimising the residence time of (potentially) odorous waste in storage or in handling systems (e.g. pipes, tanks, containers), in particular under anaerobic conditions. When relevant, adequate provisions are made for the acceptance of seasonal peak volumes of waste.</td><td>Only applicable to open systems.</td></tr>
<tr><td>b.</td><td>Using chemical treatment</td><td>Using chemicals to destroy or to reduce the formation of odorous compounds (e.g. to oxidise or to precipitate hydrogen sulphide).</td><td>Not applicable if it may hamper the desired output quality.</td></tr>
</table></td><td>Due to the scale and nature of the operations conducted at site, technique B and C are not seen to be applicable.

With regards to technique A, no waste shall be stored outside of designated storage areas. In the event of over-delivery, the facility will reserve the right to refuse or return the delivery.

Packaged feedstocks shall be delivered to and stored within the enclosed reception building. The building has a negative aeration biofiltration system and the doors are kept closed when deliveries are not being received. Liquid waste shall be pumped directly into the storage tanks by road tankers then fed into the digestion feeding line. At no point during this feeding process are liquid wastes exposed to the atmosphere. The operator manages the feeding process via the SCADA system allowing the operator to efficiently process materials through the plant.

Please note, the TCM has the appropriate WAMITAB qualification and is experienced in operating an anaerobic digestion plant. A number of elements of the techniques stated in technique A are already deemed best practise and are undertaken by the operator on a practical level and dictated within their permit management system.</td></tr>
</table>

<table>
<tr><th colspan="6">Emissions to Air</th></tr>
<tr><th>BAT Conclusion No</th><th colspan="4">BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas</th><th>HHB Biogas Permit Documents</th></tr>
<tr><td></td><td colspan="4"><table>
<tr><td>c.</td><td>Optimising aerobic treatment</td><td>In the case of aerobic treatment of water-based liquid waste, it may include:

— use of pure oxygen;
— removal of scum in tanks;
— frequent maintenance of the aeration system.

In the case of aerobic treatment of waste other than water-based liquid waste, see BAT 36.</td><td>Generally applicable.</td></tr>
</table></td><td></td></tr>
<tr><td>14</td><td colspan="4">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.<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Minimising the number of potential diffuse</td><td>This includes techniques such as:
- appropriate design of piping layout (e.g. minimising pipe run length, reducing the number of flanges and valves,</td><td>Generally applicable.</td></tr>
</table></td><td>As a responsible operator HHB do employ preventative and reactive measures to fugitive emissions as indicated within their existing management system.

A) With regards to Technique A, the AD facility is understood to be a technically advanced, bespoke anaerobic digestion plant built to high quality standard. The AD facility has minimal emission points as per its design such as emissions from the biofilter and when the reception building doors are open to allow ingress and egress of vehicles. A speed limit is also enforced onsite.

B) With reference to technique B and C, HHB operate a state-of-the-art bespoke Anaerobic Digestion facility. Plant/machinery are</td></tr>
</table>

Emissions to Air					
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		emission sources	using welded fittings and pipes); - favouring the use of gravity transfer rather than using pumps; - limiting the drop height of material; - limiting traffic speed; - using wind barriers.		maintained in line with the manufacturer's recommendations and as per the requirements of the environmental permit system. Routine checks and required maintenance of plant and machinery is undertaken in accordance with the manufacturer's specification. A maintenance record is kept for each item of plant/machinery. HHB follow a Maintenance Schedule as part of the PAS100 management system. The operator is therefore of the view they satisfy technique B and C. D) With reference to technique D, liquids are to be fully enclosed throughout the process. Material will be digested within 2 enclosed digestion tanks with no free venting to atmosphere under normal operation. The system will be regularly inspected to ensure no leaks are present which could lead to excess evaporation. The site also incorporates a biofilter to abate odour generated during the most active stage of the process. The reception building has a dedicated negative aeration biofiltration system. E) With reference to Technique E, the site is situated on a concrete pad which will mitigate the potential release of aerial emissions generated by delivery vehicle movements. The site shall be kept cleaned and well maintained to prevent dust or mud arising from vehicle movements. If any risk of dust presents itself, the operator will dampen the area down. The majority of waste transported to the site will be delivered in sealed vehicles which also reduces the likelihood of dust generation. F) With reference to technique F, and as per the response to technique B & C above, the site shall operate a strict maintenance regime and equipment used will be of sufficient capacity to allow
	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; - magnetically driven pumps/compressor- - s/agitators; - appropriate service hose access ports, piercing pliers, drill heads, e.g. when degassing WEEE containing VFCs and/or VHCs.	Applicability may be restricted in the case of existing plants due to operability requirements.	
	c.	Corrosion prevention	This includes techniques such as: - appropriate selection of construction materials;	Generally applicable.	

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			- lining or coating of equipment and painting of pipes with corrosion inhibitors.		down time for routine maintenance and servicing as recommended by the manufacturer. No plant may be operated unless full instructions and training have been given by a person competent to do so. All site based mobile plant and equipment as well as all static plant shall be serviced and maintained in accordance with the manufacturers' recommended service sheets. Routine maintenance will be recorded, and in addition operator pre-use checks will be completed to assess the general condition of the machines and identify any defects. At the end of each working day any operational plant and machinery will be blown clean if required. G) With reference to technique G, cleaning of the site is undertaken at a practical level by the operator. H) With reference to technique H, VOCs are minimised through good combustion control and implementation of the site's management system as per the following: • Fugitive emissions of VOCs are prevented by the sealed tanks. • The site will operate a CHP and use a flare for emergency operations to prevent the venting of biogas during CHP downtime. • Biogas is treated through Activated Carbon Filters to remove VOCs as part of the biogas upgrading process. • The digestate stored in the lagoon has been treated and is therefore stable which reduces the emission of VOCs.
	d.	Containment, collection and treatment of diffuse emissions	This includes techniques such as: - storing, treating and handling waste and material that may generate diffuse emissions in enclosed buildings and/or enclosed equipment (e.g. conveyor belts); - maintaining the enclosed equipment or buildings under an adequate pressure; - collecting and directing the emissions to an appropriate abatement system (see Section 6.1 of *Commission Implementing Decision (EU) 2018/1147*) via an air extraction system and/or air suction systems close to the emission sources.	The use of enclosed equipment or buildings may be restricted by safety considerations such as the risk of explosion or oxygen depletion. The use of enclosed equipment or buildings may also be constrained by the volume of waste.	
	e.	Dampening	Dampening potential sources of diffuse dust emissions (e.g. waste storage, traffic areas, and open handling processes) with water or fog.	Generally applicable.	
	f.	Maintenance	This includes techniques such as: - ensuring access to potentially leaky equipment;	Generally applicable.	

<table>
<tr><th colspan="5">Emissions to Air</th></tr>
<tr><th>BAT Conclusion No</th><th colspan="3">BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas</th><th>HHB Biogas Permit Documents</th></tr>
<tr><td></td><td colspan="3"><table>
<tr><td></td><td></td><td>- regularly controlling protective equipment such as lamellar curtains, fast-action doors.</td><td></td></tr>
<tr><td>g.</td><td>Cleaning of waste treatment and storage areas</td><td>This includes techniques such as regularly cleaning the whole waste treatment area (halls, traffic areas, storage areas, etc.), conveyor belts, equipment and containers.</td><td>Generally applicable.</td></tr>
<tr><td>h.</td><td>Leak detection and repair (LDAR) programme</td><td>See Section 6.2 of Commission Implementing Decision (EU) 2018/1147. When emissions of organic compounds are expected, a LDAR programme is set up and implemented using a risk-based approach, considering in particular the design of the plant and the amount and nature of the organic compounds concerned.</td><td>Generally applicable.</td></tr>
</table></td><td></td></tr>
<tr><td>15</td><td colspan="3">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.<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Correct plant design</td><td>This includes the provision of a gas recovery system with sufficient capacity and the use of high-integrity relief valves.</td><td>Generally applicable to new plants. A gas recovery</td></tr>
</table></td><td>In line with the requirements of this BAT conclusion and the requirements of the permit, the operator shall only use the flare in an emergency scenario.

The provision of an adequately sized CHP unit and a flare for emergency operation shall prevent the venting of biogas during CHP downtime.

The engines and flare shall be maintained as per manufacturers guidelines. HHB have commissioned an external consultant to monitor and assess the CHP unit to ensure that the CHP is operating</td></tr>
</table>

<table>
<tr><th colspan="3">Emissions to Air</th></tr>
<tr><th>BAT Conclusion No</th><th>BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas</th><th>HHB Biogas Permit Documents</th></tr>
<tr><td></td><td>
<table>
<tr><td></td><td></td><td></td><td>system may be retrofitted in existing plants.</td></tr>
<tr><td>b.</td><td>Plant management</td><td>This includes balancing the gas system and using advanced process control.</td><td>Generally applicable.</td></tr>
</table>
</td><td>in line with the parameters stated in schedule 3, table 3.1 of the permit.

The SCADA system allows the operator to continuously monitor gas pressure throughout the process. If certain parameters are met high level alarms activate warning the operator is to take action to manage the high or low pressure.</td></tr>
<tr><td>16</td><td>In order to reduce emissions to air from flares when flaring is unavoidable, BAT is to use both of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Correct design of flaring devices</td><td>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.</td><td>Generally applicable to new flares. In existing plants, applicability may be restricted, e.g. due to maintenance time availability.</td></tr>
<tr><td>b.</td><td>Monitoring and recording as</td><td>This includes continuous monitoring of the quantity of gas sent to flaring. It may include estimations of other parameters</td><td>Generally applicable.</td></tr>
</table>
</td><td>The flare is set at a height 6m at which the operator considers adequate for dispersion. It has been installed correctly and has undergone a commissioning programme.

The SCADA system allows the operator to continuously monitor gas pressure throughout the process and record any instances of flaring undertaken at the site.</td></tr>
</table>

Emissions to Air					
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas				HHB Biogas Permit Documents
		part of flare management	(e.g. composition of gas flow, heat content, ratio of assistance, velocity, purge gas flow rate, pollutant emissions (e.g. NOX, 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.		

Noise and Vibration		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas	HHB Biogas Permit Documents
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: I. a protocol containing appropriate actions and timelines; II. a protocol for conducting noise and vibration monitoring; III. a protocol for response to identified noise and vibration events, e.g. complaints; IV. a noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration	HHB do not have a standalone Noise and Vibration Management Plan as it is not considered that noise or vibration is a major issue on site. However, it is covered in the operator's Health and Safety Policy. This states that HHB will comply with the law as determined in the Control of Noise at Work Regulations 2005. The policy includes the following provisions: • Noise will be controlled at source where reasonably practicable. • As appropriate, noise assessments of tasks and areas will be conducted where workers are likely to be frequently exposed to noise above 80dB(A).

<table>
<tr><th colspan="3">Noise and Vibration</th></tr>
<tr><th>BAT Conclusion No</th><th>BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas</th><th>HHB Biogas Permit Documents</th></tr>
<tr><td></td><td>exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures.</td><td>• Hearing Protection Zones will be established for areas where hearing protection must be worn i.e. above 85dB(A). All employees and visitors to such areas must observe the requirement to wear such protection in all such areas.

All equipment is subject to a strict inspection and maintenance regime that follows the manufacturers recommendations to ensure all plant remains in good working order to prevent noise and vibration issues.

All operators shall be trained on the safe and effective use of all plant items on site.

Vehicles that arrive on site shall be asked to turn off their engines when the vehicles are not in use. The majority of waste deliveries take place inside a designated enclosed building with roller shutter doors. Deliveries are also restricted to the operational hours of the site.

Significant amounts of plant and activity are enclosed within the building, and material moving through the process is pumped through enclosed pipework.</td></tr>
<tr><td>18</td><td>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.

<table><tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>a.</td><td>Appropriate location of</td><td>Noise levels can be reduced by increasing the distance between the emitter and the</td><td>For existing plants, the relocation of equipment and building exits or</td></tr></table></td><td>Noise and vibration are not considered to be a major issue on site. The site is located in a largely agricultural area with the digesters, associated tanks, flare, CHP and gas clean-up plants located as far from the nearest sensitive receptor as logistically possible.

All equipment is subject to a strict inspection and maintenance regime that follows the manufacturers recommendations to ensure all plant remains in good working order to prevent noise and vibration issues.</td></tr>
</table>

Noise and Vibration					
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**				**HHB Biogas Permit Documents**
		equipment and buildings	receiver, by using buildings as noise screens and by relocating building exits or entrances.	entrances may be restricted by a lack of space or excessive costs.	All operators shall be trained on the safe and effective use of all plant items on site. Vehicles that arrive on site shall be asked to turn off their engines when the vehicles are not in use. The majority of waste deliveries take place inside a designated enclosed building with roller shutter doors. Deliveries are also restricted to the operational hours of the site. Significant amounts of plant and activity are enclosed within the building, and material moving through the process is pumped through enclosed pipework.
	b.	Operational measures	This includes techniques such as: (i) inspection and maintenance of equipment; (ii) closing of doors and windows of enclosed areas, if possible; (iii) equipment operation by experienced staff; (iv) avoidance of noisy activities at night, if possible; (v) provisions for noise control during maintenance, traffic, handling and treatment activities.	Generally applicable.	
	c.	Low-noise equipment	This may include direct drive motors, compressors, pumps and flares.		
	d.	Noise and vibration control equipment	This includes techniques such as: (i) noise reducers; (ii) acoustic and vibrational insulation of equipment; (iii) enclosure of noisy equipment; (iv)	Applicability may be restricted by a lack of space (for existing plants).	

Noise and Vibration					
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas				HHB Biogas Permit Documents
			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).	Applicable only to existing plants, as the design of new plants should make this technique unnecessary. For existing plants, the insertion of obstacles may be restricted by a lack of space. For mechanical treatment in shredders of metal wastes, it is applicable within the constraints associated with the risk of deflagration in shredders.	

Emissions to Water				
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas			HHB Biogas Permit Documents
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 number of different water sources, such as surface water and clean roof water, will be captured via the contained drainage system installed at the AD facility at HHB. A) With regards to technique A, water used on site is either pumped directly from a spring or recycled water collected from within the bunded operational area and stored within a 20m^3 water storage tank.
	Technique	Description	Applicability	

Emissions to Water					
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**				**HHB Biogas Permit Documents**
	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); — reducing the use of water for vacuum generation (e.g. use of liquid ring pumps with high boiling point liquids).	Generally applicable.	B) With regards to technique B, wash water used in support of the anaerobic digestion process can be used in the process as long as it doesn't contain any contaminants, such as disinfectants which would damage the process, therefore complying with BAT. C) With regards to technique C, the AD facility is situated on an impermeable surface concrete surface with hardstanding areas. Therefore, the operator complies with this technique. D) With regards to technique D, a number of measures shall be employed to reduce the likelihood and impact of overflows from tanks and vessels. All liquid waste tanks will be monitored by accurate level sensors. Should a high level be detected, the feed-pumps will be shut off to prevent the tanks filling further. If the tank level continues to rise, a high-level alarm will sound, and a warning is sent to the operator via phone. Visual monitoring of waste transfer will also be undertaken to ensure that no overflow of the tanks occurs. All tanks are fully bunded to 110% of their capacity. The site is fully contained to prevent the escape of liquid in the event of a spill. The emergency responses to drainage system failures are provided within the operator's Accident Management Plan. E) With regards to technique E, the majority of the anaerobic digestion process is conducted internally which limits contact of the
	b.	Water recirculation	Water streams are recirculated within the plant, if necessary, after treatment. The degree of recirculation is limited by the water balance of the plant, the content of impurities (e.g. odorous compounds) and/or the characteristics of the water streams (e.g. nutrient content).	Generally applicable.	
	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	Generally applicable.	

Emissions to Water					
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas				HHB Biogas Permit Documents
			impermeable to the liquids concerned.		material with rainwater. Therefore, it is the operators view that they comply with BAT. F) With regards to technique F, the site segregates water streams with precipitation that land on surfaces within the bunded operational area collected via water storage tank. Surface water from other impermeable areas of the site drain to a gully and then a sump, from which the water is pumped to one of the liquid waste storage tanks. Consequently, it is the operator's view that each water stream will be appropriately segregated, and thus the measures employed satisfy the criteria of technique F. G) With regards to technique G, the waste treatment area will be connected to the drainage infrastructure system. Rainwater falling on the enclosed operational areas will be collected in the drainage infrastructure along with surface water and enters the water storage tank for recirculation if required. Surface water on other impermeable areas of the site drain to a gully and then a sump, from which the water is pumped to one of the liquid waste storage tanks. If a spillage occurred this would be contained within the sump and then removed by a suitably qualified 3rd party contractor. HHB also have a Drainage and Spillage Procedure which details the response that will be taken in the event of a spillage. H) HHB shall carry out daily site inspections to monitor for potential leaks and spills in line with the *Daily and Weekly Checklist* (Version 5). The drainage and containment have been designed as appropriate for the specific operational areas, with waste unloading, processing and
	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; – 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).	Generally applicable.	
	e.	Roofing of waste storage and treatment areas	Depending on the risks posed by the waste in terms of soil and/or water contamination, waste is stored and treated in covered areas to prevent contact with rainwater and	Applicability may be constrained when high volumes of waste are stored or treated (e.g. mechanical	

Emissions to Water					
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**				**HHB Biogas Permit Documents**
			thus minimise the volume of contaminated run- off water.	treatment in shredders of metal waste).	storage areas having self-contained drainage. The installation surfaces and containment units have an inspection and maintenance programme for impervious surfaces and containment facilities. I) With regards to technique I, as the site has been operational for a number of years this is not seen to be applicable.
	f.	Segregation of water streams	Each water stream (e.g. surface run-off water, process water) is collected and treated separately, based on the pollutant content and on the combination of treatment techniques. In particular, uncontaminated waste water streams are segregated from waste water streams that require treatment.	Generally applicable to new plants. Generally applicable to existing plants within the constraints associated with the layout of the water collection system.	
	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.	Generally applicable to new plants. Generally applicable to existing plants within the constraints associated with the layout of the water drainage system.	
	h.	Design and maintenance provisions to allow	Regular monitoring for potential leakages is risk-based, and, when necessary, equipment is repaired.	The use of above-ground components is generally applicable to new	

Emissions to Water					
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas				HHB Biogas Permit Documents
		detection and repair of leaks	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.	plants. It may be limited however by the risk of freezing. The installation of secondary containment may be limited in the case of existing plants.	
	i.	Appropriate buffer storage capacity	Appropriate buffer storage capacity is provided for wastewater 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 wastewater from this buffer storage is only possible after appropriate measures are taken (e.g. monitor, treat, reuse).	Generally applicable to new plants. For existing plants, applicability may be limited by space availability and by the layout of the water collection system.	

<table>
<tr><th colspan="3">Emissions to Water</th></tr>
<tr><th>BAT Conclusion No</th><th>BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas</th><th>HHB Biogas Permit Documents</th></tr>
<tr><td>20</td><td>
In order to reduce emissions to water, BAT is to treat wastewater using an appropriate combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Typical pollutants targeted</th><th>Applicability</th></tr>
<tr><td colspan="4">Preliminary and primary treatment, e.g.,</td></tr>
<tr><td>a.</td><td>Equalisation</td><td>All pollutants</td><td rowspan="3">Generally applicable.</td></tr>
<tr><td>b.</td><td>Neutralisation</td><td>Acids, alkalis</td></tr>
<tr><td>c.</td><td>Physical separation, e.g., screens, sieves, grit separators, grease separators, oil- water separation or primary settlement tanks</td><td>Gross solids, suspended solids, oil/grease</td></tr>
<tr><td colspan="4">Biological treatment, e.g.,</td></tr>
<tr><td>l.</td><td>Activated sludge process</td><td rowspan="2">Biodegradable organic compounds</td><td rowspan="2">Generally applicable.</td></tr>
<tr><td>m.</td><td>Membrane bioreactor</td></tr>
</table>
The activities which are not relevant to the operator have been removed from the table.

In addition, see table 6.1 entitled ‘BAT-associated emission levels (BAT-AELs) for direct discharges to a receiving water body’ and table 6.2 entitled ‘BAT-associated emission levels (BAT-AELs) for indirect discharges to a receiving water body’ of Commission Implementing
</td><td>
The treatment techniques listed in the adjacent BAT Guidance column are not considered relevant as the water streams generated at HHB are not treated. As this is the case, the BAT associated emission levels are not considered relevant as HHB does not discharge any of their generated surface water into a watercourse.

The site is largely concreted with areas of hardstanding and has a closed drainage system with a series of surface drains and underground drains directing liquids through the system.

All surface waters generated on the impermeable site surface are drained via falls into a gulley then an internal drainage channel and collected within a sump. From here the waters are pumped into one of the liquid waste storage tanks for use within the AD process. Direct precipitation that lands on the reception building roof will be collected via gullies, spouting and downpipes. The rainwater will then be captured via the surface water system described above.

Surface waters originating from the bunded operational area will be drained to a sump within the bund, where the water is inspected. If inspection determines that the water is clean then the water will be pumped to the clean water storage tank; if it is determined that the water is “dirty,” then the water will be pumped to the one of the liquid waste storage tanks. The latter will only occur in the event of a tank failure.

The operator’s sewage requirements will be managed via a septic tank which will be emptied at set intervals by a licenced contractor.
</td></tr>
</table>

Commented [WG3]: Please confirm

Emissions to Water		
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**	**HHB Biogas Permit Documents**
	Decision (EU) 2018/1147. These tables contain the relevant BAT-EAL and substances/parameters which discharges to receiving water bodies should be tested for.	

<table>
<tr><th colspan="3">Emissions from accidents and incidents</th></tr>
<tr><th>BAT Conclusion No</th><th>BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas</th><th>HHB Biogas Permit Documents</th></tr>
<tr><td>21</td><td>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).

<table><tr><th colspan="2">Technique</th><th>Description</th></tr><tr><td>a.</td><td>Protection measures</td><td>These include measures such as:
— protection of the plant against malevolent acts;
— fire and explosion protection system, containing equipment for prevention, detection, and extinction;
— accessibility and operability of relevant control equipment in emergency situations.</td></tr><tr><td>b.</td><td>Management of incidental/accidental emissions</td><td>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.</td></tr><tr><td>c.</td><td>Incident/accident registration and assessment system</td><td>This includes techniques such as:
— a log/diary to record all accidents, incidents, changes to procedures and the findings of inspections;
— procedures to identify, respond to and learn from such incidents and accidents.</td></tr></table></td><td>HHB have an Accident Management Plan (AMP) developed as part of their permit management system.

The AMP shall be reviewed annually or sooner following the occurrence of an accident. The current version is Version 01. The AMP encompasses the following requirements:

Emergency contact details for the following:

• Emergency services
• Local Police
• Environment Agency Hotline
• Health and Safety Executive
• Electricity Supplier
• Local A&E Hospital
• Gas Supplier
• Sewerage Undertaker
• Out of hours company contact.

An up-to-date assessment of the risks at site such as:

• Fugitive emissions via leaks and spillages
• Fire
• Foaming
• Breach of critical control points
• Mechanical breakdown
• Odour
• Pests
• Unauthorised access and vandalism

Appropriate preventative and response measures that should be taken to mitigate potential accidents are detailed in the AMP and</td></tr>
</table>

Emissions from accidents and incidents		
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**	**HHB Biogas Permit Documents**
		linked to wider site procedures. Any accidents and other incidents that occur on site, the known or suspected cause(s), and the actions taken are recorded by the Site Manager on the daily check sheet and in the Accident Record Form (WD/19/0814) .

Material efficiency		
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**	**HHB Biogas Permit Documents**
22	In order to use materials efficiently, BAT is to substitute materials with waste. 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). Some applicability limitations derive from the risk of contamination posed by the presence of impurities (e.g., heavy metals, POPs, salts, pathogens) in the waste that substitutes other materials. Another limitation is the compatibility of the waste substituting other materials with the waste input (see BAT 2).	As the operator purely undertakes anaerobic digestion of food, animal feed and liquid wastes the opportunities for substituting materials with waste are quite limited, as the process needs to maintain optimum biological and chemical conditions in order to produce a quality digestate product, as well as maintaining the condition of plant equipment.

<table>
<tr><th colspan="4">Energy efficiency</th></tr>
<tr><th>BAT Conclusion No</th><th colspan="2">BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas</th><th>HHB Biogas Permit Documents</th></tr>
<tr><td>23</td><td colspan="2">In order to use energy efficiently, BAT is to use both of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a.</td><td>Energy efficiency plan</td><td>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.</td></tr>
<tr><td>b.</td><td>Energy balance record</td><td>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:
(i) information on energy consumption in terms of delivered energy;
(ii) information on energy exported from the installation;
(iii) 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.</td></tr>
</table></td><td>HHB do not currently implement Technique A or B. The following information is recorded by the operator for each calendar year in the relevant check sheets:

• Annual total energy generation (MWh).
• Annual total energy usage (MWh).
• Annual total fuel/oil usage (litres).
• Annual total propane usage (M^3).</td></tr>
</table>

Reuse of Packaging		
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**	**HHB Biogas Permit Documents**
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).	The site is an anaerobic digestion facility which processes packaged food wastes. Consequently, following initial inspection upon receipt at site, the packaged food wastes are loaded into the de-packaging machinery that serves to separate the packaging from the organic digestible fraction of the input material. Once the packaging material has been separated from the organic fraction it is then transferred to dedicated skips for either disposal or off site-recycling at a suitably licensed facility.

4.1.2 General BAT Conclusions for the Biological Treatment of Waste

Overall Environmental Performance		
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**	**HHB Biogas Permit Documents**
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 operator complies with this aspect of the BAT assessment, through their pre-acceptance, acceptance and rejection procedures and as part of their permit management system. Selection of waste input is clearly described within the procedures stated above. Please see BAT conclusion 2 earlier in the document for details on pre-acceptance and waste acceptance. On a risk-based approach as recommended in the EC BREF for Waste Treatment Industries (European Commission (2006) Reference Document on Best Available Techniques for the Waste Treatments Industries), the waste producer is required to undertake and make

Overall Environmental Performance		
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**	**HHB Biogas Permit Documents**
		available laboratory analysis of a sample of waste material to determine the properties of the waste material and any related specific hazards. Pre-acceptance at the site is handled by the Feedstock Pre-Acceptance and Acceptance procedures. The procedures include the following relevant details: Prior to the acceptance of wastes on site, HHB shall undertake the following process: 1) The supplier is asked for details of the waste and any analysis results that the supplier has. HHB then consult FM Bio for advice on its suitability as an input material. 2) Where the waste is deemed suitable, a contractual arrangement (input materials supply agreement) is made with each waste supplier including criteria for acceptance/rejection of loads delivered to the facility. Any additional acceptance/rejection criteria specific to a certain waste feedstock is also indicated in the input materials supply agreement. 3) Each feedstock load delivered shall enter the site via the weighbridge. Details of the waste type, EWC code, ABP Category, client/source, quantity of waste, delivery date and delivery location on site shall be recorded within the electronic Waste Movements Log and electronically generated weighbridge ticket.

Overall Environmental Performance		
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**	**HHB Biogas Permit Documents**
		4) Providing the hauler has a valid input supply agreement and is delivering a material as described within the agreement, the weighbridge operator shall then notify the driver to proceed to the appropriate reception area, where a site operative shall ensure the vehicle is directed to the correct offloading point. Verification of the written information provided by the supplier/producer may be required, and this will require a visit to the producer (at least annually), specifically where a third party is involved, e.g., waste broker. Detailed feedstock characterisation shall be obtained through sampling and testing as part of establishing a supply contract with a waste supplier. Periodic sampling of the waste shall be conducted as part of the site sampling plan to test for variation and ensure feedstock is consistent with the supply agreement. Waste Acceptance at the site will be handled by the Waste Acceptance procedure. The procedure includes the following relevant details: The Site Manager shall ensure that the site has the required number of qualified operatives on site (as defined in the Permit Management System Manual) and has capacity to store and treat any incoming waste prior to a load arriving at site. All loads arriving at the site will be pre-booked. All incoming vehicles will enter via the site entrance and proceed to the weighbridge. Documentation will be checked by the weighbridge operator, to ensure that the waste complies with the waste types permitted by the Planning Permission, Environmental Permit Regulations or any subsequent updates.

<table>
<tr><th colspan="3">Overall Environmental Performance</th></tr>
<tr><th>BAT Conclusion No</th><th>BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas</th><th>HHB Biogas Permit Documents</th></tr>
<tr><td></td><td></td><td>Once the documentation has been produced and checked, the weighbridge operator will direct the delivery to the designated reception area to undergo unloading. Prior to the unloading of solid wastes, a site operative undertakes a visual inspection of the waste to further ensure that it conforms to the acceptable waste types and conditions specified in the permit.</td></tr>
</table>

<table>
<tr><th colspan="3">Emissions to Air</th></tr>
<tr><th>BAT Conclusion No</th><th>BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas</th><th>HHB Biogas Permit Documents</th></tr>
<tr><td>34</td><td>In order to reduce channelled emissions to air of dust, organic compounds and odorous compounds, including H2S and NH3, BAT is to use one or a combination of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th></tr>
<tr><td>a.</td><td>Adsorption</td><td>See Section 6.1 of Commission Implementing Decision (EU) 2018/1147.</td></tr>
<tr><td>b.</td><td>Biofilter</td><td>See Section 6.1 of Commission Implementing Decision (EU) 2018/1147.

A pre-treatment of the waste gas before the biofilter (e.g., with a water or acid scrubber) may be needed in the case of a high NH_3 content (e.g. 5-40 mg/Nm^3) in order to control the media pH and to limit the formation of N_2O in the biofilter.</td></tr>
</table>
</td><td>HHB undertake daily olfactory odour monitoring through sniff tests as part of the daily site check. The monitoring frequency is detailed in the Daily and Weekly Checklist (Version 5).

All tanks and digestate lagoons are fully sealed with no free venting to atmosphere during normal operations. The liquid waste feedstock has low odour potential as does the digestate. The only venting to atmosphere that occurs takes place during tank or digestate lagoon filling. This takes place in a controlled manner and the volume that is vented via displacement is equal to the volume of liquid entering the tank or bagged lagoon. As such, no technological odour abatement is considered necessary.</td></tr>
</table>

		Some other odorous compounds (e.g., mercaptans, H_2S) can cause acidification of the biofilter media and necessitate the use of a water or alkaline scrubber for pre-treatment of the waste gas before the biofilter.
c.	Fabric filter	See Section 6.1 of *Commission Implementing Decision (EU) 2018/1147*. The fabric filter is used in the case of mechanical biological treatment of waste.
d.	Thermal oxidation	See Section 6.1 of *Commission Implementing Decision (EU) 2018/1147*.
e.	Wet scrubbing	See Section 6.1 of *Commission Implementing Decision (EU) 2018/1147*. Water, acid or alkaline scrubbers are used in combination with a biofilter, thermal oxidation or adsorption on activated carbon.

For the BAT-associated emission levels (BAT-AELs) for channelled NH3, odour, dust and TVOC emissions to air from the biological treatment of waste see table 6.7 in Commission Implementing Decision (EU) 2018/1147. The contents of the table are displayed below for ease of reference.

Parameter	Unit	BAT-AEL (Average over the sampling period)	Waste treatment process
NH3(1)(2)	mg/Nm3	0,3-20	All biological treatments of waste
Odour concentration (1)(2)	ouE/Nm3	200-1 000	
Dust	mg/Nm3	2-5	Mechanical biological treatment of waste
TVOC	mg/Nm3	5-40(3)	

(1) Either the BAT-AEL for NH3 or the BAT-AEL for the odour concentration applies.
(2) This BAT-AEL does not apply to the treatment of waste mainly composed of manure.
(3) The lower end of the range can be achieved by using thermal oxidation.

The associated monitoring is given in BAT 8.

Biofilter
The biofilter treats vented emissions to air from the treatment process. The biofilter comprises a 216m^3 system and contains suitable biofiltration media in the form of pumice stone to filter odorous air.

<table>
<tr><th colspan="5">Emissions to Water and Water Usage</th></tr>
<tr><th>BAT Conclusion No</th><th colspan="3">BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas</th><th>HHB Biogas Permit Documents</th></tr>
<tr><td>35</td><td colspan="3">In order to reduce the generation of wastewater and to reduce water usage, BAT is to use all of the techniques given below.

<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Segregation of water streams</td><td>Leachate seeping from compost piles and windrows is segregated from surface run-off water (see BAT 19f).</td><td>Generally applicable to new plants.
Generally applicable to existing plants within the constraints associated with the layout of the water circuits.</td></tr>
<tr><td>b.</td><td>Water recirculation</td><td>Recirculating process water streams (e.g. from dewatering of liquid digestate in anaerobic processes) or using as much as possible other water streams (e.g. water condensate, rinsing water, surface run-off water). The degree of recirculation is limited by the water balance of the plant, the content of impurities (e.g. heavy metals, salts, pathogens, odorous compounds) and/or the characteristics of the water streams (e.g. nutrient content).</td><td>Generally applicable.</td></tr>
<tr><td>c.</td><td>Minimisation of the</td><td>Optimising the moisture content of the waste in order</td><td>Generally applicable.</td></tr>
</table></td><td>Technique A is dealt with as part of BAT 19f.

Technique B is dealt with as part of BAT 19b.

C) With regards to technique C, the entire digestion process will be contained and any liquid runoff from the waste will be captured and added to the process. There is therefore minimal potential for the minimisation of leachate at an anaerobic digestion plant.</td></tr>
</table>

Emissions to Water and Water Usage		
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**	**HHB Biogas Permit Documents**
	generation of leachate: to minimise the generation of leachate.	

4.1.3 BAT Conclusions for the Anaerobic Treatment of Waste

Emissions to air		
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**	**HHB Biogas Permit Documents**
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.	As stated at BC01, HHB maintain high levels of process control through the combination of various different operational procedures and monitoring of the SCADA system. The SCADA will provide continuous monitoring of the entire process with automated alarms positioned to alert operatives in the event the process deviates from the set operating parameters. The feeding of the primary digesters is overseen and controlled by the site operatives using the SCADA control system. Only the Site Manager has access to this control of feed rate and the amount of feed from each feedstock source will be determined in line with loading rate calculations.

Emissions to air		
BAT Conclusion No	**BAT Guidance (Adapted from Annex I of Directive 2010/75/EU) / Information that needs to be provided by HHB Biogas**	**HHB Biogas Permit Documents**

5.0 CONCLUSION

W J Drennan Ltd operate an AD facility at their site in East Hedleyhope which meets the Best Available Technique as described in the Best Available Techniques (BAT) Reference Document for Waste Treatment 2018 (BREF) document, as well as the Commission Implementing Decision (EU) 2018/1147.

18 Manor Square, Otley, LS21 3AY

01943 468138
www.wrm-ltd.co.uk

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