




GWE Biogas Ltd
Integrated Management System
Controlled Document

Integrated Standard Operating Procedures	
Approved by:	Tom Megginson
Issue date:	25/08/2023
Version:	14

Version History


Version	Date	Amendment/Change
01	21/02/2018	Integration of PAS110, ABPR and Permit SOPs.
02	30/07/2018	Section 3 – Inclusion of roles and responsibilities of the weighbridge operator. Section 7 – New section explaining the control of person, vehicle and wash water movements through clean and dirty areas in line with ABPR requirements. Section 8.1 -Further clarification on sampling and test arrangement in line with ABP Regulations and PAS 110. Section 10.8 – Further detail provided around responses to various spillages. Section 10.11- Further detail provided around wash down procedures.
03	01/05/2019	Section 3 – Amendment of roles and responsibilities. Section 5.3.1 – Addition of Weighbridge User Guide reference.
04	30/09/2019	Annual Review. Brought in line with annual audit cycle.
05	29/09/2020	Annual Review.
06	14/12/2020	Amended in line with permit variation for gas to grid connection, reception hall extension, new digester and capacity increase.

Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	


07	26/10/2021	Integrated SOPS Annual Review (Addition of planning reference number for new digester development approval and amendment of digestate retention time to for separated liquor/fibre).
08	24/11/2021	Amendment to Section 6.1 of the SOPs to acknowledge the use of a specific process flow diagram for each of the process lines.
09	04/01/2022	Insertion of Sections 8.4 and 8.5 to cover FOS/TAC and pH sampling arrangements and corrective action procedure. Amendment of Organogram to reflect site responsibilities.
10	05/05/2022	Annual review of document.
11	13/09/2022	Insertion of Section 3.2 – Document Control
12	15/11/2022	Update the SOPs to clearly state retention time for the clean processing line.
13	17/11/2022	Updates to the SOPs following PAS 110 audit.
14	25/08/2023	Annual Review

Table of Contents

1.0	INTRODUCTION	1
2.0	COMPANY DETAILS	2
2.1	Facility name, address and telephone number	2
2.2	Process employed	2
2.3	General description of the anaerobic digestion process and its outputs	2
3.0	ROLES AND RESPONSIBILITIES	4
3.1	Individual Task Responsibility	5
3.2	Document Control.....	7
3.3	Responsibility for PAS110 and ABPR Compliance	8
3.4	Organogram	9
4.0	DOCUMENT CONTROL AND COMMUNICATION	10
4.1	Document Control.....	10
4.2	Records	10
4.2.1	Monitoring.....	10
4.2.2	Operational Records	10
4.2.3	Material Records.....	11
4.2.4	Calibration of Equipment.....	12
4.3	Duty of Care	12
	Environmental permit details are detailed in the following sections:.....	12

Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

4.4	Communication	14
5.0	INPUT MATERIALS (ACCEPTANCE AND REJECTION PROCEDURES)	15
5.1	Types of input materials and sources	15
5.2	Pre-Acceptance Agreements with material suppliers	15
5.3	Inspections of input materials against acceptance criteria	16
5.3.1	<i>Inspection of paperwork at the weighbridge</i>	16
5.3.2	<i>Inspection at the point of offloading</i>	17
5.4	Waste Rejection Procedure.....	18
6.0	PROCESS MANAGEMENT & OPERATIONAL PROCEDURES	20
6.1	Process Flow diagram	20
6.2	Feedstock/Waste Acceptance – (PAS110 CCP1 & APHA CCP1)	20
6.2.1	<i>Stock Rotation</i>	20
6.3	Input materials pre-treatment - (PAS110 CCP2 & APHA CCP2).....	21
6.4	Hydrolysis.....	22
6.5	Pasteurisation (Excluding clean waste stream) - (PAS110 CCP3 & APHA CCP3)	22
6.5.1	<i>Pasteurisation – Clean Waste Stream</i>	23
6.6	Primary Anaerobic Digestion - (PAS110 CCP4 & APHA CCP5)	23
6.7	Secondary Anaerobic Digestion (excluding Clean Waste Stream).....	24
6.8	Separator	25
6.9	Biogas production	25
6.10	CCUS	26
6.11	Biomethane Production and Gas to Grid Injection.....	26
6.12	Monitoring equipment calibration.....	27
6.13	Maintenance and processing equipment checks.....	27
6.14	Vermin control.....	28
7.0	MOVEMENTS PREVENTING ABP CONTAMINATION.....	29
7.1	Personnel Movements.....	29
7.2	Vehicle Movements.....	29
7.3	Drainage	29
8.0	SAMPLING AND TESTING	31
8.1	Sampling procedure for PAS 110 & APHA testing purposes	31
8.2	Dealing with tested portions that fail APHA sanitisation sampling:.....	33
8.3	Dealing with tested portions that fail to comply with the PAS 110 quality criteria:	33
8.4	Sampling Procedure for Digester Health Purposes	34

Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

8.5 Dealing with tested portions that are outside the critical limits identified in the HACCP 37

9.0 PRODUCT DISPATCH, STORAGE AND USE (TO PAS110 CCP7 & APHA CCP7) 38

9.1 Product labelling and supply documentation 38

9.2 Quarantine policy for sampled and tested products 38

9.3 Digestate storage and use in agriculture, forestry and soil/field-grown horticulture 38

10.0 POLLUTION CONTROL PROCEDURES 40

10.1 Infrastructure Maintenance 40

10.2 Plant Maintenance 40

10.3 Meteorological Monitoring 40

10.4 Dust 40

10.5 Mud and Debris 41

10.6 Litter 41

10.7 Pests 41

10.8 Spillages 41

10.9 Odour 41

10.10 Noise and Vibration 42

10.11 Clean Down 42

10.12 Storage of Wastes 42

10.13 Biofilter Management 42

10.14 Lagoon Pipe System Leak 43

11.0 COMPANY-WIDE AND MANAGEMENT PROCEDURES 44

11.1 Training 44

 11.1.1 Technical Competence 44

11.2 Incident and accidents 44

11.3 Complaints 45

 11.3.1 General Complaint 45

 11.3.2 Digestate Quality Complaint 45

 11.3.3 Odour Complaint 46

11.4 Environmental Permit Reporting 46


 11.4.1 Emissions/Resource Reporting 46

 11.4.2 CHP Unit Monitoring 47


 11.4.3 Quarterly Waste Returns 47

 11.4.4 Pollution Inventory 48

 11.4.5 Situations where reporting is "without delay" 48

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

11.4.6	<i>Relevant convictions</i>	48
11.4.7	<i>Change of Operator's or Holders Details</i>	48
11.4.8	<i>Relevant Convictions</i>	48
11.4.9	<i>Change of Operator's or Holders Details</i>	49
11.4.10	<i>Notification of Preparatory Works</i>	49
11.4.11	<i>Commencement or Cessation of Waste Operations</i>	49
11.4.12	<i>Reporting Following a Written Notice from the Environment Agency</i>	49
11.4.13	<i>Notification of monitoring and/or Spot Sampling</i>	49
11.5	<i>Energy and Resource Efficiency Measures</i>	50
11.6	<i>Internal Audit</i>	50
11.7	<i>Management Review</i>	50


Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

1.0 Introduction

This document details the standard operating procedures applicable to the correct management of the anaerobic digestion plant operated by GWE Biogas Ltd. This document has been produced to consolidate all aspects of the requirements set out by:

- the PAS110 accreditation scheme, administered by BCS,
- GWE's existing bespoke installation permit, regulated by the Environment Agency; and,
- the animal by-production regulations (Animal By-Products (Enforcement) (England) Regulations SI 2013/2952), regulated by the Animal and Plant Health Agency (APHA).

Please refer to the individual PAS110, Permit and ABPR manuals which reference the applicable sections of this master document for each of the three regulatory systems.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

2.0 Company details

2.1 Facility name, address and telephone number

- GWE Biogas Ltd, Sandhill, Garton Road, Kirkburn, Driffield, East Yorkshire, YO25 9DR
- Telephone number: 01377 229425
- Site Grid Reference: Easting 498707, Northing 456582

2.2 Process employed

GWE's AD process is a wet, mesophilic anaerobic digestion process preceded by pasteurisation when processing packaged waste streams and succeeded by pasteurisation when processing unpackaged (clean) wastes. The process is controlled by a fully automated computer system, to which access is strictly controlled using password entry.

2.3 General description of the anaerobic digestion process and its outputs

GWE's AD process is a wet, mesophilic anaerobic digestion process. The process overall retention time is:


- approximately 52 days for existing processing line.
- approximately 59 days for new clean processing line.

The product types for which conformance with PAS 110 and the Anaerobic Digestate Quality Protocol is intended to be claimed are:

- Separated liquor (derived from the dirty process line);
- Separated liquor (derived from the clean process line) and,
- Separated fibre (derived from the clean process line).


This AD process is operated under:

- Planning permission granted by East Riding of Yorkshire Council on 06/05/2009 (DC/09/00511);
- Planning permission granted by East Riding of Yorkshire Council on 02/10/2021 (Ref: 20/02336/PLF);
- Planning permission granted by East Riding of Yorkshire Council on 27/06/2022 (Ref: 22/010708/CM);
- Bespoke Environmental Permit EPR / TP3835KE granted by the Environment Agency on 09/09/2010; (Please note latest permit version is V009 issued 07/01/2022);
- Approval 51/115/8002/ABP/BIO granted by the Animal Health to treat Category 3, category 2 exempt materials and category 3 glycerine, animal-by products (08/06/2020); and
- PAS110 Certificate of Compliance (BCS Number – BCS0412C9) approved by OF&G on the 24/01/2023.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

- PAS110 Certificate of Compliance (BCS Number – BCS0423C155) approved by OF&G on the 25/04/2023.

The site is permitted to treat **211,000 tonnes per annum** of biodegradable waste materials.

Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

3.0 Roles and Responsibilities


The diagram below outlines the roles and responsibilities of various personnel within GWE Biogas Ltd, all of whom have, specific duties under the environmental permit, ABPR regulations and PAS110 and also a potential impact on the quality of biofertiliser produced (PAS110 requirement).

The directors have overall responsibility for the production of biofertiliser to the requirements of PAS110 and the Environment Agency's Anaerobic Digestion Quality Protocol, as well as ensuring compliance with the conditions set out within the Environmental Permit and the requirements of the Animal By-products Regulations. They are responsible for delegating such tasks as they see necessary to the IMS Representative, WRM Ltd, and the Plant Manager, Mike Walter.

The requirements of the IMS are communicated to all staff and contractors whose activities may have an impact on the quality of biofertiliser produced as well as compliance with the permit and ABP Regulations, and their individual responsibilities highlighted.

Please note, where the term IMS is used throughout this document, this incorporates the QMS element of the PAS110 system so any reference to IMS also covers the PAS110 QMS.

Responsibility	Personnel	Role
Overall GWE Biogas Ltd Biofertiliser Quality Responsibility Permit Compliance ABPR Compliance <div style="text-align: center;">↓</div>	Mathew Girking Tom Megginson	Directors
Overall IMS Responsibility <div style="text-align: center;">↓</div>	WRM Ltd (retained consultant)	Acting as IMS representative
Specific IMS Responsibilities <div style="text-align: center;">↓</div>	Mike Walter	Plant Manager


Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

Responsibility	Personnel	Role
Health & Safety Systems Compliance Management	Mark Prince	H&S Supervisor Compliance Management
Waste input contracts Digestate output contracts Specific permit reporting requirements (quarterly waste returns)	Chris Young Simon Wolgate	Commercial Manager Analytical Consultant
Digestate Dispatch	Frank Shepherdson	Provides digestate spreading services
Environmental Compliance	Tom Megginson Mathew Girking WRM Ltd	Acting as compliance representatives for GWE Ltd
<ul style="list-style-type: none"> • Responsible for own actions • Follow procedures • Adhere to IMS 	All relevant staff and contractors	

3.1 Individual Task Responsibility

Directors are responsible for:

- A. ensuring sufficient resources (people, infrastructure, equipment, work environment) for the establishment, implementation, maintenance and improvement of the IMS;
- B. defining IMS responsibilities and authorities and communicating them within the organisation;
- C. Ensuring compliance with the Permit and ABPR approval;
- D. establishing a quality policy for digestate produced under the IMS;
- E. ensuring that IMS communication processes are established within the digestate producers organisation and that communication takes place regarding the IMS's efficacy; and
- F. conducting management reviews of the IMS.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

WRM Ltd have been appointed as the person with the responsibility and authority to:

- A. ensure that the IMS processes are established, implemented and maintained; and
- B. report to senior management on IMS performance and any need for its improvement.
- C. Undertake regulatory reporting requirements to various bodies (EA, APHA and OF&G on behalf of BCS).
- D. ensure that the site's environmental permit reporting requirements are met in full.

Mike Walter (Site Manager) is responsible for:

- A. ensuring the plant is operated in line with PAS110, permit and ABPR requirements;
- B. ensuring all site operatives are trained to a sufficient standard in order to meet PAS110, permit and ABPR requirements; and
- C. maintaining all records in relation to the operating of the site and as part of PAS110, permit and ABPR requirements.
- D. ensuring the site is operated in accordance with the HACCP Plan.

Mark Price (Compliance Manager) is responsible for:

- A. ensuring all health and safety requirements are maintained at site.
- B. Maintaining, updating and communicating H&S risk assessments and safe systems of work;
- C. Delivering and advising on H&S training for employees;
- D. undertaking digestate sampling at the frequencies specified by PAS 110 Standard and the sites APHA Licence.
- E. Reporting H&S incidents or near misses to HSE in accordance with RIDDOR requirements.

Chris Young (Commercial Manager) with support from Simon Wolgate is responsible for:


- A. ensuring all waste input contracts are complete for all suppliers.
- B. ensuring all digestate output contracts are complete with all off-takers.
- C. specific permit reporting requirements not covered by the IMS representative such as, quarterly waste returns.
- D. ensuring all customers receiving digestate are provided with appropriate information in relation to the ABP Regulations, including but not limited to grazing restrictions post application to land.

Frank Shepherdson (Digestate Spreading Provider) is responsible for:

- A. Removing digestate fractions from site to the required destination.
- B. Maintaining all records with reference to digestate movements off site.

Weighbridge Operator is responsible for:

- A. Implementing the waste acceptance and rejection procedures;

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

- B. Checking duty of care documentation for waste brought to site;
- C. Maintaining records of material accepted onto the site and digestate dispatched from the site;
- D. Ensuring product information accompanies all dispatches of digestate;
- E. Ensuring all site visitors are signed in and out of the site.


Site Operatives are responsible for:

- A. Performing their tasks in accordance with operational procedures;
- B. Reporting any incidents or faults to the Site Manager;

3.2 Document Control

The site operates a document control procedure to ensure that the latest version of all documentation is being used on site at all times. Responsibilities for document control lie with the following personnel.

Document(s)	Responsibility	Authorised Personnel	Role
Environmental Management System	Overall GWE Biogas Ltd WRM Ltd Responsibility Permit Compliance ABPR Compliance	Tom Megginson	Directors
		Mathew Girking	
		Mike Walter	General Manager
		Chris Young	Commercial Manager
		James Hay	WRM Ltd
		Beth Watson	
PAS 110 Documentation	Overall GWE Biogas Ltd WRM Ltd Responsibility PAS 110 Compliance	Tom Megginson	Directors
		Mathew Girking	
		Mike Walter	General Manager
		Chris Young	Commercial Manager
		James Hay	WRM Ltd
		Beth Watson	
IMS Documentation	Overall GWE Biogas Ltd WRM Ltd Responsibility IMS Compliance	Tom Megginson	Directors
		Mathew Girking	
		Mike Walter	General Manager
		Chris Young	Commercial Manager
		Beth Watson	WRM Ltd
		James Hay	
Health and Safety	Health & Safety Systems	Mark Prince	Compliance Manager
		Tom Megginson	Directors
		Mathew Girking	
		Mike Walter	General Manager
		Chris Young	Commercial Manager


Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

Document(s)	Responsibility	Authorised Personnel	Role
		James Hay	WRM Ltd
		Beth Watson	WRM Ltd

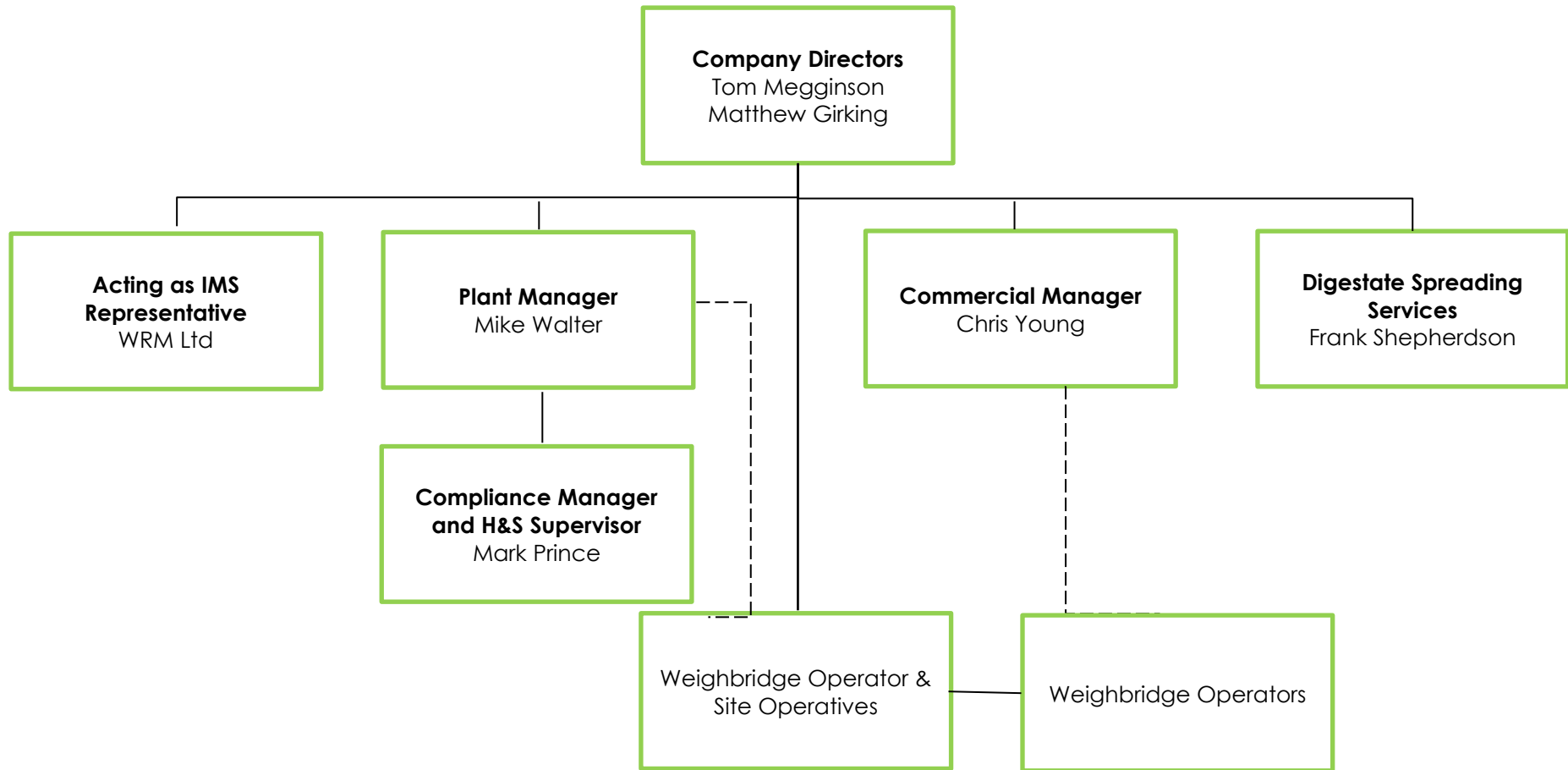
The latest version of documents is available via the online SharePoint compliance folder and a hard copy version of the latest documents is made available on site at all times for site operatives to reference.


3.3 Responsibility for PAS110 and ABPR Compliance

The current person with overall responsibility for compliance with BSI PAS 110:2014, the Anaerobic Digestate Quality Protocol (ADQP), the Biofertiliser Certification Scheme (BCS) Rules and the ABP Regulations is **Tom Megginson, Director**.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

3.4 Organogram



Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

4.0 Document Control and Communication

4.1 Document Control

All documents that form part of GWE Biogas Ltd's Integrated Management System will have a title, version number, issue date and review date.

These documents are all stored electronically, and can be accessed by relevant members of staff through shared drives on a secure server.

Any copy of a document which is printed out is no longer controlled. Obsolete documents are archived and access is removed from shared drives. All documents feature their relevant review date at the top of each page for easy reference. IMS documents are valid for a period of 12 months, unless a change in site operations or procedures necessitates a review. Archived IMS documents, any Duty of Care documents and all records required by the permit and APHA Licence are kept electronically or in paper format for a period of 6 years. Archived paper records associated with the Biofertiliser Certification Scheme are kept for 4 years. Other specific records which are maintained by site are detailed in section 4.2 along with their storage retention period if different from the above.

All documents are controlled by the IMS Representative, and are only accessible as read-only files by all other staff.

A list of all controlled documents can be found on the shared drive in Folder 01 Document Control, containing details of all documents relevant to the Integrated Management System.

4.2 Records


GWE shall ensure records are maintained in line with section 4.1 Document Control as well as the following sub-sections of 4.2.

4.2.1 Monitoring

GWE shall undertake monitoring as specified within the Integrated Standard Operating Procedures governed by the Environmental Permit, ABP Regulations and PAS110 Accreditation. GWE shall maintain records of all the monitoring required, including records of the taking and analysis of samples, instrument, measurements, calibrations, examinations, tests and surveys and any assessments or evaluations made on the basis of such data.

4.2.2 Operational Records

Operational records shall be maintained across site. Details such as visitors, non-routine activities and other incidents shall be recorded. Operational records will be assessed during compliance auditing by the Permit Holder to ensure operational records are being maintained correctly. The operational records shall be readily available for inspection. Examples of activities recorded include:

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	


- Numbers of operators and times of attendance on site.
- Names and times of technically competent managers on site.
- Names of visitors on site.
- Any accidents resulting in injury.
- Operational details of individual batches.
- Design, construction, inspection, maintenance and monitoring of pollution prevention methods.
- Any incident of fire.
- Any incident of spillage.
- Any incidents causing pollution to the environment, harm to human health or detriment to the amenities of the locality.
- Any machinery breakdown.
- Any deposit of unsuitable waste at the site.
- Condition of site infrastructure and engineering.
- Incidence of litter, dust, pest, odour and noise problems.
- Results of various inspections for litter, odour, noise, birds, pests etc.
- Environment Agency licence inspection reports.

4.2.3 Material Records

Records of all materials entering and the leaving the site shall be recorded such that all materials are traceable. All records will be made as soon as reasonably practicable and retained securely. Records will be clear, legible and available for viewing (on site). Records must be kept of all incoming wastes, and all outgoing products. Records are to be maintained in line with section 4.1 Document Control.

The following records will be retained (not comprehensive):

- Waste Carriers Licences (where appropriate).
- Tickets/Documents – incoming wastes.
- Tickets/Documents – outgoing product (including residual wastes).
- Destination of outgoing material.
- Destination of outgoing wastes (including market sector).
- Environment Agency Inspection Reports.
- Failure records for pollution prevention methods.
- Off-site environmental effects.
- Pasteurisation records.
- Records of sampling.
- Process steps for all treatment processes.
- Records of corrective actions taken during processes.
- Type of input material, whether the load is rejected or accepted, and if rejected the reason why.
- Product Preparation Information.
- Duty of Care Records.
- Quarterly Waste Returns.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

4.2.4 Calibration of Equipment

All monitoring equipment, such as temperature probes, will be regularly calibrated (annually as a minimum) by an externally verified company. This calibration will include all process monitoring devices and the weighbridge with records documented.


4.3 Duty of Care

As a waste operator, GWE are required to meet their duty of care requirements under section 34 of the Environmental Protection Act 1990. GWE is fully committed to abiding by the regulations and acting as a responsible waste operator.


The following section of the SOPs has been produced in line with the Waste Duty of Care Code of Practice 2016 guidance document and details the procedures which GWE implement to certify that the site is managing waste in line with the duty of care requirements. The table below summarises each section of the requirement and signposts the relevant section of the SOPs document where more detailed procedures are explained.

Table 1 - Duty of care requirements and GWE's corresponding SOPs section

Duty of Care Section	Details	Section of SOPs
4.1 Prevent unauthorised or harmful deposit, treatment or disposal:	It is illegal to operate a waste site without an environmental permit or waste exemption.	Environmental permit details are detailed in the following sections: <ul style="list-style-type: none"> • 2.3: General description of the anaerobic digestion process and its outputs. • 10.4: Environmental Permit Reporting.
4.2 Prevent a breach of an environmental permit or a breach of a permit condition	The site must not breach the conditions of their permit, such as: <ul style="list-style-type: none"> • limits to the amount of waste that can be handled; • restrictions to the types of waste that can be handled; • measures that need to be put in place to protect the environment and human health. 	Environmental permit condition controls are detailed in sections: <ul style="list-style-type: none"> • 2.3: General description of the anaerobic digestion process and its outputs. • 3.1: Individual Task Responsibility. • 5.2 Types of input materials and sources. • 5.3 Inspections of input materials against acceptance criteria. • 6.11: Vermin control. • 9.4 Dust. • 9.5 Mud & Debris. • 9.6 Litter. • 9.7 Pests. • 9.8 Spillages. • 9.9 Odour. • 9.10 Noise and Vibration. • 10.2 Incident and accidents.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

Duty of Care Section	Details	Section of SOPs
4.3 Prevent the escape of waste	<p>Operators must ensure waste is handled and stored safely and securely. Examples include:</p> <ul style="list-style-type: none"> Clearly and correctly labelled. Suitable for storage. transportation and subsequent management activities. Storage areas designed to prevent leakage, contamination or spoiling of waste. Limiting access to the waste to authorised personnel. Ensuring vehicles are covered and waste is secured appropriately. Before collection, waste must be assessed and classified 	<ul style="list-style-type: none"> 2.2 Process Employed. 4.2.3 Material Records. 8.0 Product Dispatch, Storage and use. 10.8 Spillages. 10.12 Storage of Wastes.
4.4 Transfer of waste	<p>Before transfer, check whether the receiver of waste is authorised to accept the waste, by at least one of the following:</p> <ul style="list-style-type: none"> Valid registration Environmental permit/ registered waste exemption 	<ul style="list-style-type: none"> 4.2.3 Material Records.
4.5 Provide an accurate description of waste to the receiver of waste.	<p>It must include a transfer note with the following:</p> <ul style="list-style-type: none"> a statement confirming your duty to apply the waste hierarchy, required by regulation 12 of the Waste Regulations 2011 EWC Code Quantity, nature, loose/container Type of container SIC Code of the transferor the name and address of the transferor and transferee (person receiving the waste) and their signatures Capacity in which transferor and transferee are acting and their relevant authorisation Any issues with the waste. 	<ul style="list-style-type: none"> 4.2.3 Material Records.
4.6 Retention of Waste Documentation	<p>You must keep a copy of the waste description for waste you have transferred or received for:</p> <ul style="list-style-type: none"> 2 years for non-hazardous waste 2 years for transfer notes Any retention time stated with your environmental permit. 	<ul style="list-style-type: none"> 4.0 Document Control and Communication.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	


Duty of Care Section	Details	Section of SOPs

4.4 Communication

This procedure defines how communication is undertaken by GWE Biogas Ltd, both within the organisation, and to new employees. Internal communication is carried out in a variety of manners, sharing information via emails, team meetings and toolbox talks. Where necessary, records of these communications are kept by the IMS Representative or Plant Manager. New members of staff whose roles and activities may have an impact on permit and ABP compliance and biofertiliser quality will have relevant aspects of this IMS communicated to them during their induction, and will sign an induction sheet to demonstrate this.

GWE Biogas Ltd does not communicate any part of its Integrated Management System, apart from the Quality Policy, to external parties due to commercial confidentiality and competition.

Informal meetings are held with client groups and individuals, to communicate digestate benefits as a biofertiliser. Within these meetings, verbal communication is predominantly used, and written evidence of PAS110 compliance is supplied to the client if requested.

Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

5.0 Input materials (Acceptance and Rejection Procedures)

5.1 Types of input materials and sources

The following waste input materials are digested:

Bulk liquid biodegradable wastes:

- Off-specification products from the food and beverage industry;
- Washings and effluents from food and drink manufacturing processes;
- Pea wash water from Yorkshire Greens plant.

Solid biodegradable wastes:

- Food manufacturing wastes and former foodstuffs, packaged or palletised, from local supermarkets and food manufacturers;
- source-segregated biodegradable waste from households, mainly delivered in bulk in biobags.

Solid (clean) biodegradable wastes:

- Non-packaged foodstuffs such as vegetables, maltings and maize;
- Poultry manure;
- Non-packaged source-segregated food stocks.


With regards to PAS110, please see Annex B of the Quality Protocol – Anaerobic Digestion, for the full list of EWC codes which can be accepted at the site under PAS110. The list of EWC codes in Annex B has been assessed against the list of EWC codes stipulated within the environmental permit and there are no EWC codes within Annex B which can't be accepted under the permit. No category 1 or 2 ABP Material will be accepted onto the site in accordance with the APHA Licence, apart from cat 2 exempt materials and cat 1-derived glycerine.

5.2 Pre-Acceptance Agreements with material suppliers

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. These contracts are reviewed whenever there is a change identified by either the supplier or GWE Biogas Ltd to the constituents of the incoming waste. Any additional waste feedstocks to be delivered by a supplier will be added to the existing agreement.

The written agreement shall as a minimum provide the following;

- The waste type and specific source location(s) of the material;
- A brief description of the source type, physical form and the specific process producing the waste (usually defined by SIC Code);

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

- What the criteria of the incoming waste should be to allow acceptance of deliveries (e.g visual assessment or testing samples);
- Any additional arrangements that may need to take place to remove or reduce any contaminants or any other unsuitable content prior to digestion;
- What the criteria of the incoming waste would be to trigger waste rejection;
- A requirement that any significant change in the quality of the waste will be notified to GWE Biogas Ltd before delivery; and
- European Waste Catalogue (EWC) code.

Whenever the criteria specified in the contractual arrangements are not met, the load shall be rejected in accordance with the waste rejection procedure and this shall be clearly communicated to the waste supplier and records of the communication shall be kept, in addition to completion of an *input materials acceptance/rejection (PAS110 input) sheet* with the appropriate details.

Improved instructions, reminders of the AD operator's acceptance/rejection criteria, contractual arrangements, control measures, and further clarification of any of the above shall be sent to the relevant waste supplier(s) when deemed appropriate by the AD operator. The relevant staff on site shall be made aware of the acceptance/rejection criteria, any contractual arrangements and control measures.

The site shall cease accepting loads from a particular source if contamination has occurred repeatedly, yet the supplier has not attempted corrective action or, in the AD operator's opinion, the action taken has been ineffective.


5.3 Inspections of input materials against acceptance criteria

In addition to the sections below, please note the operator possesses a Weighbridge User Guide for use by the weighbridge operator as a reference to correct practise.

5.3.1 Inspection of paperwork at the weighbridge

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 on an *input materials acceptance/rejection (PAS110 input) sheet* and electronically generated weighbridge ticket. The weighbridge operator is equipped with a list of Quality Protocol Appendix B acceptable EWC codes to check the incoming waste load EWC code against. Any wastes brought to site under an EWC code that is not stated in Appendix B will be refused entry to the site in accordance with Waste Rejection Process. Please see document *Weighbridge User Guide for details of how to operate the weighbridge*.

Providing the supplier/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 reception area, where a site operative shall ensure the vehicle is directed to the correct off-loading point.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

5.3.2 Inspection at the point of offloading

The only time an inspection of the waste will not take place is where a delivery cannot be visually inspected without unacceptable risk to human health, after all practical measures have been taken into account.

Bulk Solid, Clean & Palletised Wastes:

Bulk solid wastes are tipped within a dedicated area which is a fully enclosed reception building. Palletised solid wastes shall be delivered into the dedicated reception area for palletised goods, which is physically separate to the reception area for bulk wastes. Palletised goods shall be processed according to their contents/state of packaging or customer destruction requirements. Clean or unpackaged solid wastes shall be delivered into a dedicated area which is a separated fully enclosed reception building adjacent to the main reception hall used for bulk solid and palletised wastes.

An inspection of the waste within these designated areas ensures there is no risk that the delivery will cross-contaminate any other input materials accepted for treatment, materials undergoing treatment or any materials in storage. It also ensures that packaged and non-packaged waste are received in their designated reception halls.

A trained site operative inspects each load delivered. The load shall be rejected if, by subjective assessment, it contains more than the acceptable level of packaging or contamination, as specified in the relevant *input materials supply agreement*, or is not as described in the relevant *input materials supply agreement* (e.g. non-approved Category 1 ABP Material). All wastes will be visually inspected to ensure the following:


- Waste meets the EWC Code definition;
- Waste does not contain excessive extraneous materials (metals, glass etc);
- Wastes do not exhibit malodorous properties; and
- Wastes do not contain any Animal-By Products not permitted on site.

Where the need to reject the load is identified the waste rejection procedure shall be followed.

The movement of plant equipment, vehicles and persons within the reception areas are strictly controlled in accordance with the site movement arrangements.

Liquid Wastes:

Liquid wastes delivered by a sealed tanker will be directed to the dedicated liquid waste reception area. A trained site operative inspects each load delivered in the tanker, by taking a sample from the tanker. The sample taken on site will be analysed for dry matter content and a sub-sample frozen before the material is used in the process. The frozen sample shall be retained on site for a period of one month. The load shall be rejected if, by subjective assessment, it does not correspond to the waste description agreed within the associated *input waste materials supply agreement*.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

Pea Wash Water:

Pea wash water from the neighbouring vegetable facility is delivered via underground pipes and is stored in a lagoon on site. The transfer of pea wash water from the Yorkshire Greens facility is undertaken via an automatic computerised process. Flow meters are fitted to the pipework at the Yorkshire Greens facility, at the GWE biogas plant and lagoon, allowing for measurements to be recorded. At the end of each working day the Site Manager or site supervisor shall check the volume dispatched from the Yorkshire Greens facility matches the volume received at the GWE plant. If there is a difference in value, this error shall be investigated. The process is monitored by the Site Manager periodically and the Site Manager can close the valves to the plant if required. It is important to note, that the pea wash water can't access the digestion process, starting at the pasteurisation tanks, without GWE biogas authorising the action by their internal SCADA system.

Pea wash water (waste) from Yorkshire Greens will be accepted onto site under the EWC code: 02 03 04. This is in an allowable input under the PAS110 certification scheme which therefore means that it is a waste code that is suitable for treatment in the AD process. The pea waste water shall be accepted onto site following the same waste acceptance process as all other material. The current acceptance procedures meet the BAT guidance.

Pea wash water shall be subject to daily visual checks at the Yorkshire Greens site. Feedstock testing is also carried out on the pea wash water at Yorkshire Greens to ensure that it is suitable to be treated in the AD process. Pea wash water is then pumped from the factory to the lagoon. A pre-supply contract is also in place between Yorkshire Greens Ltd and GWE Biogas Ltd.

5.4 Waste Rejection Procedure


Rejection consists of re-loading the non-compliant load into the vehicle and sending it for disposal, or quarantining the rejected materials and arranging disposal.

The following information about rejected loads shall be recorded by the site operative on the input material acceptance/rejection (PAS110 input) sheet:

- Input material type and EWC code / ABP Category
- Source
- Amount
- Date rejected
- Reason for rejection, and
- onward destination.

Before removal from the site, each load or part-load due for rejection shall be kept separate from loads awaiting inspection or those accepted for treatment.


In the event that the inspected load contains larger items unsuitable for processing, these shall be removed and placed into a 'rejects' container stored on site. The container's contents shall regularly be removed for disposal.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

Pallets shall be checked for compliance against the description in the relevant input materials supply agreement, and rejected if they are deemed non-compliant. Rejection will consist of the pallet either being re-loaded onto the delivery vehicle, or being quarantined on-site and disposal arranged accordingly. Pallets accepted on-site will be visually inspected

If a load delivered by tanker is rejected, it shall be pumped back onto the delivering tanker, or held in one of the reception tanks until appropriate disposal can be arranged.

A waste rejection record will be produced for all rejections made. The consignor of the waste must be contacted by the Site Manager and be made aware that the waste has been rejected. The Site Manager holds the responsibility for the acceptance / rejection of all wastes onto site.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

6.0 Process management & Operational Procedures

GWE Biogas run two different processes at the site:

- one is for bulk packaged feedstocks and consists of materials being received into the older packaged reception hall. This material is then pre-processed, pasteurised and then digested via digester 3, 4 and 5.
- The other is for clean (non-packaged) material and consists of materials being received into the new clean (unpackaged reception hall). This material is then mixed with recirculated material from digesters 1 & 2 via a mixing pump. The material is then digested in tanks 1 & 2 before undergoing pasteurisation and separation.

These processes are discussed in more detail below.

6.1 Process Flow diagram

A flow diagram of the AD process is shown in the IMS Hazard Analysis and Critical Control Points (HACCP) document. A process flow diagram has been produced for both the clean (unpackaged) process line and the 'dirty' process line. In each sub-section below reference has been made if an element of the process is a critical control point (CCP) for PAS110 or APHA compliance, as defined within the HACCP.

6.2 Feedstock/Waste Acceptance – (PAS110 CCP1 & APHA CCP1)

Section 5 above covers all aspects of the process related to feedstock/waste acceptance.

6.2.1 Stock Rotation


With regards to the solid feedstocks described above (bulk solid & palletised wastes), GWE enforce robust stock rotation procedures for any wastes delivered and stored within the reception halls.

Category 3 material which arrives un-packaged will be treated within 24 hours.

Category 2 manures which arrive un-packaged will be treated within 24 hours.

Category 3 material arriving in a packaged form may be temporarily stored in the reception building.

In each reception hall the different bulk solid feedstocks are split into different bays depending on the material. Concrete A-frames are used to form the bays to provide a physical barrier. Once deposited within a bay, the material piles are worked from the left to the right to ensure all material is processed within the required timescale. As a simple rule, waste material is taken from one side of the pile and added to the other and then the process repeats. If a large amount of one type of material is received, the A-frames can be taken out to reduce/enlarge the bay areas in accordance with stock rotation requirements. Any manures received at site

Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

shall be kept separate from other materials and stored within their own bay in the clean (unpackaged) reception hall. The manure shall be taken out of the bay to be added to the process as required. This process shall ensure there is reduced risk that the high bacteria content of the manures can impact on the other stored materials.

Any bloods received at site shall be stored within their own isolated feedstock reception tank to reduce the risk of contaminating other liquid feedstocks. This same process is also undertaken when receiving cat 1 approved Glycerine.

6.3 Input materials pre-treatment - (PAS110 CCP2 & APHA CCP2)

Following the inspection procedures, for the packaged food line, the bulk solid and palletised wastes are loaded into the solid waste feeding system and fed into the shredding and de-packaging machinery that:

- separates the packaging from the organic digestible fraction; and
- converts the organic digestible fraction into a pumpable soup with particle sizes less than 12 mm in any one plane, in compliance with the requirements of the animal by-products regulations.

Machines are checked regularly for signs of wear and to ensure the screens through which the material passes have not been damaged.

An operative shall utilise a 12mm sieve to verify size reduction to ensure the particle size is adequate and in compliance with the European ABP Regulations' particle size requirements. These checks are recorded on the HACCP Daily Check Sheet and Daily Maintenance Check Sheet.


Water or digested material may in some cases be added at this stage to aid this processing step or increase nutrient content of the feedstock.

The separated packaging material is washed and squeezed again via a screw press to remove further organic solids and transferred to skips for either disposal or off-site recycling.

In the separate unpackaged process, the clean wastes from the reception hall extension are placed in a bunker or on the floor and then into a hopper, where the material will be blended via a mixing pump with re-circulated material from digesters 1 and 2. The mixing pump will have a built in macerator to ensure all material achieves a particle size of <12mm.

For the packaged food line, liquid from the holding tanks at the liquid waste reception area are pumped into the macerator unit, together with any wash water and spillages collected through the exterior enclosed drain system which captures all water and liquids from external areas. Any internal washings are collected in a sump under the packaged waste reception hall, and pumped into the hydrolysis tank.

Each day, 160m³ of pea wash water stored in the lagoon is also pumped from the lagoon to the mixing tank, entering the packaged food line Anaerobic Digestion process. Yorkshire

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

Greens produce 30,000m³ of pea wash water per annum. This 30,000m³ is produced during the pea harvesting season which lasts for 50 days. The storage lagoon has a capacity of 40,000m³. The lagoon will be filled with 30,000m³ over the course of this 50-day period. After the harvest period of 50 days, 160m³ of pea wash water will be drained from the lagoon to the mixing tank each day. Therefore, there is insufficient pea wash water being produced to overflow the lagoon. Furthermore, the lagoon is fitted with level sensors to indicate when the lagoon is nearing its capacity.

6.4 Hydrolysis

For the packaged food line, the pumpable soup from the solid waste pre-treatment and the macerated liquid wastes are fed into the 560 m³ Hydrolysis/Buffer Tank. The main functions of this processing step are:

- to work as a buffer during periods where incoming waste is varied;
- to homogenise and prepare the 'soup' for the following step; and
- to convert the insoluble biological polymers to soluble organic compounds by hydrolysis (complex primary polymers of carbohydrates, lipids and proteins are solubilised by enzymes secreted by hydrolytic bacteria).

The process parameters that are continuously monitored in this tank are:

- Temperature,
- Substrate level (through pressure sensor installed on the hydrolysis tank); and
- Stirring

Monitoring data are transmitted and regularly evaluated from the central computer system (*hydrolysis screen sequence*). The outcome of the evaluation for the unit of production is recorded electronically by the SCADA control system.

The average retention time in the hydrolysis tank is one day.


For the unpackaged line, clean materials from the reception hall extension are fed directly into digesters 1 and 2 from the mixing pump.

6.5 Pasteurisation (Excluding clean waste stream) - (PAS110 CCP3 & APHA CCP3)

The material is then transferred to the pasteurisation room, where it is subject to a batch pasteurisation process. This is designed to achieve a minimum of > 70°C for 1 hour with a maximum particle size of 12 mm in any one plane.

Temperature and time are the critical parameters monitored at this stage. Temperature readings, temperature and time charts are checked and appraised from the *Pasteurisation screen sequence* on the central computer system.

The outcome of the appraisal for each batch is recorded by the automated computer control system, and material will not be released from the pasteurisation phase until the time and

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

temperature parameters have been reached. This is achieved using 3 three stirred and heated tanks (pasteurisation tank 1, pasteurisation tank 2 and pasteurisation tank 3, 14 m³ each).

The tanks are heated with hot water from the CHP engines, feeding through a heat exchanger unit within the pasteurisation hall.

At any one time, one of the tanks will be filling with material from the hydrolysis tank, one will be full and being heated to 70 °C for one hour, whilst the other will be emptying with the pasteurised material going to the digesters. Hot material from the emptying tank passes through a heat exchanger, to warm the incoming material from the hydrolysis tank. This simultaneously cools the mixture going to the digester. Feed rate can be altered to the digesters by holding pasteurised material for a measured amount of time within the tank, following successful pasteurisation.

The temperature in the tanks is monitored by 3 platinum resistance thermometers per tank located in the top, middle, and bottom zones.

If any of the thermometers fail to reach the desired temperature of >70°C for one hour, the system will not allow the release of the material in that tank. The pasteurisation sequence will be re-started and the material will be re-heated by passing it through the heat exchanger.

Once the problem has been resolved the material will be pasteurised until all three thermometers reach the required temperature for the required time.

Routine testing for *E.Coli* and *Salmonella* is carried out in addition to the requirements of PAS110 (2014) on the pasteurised material for the purposes of the APHA Approval (APHA CCP4).

6.5.1 Pasteurisation – Clean Waste Stream

Blended clean materials from the clean waste feeding system undergo a post-digestion pasteurisation within a separate system to the other waste streams. This is operated in line with the pasteurisation procedures described above, but ensuring this material is kept separate from the other wastes.


6.6 Primary Anaerobic Digestion - (PAS110 CCP4 & APHA CCP5)

After pasteurisation, the material blend of bulk solid, palletised and liquid feedstock is fed to the remaining three primary digesters, which operate in parallel. Digesters 3 and 4 hold 4000 tonnes each, with digester 5 holding 5500 tonnes.

Digesters 1 and 2 (clean line) hold 3000 tonnes each and process the clean materials from the separate reception hall.

The process overall retention time is:

- approximately 52 days for the dirty processing line.
- approximately 59 days for the clean processing line.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

The material in the digesters is continuously stirred using automatically controlled paddles.

The following process or operational parameters are monitored in the five digesters:

- Temperature
- Pressure
- Gas flow rate
- Biogas quality (CH₄, CO₂, H₂S and O₂ content)
- Stirring
- Foaming level
- Substrate level (via a pressure sensor installed on the digestion tanks)

Digester temperatures are kept between 35°C and 45°C, and are constantly monitored by the main process computer. They are also recorded by the computer and recorded manually by site staff on a daily basis.

As the substrate from digesters 3, 4, 5 and 7 is transferred for secondary digestion, it is passed through a 3.35mm screen which removes any remaining larger contaminants in the form of non-or slowly biodegradable material. These materials are sent off-site for appropriate processing and recycling (PAS110 CCP5). The whole substrate undergoes a separation process into its separated liquor and fibre fractions. The separated fibre fraction is directed to an external skip to await despatch offsite. The liquid fraction is pumped into the secondary digester named the Dual-purpose tank and is available for recirculation as required within the primary digestion process.

6.7 Secondary Anaerobic Digestion (excluding Clean Waste Stream)


After primary digestion, the substrate from digesters 3, 4, 5 and 7 undergoes material separation by way of a separator to separate out the fibre fraction of the digestate from the liquid fraction. The separated liquor is pumped to the Dual-purpose tank, which has a capacity of 2,300 m³. The average hydraulic retention time in the secondary digester is 10 days.

The mixture in the tank is stirred as required.

The following process or operational parameters are monitored in the secondary digester:

- Temperature
- Pressure
- Gas flow rate
- Biogas quality (CH₄, CO₂, H₂S and O₂ content)
- Stirring
- Foaming level
- Substrate level (via a pressure sensor installed on the digestion tank)

The temperature in the secondary digester is kept between 20°C and 35°C, and is constantly monitored by the main process computer. They are also recorded by the computer and manually checked by staff daily.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

Digestate is produced in monthly batches, and stored in the dual-purpose tank until test results from a representative sample are received and confirm that the batch meets the required standard. The product digestate is then dispatched to off-site stores or directly onto land if conditions are suitable.

6.8 Separator

For the clean line, once the material has resided in digesters 1,2 and 6 for the required time period it is directed to a separator. The separator will create a separated fibre fraction with the remaining liquid fraction directed to the dual-purpose tank, where it is available for recirculation into the primary digestion process. The separated fibre fraction is conferred to a skip for appropriate despatch offsite.

For the dirty line, once the material has resided in digesters 3,4 and 5 for the required time period, it undergoes separation before the dual purpose tank. The separation process is the same as that described above.

6.9 Biogas production


The biogas produced during the anaerobic breakdown process is fed, via the storage systems on digester 3 and the dual-purpose tank to the gas cleaning unit. This unit comprises of a filter tower, within which the gas is cleaned using bacterial processes. The sulphur-rich liquor produced is transferred to the dual-purpose tank for incorporation into the digestate.

The desulphurisation process consists of a heat scrubber – which takes heat from the CHP engines' water jacket – which heats the gas to greater than 30o via a hot spray loop. The hot spray loop also saturates the gas to 100% humidity. The biogas is then passed into the biological reactor, where it passes up the reactor through active biological media, against a counter current of digestate slurry injected into the top of the reactor.

The active microorganisms are seeded on SESSIL media, made of polyethylene, located within the reactor tank, which has a volume of 89m³. Microorganisms of the species Thiobacillus and Sulfolobus have been used in both commissioning and operation of the reactor. These species are highly selective in their ability to oxidise sulphur containing compounds in the presence of oxygen and at temperatures above 30° and subsequently remove them from the gas stream via conversion to an elemental sulphur solution.

The plant is monitored and controlled via a control panel mounted locally within the technical centre (Siemens HMI) and also connected to the existing SCADA system via Modbus TCP.

The cleaned biogas, virtually free of hydrogen sulphide, is passed through a compressor and cooler that increases the pressure of the gas and reduces its moisture content. The cleaned and semi-dry gas passes to the engines where it is mixed with a supply of air and combusted in a set of reciprocating cylinders to produce an exhaust gas principally containing nitrogen, carbon dioxide and water vapour.

Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

6.10 CCUS

Exhaust CO₂ from the biogas unit is fed to the bolt-on-system, where CO₂ compressor units increase the gas pressure to 18 barg (261psig) in two stages, removing the condensate in the process. Trace impurities and moisture are then removed. The gas, now purified, is led into the cooling system where the CO₂ is liquefied. The off-gas contained all non-condensable gases (CH₄, O₂, N₂), is purged as off-gas and can be brought back to the inlet of the upgrading unit. The purified liquid CO₂ end product is fed at 17.5 barg (218psig) to the onsite storage tank.

6.11 Biomethane Production and Gas to Grid Injection

In conjunction with the CHP activity above, biogas produced during the anaerobic breakdown process is also fed, via the storage systems on digester 3 and the dual-purpose tank, to the desulphurisation and gas upgrading units. Between 750 and 1200m³ of biogas per hour is directed to the upgrading unit. The desulphurisation unit contains a filter which removes hydrogen sulphide prior to the upgrading process. The sulphur-rich liquor produced is transferred to the dual-purpose tank for incorporation into the digestate.


The biogas is then processed through the gas upgrading unit, which dries, cleans, and compresses the biogas, before stripping the CO₂ to form biomethane. The biomethane is then transferred to the gas grid entry unit, where it is injected with propane to increase the calorific value and an odorant is added. The biomethane is quality monitored to ensure it meets the specifications for injection into the gas grid before being entered into the grid via an underground pipeline. Whilst this upgrading equipment is running, 2 of the 4 existing CHP units will not run at the same time.

This upgrading system is incorporated into the existing SCADA control panel and monitored via the main process computer.

Details of this gas to grid upgrading system are as follows:

Table 2 – Gas to Grid Kit

Plant	Purpose	Materials/Colour	Dimensions (H, W, L)
Gas Entry Unit	Adds propane and odorant before final quality monitoring and before entering the adopted gas grid.	Steel container, Colour - Ral6005 (moss-green)	2.67m x 3m x 8m
Upgrading Equipment	Drys, cleans, compresses, and then strips the CO ₂ from the biogas to form biomethane.	Colour - Ral6005 (moss-green) Galvanised steel and black HDPE	5.1m (excluding 7.8m stack) x 7.5m x 18m
Desulphurisation Unit	Removes hydrogen sulphide prior to upgrading (will replace	Steel container to match existing plant.	6.9m x 2.2m x 6.17m

Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

	an existing 20' containerised boiler)		
Propane Tanks	Storage of Propane. (existing tanks from Yorkshire Greens Factory to be relocated)	As existing, including green security mesh	1.8m x 2.1m x 4.35m

6.12 Monitoring equipment calibration

Temperature:

The temperature monitoring equipment is described below:

- Hydrolysis tank: 1 Endress and Hauser probe
- Pasteurisation tanks: 3 platinum resistance thermometers per tank (Dirty Line)
- Pasteurisation tanks: 2 platinum resistance thermometers per tank (Clean Line)
- Primary Digesters: 2 Endress and Hauser probes
- Double Purpose Tank: 1 Endress and Hauser probe

All temperature probes are validated annually.

Other relevant monitoring equipment is represented by:

- Pressure sensors
- Flow meters measuring feeding rates.

Site Weighbridge:


The weighbridge is calibrated annually.

6.13 Maintenance and processing equipment checks

Daily checks of various parts of the plant are undertaken across the site by the site manager. The results of these checks are recorded on the daily check sheet and if any faults are identified they too are recorded on the daily issues raised record sheet.

In addition to these daily checks, the site manager also ensures a number of routine maintenance schedules and service sheets for specific plant/equipment are conducted at varying frequencies as well as the undertaking of a cleaning schedule. Please see table 3 within the master list of documents in Folder 01 Document Control on the shared drive for a list of daily checks sheets, maintenance schedules, service sheets for specific plant/equipment and the cleaning schedule in place at the GWE site.

A daily maintenance job list is retained within the site manager's office. The daily maintenance job list describes various tasks from the schedules as well as any reactive maintenance tasks which need to be undertaken. In order to produce this daily maintenance job list, the site

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

manager adds various planned and reactive tasks to an excel sheet and categorises the various tasks by red, yellow and green in order to prioritise the task list. The site manager then distributes the tasks to GWE operatives. For a full list of all procedures and risk assessments of how to undertake different aspects of maintenance, please see Section 10.1 Training.

All completed physical copies of the maintenance records are retained within the site manager's office with electronic templates stored on the shared drive.

Physical records of the calibration of pasteurisation temperature probes are kept at the site office.


6.14 Vermin control

Risk of vermin activity on the site is controlled by:

- Mowing the grass as necessary,
- litter picking activities,
- Pest control to control rodents every month by vermin control contractor,
- Keeping the reception building doors closed whenever possible.

Pest control measures are recorded by the vermin control contractor in the vermin control record folder which is kept in the weighbridge office.

If pests are identified on site, then the Site Manager is informed immediately. An investigation is undertaken to identify any ingress points within the building fabric and bait boxes inspected. Professional pest control contractors will be informed, and additional controls implemented as required. All investigations and outcomes will be recorded in the Site Diary, pest control plans will be updated accordingly.

Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

7.0 Movements Preventing ABP Contamination

7.1 Personnel Movements

Staff rotation between the defined clean and dirty areas will be kept to a minimum. Any persons moving between the defined clean and dirty areas will have to sanitise their footwear in the designated footbaths and change their overalls where appropriate. The footbaths will be kept topped up with DEFRA approved disinfectant and they shall be inspected as part of the daily site checks.

The classification of the sites clean and dirty operating areas are as follows:

Table 3 – APB Clean and Dirty Areas

Clean Areas	Dirty Areas
Pasteurisation Room	Packaged waste reception area
Control Room	Press Room
CHP unit Area	Liquid waste reception tanks
Palletised goods storage area	Digester 1,2,3,4
Bund surrounding Digester 1,2,4,5,6 & Secondary Digester	Secondary Digester
Bund surrounding Digester 3	Clean (unpacked) waste reception area
Digestate storage lagoon	

Any problems will be logged in the site diary along with the appropriate actions taken and staff re-training as appropriate.

7.2 Vehicle Movements

Mobile plant working in the AD reception areas is dedicated to this area and will not be used for any other site processes. Should the dirty vehicles need to be moved outside of this area for maintenance purposes they will be thoroughly cleaned and disinfected.


It will be the responsibility of the Site Manager to ensure correct use of each machine is observed in each area and so ensure cross contamination is prevented. Any problems will be logged in the site diary along with the appropriate actions taken and staff-retraining as appropriate.

Delivery vehicles will be required to cleanse and sanitise their wheels and wheel arches using the washing facilities provided prior to leave the waste reception area.

7.3 Drainage

Reception Building Roof:

Rain water falling on the side of the apex that slopes to the front of the reception hall will enter the guttering system and shall enter a liquid waste reception tank for use in the AD process.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

Rain water falling on the side of the apex that slopes to the back of the reception hall will enter the guttering and drain to a land drain.

Packaged Waste Reception Hall:

The fall of the concrete within the reception hall ensures any liquids drain to the side of the building and away from the reception hall entrance and exit point. The liquid then drains into a sump which is fed into the liquid waste reception tank, where it will enter the AD process.

Clean (unpacked) Waste Reception Hall

The fall of the concrete within the reception hall ensures any liquids drain to the side of the building and away from the reception hall entrance and exit point. The liquid then drains into a sump which is fed into the liquid waste reception tank, where it will enter the AD process.

Digester Tank Bunding:


The exterior bunding around the digester tanks is designed to fall to a sump to allow the removal of rainwater from the bund. The sump is then pumped into a surface water lagoon. If a digestate tank is ruptured the sump valve will not be opened allowing the digestate to be contained.

Silage Clamp

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

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

The pumps have a pump rate of 150m³ per hour each. With an area of approximately 8,000m², this equates to a rainfall event of 37.5mm per hour. Any rainfall that is in excess of this drains to a low area of site, where it will be discharged to the soakaway.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

8.0 Sampling and testing

Sections 8.1, 8.2 and 8.3 cover aspects of the process related to PAS110 CCP6 & APHA CCP6. Sections 8.4 and 8.5 covers aspects of the process related to PAS110 CCP4 & APHA CCP5 for the packaged waste and PAS 110 CCP3 & APHA CCP4 for the clean process line.

8.1 Sampling procedure for PAS 110 & APHA testing purposes

All samples that are to be submitted for analysis for adherence to ABP Regulations, PAS110 (2014) and the ADQP are taken from the same points in the process, to eliminate any variation that may be due to differences in prior processing.

PAS 110 Sampling Point: A dedicated sample point (TAP A3) is located on pipework that transports the digestate from secondary cleaning into on-site storage within the dual-purpose tank. For the separated clean material substrate, there is a dedicated sample point after the separator to allow for the sampling of separated liquor. Separated fibre shall be sampled in line with PAS110 frequency from the intermittent storage area.

APHA Sampling Point: For the packaged food waste line the sample point is located on pipework exiting the pasteurisation tanks. For the clean (unpacked) food waste line the sample points is located on pipework existing the separate pasteurisation tanks.


A sample is taken using a dedicated PAS110/ABP sampling bucket, that is kept clean and locked away when not in use, to minimise potential contamination with dust etc. The sample is taken when digestate is flowing through the pipe, to ensure a representative sample can be obtained.

The tap is opened, and a bucket of digestate (approximately 4 litres) is taken from each sample tap, and discarded. This is to ensure any sample taken does not contain sediment that may have settled in the sample tap. A second bucketful is then taken, and this is the representative sample for PAS110 / APHA purposes. The tap is then shut again to ensure minimal spillages.

The sample is then decanted into suitable containers provided by the appointed laboratory, and these are then dispatched using the cool box provided, using the courier appointed by the laboratory. If an additional sample is required for RBP testing, a third bucketful of digestate is taken from the same tap and dispensed into the appropriate container.

The samples are dispatched using an automated courier booking system provided online by the appointed laboratory. APHA samples are dispatched to Sciantec Analytical and PAS 110 samples to Alliance Technical Laboratories Ltd.

PAS 110 samples are accompanied by a completed PAS110 request sheet, again provided by the appointed laboratory. A copy is kept on site, and this form details the date of sampling, the sampler, and the testing required.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

During normal operating the frequency for APHA sampling for each bacteria will be:

- a sample from 1 in every 4 batches of digestate you produce; or;
- 1 sample of digestate a month.

GWE will ensure that at least 1 sample a month, is taken as a minimum requirement. The critical limits for testing are as follows:

Escherichia coli in 1 g:

$n = 5, c = 1,$

$m = 1\ 000,$

$M = 5\ 000$

Enterococcaceae in 1 g:

$n = 5, c = 1,$

$m = 1\ 000,$

$M = 5\ 000;$

Salmonella: absence in 25 g:

$n = 5; c = 0;$

$m = 0;$

$M = 0$

n = number of samples to be tested;


m = threshold value for the number of bacteria; the result is considered satisfactory if the number of bacteria in all samples does not exceed m;

M = maximum value for the number of bacteria; the result is considered unsatisfactory if the number of bacteria in one or more samples is M or more; and

c = number of samples the bacterial count of which may be between m and M, the sample still being considered acceptable if the bacterial count of the other samples is m or less.

The frequency of testing against the PAS 110 Specification will be done as follows:

- Potentially toxic elements (PTE): 1 per 6,000 m³ of WD produced, or 1 per 3 months, whichever is the soonest.
- Stability: 2 per 12 months and not within 3 months of each other, or sooner if and when significant change occurs.
- Physical contaminants: 1 per 6,000 m³ of WD produced, or 1 per 3 months, whichever is the soonest.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

- Total nitrogen (N), total phosphorus (P) and total potassium (K): 1 per 6,000 m³ of WD produced, or 1 per 3 months, whichever is the soonest.
- Ammoniacal nitrogen (NH₄-N): 1 per 6,000 m³ of WD produced, or 1 per 3 months, whichever is the soonest.
- Dry matter (total solids): 1 per 6,000 m³ of WD produced, or 1 per 3 months, whichever is the soonest.
- Loss on ignition (volatile solids or a measure of organic matter): 1 per 6,000 m³ of WD produced, or 1 per 3 months, whichever is the soonest.

Please see the separate *PAS110 Sampling Procedure and ABPR Sampling Procedure* for full details of this procedure.

8.2 Dealing with tested portions that fail APHA sanitisation sampling:

If one of the samples fails APHA testing the sites APHA Officer will be informed immediately.

An investigation into what caused the failed test result is undertaken and will be documented using batch failure investigation form. APHA will be required to agree that the solution addresses the problem. Any failed test is recorded along with the actions taken as a result. No digestate shall be released from site pending an investigation.

For the packaged food waste line, after identifying and correcting the cause of the test failure the batch shall be re-treated. The digestate shall be pumped back into the hydrolysis tank to allow the material to re-enter the pasteurisation process for a second time where it will subsequently enter one of the other digester tanks following pasteurisation. Once all the digestate has been reprocessed through the pasteurisers, the digestate tank(s) shall then be thoroughly cleaned before pasteurised digestate is allowed to re-enter the digestion tank.


For the clean (unpacked) food waste line, after identifying and correcting the cause of the test failure the batch shall be re-treated. The digestate will most likely have undergone separation once a test failure is received so appropriate corrective action shall be undertaken in line with APHA guidance.

If a failed batch from either processing line cannot be reprocessed it shall be disposed of via the most appropriate means, such as sending it to another suitably qualified treatment facility.

Revalidation of the process will occur if deemed necessary.

8.3 Dealing with tested portions that fail to comply with the PAS 110 quality criteria:

Any sampled and tested portion that does not conform to the PAS 110 quality criteria shall:

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

1. undergo corrective action, which could include re-circulation to remove physical contamination or then be sampled and tested in terms of the parameter(s) relevant for evaluating efficacy of the corrective action; or
2. be dispatched for use, processing elsewhere or disposal, and the recipient and regulator notified of the nature of its non-conformity with PAS 110.

The actions taken and the destination of each such batch shall be recorded by the IMS Representative. The PAS 110 Certification Body will be notified of the test failure.

An example of corrective action that can be performed for the digestate is as follows:

An additional portion (daily amount) of digested material can be pumped into the dual-purpose tank and after thorough mixing a sample representative of the tank content can be sampled for testing. The associated test results shall be considered when evaluating conformance with PAS 110 minimum requirements.

8.4 Sampling Procedure for Digester Health Purposes

GWE Biogas have an on-site lab for monitoring digester health and undertake sampling for FOS(VOA)/TAC, pH and Dry matter. The sampling process is described below.

A combined FOS/TAC and pH sampling point is provided on each digester for both the packaged food waste line (i.e. digesters 3, 4 and 5) and the clean line material take offs (digesters 1 and 2). Each digester has its own dedicated pipework which avoid cross-contamination between samples.


A sample is taken as required using a dedicated sampling bucket that is kept clean and locked away when not in use, which minimises potential contamination with particulates. The sample is taken when digestate is flowing through the pipe, to ensure a representative sample can be obtained.

Each Digester specific valve is opened in turn, and a bucket of digestate (approximately 4 litres) is taken from each sample valve and discarded. This is done to ensure any sample taken does not contain sediment that may have settled in the sample tap. A second bucketful of sample is then taken, and this is the representative sample for FOS/TAC, pH and Dry Matter testing. Once a representative sample is obtained the valve is then shut again to ensure minimal spillages. The sample is then decanted into suitable containers dependent on the type of test to be carried out, and these are then taken to the site lab for internal testing purposes.

The process for FOS/TAC Sampling and pH Sampling is detailed below:

FOS/TAC Sampling Procedure

- Ensure all container, beakers and equipment is clean prior to use, if not clean thoroughly in the adjacent sink using hot (no soap) water to remove all debris, once clean – thoroughly dry the equipment – it is now ready for use.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

- Decant 95ml of clean distilled water into a clean plastic beaker (each beaker is labelled specific to digester).

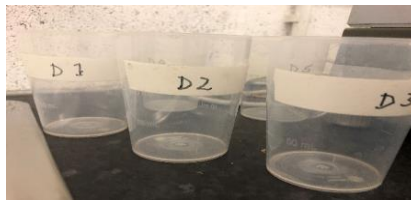


Figure 1 - Labelled plastic beaker ready for testing

- Material to be tested is taken from the bucket sample and placed inside a 'cafetiere' (approximately 500ml), the plunger is pressed down to release the digestate liquid from the fibrous material.



Figure 2 - Cafetiere used for FOS/TAC sampling

- Using the syringe, suck up 5ml of liquid digestate and place inside the beaker to give a maximum 100ml sample.
- Place the magnetic stirring 'tablet' into the beaker.

4.5 Install the stir bar and the beaker

Add the stir bar to the beaker, and then attach the beaker to the sensor holder.

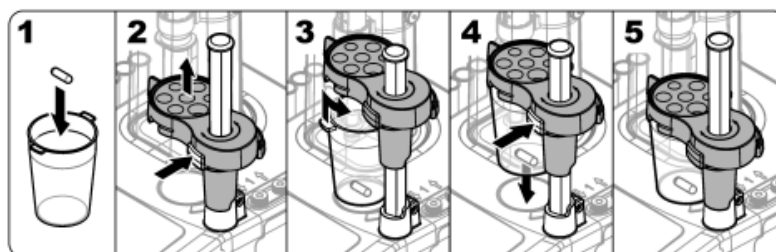



Figure 3 - Instructions for installing the stirring tablet into the beaker

- Secure the beaker onto the Titrator beaker arm.
- Remove the Titrator sample probe liquid protection cap.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

- Place the sample device in the carrier and into the sample liquid.
- Turn on the AT1000 Titrator.

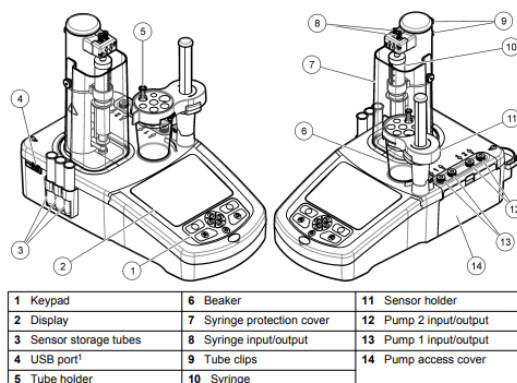



Figure 4 - AT1000 Titrator schematic

- At the home screen select 'FosTac' sample.
- Press start sample.
- The AT1000 Titrator will begin its test and analysis cycle, this may take up to 4 minutes, at the end of analysis a Fos, Tac and FosTac reading will be visible (and stored electronically on the machine's internal hard drive).
- Record the result on the specific sheet in the correct column.
- Shut the machine down and clean every item that has been in contact with the sample.

pH Sampling Procedure

- Ensure all container, beakers and equipment is clean prior to use, if not clean thoroughly in the adjacent sink using hot (no soap) water to remove all debris, once clean – thoroughly dry the equipment – it is now ready for use.
- Decant sufficient (50ml) sample material into a designated, labelled beaker.
- Place the magnetic stirring 'tablet' into the beaker.
- Secure the beaker onto the Titrator beaker arm.
- Remove the Titrator sample probe liquid protection cap.
- Place the sample device in the carrier and into the sample liquid.
- Turn on the AT1000 Titrator.
- At the home screen select 'pH' sample.
- Press start sample.
- The AT1000 Titrator will begin its test and analysis cycle, this may take up to 4 minutes, at the end of analysis a pH and temperature reading will be visible (and stored electronically on the machine's internal hard drive).
- Record the result on the specific sheet in the correct column.
- Shut the machine down and clean every item that has been in contact with the sample.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	


FOS/TAC, pH and Dry matter testing is taken on a twice weekly basis, on a Monday and a Thursday. The results for sampling are recorded on paper within the first instance, and are transferred on to an electric file on a weekly basis.

8.5 Dealing with tested portions that are outside the critical limits identified in the HACCP

For any sampled portion of material that returns sample results that falls outside the critical limits identified in the HACCP, the following action shall be taken:

For pH: Lower limit – 6.0, Upper limit – 9.5. Where the result returned is outside of these ranges, a second pH test is first carried out to confirm the test results. If correct, the feeding rate/feedstock is adjusted as necessary, and lime may be added to adjust the pH balance where required.

For FOS/TAC: Lower limit – 0.2, Upper limit – 0.55. Where the result returned is outside of these ranges, a second FOS/TAC test is first carried out to confirm the test results. If correct, the feeding rate/feedstock is adjusted as necessary, and lime maybe added to adjust the pH balance where required.

Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

9.0 Product dispatch, storage and use (to PAS110 CCP7 & APHA CCP7)

Sections 9.1, 9.2 and 9.3 cover aspects of the process related to PAS110 CCP7 & APHA CCP7.

9.1 Product labelling and supply documentation

Information supplied to the customer shall include the obligatory information required by PAS 110 section 14 and the Anaerobic Digestate Quality Protocol.

A contractual arrangement shall be made between the AD operator and each customer to whom any digestate is dispatched.

Each order placed by a customer is recorded by the Commercial Manager, and a record of the digestate delivered is returned to the customer following delivery, detailing the amount delivered, the date and including a copy of the relevant PAS110 analysis.

9.2 Quarantine policy for sampled and tested products


Whenever possible, the test results for all relevant parameters specified in PAS110 ABP Regulations shall be checked for conformance before the tested portion of production is dispatched.

However, the storage provisions on site won't always allow storage of the products until test results have been evaluated. Thus, it may be that the portion of production is dispatched for use prior to evaluation of the test results.

Hence, if any portion that is sampled and tested is dispatched with claim of conformance to ABP Regulations PAS110 and the AD Quality Protocol before its test results have been received from the laboratory and evaluated, and such dispatched portion is subsequently found to have failed to comply with any of the quality criteria, the digestate recipient and the regulator shall be notified of the nature of its non-conformity. Where required APHA and the PAS 110 Certification Body will be notified.

9.3 Digestate storage and use in agriculture, forestry and soil/field-grown horticulture

Terms and conditions included in the contractual arrangement with the digestate recipient clearly state that each product shall be stored and used according to the AD Quality Protocol's section 4.2 and Appendixes F and H. Storage and application of digestate is fully controlled by GWE Biogas Ltd, using precision trailing hose application equipment. Liquor is either pumped or delivered via HGV tankers to off-site lagoons, which are covered and lined to prevent groundwater pollution or rainwater ingress. These lagoons have a total storage capacity of 45,000 cubic metres of digestate.


Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

Separated fibre derived from the clean waste stream is collected in a farm trailer and stored in a corner of the field it is to be spread in, with the liquid fraction being directed to the dual-purpose tank where it is available for recirculation into the primary digestion process.

When the liquor is required for dispatch to customers, HGV road tankers are filled at the facility using pumps installed adjacent to the on-site storage tank (Dual Purpose) and directed to the relevant location. These HGV tankers then offload digestate to the application tanker and dribble bar which is towed behind a tractor. The rate of application is matched to crop nutrition demand and is controlled by the tractor operator from computer controls within the tractor cab. This spreading rate and the total applied to each field is recorded by the operator, and a map can also be produced showing the area covered with each application, if required. All data is supplied to the office, which records it electronically.

The separated fibre is manually loaded into trailers using a JCB shovel loader from the onsite intermittent storage and taken to its destination.

To comply with the ABP regulations the products are not to be spread on pasture land if it is to be occupied by pigs before 60 days have elapsed following spreading, or 21 days for all other farm animals, or if cropping for stock feed is to take place. This requirement is clearly stated in both the contract of supply and digestate consignment note. Should it come to the attention of GWE that digestate products supplied have been used inappropriately or grazing restriction have not been adhered to, GWE shall immediately suspend consignments of digestate products to the individual and notify APHA that an offence under ABP Regulations has been committed.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

10.0 POLLUTION CONTROL PROCEDURES

The following section covers how GWE mitigate any potential environmental risks occurring at the site or as a direct consequence of operating the site, in order to comply with their environmental permit.

10.1 Infrastructure Maintenance

The Identification Board shall be inspected at least once per week. In the event of damage or defect, the board shall be repaired or replaced as soon as possible.

The fencing and entrance gates will be inspected on a regular basis and any defects noted in the security of the site will be rectified within a reasonable period of time of their discovery.

All maintenance of tank and bunding infrastructure is undertaken in line with the site's maintenance schedules.

10.2 Plant Maintenance

The site operates a strict maintenance regime and equipment used is of sufficient capacity to allow 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 will be serviced and maintained in accordance with the manufacturers' recommended service sheets.


In the event of plant or equipment experiencing significant downtime, replacement hire plant will be mobilised for the remaining duration of the downtime. Any newly arrived or hired in equipment is subject to particular scrutiny to ensure it meets the standards required by both the company and current legislation.

10.3 Meteorological Monitoring

The weather station is serviced at regular intervals and a service report filed in the site office.

10.4 Dust

Please refer to the Fugitive Emissions Management Plan for frequency and description of required monitoring as well as mitigation measures.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

10.5 Mud and Debris

Please refer to the Fugitive Emissions Management Plan for actions to prevent mud and debris from being deposited on to public roads.

10.6 Litter

Very little litter is expected within incoming waste, but where present it will be immediately removed to sealed refuse containers, prior to disposal.

A daily check is made within and around the site for litter which may escape, to ensure the site is kept clean and tidy.

10.7 Pests

Please refer to the Fugitive Emissions Management Plan for frequency and description of required pests monitoring as well as required action if an infestation should ever be found.

10.8 Spillages

All spillages will be dealt with immediately. All vehicles, plant and equipment used on site will be operated and maintained in line with section 9.2, with the objective of preventing environmentally harmful leaks and spills.

In the event of any potentially environmentally harmful leaks or spillages, the Spillage Procedures for feedstock, ferric chloride or oil or diesel will be implemented immediately. Spillage kits and sand are available on-site.


Any spillages of ABP material will be cleaned up immediately and the area cleansed and sanitised.

In the event of a spillage the following emergency response procedures should be referred to:

- SMS EP 02 – Action to be taken in the event of a leaking feedstock delivery
- SMS EP 04 – Action to be taken in the event of a leaking process tank
- SMS EP 05 – Action to be taken in the event of a spill or leak of oil or diesel
- SMS EP 06 – Action to taken in the event of a spill or leak of ferric chloride

10.9 Odour

Emissions from the activities shall be free from odour levels likely to cause pollution outside the site. The site has a fully implemented Odour Management Plan (EPR-A07) to the Environment Agency 'H4 Guidance' standard as per SGN page 73. Please refer to the OMP for frequency and description of required odour monitoring.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

10.10 Noise and Vibration

The site has a fully implemented Noise Management Plan (EPR-A03).

Suitable measures will be implemented and maintained throughout the operational life of the site to ensure noise emanating from the site is minimised. All equipment used at the site will be appropriately silenced. All vehicles, equipment and plant will be switched off when not in use. All vehicles, equipment and plant will be maintained with a clear intention to reduce noise and vibration levels.

10.11 Clean Down

The site processes a comprehensive Cleaning Schedule which is overseen by the Site Manager. The Site Manager delegates tasks off this schedule to trained operatives to ensure the site is operating in line with ABPR and permit requirements. The schedule contains a frequency for individual cleaning tasks as well as a sign off system when tasks are completed.

Vehicles arriving into the reception hall to deposit bulk loads have their wheels cleaned prior to leaving the hall. Any wash water generated from this task is captured within the central drainage system and transported into the process.

10.12 Storage of Wastes

All storage and treatment of waste solids, liquids and sludges shall not be within the following distances:

- 10 metres of any watercourse;
- 50 metres from any spring or well, or from any borehole not used to supply water for domestic or food production purposes; and
- 250 metres from any borehole used to supply water for domestic or food production purposes.

All wastes shall be stored and processed on an impermeable surface with a sealed drainage system.

10.13 Biofilter Management

Management of the biofilter includes moisture, temperature and compaction monitoring, performance monitoring and the establishment of a maintenance schedule.

With regards to potential odour issues originating at the biofilter, due to levels rising past or falling below the critical limits, the actions outlined with table 4 below shall be undertaken and recorded by the site manager.



Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

Table 4 – Biofilter Infrastructure Controls

Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Biofilter too dry leading to ineffective absorption of odorous compounds.	Moisture Monitoring.	Moisture Index: 5	Additions of water to the biofilter should be done on a little and often basis. Water is added to the biofilter routinely to prevent drying out via a sprinkler. Too much water should not be added as it will generate excessive runoff and potentially flood the biofilter media.	Site Records.
Biofilter too wet leading to anaerobic conditions.	Moisture Monitoring.	Moisture Index: 1-2	Air from the reception building is constantly fed through the biofilter. Should moisture levels exceed the critical limit for the biofilter, air will be purged through the aeration system to dry the biofilter material out.	Site Records.
Biofilter not in optimal temperature range for performance.	Temperature Monitoring.	10-50°C.	Elevated temperature readings indicate that biodegradation of biofilter media is occurring. Should temperature become elevated above critical limits, media will be inspected and replaced as required.	Site Records.
Biofilter too compacted leading to ineffective operation of biofilter.	Visual Assessment.	At discretion of Site Manager.	If the Site Manager deems the biofilter to be too compacted then they shall instruct the replacement or addition of media.	Site Records.

10.14 Lagoon Pipe System Leak

Please refer to the Fugitive Emissions Management Plan for actions in the event of a leak or a suspected leak in the pipework from the pea wash plant to the Anaerobic Digestion facility.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

11.0 Company-wide and Management Procedures

11.1 Training

This procedure sets out how training is defined and recorded, where employee's roles may have an impact on biofertiliser quality and the local environment. Staff will also receive training on PAS 110, HACCP and Management System maintenance, and a record kept of this training. Training records and copies of certificates are kept by the relevant manager.

At present, a procedure, associated risk assessment and isolation document are written. The site manager then undertakes a review of each document and approves them once satisfied. Evidence of this approval is in the form of a document acknowledge sheet signed by the site manager (a document acknowledge sheet exists for each individual procedure, risk assessment and isolation document). The site manager also retains a comprehensive training matrix which incorporates references to all the procedures, associated risk assessment and isolation documents and acts as a central reference point for all training conducted on site by the site manager.

The site manager selects which procedures, risk assessments and isolation documents an operative is required to be trained in and then undertakes the necessary training with said operative. Once a staff member has received training in a procedure, risk assessment and isolation document, the site manager then asks the operative to sign off their details on a different document acknowledge sheet as evidence the operative has completed the relevant training. In conjunction with this, the site manger also makes an entry in the training matrix for the relevant operative.

For a full list of all procedures, associated risk assessments and isolation documents used at site, please see table 4 within the master list of documents in Folder 01 Document Control on the shared drive.

11.1.1 Technical Competence


The following GWE personnel possess WAMITAB qualifications:

Mike Walters

11.2 Incident and accidents

The Accident Management Plan (EPR-A02) and Plant Emergency Procedures describe the procedures to be followed in the event of potential environmental accidents or incidents that affect the digestion process or the quality of the digested material.

Any accidents and other incidents that occur on site, the known or suspected cause(s), and the actions taken are recorded by the plant manager on the daily check sheet and in the general accident record form.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

Incidents which specifically affect digestate quality are recorded on a separate incident sheet, which requires a record of corrective actions as well as details of the incident.

The need for preventive action shall be considered, and any such action taken shall be recorded on the above record.

11.3 Complaints

GWE Biogas aims to provide a high standard of services and meet the expectations of their customers. GWE shall treat all complaints seriously, in confidence and use this valuable information to help them improve their services. GWE shall decide and implement any necessary action in response to any complaints or concerns expressed by interested parties, including operatives, clients and regulatory authorities. The following section details how the site deals with the various types of complaints that could be received.

11.3.1 General Complaint

In the event a general complaint is received at site, a site operative will record the following information:


- Name and contact details of the person who expressed concern or made a complaint;
- Specific subject(s) of the concern or complaint;
- The source / location of where the complaint comes from;
- Date and time communicated to the producer and name of the person to whom it was communicated;
- Nature and date(s) of any actions and checks and who carried them out;
- Nature and date of any response to the person who expressed a concern or made the complaint; and
- Name of the person who communicated the response.

11.3.2 Digestate Quality Complaint

Any complaints received from clients regarding biofertiliser quality are recorded using the complaint log. All relevant members of staff are trained in this procedure, and will direct the complaint to the Site Manager, who will log the complaint and take the appropriate actions as set out in the complaints log, which includes timescales for response and follow-up activities. If the Site Manager is not available, another member of staff can complete Steps 1, 2 and 3 of the complaint log, and pass the log on to the Site Manager as soon as is possible. If the Site Manager is unavailable for any period of time, due to annual leave or sickness absence, the log should be passed to a Director for action.

Where possible, any complaint GWE receive about the quality of certified digestate should be submitted to the relevant certification body by completing the REAL BCS Complaint Form available on the Scheme website under the following link: www.biofertiliser.org.uk/product-complaints.

If GWE receives a complaint about a digestate product, they shall investigate that

Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

complaint, and if necessary, take appropriate action. GWE shall record all complaints received and the action taken to investigate it and any remedial action taken. These records will be examined as part of the audit process.

Where a complaint is received, GWE shall notify the certification body on receipt of the complaint, and once an investigation has been carried out.

On receipt of the complaint, GWE shall take the appropriate measures necessary to identify, locate, preserve and recover evidence. If a batch of digestate under investigation is dispatched to a Digestate Customer and subsequently returned to the site, GWE will ensure that the load is quarantined and not re-processed.

11.3.3 Odour Complaint

The Site Manager shall inform the Environment Agency **without delay** upon receiving an odour complaint, by telephone, by fax or by email and the details recorded on an odour complaint form. A site operative shall lead an investigation into the likely cause and source of the odour, using the site records and meteorological conditions to understand the nature of the operations recorded at the time of the complaint. This helps to determine whether the site was likely to be responsible, or whether other sources were involved.

If the odour is still detectable at the complainant's location, then additional investigation will take place around the area to characterise the odour and its likely source.

Please see the odour management plan (EPR-A07) for the odour complaint form and full details regarding how to deal with an odour complaint arising at site.

11.4 Environmental Permit Reporting


The following section highlights what information needs to be reported to the Environment Agency and under what timescale.

11.4.1 Emissions/Resource Reporting

As part of the conditions of the site's Environmental Permit, certain aspects of site operations need to be monitored and reported to the Environment Agency. This section will provide clarification on the timeframes for reporting requirements in order to satisfy the needs of the Environmental Permit.

In line with Section 4 of the permit, GWE Biogas shall report the following aspects in Table 5 below when stated. This table has been condensed for ease of reference, for full details of reporting please see Schedule 4 of Environmental Permit.

Table 5: Reporting of Data Requirements

Integrated Management System		 GWE Biogas
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

Parameter	Emission or monitoring point/reference	Units	Reporting period
Emissions to air	CHP1, CHP2, CHP3 and CHP4	mg/m ³	Annually
Water usage	Mains water, site borehole and river abstraction	m ³ /year	Annually
Energy usage	Electricity, natural gas	MWh	Annually
	gas oil, recovered fuel oil	Tonnes	Annually
Waste returns	Waste accepted and removed	Tonnes	Quarterly
Production/ treatment	Electricity generated	MWh	Annually
	Digestate	Tonnes	Annually
Performance parameters	CHP engine usage	Hours	Annually
	CHP engine efficiency	%	
	Electricity exported	MWh	
	Electricity flare operation	Hours	
	Water usage	tonnes or m ³	
	Energy usage	MWh	
	Biogas usage	tonnes or m ³	
	Raw material usage	tonnes or m ³	


These parameters are to be provided to the Environment Agency in the reporting forms displayed at the end of the Environmental Permit or through the bespoke excel sheet produced by GWE. This data needs to be provided to the Environment Agency by the 31st January for every reporting year.

11.4.2 CHP Unit Monitoring

GWE shall commission an external consultant to monitor and assess the four CHP units to ensure the CHP units are operating in line with the parameters for the CHP units stated in schedule 3, table 3.1 of the permit. The resulting report shall be submitted to the Environment Agency within 28 days of the end of the reporting period, with the reporting period set as every 12 months.

11.4.3 Quarterly Waste Returns

Within 1 month of the end of each quarter, the operator shall submit to the Environment Agency using the form made available for the purpose, the information specified on the form relating to the site and the waste accepted and removed from it during the previous quarter. The quarterly waste returns shall be submitted using the online return forms.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

11.4.4 Pollution Inventory

Using the Environment Agency's online Pollution Inventory Electronic Data Capture (PIEDC) system, GWE is required to submit details of their emissions to the Environment Agency. The PIEDC online system opens for reporting on 1 January each year and the deadline for submitting GWE's pollution inventory data is 28 February each year. GWE have a bespoke pollution inventory reporting excel sheet which is used to help populate the PIEDC online system.

11.4.5 Situations where reporting is "without delay"

GWE Biogas will notify the Environment Agency, "without delay", following the detection of:

- Any malfunction, breakdown or failure of equipment or techniques, accident, or fugitive emission which has caused, is causing or may cause significant pollution.
- The breach of a limit specified in the Permit.
- Any significant adverse environmental and health effects.

Site personnel will notify the Environment Agency within 24 hours:

- Of actual or potential incidents and breaches of emissions limits.

During normal working hours' site personnel will contact the Site Officer or the local Environment Agency Office by telephone. The Environment Agency National Incident Hotline number is: 0800 807 060.

11.4.6 Relevant convictions

In the unlikely event of the Permit Holder or a relevant person being convicted of any relevant offence, the full details will be provided to the Environment Agency within 14 days of the conviction, as will be details of any appeals.


11.4.7 Change of Operator's or Holders Details

The following information shall be notified in writing within 5 working days to the Agency:

- Any change to the Permit holders trading name;
- Any steps taken with a view to the Permit holder going into administration; and
- Any change in the operators trading name, address registered name or registered office address.

11.4.8 Relevant Convictions

In the unlikely event of the Permit Holder or a relevant person being convicted of any relevant offence, the full details will be provided to the Environment Agency within 14 days of the conviction, as will be details of any appeals.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

11.4.9 Change of Operator's or Holders Details

The following information shall be notified in writing within 5 working days to the Agency:

- Any change to the Permit holders trading name;
- Any steps taken with a view to the Permit holder going into administration; and
- Any change in the operators trading name, address registered name or registered office address.

11.4.10 Notification of Preparatory Works

Commencement of preparatory works for construction on the site and infrastructure and its completion will be notified to the Agency in writing.

Any additional preparatory works required as a result of the issuing of a new Environmental Permit or site improvement would be notified to the Agency or relevant authority.

GWE Biogas must give no less than 7 days' prior notice of any changes to the Management System.

11.4.11 Commencement or Cessation of Waste Operations

Commencement of anaerobic digestion operations on the site will be notified to the relevant authority in writing in advance of operations commencing.

In the event of any future cessation and subsequent re-commencement of the use of the site for waste treatment operations, the relevant authorities would be notified in writing specifying the date of any such cessation or re-commencement.


11.4.12 Reporting Following a Written Notice from the Environment Agency

In accordance with Environmental Permit condition 4.2.4, GWE Biogas will produce a Report assessing if appropriate measures are available to prevent or minimise pollution within 6 months of receiving a written notice from EA requesting such a report. The report is only to be provided within 6 months of receiving a written notice unless a notice has already been received in the previous 4 years.

11.4.13 Notification of monitoring and/or Spot Sampling

Site personnel will notify the Environment Agency within 14 days of:

Where the Environment Agency has requested in writing that it shall be notified when GWE Biogas is to undertake monitoring and/or spot sampling.

Integrated Management System		
Integrated Standard Operating Procedures		
Version 14	Approved by Tom Megginson	
Issue Date August 2023	Review Date August 2024	

11.5 Energy and Resource Efficiency Measures

The site possesses an energy and resource efficiency management plan. As part of this plan, the operator shall assess energy efficiency on an annual basis as part of the management review.

11.6 Internal Audit

The Quality Management System must be audited on a regular basis, and not less frequently than once every twelve months, or sooner if significant changes are made to the operation of the plant that could have an effect on digestate quality for PAS110 or compliance with the permit or ABPR approval. The procedures (of which this is one) that make up the Quality Management System must be assessed for their compliance with the relevant PAS110 scheme document (currently PAS110:2014), the latest environmental permit (EPR-TP3835KE-V008) and the APHA approval (51/115/8002 ABP/BIO), and for their accurate reflection of the procedure in terms of management activities. The Standard Operating Procedures must also be audited against the actual site activities, to ensure these are correctly recorded, the quality of the digestate is not potentially compromised, the potential for spread of diseases is minimised and the potential for environmental incidents are minimised.

The HACCP Plan must also be audited against the requirements of the Quality Management System, the PAS110 scheme document and the ABP regulations, ensuring that Critical Limits are relevant and the associated Critical Control Points are still relevant.

Audits of the IMS documents, HACCP Plan and Standard Operating Procedures will be undertaken by members of the management team other than the IMS Representative, or external consultants, as deemed necessary by the directors. All audits will be recorded on the Integrated Internal Audit Record Form and necessary actions undertaken wherever identified.

11.7 Management Review

At least once per year, senior management shall review opportunities for improvement and the need for changes to the IMS to ensure compliance with the PAS110 certification scheme, environmental permit and ABPR approval (including the PAS110 Quality Policy and HACCP plan). The review shall be carried out sooner than scheduled if triggered by a change in the process or if an incident occurs, before the scheduled date.

Each review, its inputs and outputs shall be recorded in the Integrated Management Review Record Form.