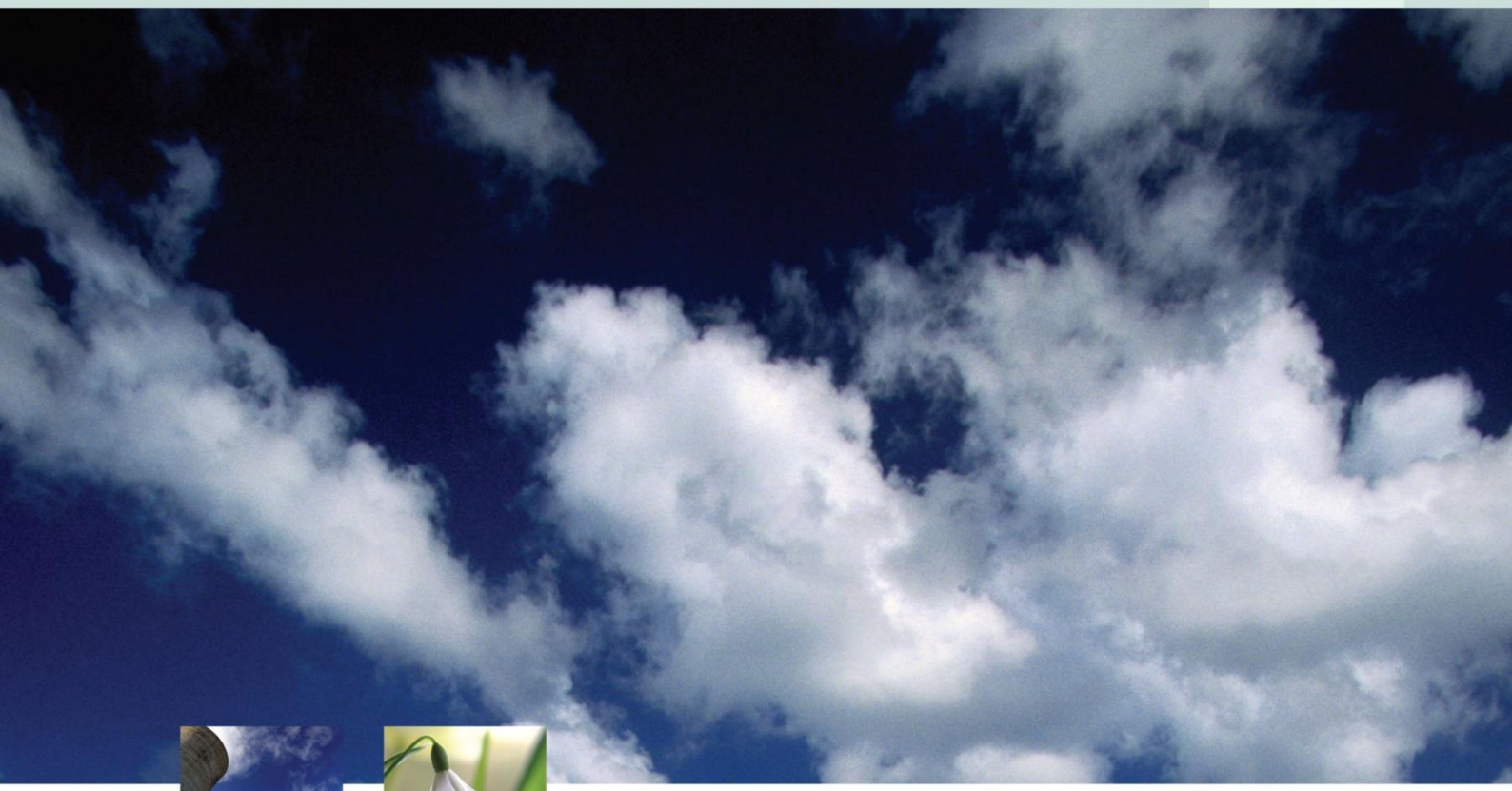

EPR PERMIT VARIATION APPLICATION EPR/AB3233DW

GP Biotec Limited
Great Porthamel AD Plant

Prepared by:
Sol Environment Ltd

Date:
September 2014

Project or Issue Number:
SOL0614GP02

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Contract/Proposal No:	SOL0614GP02
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VERSION CONTROL RECORD

Issue	Description of Status	Date	Reviewer Initials	Authors Initials
1	First Draft for Submission	September 2014	HW	SB

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Glossary of Terms

Term	Definition
Advanced Conversion Technology	A suite of technologies which have the capacity to convert solid waste materials into gas for the generation of renewable energy through Combine Heat and Power Plant (CHP). Technologies include Pyrolysis, Gasification and Anaerobic Digestion. The technologies used to utilise renewable fuels or waste include: – Direct firing open cycle steam turbine systems, – Integrated gasification combined cycle turbine systems, – Integrated pyrolysis combined cycle turbine systems, – Anaerobically generated biogas fuel in reciprocating engine or gas turbine systems.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
AQMA	Air Quality Management Area.
BTEX	BTEX is an acronym that stands for benzene, toluene, ethylbenzene, and xylenes.[1] These compounds are some of the volatile organic compounds (VOCs) found in petroleum derivatives such as petrol (gasoline). Toluene, ethylbenzene, and xylenes have harmful effects on the central nervous system.
By-product	A by-product is a secondary product derived from a manufacturing process or chemical reaction. It is not the primary product or service being produced.
CHP	Combined Heat and Power Plant (CHP) integrates the production of usable heat and power (electricity), in one single, highly efficient process.
CHPQA	The CHPQA (Quality Assurance for Combined Heat and Power) programme is carried out on behalf of the Department of Energy and Climate Change, in consultation with the Scottish Executive, the National Assembly for Wales, and the Northern Ireland Department of Enterprise, Trade and Investment.
DEFRA	Department for Environment, Food and Rural Affairs.
Dioxin	Dioxins and dioxin-like compounds, a diverse range of chemical compounds which are known to exhibit “dioxin-like” toxicity. In chemistry, a dioxin is a heterocyclic 6-membered ring, where 2 carbon atoms have

	been replaced by oxygen atoms.
Exceedence	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system.
Gasification	Gasification is a process that converts organic or fossil based carbonaceous materials into carbon monoxide, hydrogen and carbon dioxide. This is achieved by reacting the material at high temperatures (>700 °C), without combustion, with a controlled amount of oxygen and/or steam.
HVAC	HVAC (heating, ventilation, and air conditioning) is the technology of indoor and vehicular environmental comfort.
ISO14001	ISO 14000 is a family of standards related to environmental management that exists to help organizations (a) minimize how their operations (processes etc.) negatively affect the environment (i.e. cause adverse changes to air, water, or land); (b) comply with applicable laws, regulations, and other environmentally oriented requirements, and (c) continually improve in the above.
LAQM	Local Air Quality Management.
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO_2	Nitrogen dioxide.
NOx	Nitrogen oxides.
O_3	Ozone.
PAH	Polycyclic aromatic hydrocarbons (PAHs), also known as poly-aromatic hydrocarbons or polynuclear aromatic hydrocarbons, are potent atmospheric pollutants that consist of fused aromatic rings and do not contain heteroatoms or carry substituents. Naphthalene is the simplest example of a PAH. PAHs occur in oil, coal, and tar deposits, and are produced as byproducts of fuel burning (whether fossil fuel or biomass). As a pollutant, they are of concern because some compounds have been identified as carcinogenic, mutagenic, and teratogenic.
Percentile	The percentage of results below a given value.
PLC	A Programmable Logic Controller, PLC or Programmable Controller is a digital computer used for automation of electromechanical processes, such as control of machinery.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
PPB parts per billion	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppb means that for every billion (109) units of air, there is one unit of pollutant present.
PPM parts per million	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppm means that for every billion (106) units of air, there is one unit of pollutant present.
Ratification (Monitoring)	Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation).

RDF	Refuse-derived fuel (RDF) or solid recovered fuel/ specified recovered fuel (SRF) is a fuel produced by shredding and dehydrating solid waste (MSW) with a Waste converter technology. RDF consists largely of combustible components of municipal waste such as plastics and biodegradable waste.
Renewable Energy	Renewable energy is generally defined as energy that comes from resources which are continually replenished on a human timescale such as sunlight, wind, rain, tides, waves and geothermal heat. Renewable energy is also defined under the Renewable Energy Directive as comprising energy from the biomass fraction of waste.
ROC	Renewable Obligation Certificates
SCADA	SCADA (supervisory control and data acquisition) is a type of industrial control system (ICS). Industrial control systems are computer controlled systems that monitor and control industrial processes.
SCR	Selective catalytic reduction (SCR) is a means of converting nitrogen oxides, also referred to as NOx with the aid of a catalyst into diatomic nitrogen, N_2, and water, H_2O. A gaseous reductant, typically anhydrous ammonia, aqueous ammonia or urea, is added to a stream of flue or exhaust gas and is adsorbed onto a catalyst.
Synthesis Gas (Syngas)	Syngas, or synthesis gas, is a fuel gas mixture consisting primarily of hydrogen, carbon monoxide, and very often some carbon dioxide. The name comes from its use as intermediates in creating synthetic natural gas (SNG) and for producing ammonia or methanol.
µg/m^3 micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1ug/m^3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
UKAS	United Kingdom Accreditation Service.
Uncertainty	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation.
USA	Updating and Screening Assessment.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).
VSD	Adjustable speed drive (ASD) or variable-speed drive (VSD) describes equipment used to control the speed of machinery. Many industrial processes such as assembly lines must operate at different speeds for different products. Where process conditions demand adjustment of flow from a pump or fan, varying the speed of the drive may save energy compared with other techniques for flow control.

NON TECHNICAL SUMMARY

This document has been prepared on behalf of GP Biotec Ltd (GP Biotec hereafter) by Sol Environment Ltd and provides supporting evidence as required by Natural Resources Wales Application Forms Part C2 and C3 issued by Natural Resources Wales (NRW).

GP Biotec is making this application to carry out a Normal Variation of their existing EPR permit under The Environmental Permitting (England and Wales) Regulations 2013 (as amended) for the following reasons:

- To vary the existing permit (EPR/AB3233DW) to become a bespoke Installation Permit due to the anaerobic digestion activities on site now being considered a Section 5.4 Part A(1)(b)(i) activity due to the changes to the Industrial Emissions Directive (IED).

The GP Biotec Installation (*'the Site')* is an existing waste operation and is located at Great Porthamel Farm, Talgarth, Brecon, Powys, LD3 0DL.

The Anaerobic Digestion plant has been operating since 2012 has been designed to process the following key waste types:

- Energy Crops: Comprising Maize and Beet generally grown on Great Porthamel Farm;
- Liquid and Slurry Wastes: Comprising abattoir bloods, gut content and lairage, cowshed slurries and manures;
- Biodegradable Solid Wastes: Comprising food and agricultural (energy crops) 'non-waste' products and wastes.

The site is required by a condition of the planning consent to process a minimum of at least 50% farm generated waste products and to ensure that all digestate is spread to land within the wider grounds of Great Porthamel Farm.

All feedstocks are sourced from local food waste sources, abattoirs and agricultural sources.

All digestate material produced by GP Biotec complies with the requirements of the PAS110:2014. GP Biotec has registered with REA (Renewable Energy Accreditation) for certification to the WRAP Anaerobic Digestate Quality Protocol. Certification has been recommended and will be issued within the determination period of this application.

All digestate produced by the process is a high quality low odour alternative to the traditional spreading methods utilised by the agricultural sector and is considered a best practice. The storage and use of the PAS110 complaint digestate falls outside of the controls of this permit.

The Great Porthamel AD Plant is currently permitted under Permit EPR/AB3233DW and includes the following plant and processes:

- ABP Reception area – containing 2 x 60m^3 ABP waste storage tanks and associated activated carbon odour control plant;
- A sealed main waste processing building containing:
  - 2 x CHP Engine plant capable of electrical export up to 1.2MWe (1 engine currently installed exporting 499KWe);
  - Feedstock blending systems and associated pumps / pipelines;

    - Batch pasteurisation equipment;
- 2 x bunded primary digestion tanks (1 x 2714m^3 tank currently installed);
- 2 x bunded secondary digestion tanks (1 x 3695m^3 tank currently installed);
- 4 x digestate storage tanks (1 x 550m^3, 3 100m^3 installed);
- Gas treatment plant; and
- Emergency flare.

The plant is being constructed in two phases and currently consists of the above but with one CHP Engine Plant, one primary digestion tank, one secondary digestion tank and 2 ABP waste storage tanks. The additional CHP engine plant, digestion tanks and ABP waste storage tank are due to be constructed in 2015.

Due to the implementation of the Industrial Emissions Directive, biological treatment of waste in excess of 100 tonnes per day now meets the description of an Installation as defined by Section 5.4 Part A(1)(b)(i) 'Disposal, r*ecovery or a mix of disposal and recovery of non-hazardous waste*' Paragraph A(1)a namely;

'Recovery or a mix of disposal and recovery of non-hazardous waste with a capacity of exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment.'

The main features of the Installation, as described in this variation document are as follows:

- *Waste Reception and Pre-Processing Areas:* For the reception and pre-processing (macerating) of waste feedstocks;
- *Primary Digestion Stage:* For the treatment and conversion of the waste into biogas, condensate and solid digestate;
- *Secondary Digestion Stage:* For the post-digestion phase of the digestate prior to pasteurisation;
- *Gas CHP and Electrical Generation:* For the combustion of biogas and generation of electricity; and
- *Batch Pasteurisation:* For the pasteurisation of all digestate produced, for the purpose of compliance with the prevailing Animal By-Products Regulations, PAS110 and the WRAP Anaerobic Digestate Quality Protocol; and
- *Post Pasteurisation Storage:* The storage of post pasteurised digestate prior to discharge to Great Porthamel Farm Digestate.

Emissions to Air

The site is an existing permitted facility that has previously been assessed as part of the original site permit application assuming full electrical load and output.

The air quality impact modelling that was carried out in support of the original permit has now been updated to include the most current metrological data and has been included as part of this application (SOL0614GP02 Volume 2 Annex C1: Updated Air Quality Impact Assessment).

In similarity with the findings of the original assessment, impacts of the Air Quality Impact Assessment have been deemed as insignificant.

Emissions to Controlled Water

There are no process emissions to water arising from the Installation.
All surface water collected from the ABP reception areas is collected and transferred into the AD tanks.

All uncontaminated surface water is collected within a sealed drainage system and stored for use for vehicle washing, road way cleaning and other uses within the ABP reception area or it is discharged to the wider Great Porthamel Farm surface water drainage system.

Emissions to Land

There are no emissions to land arising from the Installation.

All PAS110 compliant digestate produced by the plant will be transferred by sealed pipework to the Great Porthamel Farm storage lagoon for use as a soil conditioner. The storage and use of digestate falls outside of the permitted Installation and is not regulated or controlled by the Permit.

All digestate will be monitored in accordance with WRAP Protocol PAS110 and Anaerobic Digestate Quality Protocol (ADQP) and therefore falls outside of the waste regulatory framework.

1 INTRODUCTION

This document has been prepared on behalf of GP Biotec Ltd (GP Biotec hereafter) by Sol Environment Ltd and provides supporting evidence as required by Natural Resources Wales Application Forms Part C2 and C3 issued by Natural Resources Wales (NRW).

GP Biotec is making this application to carry out a Normal Variation of their existing EPR permit under The Environmental Permitting (England and Wales) Regulations 2013 (as amended) for the following reasons:

- To vary the existing permit (EPR/AB3233DW) to become a bespoke Installation Permit due to the anaerobic digestion activities on site now being considered a Section 5.4 Part A(1)(b)(i) activity due to the changes to the Industrial Emissions Directive (IED).

The GP Biotec Installation (*'the Site')* is an existing waste operation and is located at Great Porthamel Farm, Talgarth, Brecon, Powys, LD3 0DL.

The Anaerobic Digestion plant has been operating since 2012 has been designed to process the following key waste types:

- Energy Crops: Comprising Maize and Beet generally grown on Great Porthamel Farm;
- Liquid and Slurry Wastes: Comprising abattoir bloods, gut content and lairage, cowshed slurries and manures; and
- Biodegradable Solid Wastes: Comprising food and agricultural (energy crops) 'non-waste' products and wastes.

Due to the implementation of the Industrial Emissions Directive, biological treatment of waste in excess of 100 tonnes per day now meets the description of an Installation as defined by Section 5.4 Part A(1)(b)(i) 'Disposal, r*ecovery or a mix of disposal and recovery of non-hazardous waste*' Paragraph A(1)a) namely;

'Recovery or a mix of disposal and recovery of non-hazardous waste with a capacity of exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment.'

The site is required by a condition of the planning consent to process a minimum of at least 50% farm generated waste products and to ensure that all digestate is spread to land within the wider grounds of Great Porthamel Farm.

All feedstocks are sourced from local food waste sources, abattoirs and agricultural sources.

All digestate material produced by GP Biotec complies with the requirements of the PAS110:2014. GP Biotec has registered with REA (Renewable Energy Accreditation) for certification to the WRAP Anaerobic Digestate Quality Protocol. Certification has been recommended and will be issued within the determination period of this application.

All digestate produced by the process is a high quality low odour alternative to the traditional spreading methods utilised by the agricultural sector and is considered a best practice. The storage and use of the PAS110 complaint digestate falls outside of the controls of this permit.

The Great Porthamel AD Plant is currently permitted under Permit EPR/AB3233DW and includes the following plant and processes:

- ABP Reception area – containing 2 x 60m^3 ABP waste storage tanks and associated activated carbon odour control plant;
- A sealed main waste processing building containing:
  - 2 x CHP Engine plant capable of electrical export up to 1.2MWe (1 engine currently installed exporting 499KWe);
  - Feedstock blending systems and associated pumps / pipelines;
  - Batch pasteurisation equipment;
- 2 x bunded primary digestion tanks (1 x 2,714m^3 tank currently installed);
- 2 x bunded secondary digestion tanks (1 x 3,695m^3 tank currently installed);
- 4 x digestate storage tanks (1 x 550m^3, 3 100m^3 installed);
- Gas treatment plant; and
- Emergency flare.

The remainder of this application support document is structured accordingly:

- *Section 2:* Provides a detailed planning and permitting history of the site and associated activities;
- *Section 3:* Provides specific nature of the proposed changes associated with the Variation Application;
- *Section 4:* Provides specific nature and detailed description of the emissions to air and water associated with the installation;
- *Section 5:* Provides details of all environmental monitoring associated with the Installation;
- *Section 6:* Provides details of the energy efficiency measures on site; and
- *Section 7:* Provides an Environmental Impact and Assessment of the Installation.

All technical appendices associated with the Installation are included within SOL0614GP02 - Volume 2 and comprise the following:

- *Vol 2 – Annex A:* Figures
- *Vol 2 – Annex B1*: Energy Balance
- *Vol 2 – Annex B2:* Existing Engine Information
- *Vol 2 – Annex C1:* Updated Air Quality Impact Assessment
- *Vol 2 – Annex C2:* Updated Site Condition Report
- *Vol 2* – Annex C3: Hazard Analysis & Critical Control Points (HACCP) Assessment
- *Vol 2 – Annex D1:* Site Working Plan
- *Vol 2* – Annex D2: Odour Management Plan
- *Vol 2 – Annex D3:* Accident Management Plan
- *Vol 2 – Annex E:* Existing Permit

The site location and the boundary of the installation are provided overleaf in Figure 1.1 and 1.2.

Additional annexes include EP OPRA and Application Forms A, C2, C3 and F.

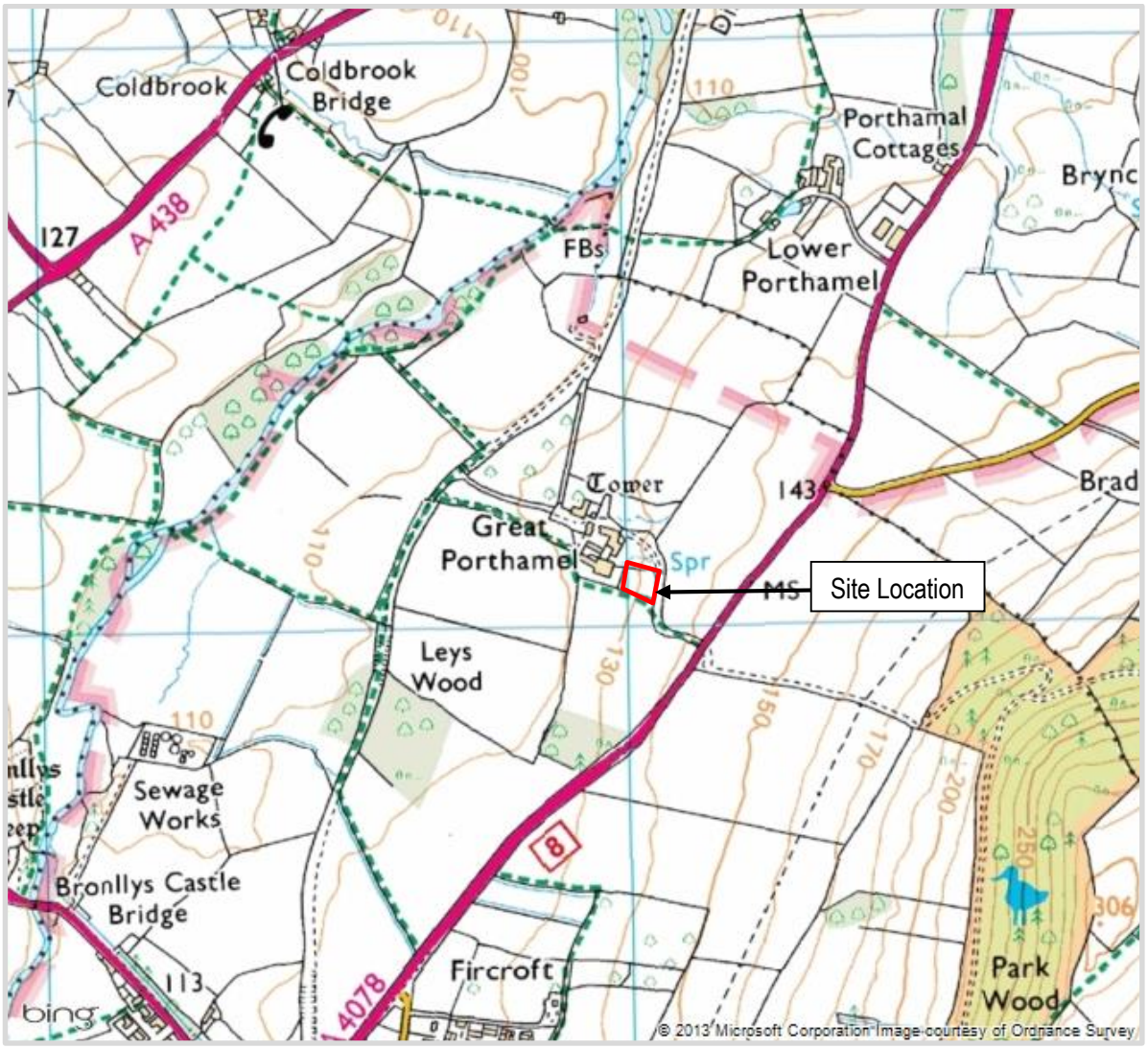

Figure 1.1: Site Location

Figure 1.2: Installation Boundary and Plant Layout

2 PERMITTING & PLANNING HISTORY

The sites permitting and planning history is provided in Table 2.1(a) and Table 2.1(b). The changes brought about by this variation do not constitute a material change to the existing planning consent at the site.

The most recent permit has been included within *Volume 2: Annex E of SOL0614GP02* and the details pertaining to all known planning permissions are provided in Table 2.1 below.

Table 2.1(a): Permitting History

Reference	Description	Status	Date Granted
EPR/AB3233DW/A001	Application for an Anaerobic Digestion Facility	Granted	12/03/12

Table 2.1(b): Planning History

Reference	Description	Status	Date Granted
07/01356/FUL	GP Services Proposed AD application submitted	Granted	26/09/07
07/01356/FUL	LPA Decision	Refused	08/05/09
APP/P9502/A/09/2106895	Appeal Lodged	-	June 2009
APP/P9502/A/09/2106895	Appeal Decision	Approved	13/01/09
CO/2615/2010	S288 application lodged by BBNPPA	-	February 2010
CO/2615/2010	S288 Hearing in High Court	Permission Granted	17/11/10

3 DESCRIPTION OF VARIED ACTIVITIES

3.1 Schedule References

GP Biotec is making this application to carry out a Normal Variation of their existing EPR permit under The Environmental Permitting (England and Wales) Regulations 2013 (as amended) for the following reasons:

- To vary the existing permit (EPR/AB3233DW) to become a bespoke Installation Permit due to the anaerobic digestion activities on site now being considered a Section 5.4 Part A(1)(b)(i) biological treatment activity due to the changes to the Industrial Emissions Directive (IED).

Due to the implementation of the Industrial Emissions Directive, the biological treatment of waste in excess of 100 tonnes per day now meets the description of an Installation as defined by Section 5.4 'Disposal, r*ecovery or a mix of disposal and recovery of non-hazardous waste*' Paragraph A(1)(b)(i) namely;

'Recovery or a mix of disposal and recovery of non-hazardous waste with a capacity of exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment.'

The site will site will accept and process less than 10 tonnes of animal wastes per day.

The site is currently permitted under the extant Environmental Permit to carry out the following activities:

- EPR/AB3233DW/A001: To treat non-hazardous wastes using anaerobic digestion to produce digestate (solid and liquid form) and also use the biogas from two combined heat and power CHP engines to generate electricity and heat. The electricity will feed into the National Grid as a source of renewable energy.

Table 3.1 IED Activities

Activity listed in EP Regulations 2013	Description of specified activity	Limits of specified activity	Specified waste management operation
Section 5.4 Part A(1)(b)(i) Disposal, recovery or a mix of disposal and recovery of non-hazardous waste	Recovery of non-hazardous waste with a capacity exceeding 100 tonnes per day if the only waste treatment activity is anaerobic digestion involving biological treatment	Anaerobic Digestion of non-hazardous waste and subsequent production of clean bio-methane gas	R1: Use principally as a fuel or other means to generate electricity R3: Recycling/reclamation of organic substances R10: Land treatment R13: Storage of Category R Wastes
Directly Associated Activities	Waste reception, Storage and Transfer of PAS100 digestate, Generation of renewable heat and Power by CHP	• Reception of all waste and energy crops • Tanked storage of all digestate prior to transfer to lagoon • Generation of renewable energy with CHP	

All waste activities carried out at the site i.e. waste reception, associated storage and waste pre-processing are all considered to be technical linked to the main activity and are included within the installation boundary of the site.

3.2 Details of the Installation

3.2.1 Installation Boundary

There will be no change to the existing installation boundary of the existing permit.

No processing or storage activities take place in any area not previously consented or permitted under the existing Permit.

A figure confirming the building configuration, plant layout and Installation boundary has been provided in Section 1, Figure 1.2.

An updated Site Condition Report that provides a baseline conceptual model for the site has been completed and included within SOL0614GP02: Volume 2: Annex C2 '*Site Condition Report.*

The Site Condition Report clearly states that the existing site does not represent a significant contamination risk, or does it identify any aspect of the varied installation that presents a potential contamination risk to the environment. The site is considered to be uncontaminated and located on previously undeveloped 'greenfield' land.

No contamination baseline information is considered necessary.

The plant has been designed in accordance with the Environment Agency's / NRW Pollution Prevention Guidance and best practice for the sector. There are no potential pollution pathways relating to the site.

3.2.2 Infrastructure and Design

Existing Site Drainage Arrangements

All aspects of the operating site are constructed on a sealed 'impermeable' concrete hardstanding. The construction of the site has been confirmed within the section below.

All surface water collected from the ABP reception areas is collected and routed directly to the 60m^3 waste reception hopper and transferred into the AD tanks.

All uncontaminated surface water is collected within a sealed drainage system and stored for use for vehicle washing, road way cleaning and other uses within the ABP reception area.

Any surplus clean surface water runoff will be discharged to the wider Great Porthamel Farm surface water drainage system.

The cross contamination of the ABP reception area and the wider site is prevented through the strict controls required by the ABP regulations.

There are no surface water drains, direct releases or uncontrolled discharges to controlled waters emanating on the site.

Tanks and Bunds

All tanks have been installed with secondary containment and designed to comply with the Environment Protection Pollution Prevention Guideline Above Ground Oil Storage Tanks: PPG 2.

The construction of the site has been confirmed as follows;

Primary and secondary digestion tanks:

- Site excavated to bedrock base, overlain by;
- Compacted sub-base, overlain by;
- Concrete blinding, overlain by;
- Impermeable geo-membrane liner, overlain by;
- 60 mm layer of impermeable thermal insulation, overlain by;
- Impermeable 'Visqueen' liner, overlain by;
- A 250mm steel reinforced concrete base, upon which the tank walls were constructed complete with proprietary leak detection system;
- A liner was welded on up the sides of the tanks which had also insulation around the walls; and
- A viol drain system was then fixed around the tanks to protect the liner and allow free drainage to flow down outside of the liner.

All other areas of the site have been constructed upon;

- Site excavated to bedrock base, overlain by;
- Compacted sub-base, overlain by;
- Concrete blinding, overlain by;
- Impermeable geo-membrane liner, overlain by;
- 250mm steel reinforced concrete base.

All storage and processing tanks associated with the Installation are detailed within Table 3.3 in Section 3.3.1 '*Raw Materials'.*

Building Design and Layout
There are no changes to existing building or plant layout resulting from this Variation.

The layout of the site is provided in Figure 1.2.

Odour Control Plant
The site has installed an activated carbon filtration plant as part of the waste reception and storage tanks. This system is fully described with this application

Roadways and External Areas
The site has an internal roadway system that has been designed to give safe access to all aspects of the site.

Separate segregated pedestrian walkways and car parking areas have been provided to allow for safe access and egress of all personnel at site.

All vehicular access and personnel access areas are included within the installation boundary.

3.3 Description of the Process

The proposed variation does not change the purpose and function of the Installation. A summary description of the key stages of the operation is described below.

- *Waste Reception / Pre-Processing:* ABP wastes are accepted into the 'dirty' reception area and discharged directly into the enclosed 60m^3 reception hopper or into the 60m^3 liquid waste tanks dependent on waste type (solid, liquid etc).

  The liquid waste tanks and reception hoppers are fitted with activated carbon odour treatment plant and kept under negative pressure to ensure that there is no discharge of odours.

  All non-ABP wastes will be unloaded in the non-ABP reception area ('clean area') at the lower (western portion of the site).

  The reception hoppers and liquid storage are fitted with macerating blades and 'stirring agitator' to enable the discharge and pumping of the waste feedstock's to the primary digestion tanks.

- *Primary and Secondary Digestion:* The feedstocks are pumped directly into the primary digestion tanks where it is retained for a total period of approximately 64 days. During this process the temperature is maintained at a mesophillic range (35 - 40ºC).

  The fermentation process produces a methane-rich biogas, condensate and solid digestate. The digestate is transferred between the two tanks via a cutting screen to ensure that the digestate achieves the ABPR requirements of 12mm.

  All biogas formed within the digester collects in the airspace in the very top of the tanks and is subsequently pumped through gas treatment measures (condensate pit and dry carbon filter) which remove excess condensate through gas drying.

  The biogas is then pumped to the CHP unit where it is combusted to form electricity and heat. Condensate removed from the gas is fed back into the digesters.

- *Batch Pasteurisation:* All post digested material is batch pasteurised prior to discharge from site for landspreading. Batch pasteurisation takes place within two sealed 10m^3 batch pasteurisation tanks where it is heated in accordance to the time / temperature requirements (1 hour at 70ºC) stipulated by the ABP Directive.

  Once pasteurised, the digestate is stored in 4 storage tanks (3 x 100m^3, 1 x 550m^3) for 4 weeks before being transferred directly off site or to a covered 4000m^3 lagoon, prior to use for landspreading.

A simplified process layout is provided in Figure 3.1 overleaf.

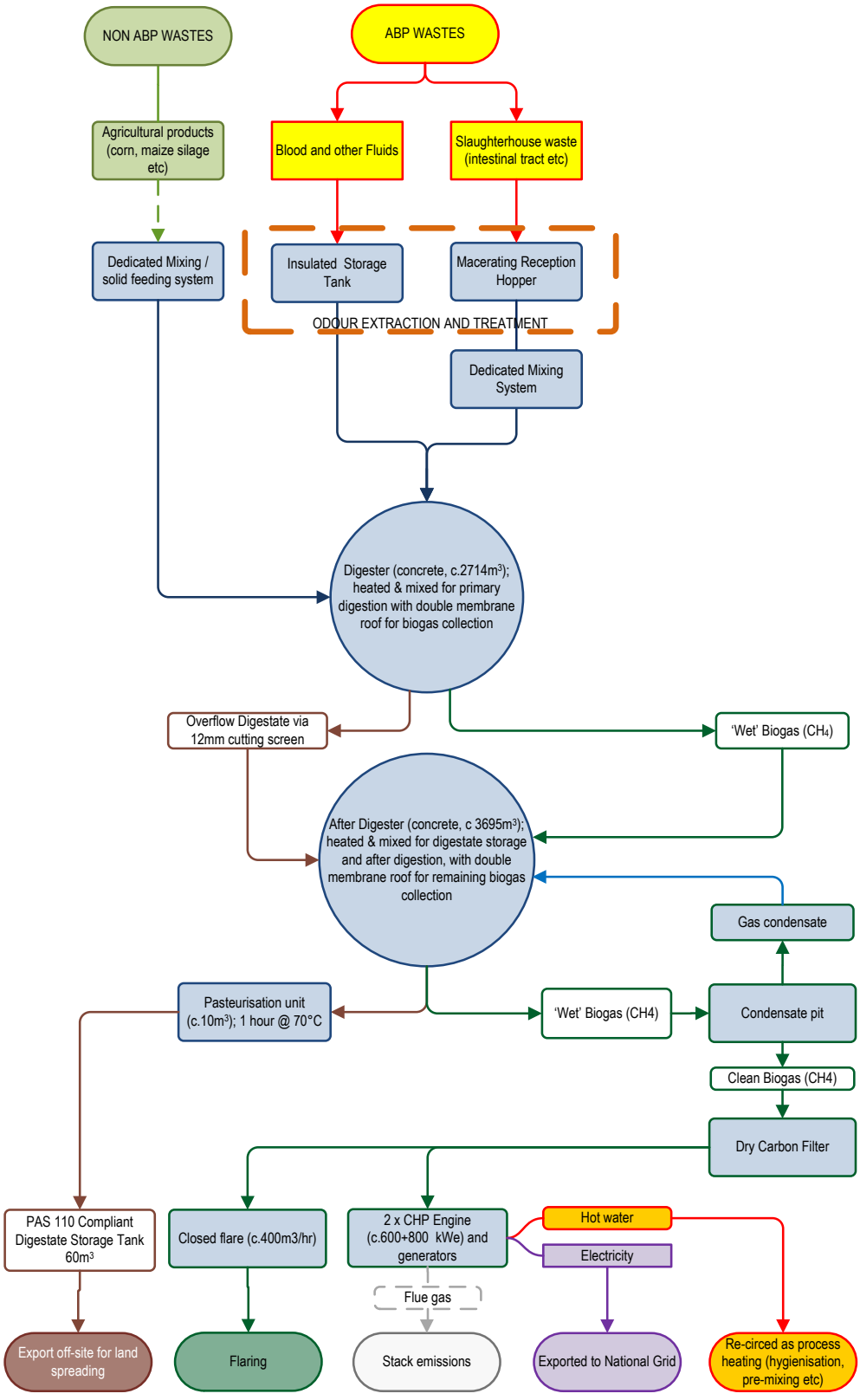

Figure 3.1: Simplified Process Schematic

3.3.1 Raw Materials

Waste Feedstocks

GP Biotec has been designed to be able to treat and process three main feedstock streams namely:

- Energy Crops: Comprising Maize and Beet generally grown on Great Porthamel Farm;
- Liquid and Slurry Wastes: Comprising abattoir bloods, gut content and lairage, cowshed slurries and manures;
- Biodegradable Solid Wastes: Comprising food and agricultural (energy crops) 'non-waste' products and wastes.

In accordance with the Environment Agency May 2011 position statement[1] ('*the regulation of waste derived fuels*') and Regulatory Guidance Note 2 *('definition of a regulated facility'*)[2], only abattoir blood materials are considered to be 'Animal Waste' in the context of the definitions provided within Section 6.8 Part A(1)(c).

The total quantity of waste accepted by the site will be unlikely to increase beyond those currently permitted and will ultimately be determined by the digestate quality requirements. Therefore the total quantity of waste processed at the site will remain as 35,000 tonnes per annum.

Additional feedstock capacity is made up with energy crops as required to ensure that the above conditions are met.

All wastes accepted on site are subjected to stringent waste acceptance criteria in accordance with the site environmental management plan and associated procedures:

- GP-E01 Waste Pre-Acceptance;
- GP-E02 Waste Acceptance; and
- GP-E03 Waste Rejection.

A detailed list of European Waste Catalogue (EWC) codes of wastes that are accepted by the Installation is provided in Table 3.2 below.

[1] MWRP RPS 072 version 2.0 May 2011

[2] It is stated within RGN 2 Note 6.8.5 that '*For the purposes of this Section, 'Animal waste' is 'any waste consisting of animal matter that has not been processed into food for human consumption'. This does include, blood, feathers, uncooked butchers waste and any other animal waste that is not catering waste or former foodstuffs. This does not include faecal matter from animals (e.g. chicken litter or farmyard manure), catering waste or former foodstuffs'.*

Table 3.2: Permitted Feedstock EWC Codes and Types	
Waste Code	**Description**
02	**WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING**
02 01	**wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing**
02 02 01	sludges from washing and cleaning
02 02 02	animal-tissue waste
02 01 03	plant-tissue waste
02 01 06	animal faeces, urine and manure (including spoiled straw), effluent, collected separately and treated off-site
02 01 07	waste from forestry
02 02	**wastes from the preparation and processing of meat, fish and other foods of animal origin**
02 02 01	sludges from washing and cleaning
02 02 02	animal-tissue waste
02 02 03	materials unsuitable for consumption or processing
02 02 04	sludges from on-site effluent treatment
02 03	**wastes from fruit, vegetables, cereals, edible oils, cocoa, coffee and tobacco preparation and processing**
02 03 01	sludges from washing, cleaning, peeling, centrifuging and separation
02 03 04	materials unsuitable for consumption or processing
02 03 05	sludges from on-site effluent treatment
02 04	**wastes from sugar processing**
02 04 01	soil from cleaning and washing beet
02 04 03	sludges from on-site effluent treatment
02 05	**wastes from the dairy products industry**
02 05 01	materials unsuitable for consumption or processing
02 05 02	sludges from on-site effluent treatment
02 05 99	wastes not otherwise specified
02 06	**wastes from the baking and confectionery industry**
02 06 01	materials unsuitable for consumption or processing
02 06 03	sludges from on-site effluent
02 06 99	wastes not otherwise specified
02 07	**wastes from the production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa)**
02 07 01	wastes from washing, cleaning and mechanical reduction of raw materials
02 07 02	wastes from spirits distillation
02 07 04	materials unsuitable for consumption or processing
02 07 05	sludges from on-site effluent
02 07 99	wastes not otherwise specified
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FROM HUMAN CONSUMPTION AND WASTE FOR INDUSTRIAL USE**
19 05	**wastes from aerobic treatment of solid wastes**

19 05 01	non-composted fraction of municipal and similar waste
19 05 02	non-composted fraction of animal and vegetable waste
19 05 03	off-specification compost
19 08	**wastes from waste water treatment plants not otherwise specified**
19 08 01	screenings
20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMULAR COMMERICAL, INDUSTRIAL AND INSTITUTIONAL WASTES). INLCUDING SEPARATELY COLLECTED FRACTIONS.**
20 01	**separately collected fractions (except 15 01)**
20 01 08	biodegradable kitchen and canteen waste
20 01 25	edible oil and fat
20 02	**garden and park wastes (including cemetery waste)**
20 02 01	biodegradable waste
20 03	**other municipal wastes**
20 03 02	waste from markets

Notwithstanding the EWC's codes stipulated in Table 3.3 above, waste shall not be accepted at the site which has any of the following characteristics;

- Category 1 Animal By-Products Wastes
- Extraneous Materials (metals, plastic, glass etc); and
- Wastes that are malodorous.

Waste deliveries take place on a weekday, daytime basis only, with additional deliveries on Saturday mornings and in emergency scenarios.

Process Consumables

The varied operation will not utilise or store any materials that are not already used or utilised at site.

As previously, the Installation will not require large volumes of process chemicals or raw materials beyond the waste feedstocks.

Table 3.3: Raw Materials and Storage Tank Inventory				
Material	**Tank Inventory**	**Description**	**Location**	**Fate**
Lubrication Oils	<1m^3	<10m^3 per annum Bunded oil tank Double skinned tanks stored internally and designed in accordance with EA PPG2 Oil Storage Tanks	Internal	Used within gas engine. All oils disposed off site
Ferric Oxide	5 – 10m^3	Internal enclosed hopper	Internal – within Reception Building	100% injected into AD reactor tanks, used or Hydrogen Sulphide Removal
ABP Liquid Storage Tank	2 x 60m^3	Insulated GRP storage tank located within concrete bunded area Tank to be fitted with enclosed roof Process tanks directly connected to activated carbon odour control plant	External – within secondary containment	Digested and spread to land
Primary Digestion Tank	1 x 2714m^3	Double skinned insulated and heated concrete tank installed within bunded compound and fitted with leak detection	External – within secondary containment	Digested and spread to land
Secondary Digestion Tank	1 x 3695m^3	Double skinned insulated and heated concrete tank installed within bunded compound and fitted with leak detection	External – within secondary containment	Digested and spread to land
Pasteurisation Tanks	2 x 10m^3	Single skinned heated processing tank	Internal – within secondary containment	Transferred and spread to land
Post Pasteurisation Tanks	1 x 550m^3 3 x 100m^3	Single skinned digestate storage tank installed within bunded area	External – within bunded area	Transferred and spread to land

3.3.2 Waste Reception/ Pre-Processing

All ABP waste accepted on site is delivered into a dedicated and segregated enclosed reception hopper, which has been designed in compliance with the EU ABP Regulations.

The ABP reception area is physically separated from the other areas of the plant and has an impermeable floor to ensure that all liquids drain back into the sealed reception hopper.

All non ABP wastes are delivered directly to the dedicated non ABP reception area at the lower (western) portion of the site.

Each reception area is clearly signposted and identified.

Liquid and Slurry Wastes (ABP Wastes)
Liquid and slurry wastes are delivered to the ABP reception and transferred directly into insulated storage tanks. The insulation of the tanks minimises the heating of the tanks from the sun and significantly reduces the potential odour produced by the storage of blood.

Each tank is 60m^3 and contains cooling elements and agitation impellors to maintain the tank contents in a pumpable form. There are currently two tanks located on site and space for another two should they be required.

All vent pipes associated with the tanks are in the process of being connected to a dedicated activated carbon odour treatment plant.

The transfer of the tank contents is carried out through a sealed pipework system. The tanks are fitted inside a reinforced concrete bund. The tanks are shown in the right of Figure 3.2.

Figure 3.2: Existing ABP Reception and Blood and ABP Fluid Storage Tanks

Solid Wastes and Other Abattoir Waste Streams

All solid wastes and abattoir sourced gut wastes are delivered to the ABP 60m^3 macerating reception hopper[3]. The waste is then transferred into a mixer[4] in order to produce a homogenous feed of ABP materials into the digesters. The hopper and mixer are contained in an enclosed building with roller shutter doors which will be opened and closed prior to and after loading, shown in Figure 3.2.

Energy Crop Reception

All solid materials (energy crops etc) will be delivered directly to the external feeding hopper of 42m^3 capacity located in the 'clean area' located at the lower (western) portion of the site.

Figure 3.3: Existing Maize (Non ABP) Reception Hopper

3.3.3 Anaerobic Digestion

All batches are transferred into the sealed Primary Digestion Tank (24m x 6m), where active digestion takes place. The tank contents are maintained at a mesophillic range (35 - 40ºC).

There is currently one Primary Digestion Tank present on site, with plans for a second to be installed in 2015.

The fermentation process produces a methane-rich biogas, condensate and solid digestate.

Once material within the Primary Digester has achieved the time / temperature parameters and / or the biogas yield has significantly decreased, the digestate is pumped into the Secondary 'Post' Digestion Tank (28m x 6m) where it will remain for the duration of the post-digestion phase.

There is currently one Secondary Digestion Tank present on site, with plans for a second to be installed in 2015.

3 Plant installed is a proprietary stationary Biogas mixer manufactured by Trioliet.
4 Plant installed is a QuickMix mixer manufactured by Vogelsang.

The temperature is monitored continually and downloaded electronically within the site office.

Within the Primary Digestion Tank, the digestate settles into different density phases. Less active material naturally migrates to the bottom of the tank.

When the temperature and gas pressure drops below a given set point, material is pumped from the bottom of the tank into the Secondary (post) Digestion Tank.

As the level in the tank drops, new material is transferred automatically.

The concrete digester tanks are insulated and heated with a heating system installed inside the walls and base. The tanks have a double membrane roof, to ensure stability and flexible gas storage. Both Primary Digestion Tanks will be fed directly from the reception areas.

The tanks have two propeller (5.5 kWe) mixers installed. This ensures a homogeneous mixture for best mass transfer and to prevent floating layers or sedimentation. The presence of this equipment allows for high organic loads (average is 8kg organic dry matter/m³/digester/day) and therefore can achieve high biogas production per m³ digester volume.

The digesters are equipped with an air blown cover with gas storage capacity which is where all the biogas formed in the digester collects.

The double membrane roofs, above the digester tanks, ensure stability and flexible gas storage.

The tanks have been fitted with two chemical dosing systems for the reduction of H_2S in the biogas. The primary system injects a small quantity of O_2 into the gas storage region of the tank (i.e. headspace beneath the membrane roofs). If oxygen injection is not sufficient to reduce the levels, Ferric Sulphate will be dosed directly into the digester.

The total retention time between the two tanks is approximately 64 days.

Table 3.4: Primary Digestion Tanks Specification

Parameter	Specification
Quantity	2
Volume (gross)	2714m³
Dimensions	24m x 6m
Material	Concrete walls (double skinned) with leak detection
Roof	Double membrane with integrated gas storage, green
Insulation	Wall and floor 60 mm, with sheet piling
Heating	Heating Elements installed inside tank or in tank base
Mixers	2 propeller mixers (5.5 kWe) in each tank

Table 3.5: Secondary Digestion Tanks Specification	
Parameter	**Specification**
Quantity	2
Volume (gross)	3695m³
Dimensions	28m x 6m
Material	Concrete walls (double skinned) with leak detection
Roof	Double membrane with integrated gas storage, green
Process Pressure	0 – 5 mBar
Maximum Pressure	10 mBar

Figure 3.4: Existing Primary and Secondary Digestion Tanks on Site

3.3.4 Pasteurisation

All post digested material is batch pasteurised prior to discharge from site for storage in batch holding tanks.

The pasteurisation plant comprises two pasteurisation tanks each able to hold 10 tonnes of digestate. Batch pasteurisation takes place within a sealed 10m³ batch pasteurisation tank where it is heated in accordance to the time / temperature requirements (1 hour at 70ºC)[5] stipulated by the ABP Directive.

All digestate is tested for compliance against PAS110:2014.

Each pasteurisation tank is equipped with a top-mounted agitator. The purpose of the agitator (4 bladed axial stream turbine) is to keep the product homogeneous and to ensure a good heat transfer. The pasteurisation process is operated in batches.

5 GP Biotec actually process at 72ºC for a period of 65minutes

Figure 3.5 below shows the two pasteurisation tanks on site.

Figure 3.5: Existing Pasteurisation Tanks

Each batch is screened and verified to ensure that the time and temperature requirements (70ºC / 1 hour) have been met, after which the digestate end product is considered ready for use. This validation process is software controlled and the plant is configured to ensure that pasteurisation comfortably achieves a minimum of 70ºC for a full 60 minute cycle without interruption.

Each pasteuriser is fitted with two thermocouples to ensure 70ºC is achieved throughout the mix. The heat is produced by hot water circulating through internal pipes within the pasteuriser.

In the event that the above time / temperature requirements are not met, the entire batch will be re-pasteurised and processed until the pasteurisation can be confirmed.

All pasteurised digestate is collected and stored in one of 3 x 100m^3 and 1 x 550m^3 glass coated steel tanks (Figure 3.6). The digestate is stored for 4 weeks before being transferred off site into a 5000m^3 covered lagoon.

Digestate is only transferred from the storage tanks once it has been confirmed to have met requirements of the WRPA ADQP/PAS110 and AHVLA validation requirements.

Figure 3.6: Existing Digestate Storage Tanks

3.3.5 Gas Clean Up and Conditioning

Prior to combustion within the CHP plant it is necessary to remove any condensate and to fully dewater the gas.

Dewatering is achieved by cooling the biogas in an underground gas pipe and condensing out any liquid content. The condensate is then collected within condensation wells and pumped back to the digester tanks.

The dry gas is then recirculated through a dry carbon filter (Figure 3.7) for the purpose of removing any residual odourous gases (Hydrogen Sulphate, Ammonia) or other volatile odourous content.

There is no odour associated with the combustion of the biomethane.

Figure 3.7: Existing Dry Carbon Filter Unit

3.3.6 CHP Plant

The plant has been designed to be operated with two MWM 2016 CV12 biogas engines (600kWe).

The installation currently has one engine plant which is mechanically limited to operate with an electrical output of 499kW.

An additional identical engine will be installed at a later date with a corresponding increase of power output to up to 1.2MWe.

Detailed technical information relating to the existing engine has been included within SOL0614GP02 Volume 2: Annex B2: Existing Engine Information.

Table 3.6: CHP Plant Specification

Parameter	Specification
Quantity	2
Flue Gas Cooler	Yes
Supplier	MWM
Type	TCG 2016 CV12
Electrical Capacity	600 kW
Mechanical Capacity	620 kW
Electrical Efficiency	42.5%
Thermal Efficiency	43.0%
Overall Efficiency	85.5%

The CHP Plant exhausts directly to a 9.7m high chimney stacks (Authorised Release Points A1 & A2).

The CHP Plant has attenuators to ensure that any noise levels are minimised. The technical specification of the plant indicates that the specific noise level of the exhaust is 70 dB (A) at 10 metres (free field condition excluding influences of external sources).

All details relating to the CHP plant emissions are provided within Section 5 of this document.

The impacts of the predicted emissions have been provided in Section 7 of this document and are considered to be negligible.

Figure 3.8: Existing CHP Plant

3.3.7 Enclosed flare

For safety reasons an automatic enclosed flare (Authorised Release Point A3) is installed on site. The primary function of the flare is to provide a safe outlet for the biogas in the event of over pressurisation, pipeline or tank leaks or any other emergency condition necessitating that the gas is diverted from either the tanks, pipework or engines.

The flare is under fully automatic control and has a continuously ignited pilot light. The flare is constructed of stainless steel, with motor control inlet valve, flame arrestors, automatic spark ignition and flame detection.

The unit is a standard elevated flare with free visible flame, with local electrical panel. The capacity of the flare is approximately 400m³/hr. The flare will not be required to be lit under normal operation and is not required during start up or shut down.

3.3.8 Control Systems

The Operation is provided with a central PLC control system manufactured by Siemens.

All of the process plant is operated remotely from the main control room through the use of a SCADA system. All of the individual local equipment panels are equipped with touch screen interfaces which show the process control parameters, alarms and plant status.

The entire Operation control system is monitored and controlled remotely through the use of on-line telemetry.

Any malfunction and alarm conditions that occur when the plant is unattended can be relayed via mobile telephone and remote operators (e.g. OEM providers).

3.3.9 Odour Control

GP Biotec is in the process of installing an activated carbon filtration system to the ABP tanks at site. This plant will be installed and operational during October 2014.

The plant has been design to abate all of the odour emissions produced within the ABP reception tanks and hoppers. The odour abatement plant will be directly connected to the tank vent pipes and treat 100% of all emissions from this aspect of the process[6].

GP Biotec will be installing a water regenerable carbon filter which has been specifically designed for the AD and wastewater treatment market. The plant will remove all Hydrogen Sulphide (H_2S), mercaptans and other organic compounds (VOC's) which are produced by the anaerobic action within the blood storage tanks. The system has been designed to treat in excess of 500m^3 per hour which is significantly in excess of the 10m^3 displacement and gas generation from the tanks.

The system will also extract from a lip extraction system fitted around the rim of the Triollet ABP hopper.

Specific details of the plant are provided within the Odour Management Plan provided as part of this application.

3.3.10 Digestate Management

All pasteurised digestate is mechanically pumped from the pasteurisation plant to the digestate storage tanks.

These tanks are industry standard slurry tanks which are located in the south eastern corner of the site within the secondary containment area.

Prior to transfer, the digestate is subjected to detailed analysis, as defined by the Working Plan Procedure GP-E07: AD Monitoring and Control which is included in SOL0614GP02 Volume 2: Annex D1: Site Working Plan.

This procedure stipulates that all digestate will be produced and tested for compliance against PAS110:2014 and the requirements of the AHVLA.

6 GP Biotec and Great Porthamel Farm have recently been subject to a number of odour complaints arising from the nearby town, all of which have been attributed to the farming and waste management activities carried out on site. The blood storage tanks have been identified as being a potential source of off-site odour impacts at the site and therefore been targeted for source control and mitigation by the company. The proposed plant is being provided with a manufacturers performance guarantee and has been designed to treat 100% of all emissions arising from the tanks and reception hopper.

3.3.11 Environmental Management and Operator Competence

The GP Biotec Ltd site is operated in accordance to the company's Environmental Management Plan and Quality Management System. This has been developed to ensure compliance with the EPR Permitting Requirements, Defra ABP Regulations and PAS110.

The EMS has been designed to ensure:

- The identification of all foreseeable environmental impacts and risks that GP Biotec's activities pose to the environment.
- Prevention or minimisation of any identified risks to practical minimum.
- Legal Compliance assurance.
- Activities at the site are managed in accordance with the management system, which is subject to continuous review, audit and improvement. Specific detailed management system reviews will take place if there is a significant change to the activities, following an accident or if a non-compliance is found.
- Furthermore, the whole management system is subject to annual external audit by competent third parties.
- The key aspects of the EMS for the site include:
  - Preventative maintenance;
  - Operator requirements;
  - Training and competence;
  - Emergency response and incident management;
  - Monitoring, measurement and reporting.

Working Plan

The Working Plan Procedures have also been updated with this permit variation application.

The basic structure of the operational procedures have been designed around the best practice requirements of the PAS110. These procedures have previously been accepted by the EA and used at site.

The revised suite of procedures for each of the key activities are included in SOL0614GP02 Volume 2: Annex D1: Site Working Plan and include the following:

Table 3:7 Working Plan

Ref No:	Title	Purpose
GP-E01	Waste Pre-Acceptance	This procedure defines the upstream screening, checking and pre-acceptance of all incoming waste prior to its arrival on site.
GP-E02	Waste Acceptance	This procedure outlines the onsite controls and considerations that need to be applied when waste materials arrive on site for processing.
GP-E03	Waste Rejection	This procedure outlines the waste rejection process for all non-conforming wastes that cannot be processed on site. Acceptance of non-conforming wastes will be a direct breach of the permitted conditions of the sites Environmental Permit.
GP-E04	Off Site Waste Transfers	This procedure provides the necessary information to enable the assessment and off site transfer of non-conforming or untreatable waste streams.
GP-E05	Waste Reception	This procedure outlines the waste reception, storage processes for all incoming waste.

GP-E06	Anaerobic Digestion	This procedure defines the stages and control measures for the anaerobic digestion process
GP-E07	AD Monitoring and Control	This procedure defines the digestate management and control process and outlines the required monitoring and analysis requirements for the pasteurisation and digestion stages
GP-E08	Compliance with the ADQP	This procedure defines the relevant requirements in order for the digestate to be ADQP compliant
GP-E09	Environmental Records	This procedure defines the necessary Environmental Permit and Waste Records that are required to be managed by the site to ensure compliance.
GP-E10	Control of Vermin and Scavenging Birds	This procedure describes the site control measures for effective controls and management procedures to reduce the risk of attracting pest and vermin.
GP-E11	Infrastructure Management and Maintenance	This procedure provides an outline of the inspection and cleaning requirements for the site.
GP-E12	Environmental Management and Monitoring Programme	This procedure provides an overview of all of the necessary environmental monitoring procedures and controls to ensure compliance with the Permit.
GP-E13	Accident Management Plan	This procedures refers to the sites emergency plans and response requirements.
GP-E14	Odour Management Plan	This document outlines the sites Odour Management Plan and requirements.

Site Maintenance

As per the existing permit all maintenance activities on site are carried out in accordance to the manufacturers' recommendations and are integrated within the company's environmental management system.

The key aspects of the maintenance management programme include:

- A programme of Planned Preventative Maintenance (PPM), to ensure ongoing management and replacement of key plant and equipment rather than waiting for equipment to fail.
- The inspection and maintenance schedules that the manufacturer recommends are adhered to, including any period of recommended shut-down.
- Predictive maintenance is carried out to prevent any catastrophic breakdown.
- Real time data collection and plant condition monitoring.

The maintenance programme ensures that all equipment or infrastructure that is deemed essential in the prevention of pollution to the environment (e.g. hard-standing, bunds etc) or the prevention of local nuisance impacts (e.g. noise abatement equipment etc) is maintained and kept in good operating condition.

All maintenance activities for each key of the key plant components (digestion tanks, pasteurisation tanks, engines etc) are carried out under contract by suitably qualified and competent third party organisations.

3.3.12 Operator Competence

There are no changes to the key personnel at site.

All personnel working at the facility have been trained in the necessary sections of the revised Working Plan and work under the instruction and management of the Site Manager, who acts as both the competent person at the facility and the main process supervisor.

The Site Manager at the site is deemed competent through qualification and holds the necessary Level 4 WAMITAB qualifications as required by the WAMITAB competency scheme.

All staff working for, and on the behalf of GP Biotec Ltd are suitably trained and competent. (e.g. professional maintenance engineers, electricians, equipment operators etc).

3.3.13 Site security

The site security measures have stayed the same as per the existing permitting requirements.

In summary the Site Security measures comprise;

- A perimeter fence which is inspected periodically to ensure that the site security has not been compromised.
- A gatehouse and weighbridge which acts as the sole access point to the site. This gatehouse is manned from 08:00hrs until 1800hrs during site operation and which is alarmed and monitored between 18:00 – 08:00hrs.
- CCTV monitoring of the external and internal areas of the Installation.
- External on-line monitoring and administration of the waste-to-energy process from a remote location.

3.3.14 Accidents and Emergencies

GP Biotec have developed its own Accident Management Plan based around the specific risks associated with the site operations.

The Accident Management Plan has been included in SOL0614GP02 Volume 2: Annex D3 – Accident Management Plan.

Additional specific emergency response procedures have been developed by the operator in conjunction with the anaerobic digestion plant and engine manufacturers.

The key aspects of the Sites Accident Management Plan are:

- Reviewed by Site Management annually, and as soon as practicable after an accident.
- Considers hazards presented by
  - emergency shut-down procedures;
  - actions in case of fire/explosion;
  - contaminated firewater;
  - failure of any equipment;
  - failure of abatement plant;
  - spillages and uncontrolled releases;
  - plant or equipment failure (e.g. over-pressure of vessels and pipework, blocked drains);
  - vandalism;
  - flooding;
- Identifies events or failures that could damage the environment.
- Assesses the likelihood and the potential environmental consequences from accidents at the site.
- Proposes actions to minimise the potential causes and consequences of accidents.

4 EMISSIONS & THEIR ABATEMENT

4.1 Emissions to air

Point-source Emissions to Air

Air quality impact modelling was carried out in support of the original permit and was carried out by Entran Ltd. The findings of this assessment indicate that all impacts associated with the site are insignificant.

An updated assessment has been carried out taking into account the most recent metrological data for the site and included as part of this application (SOL0614GP02 Volume 2: Annex C1 – Updated Air Quality Impact Assessment). The findings of this report indicate that the impacts of the process are insignificant.

The general characteristics of the authorised release points are as follows:

Table 4.1: Emission Parameters

Parameter	Modelled Value Existing
STACK A1 and A2	
Stack Height (m)	9.7
Stack diameter (m)	0.30
Temperature of release (ºC)	180
Efflux velocity (m/sec)	21
Exhaust Mass Flow Rate (kg/hr)	3227
Emission Concentration (mg/m^3)	
TPM	<5
NOx[10]	<500
CO	<50
SOx	<50

Emission Rate (g/s) (each flue)	Short-Term and Long Term (a)
NOx[7]	0.74
STACK A3 – EMERGENCY FLARE	
Stack Height (m)	10
Stack diameter (m)	0.6

Emissions from the emergency flare have been discounted and not modelled for the following reasons:

- The emergency flare is only used in emergency scenarios i.e. during start up and shut down;
- The emergency flare use is very short term.

On the basis that the atmospheric modelling screening assessment that was undertaken for NOx emissions from the emission points on site indicates that the emissions arising from the Operation are well below both the short-term and long-term objectives and that this Permit Variation will not result in any change to this, no further air modeling is proposed.

All details are provided within SOL0614GP02: Volume 2: Annex C1 – Updated Air Quality Impact Assessment.

7 The emissions of NOx have been modelled using an AERMOD. Modelled concentrations of 500mg/m^3 and corresponding mass emission rate have been used for each engine.

4.2 Emissions to Controlled Water

There are no process emissions to controlled water from the site.

4.3 Emissions to Sewer

There are no emissions to sewer arising from the process. There are no connections to any public or private foul water systems at the site.

4.4 Emissions to Land

There are no emissions to land arising from the installation.

All solid and liquid digestate arising from the operation will comply with the requirements of PAS110:2014[8].

All digestate material is utilised as a soil conditioner and fertiliser for Great Porthamel Farm.

4.5 Odour

Odour management and mitigation is a key issue for the Installation and has formed part of the primary design parameters of the plant. The Installation has been designed with a hierarchy of odour control and abatement measures to ensure that the potential for odour impacts is minimised.

An overview of the measures has been provided in Table 4.2 below and is in provided in detail within the Odour Management Plan (SOL0614GP02 Volume 2: Annex D2 – Odour Management Plan).

Table 4.2: Odour Management Summary

Tier	Reference	Description
1	Inventory Control	GP Biotec Ltd have established Inventory Controls comprising Pre-Acceptance, Acceptance and Rejection Procedures. All wastes accepted on site are required to be pre-declared and be deemed acceptable by the site manager prior to the transportation and delivery to site. All waste accepted on site is inspected on arrival to ensure compliance with the agreed *'Waste Declaration Form'* and do not have any malodourous properties. No new wastes will be accepted on site unless they have undergone qualitative assessment and been analysed / assessed for compatibility with the AD plant chemistry. Waste Acceptance and inventory controls are covered within the sites Working Plan document Procedures GP-E02 to GP-E05.

[8] PAS 110:2014 'Specification for whole digestate, separated liquor and separated fibre derived from the anaerobic digestion of source-segregated biodegradable' materials

2	Management Control	All acceptance, pre-treatment and processing tanks are equipped with level gauges and alarms. Procedural controls dictate that no consignments of wastes greater than the capacity of the available storage is accepted. All wastes are supervised when delivered to ensure that they are correctly discharged and unloaded. All digestion, gas generation and equipment operation is controlled via a SCADA PLC system. Very little human intervention is required in relation to the operation of the plant. Management controls are covered within the sites Working Plan Procedures.
3	Containment and Abatement	The following measures have been incorporated into the design of the plant to contain and abate the odour emissions from the process. • Enclosure of waste throughout the process: – All waste transferred to site for processing is delivered within enclosed vehicles and tankers; – All wastes received are stored within enclosed containment as soon as possible with the exception of abattoir waste which is temporarily inspected within an inspection pit (located within the enclosed Reception Building); – All pre-processing of materials is carried out within enclosed systems and within the Reception Building; – Transfer of materials from the Reception Building to the tank farm takes place through the use of closed pumping; and – All tanks are air tight and fitted with a sealing double skinned membrane roof. • Reception Facilities – The building operated with doors closed (excluding times when access and egress are required). – Odour related to the blood storage tanks is 100% abated through the use of a dedicated activated carbon odour treatment plant. The ABP storage tanks are and hoppers are maintained at negative pressure at all times. • Digestion Tanks; – Injection of Oxygen and Ferric Sulphate to alleviate H_2S levels – Monitoring and control of all gas levels within the digester tanks; – Any H_2S generated in the digesters will be reduced by injecting a small quantity of O_2 into the gas storage). If levels are particularly high and O_2 addition is not sufficient, Ferric Sulphate will be injected to the digester. • Treatment of Biogas – All biogas will be circulated through a dry carbon filter in order to remove any trace hydrogen sulphide emissions and other odourous content generated through the process.

During normal operation of the biogas plant, the likelihood of odour impacts is judged to be insignificant given that:

- The above measures have all been incorporated in the biogas plant design solely for the prevention / mitigation of odour emissions; and

- The distance between the site and non-site sensitive receptors.

More detail relating to the sites odour prevention measures are provided in detail within the Odour Management Plan (SOL0614GP02 Volume 2: Annex D2 – Odour Management Plan).

Due to a recent one off odour event that took place on the wider Great Porthamel Farm in association with the excavation of a former ABP storage lagoon, the site has been subject to a recent campaign of odour complaints from the nearby town.

The only substantiated odour complaint in relation to the Permitted Activity relates to the 'breather pipe' or 'vent' pipe emissions arising from the 'gassing' of the stored ABP blood wastes during hot weather. This issue has now been addressed by the operator through the installation of the activated carbon filtration systems.

The gassing of these tanks is a specific issue that is directly related to the ambient temperature vessel. In conjunction with the installation of the activated carbon plant, the tanks are being provided with a roof (to prevent direct sunlight), insulation and cooling.

Once commissioned the likelihood of there being any process related odour impacts associated with the operation of the plant are considered to be very low.

All other complaints that have been levied at the site are unsubstantiated.

4.6 Noise Impacts

There are no new noise impacts associated with the proposed variation. Both of the proposed activities are existing and are essentially unchanged in regard to noise impact.

4.7 Fugitive emissions

There are no changes to the site activities that introduce any new fugitive emission sources.

4.8 Waste Generation and Management

The AD process has been designed to meet with the requirements of PAS110 and as such all liquid and solid by product material that is generated by the operation meets the 'end of waste' criteria and is not be regarded as a waste as defined by 2006/12/EC, namely the 'Waste Framework Directive'.

All solid and liquid digestate is processed and spread to land by the owners and operators of Great Porthamel Farm. This is a specified planning condition and has been agreed as part of the permissions relating to 07/01356/FUL.

The offsite spreading of digestate is subject to a strict odour management plan which ensures that the potential for odour generation is minimised ad determined by the agricultural cropping and harvesting cycle.

The site does not routinely create any wastes beyond typical site general wastes and low levels of maintenance related wastes.

Incidental wastes, general wastes, road sweepings, maintenance consumables etc will be recycled and reused where possible. Little if any wastes will be consigned to landfill.

The specified waste activities carried out on site are:

- R1 Use principally as a fuel or other means to generate energy: *This is the main activity on site.*
- R10 Land treatment resulting in benefit to agriculture or ecological improvement: *This activity is carried out by the operators of Great Porthamel Farm and not as part of the Operation activities.*
- R11 Use of Category R Wastes: *This activity is considered incidental to the main activity.*
- R13 Storage of Category R wastes: *This activity is considered incidental to the main activity.*

5 ENVIRONMENTAL MONITORING

5.1 Emissions to air

The main emissions from site, as identified within Table 4.1, arise from the gas engines.

All sampling equipment and associated platforms and sampling ports installed on site meet the requirements of the Environment Agency Technical Guidance Notes M1 and M2 and will be MCERTS approved.

The sampling parameters, frequency and methodology is provided in Table 5.1 below:

Table 5.1: Emissions Monitoring

Parameter	Method	Frequency
Particulate	BS EN 13284-1[9]	Annually
Carbon Monoxide	BS EN 15058[10] & ISO 12039:2001	Annually
Oxides of Nitrogen (NOx)	BS EN 14792[11] & ISO10849:1996	Annually
Oxides of Sulphur (SOx)	BE EN 14792	Annually

5.2 Emissions to Controlled Water

There are no process emissions to controlled water.

5.3 Emissions to Sewer

There are no process water emissions to sewer.

5.4 Digestate Monitoring

In order for all digestate produced on site to be PAS 110 compliant GP Biotec continuously monitor the digestate material quality. PAS 110:2014 details the requirements for the minimum testing of the digestate quality and the frequency that this should take place.

Samples taken from each batch of digestate shall be tested **at least** at the minimum frequencies specified in Table 5.2 and Table 5.3 below:

[9] **BS EN 13284-1**:2002. Title Identifier, Stationary source emissions. Determination of low range mass concentration of dust

[10] **BS EN 15058**:2006. Determination of the mass concentration of carbon monoxide

[11] **BS EN 14792**:2005 Stationary source emissions. Determination of mass concentration of nitrogen oxides (NOx).

Table 5.2: PAS 110 Testing Requirements			
Parameter	**Methodology**	**Upper Limit (unit)**	**Minimum Frequency**
Pathogens (human and animal indicator species) in Digestate			
ABP digestate: human and animal pathogen indicator species	As per appropriate ABP regulation or any other method approved by the competent authority / Animal Health vet / Veterinary Service vet	As specified by the competent authority / Animal Health vet / Veterinary Service vet in the 'approval in principal' or 'full approval'	As specified by the competent authority / Animal Health vet / Veterinary Service vet in the 'approval in principal' or 'full approval'
Enterobacteriaceae	BS ISO 16649-2	10 bacteria in 1g fresh matter	5 samples per batch
Salmonella	SCA MSS Part 4A	Absent in 25g fresh matter	5 samples per batch
Potentially Toxic Elements in Digestate			
Liquid (≤ 15% TS) Digestates	For all PTEs: BS EN ISO 15587-1:2002	Declare on a fresh weight basis	Once per 6,000 m3 of digestate produced, or once every three months (whichever is the soonest)
Fibre (> 15% TS) Digestates	For all PTEs except Hg: BS EN ISO 13650:2001 For Hg: BS ISO 16772	Declare on a fresh weight basis	

Total Nitrogen (N)	**kg/t**	**Less than 1**	**1 to 1.9**	**2 to 2.9**	**3 to 3.9**	**4 to 4.9**	**5 to 5.9**	**6 to 6.9**	**7 to 7.9**	**8 to 8.9**	**9 or more**
Cadmium (Cd)	mg/kg	0.12	0.24	0.36	0.48	0.60	0.72	0.84	0.96	1.08	1.2
Chromium (Cr)	mg/kg	8	16	24	32	40	48	56	64	72	80
Copper (Cu)	mg/kg	16	32	48	64	80	96	112	128	144	160
Mercury (Hg)	mg/kg	0.08	0.16	0.24	0.32	0.40	0.48	0.56	0.64	0.72	0.80
Nickel (Ni)	mg/kg	4	8	12	16	20	14	18	32	36	40
Lead (Pb)	mg/kg	16	32	48	64	80	96	112	128	144	160
Zinc (Zn)	mg/kg	32	64	96	128	160	192	224	256	288	320

Stability of Digestate			
Residual biogas potential	OFW004-005 (WRAP)	0.45 l biogas/g volatile solids (assessment of RBP test pass or fail shall use the average of the triplicate RBP values that each test generates)	Twice every 12 months and not within three months of each other. Sooner if and when significant change occurs.
Physical Contaminants in Digestate			
Stones > 5mm	NRM method JAS-497/001 [N3]	Declare on a fresh weight basis	Once per 6,000 m3 of digestate

Total glass, metal, plastic and any 'other' non-stone, man-made fragments > 2 mm	NRM method JAS-497/001 [N3]	Declare on a fresh weight basis	produced, or once every three months (whichever is the soonest)	

Total Nitrogen (N)	**kg/t**	**Less than 1**	**1 to 1.9**	**2 to 2.9**	**3 to 3.9**	**4 to 4.9**	**5 to 5.9**	**6 to 6.9**	**7 to 7.9**	**8 to 8.9**	**9 or more**
Total Stones	kg/t	3.2	6.4	9.6	12.8	16	19.2	22.4	25.6	28.8	32
Total physical contaminants (excluding stones)	kg/t	0.04	0.07	0.11	0.14	0.18	0.22	0.25	0.29	0.32	0.36
Note: Total Nitrogen is the limiting factor for PTE and physical contaminant contents.											

Table 5.3 below, shows the parameters required, that do not have prescribed upper limits. However, the below parameters must be recorded and declared as part of the typical/average characteristics of the digestate in order for the digestate to comply with PAS:110.

Table 5.3: PAS 110 Testing Requirements

Parameter	Methodology	Declaration and Unit	Minimum Frequency
pH	BS EN 13037	Declare result as part of typical or actual characteristics	Once per 6,000m^3 of digestate produced, or once every three months (wherever is the soonest).
Total Nitrogen (N)	BS EN 13654-1 (Kjeldahl) or BS EN 13654-2 (Dumas) Test to be applied to fresh digestate only, without drying	Declare result as part of typical or actual characteristics, units as appropriate	
Total Phosphorus (P)	Liquid (≤ 15% TS) Digestates: BS EN ISO 15587 – 1:2002 Fibre (> 15% TS) Digestates: BS EN 13650		
Total Potassium (K)	Liquid (≤ 15% TS) Digestates: BS EN ISO 15587 – 1:2002 Fibre (> 15% TS) Digestates: BS EN 13650		
Ammoniacal Nitrogen (NH_4-N) extractable in potassium chloride	SOP Z/004 [N4] or SOP JAS-083 [N5]		
Dry Matter (also referred to total solids)	BS EN 14346	Declare result as part of typical or actual characteristics, mass fraction % of fresh sample	
Loss on Ignition	BS EN 15169	Declare result as part of typical or actual characteristics, units as appropriate	

Further detail of the digestate monitoring carried out on site is provided in the Working Plan Procedure GP-E07: AD Monitoring and Control which is included in SOL0614GP02 Volume 2: Annex D1 – Site Working Plan.

6 RESOURCE EFFICIENCY AND CLIMATE CHANGE

6.1 Basic Measures for Energy Efficiency

The energy efficiency of the process remains unchanged as a result of this variation.

The site was designed to ensure that all potential electrical energy is generated and supplied to the grid. A summary of the basic measures for energy efficiency used on site are provided below:

- Wherever possible the plant utilises the waste heat from the engines to pre-heat the waste streams.
- All parasitic loads of the plant are provided by the generated electricity, and hence no net energy imports are required to power and operate the plant.
- All pipelines, heated tanks and thermal processes are lagged and insulated to ensure that heat loss is minimised and prevented.
- The CHP engines specified for the plant are considered to be best in class and have a quoted generator efficiency of 96.7% and total efficiency of 84% respectively.
- All ancillary plant (fans and motors) have been specified with high efficiency electrical motors and variable speed drives.
- The plant is controlled by PLC and optimised to ensure maximum efficiency and minimal operation of ancillary components where required.

The site is a net energy generator and is be registered with OFGEM for the generation of electricity under the Feed in Tariff scheme (FIT's). The site is not be subject to any Climate Change Levy (CCL) agreements.

An energy mass balance is provided in Volume 2 - Annex B1.

7 IMPACT TO THE ENVIRONMENT

7.1 Impacts to Air

An updated air quality impact assessment has been carried out in support of the original permit and has been included as part of this application (SOL0614GP02 Volume 2: Annex C1 – Updated Air Quality Impact Assessment).

The scope of the assessment was determined in the following way:

- Consultation with the Environmental Health Department of PCC;
- Review of air quality data for the area surrounding the site, including data from the National Air Quality Information Archive (NAQIA);
- Desk study to confirm the location of nearby areas that may be sensitive to changes in local air quality; and
- Review and modelling of emissions data which has been used as an input to the breeze AERMOD dispersion modelling assessment.

The report concluded that nitrogen dioxide concentrations will remain well below both the short-term and long-term objectives for this pollutant. The maximum annual mean process contribution is considered to be a negligible impact when assessed in relation to the low background levels of nitrogen dioxide in the area.

The maximum short-term process contribution was predicted to be well below the 200µg/m^3 short term objective for this pollutant. The report therefore concludes that nitrogen dioxide impacts from the proposed installation are acceptable and are not likely to result in exceedance of objectives for the pollutant.

On the basis that the impacts of the assessment have been deemed to be insignificant, no further environmental impact assessment has been carried out.

7.2 Impacts to Land

There are no impacts to land relating to this proposed Variation.

7.3 Impacts to Controlled Waters

There are no impacts to controlled water relating to this proposed Variation.

7.4 Impacts to sewer

There are no impacts to Sewer relating to this proposed Variation.

7.5 Odour Impacts

There are no foreseeable increases in the odour potential of the site as a result of this proposed variation.