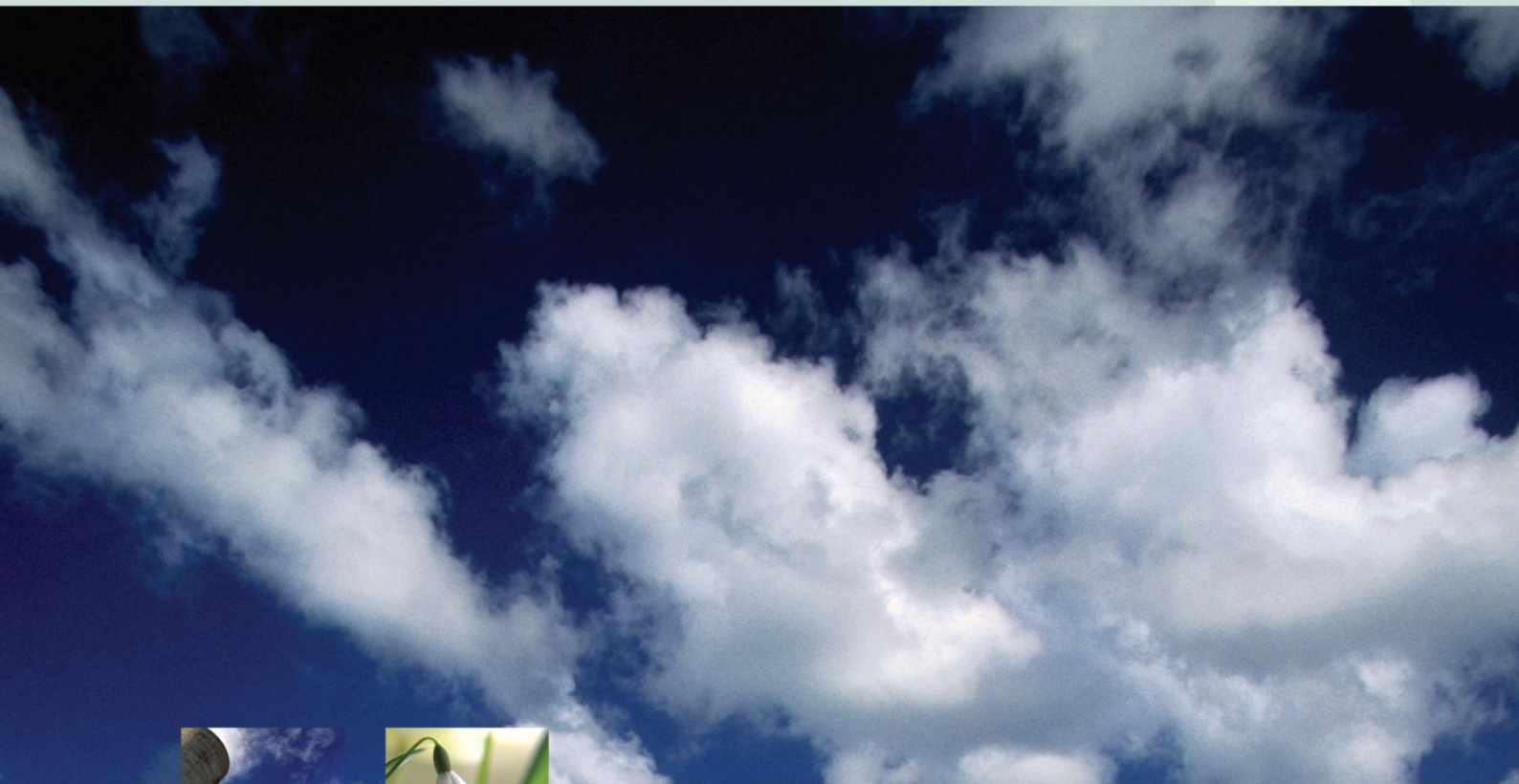


EPR SR2012 NO10 PERMIT APPLICATION

Derwent Renewable Power Ltd Argoed Farm AD Plant

Prepared by:
Sol Environment Ltd

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Author:
(signature): Steve Butler



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1 INTRODUCTION

This document has been prepared on behalf of Derwent Renewable Power Ltd (*'the applicant'* hereafter) by Sol Environment Ltd and provides supporting evidence as required by Environmental Permit Application Form Part B1 issued by Natural Resources Wales.

Derwent Renewable Power is making this application for a Standard Rules Permit SR2010 No.10 *'On-farm Anaerobic Digestion Facility Using Farm Wastes Only, Including Use of the Resultant Biogas'*.

The proposed site is located on land at Argoed Farm, Trefeglyws, Caersws, Powys, SY17 5QT.

The proposed facility will process and manage approximately 12,350 tonnes of feedstock per annum which will comprise cattle slurry and chicken litter produced on the farm, in addition to supplementary home grown crops.

Presently, all slurry and litter produced by the farm activities is spread as an organic fertiliser to agricultural land. The proposed scheme will divert all livestock waste through the anaerobic digestion process, effectively utilising it as an energy resource prior to the spreading of the resultant nutrient rich and odourless digestate to agricultural land in place of raw slurry and litter.

The resultant biogas produced by the process will be utilised by a 500kWe Jenbacher Combined Heat and Power (CHP) Unit to generate electricity and heat.

The remainder of this application support document is structured accordingly:

- *Section 2:* Provides a detailed planning history of the site and associated activities;
- *Section 3:* Provides specific nature of the proposed SR2012 No10 Permit Application; and
- *Section 4:* Provides specific nature and detailed description of the emissions associated with the Waste Operation.

The applications annexes comprise the following:

- *Annex A:* Figures;
- *Annex B:* Waste Acceptance Procedures;
- *Annex C:* Planning Permissions;
- *Annex D:* SR2012 No10 Compliance Table; and
- *Annex E:* WAMITAB Certification.

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

Additional annexes include Application Forms A, B1 and F.

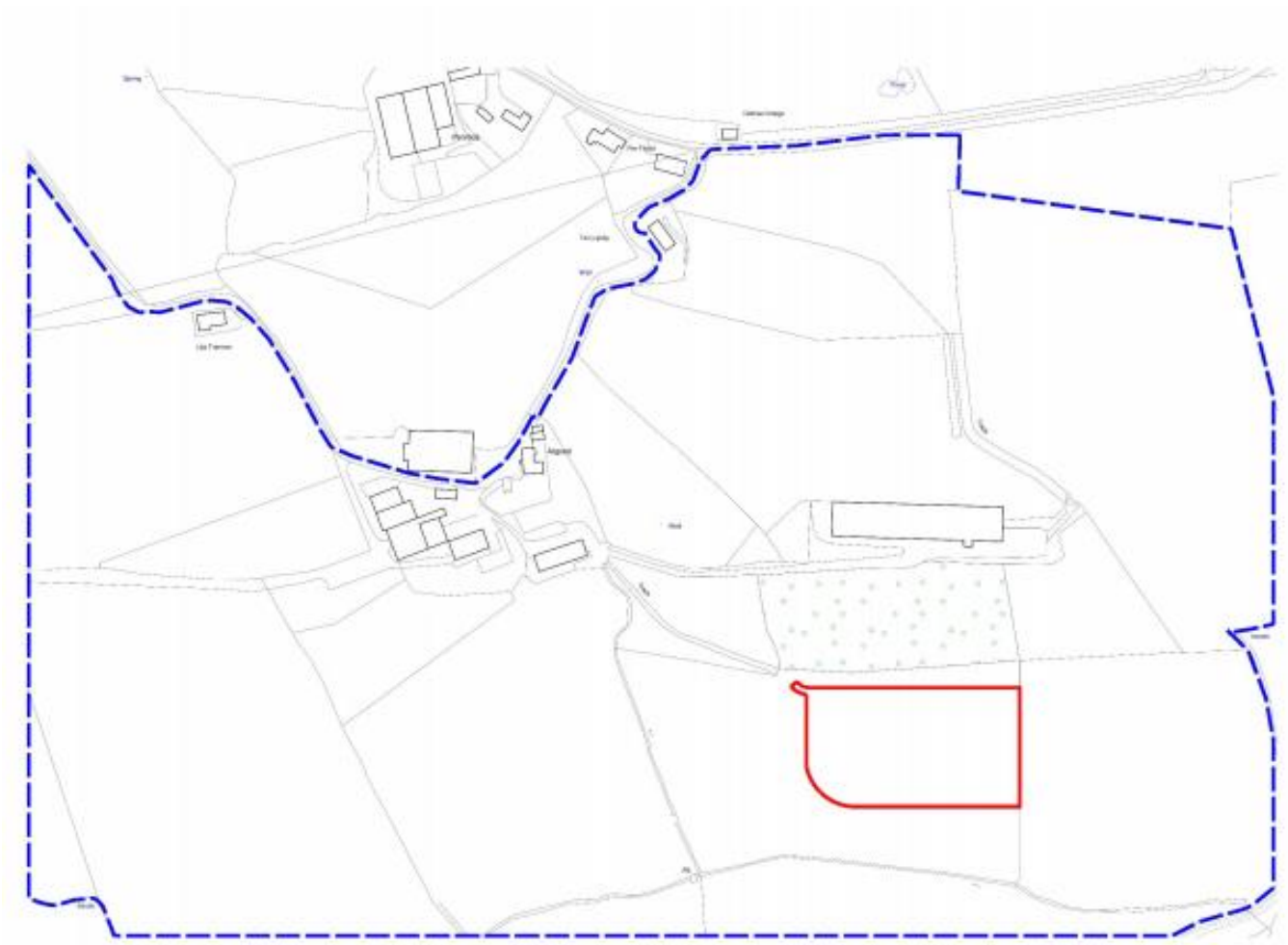


Figure 1.1: Site Location



2 PLANNING HISTORY

Planning permission relating to the proposed facility was granted by Powys County Council in December 2014 (P/2014/1024). The planning permission has been included within Annex C of this document. Details pertaining to the planning permission is provided in Table 2.1 below.

There is a planning amendment currently being determined to increase the plant size to 500 kW.

Table 2.1: Planning History

Reference	Description	Status	Date Granted
P/2014/1024	Construction of a 250 kW on-farm Anaerobic Digester plant including digester tank, digester store tank, 3 silage clamps, storage shed, slurry tank, CHP unit, transformer and substation, gas flare together with retaining wall, formation of access road, engineering operations including formation of earth bund and all associated works	Granted	12/12/2014

3 DESCRIPTION OF ACTIVITIES

3.1 Permitted Activities

Derwent Renewable Power is making this application for a Standard Rules Permit SR2012 No.10 'On-farm Anaerobic Digestion Facility Using Farm Wastes Only, Including Use of the Resultant Biogas' under The Environmental Permitting (England and Wales) Regulations 2013.

Please refer to the table in Annex D which shows the proposed operations compliance with the Standard Rules 2012 No.10 requirements.

Table 3.1 below details the activities that will be carried out on site.

Table 3.1: Activities	
Description of Activities	Limits of Activities
R13: Storage of wastes pending the operations numbered R1 and R3	All activities will be carried out on premises used for agriculture
R3: Recycling or reclamation of organic substances that are not used as solvents	Anaerobic digestion of waste and the following associated activities:
R1: Use principally as a fuel or other means to generate energy	- Physical treatment of waste including shredding, sorting, screening, compaction, bailing, mixing and maceration - Gas storage and drying - Treatment of digestate involving screening to remove plastic residues, centrifuge or pressing, addition of thickening agents or drying - Maturation of digestate - The use of combustible gases produced as a by-product of the anaerobic digestion process as fuel - Burning of the biogas in a gas engine - Use of an auxiliary flare required only for short periods of breakdown or maintenance of the facility - Use of pressure release valves to protect the integrity of the plant
	Anaerobic digestion of waste or waste containing mixtures shall not exceed 100 tonnes per day

All process plant and equipment will be commissioned, operated and maintained, and shall be fully documented and recorded in accordance with the manufacturers recommendations.

3.2 Details of the Waste Operation

3.2.1 Site Plan

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

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

All tanks have been installed with secondary containment and designed to comply with the Natural Resources Wales Pollution Prevention Guidance Note – Above Ground Oil Storage Tanks: PPG 2.

3.3 Raw Materials

Waste Feedstocks

The proposed facility will process and manage approximately 12,350 tonnes of feedstock per annum which will comprise cattle slurry and chicken litter produced on the farm, in addition to supplementary home grown crops. All feedstock is to be produced on the applicant's holding and land.

All wastes accepted on site will be subjected to stringent waste acceptance criteria in accordance with the sites waste acceptance procedures:

- DRP-E01 – Waste Acceptance;
- DRP-E02 – Waste Rejection; and
- DRP-E03 – Waste Reception.

The sites waste acceptance procedures are shown in Annex B of this document.

The main types of materials accepted on site, including how much biogas each feedstock will produce is provided to Table 3.2 below:

Feedstock	t/yr	Dry Matter %	Organic Matter %	Methane Production (m3/day)	Biogas Production (m3/day)	Electricity Production kWe
Cow Slurry	1,000	8	87	34	65	6
Poultry Litter	2,000	35	80	368	708	59
Wholecrop	1,200	33	92	399	768	64
Hybrid Rye	2,500	33	92	790	1,520	124
Maize	3,850	30	95	1,142	2,155	184
Beet	1,800	19	90	371	675	60
Total :	12,350	28.3	90.3	3,105	5,890	500

A detailed list of European Waste Catalogue (EWC) codes of wastes that are accepted by the Waste Operation is provided in Table 3.3 below. All wastes that are permitted on site are in compliance with SR2012 No. 10 requirements.

Table 3.3: 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 01 01	sludges from washing and cleaning
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 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

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

- Waste that does not conform to the description and documentation supplied by the producer and holder;
- Non biodegradable waste; and
- Wastes that are animal by-products or contain animal by-products.

3.4 Process Description

3.4.1 Waste Reception / Pre-Processing

All feedstock is to be produced on the applicant's holding and land.

Liquid feedstock (e.g animal slurry) will be loaded directly into the liquid buffer tank.

Manure will be stored in the cattle sheds and poultry shed at the farm and will only be disturbed when required for use at the AD site. When the manure arrives on site, it will be stored directly in the enclosed storage shed, prior to being deposited into the solid feed system located within the same storage shed to minimise odour release during loading.

Crops produced on land surrounding the site will be stored in silage clamps to the east of the site and will be delivered directly into the solid feed system when needed.

Liquid Buffer Tank

Liquid animal slurry will be transferred to a 140m³ concrete buffer tank. The buffer tank is fitted with a mechanical mixer to homogenise the contents. The material is then pumped into the feed line via a macerator to ensure that no large objects enter the digester. The waste enters the digester through fully enclosed pipework.

Solid Feed System

Solid feedstocks will be delivered into a 6m³ Trioliet Solomix bulk feeder / mixer hopper, fitted with weigh cells to enable the operator to load the correct quantity of feed. The bulk feeder mixes the feedstock via three vertical augers and cuts up any long fibres before discharging into the Vogelsang Quickmix solids feeder. The Quickmix's twin horizontal augers further chop the solid feedstock and combine the feedstock with liquid feedstock and / or recirculated digestate to produce a pumpable slurry.

The waste enters the digester through fully enclosed pipework.

The slurry is pumped into the digester via a macerator which reduces the particle size to a maximum of 20mm which presents a greater surface area for bacterial activity to take place which will ensure efficient digestion.

The solids feeder will be capable of feeding on a batch basis to achieve suitable feed rates. The process control allows for accurate measurement of feedstock into the digester at predetermined intervals to maintain optimum gas production.

3.4.2 Anaerobic Digestion

The concrete digester has a fixed roof around the outer ring and a flexible membrane roof which acts as biogas storage. The fixed roof includes a gas pressure / vacuum relief valve and an emergency liquid relief valve.

Table 3.4 below shows the details of the digester tank.

Table 3.4: Digester Details	
Nominal Diameter (outer tank)	20m
Nominal Diameter (inner tank)	14m
Nominal Height (outer tank)	9m (2m below ground level)
Nominal Height (inner tank)	9m + steel extension ring
Working Volume	2400m ³
Contents	Feedstock Slurry (pH 6.5 – 7.8)
Temperature of Contents	10°C – 50°C
Top Liquid Level	500mm below roof
Fixed Roof (outer tank)	Yes
Internal Baffle	Yes
De-grit Chambers	Yes
Height to top of gas holder	Approx. 12.5m (from ground level)

Digester Heat Exchange System

The digester temperature will be maintained within the temperature range of 37 – 42°C by the circulation of hot water through an internal heat exchanger of 200kW capacity. Isolation valves and temperature indicators will be fitted in the pipeline.

The hot water for the exchanger will be provided by the CHP unit during normal operation. If the CHP unit is under maintenance then the hot water will be provided by a gas boiler.

Hot water will be re-circulated through the heat exchanger via a dedicated circulation pump from the CHP hot water heater.

Digester Mixing System

The contents of the digester tank will be mixed by re-circulating biogas through a series of nozzles positioned at the tank base. The mixing nozzles will be fed by mixing systems (manufactured by Marches Biogas Ltd) and include:

- Floor-mounted rotary-vane compressor set, driven by a 5.5kW motor;
- Roof-mounted rotary valve skids with 18-off individual gas mixing pipes, diameter 32mm, each complete with isolation valve

- Hydraulic mixing pipework
- Inlet stainless steel pipework, diameter 50mm, complete with isolation valve
- All pipework fitted with isolation valves, non-return valves and pressure relief valves.

Gas Holder

The biogas generated as a product of the AD process will flow from the sealed digester to the integral gas holder positioned above the digester tank. The gas holder will consist of a double membrane with a capacity of approximately 300m³. The inner and outer membranes will be fabricated from PVC-coated oyster fabric.

The outer membrane is permanently inflated by means of a 1.5kW air bower, to maintain a positive pressure on the inner membrane. A pressure relief valve maintains the pressure at 12mbar. The pressure on the inner membrane is sufficient to supply gas to the gas booster unit prior to its supply to the CHP unit.

The inner membrane provides containment for the biogas, and inflates or deflates according to biogas production and demand. A level controller is installed to control the operation of the CHP unit, boiler, surplus gas burner and gas mixing system.

Hydrogen Sulphide Reduction

Biogas hydrogen sulphide reduction will be carried out by injecting air into the roof space of the digester tank. Netting will also be fitted between the liquid level and the gas membrane to promote the growth of sulphur reducing bacteria.

3.4.3 Electrical Generation

Biogas will be utilised by a 500kWe Jenbacher Combined Heat and Power (CHP) Unit to generate electricity and heat.

In the event of CHP shut down (e.g for maintenance operations) biogas can be diverted to a biogas boiler in order to provide hot water to the heat exchange system and maintain plant process heat.

In the event that the boiler is also shut down, the biogas will be diverted to a surplus gas burner with a throughput capacity of 250m³/hr to prevent an overpressure situation arising within the gas holder and to ensure that no unburnt gas is released to the atmosphere.

3.4.4 Digestate

Digested material is discharged from the digester and pumped to a separator. The separator will separate the nutrient rich digestate into a solid and liquid form.

The liquid digestate will be stored in a 2500m³ concrete digestate tank whilst the solid portion will be collected in the clamp positioned below the separator.

A conveyor will transport the solid digestate into a containerised belt dryer which will use surplus heat from the process to dry the digestate fibre. Dried material will then be augured into the storage building.

The process will produce approximately 2,013 tonnes/year (5.5 tonnes/day) of solid digestate and approximately 7,564 tonnes/year (20.7 tonnes/day) of liquid digestate.

Both solid and liquid digestate will be transported to the land farmed by the applicant for use as a nutrient rich and odourless alternative to the current spreading of raw slurry and chicken litter.

3.4.5 Control Systems

The operation of the biogas plant is fully automated from an onsite central control panel which monitors information transmitted from field instrumentation around the plant. Marches Biogas Ltd will provide a remote monitoring service via an internet connection which allows the plant operator to monitor the site remotely.

The control system is bespoke designed and operators will receive formal training in use of the HMI system. The control system facilitates optimal operation and a constant communication portal with Marches Biogas Ltd engineers.

The operator HMI station will consist of a computer terminal running a graphical interface of several pages. The pages will show the running status of the plant and provide control screens from where items of plant and variables can be manually controlled by the operator. The terminal will also record data for display in historical trends and have provision for presenting the data as a report or a graphical representation.

3.4.6 Environmental Management and Operator Competence

The Derwent Renewable Power Ltd site will be operated in accordance to an Environmental Management System. The system will be developed to ensure compliance with the EPR Permitting Requirements.

The EMS will be designed to ensure:

- The identification of all foreseeable environmental impacts and risks that Derwent Renewable Power'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 will be 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

Derwent Renewable Power will develop a working plan for the operation of the site. The working plan will define the management of the site and provides the management controls for all aspects of the site. The basic structure of the operational procedures has been designed around the best practice requirements of the EPR S5.06 Guidance note.

The suite of procedures for each of the key activities will include the following:

Table 3:5 Working Plan		
Ref No:	Title	Purpose
DRP-E01	Waste Acceptance	This procedure outlines the onsite controls and considerations that need to be applied when waste materials arrive on site for processing.
DRP-E02	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.
DRP-E03	Waste Reception	This procedure outlines the waste reception, storage processes for all incoming waste.
DRP-E04	Anaerobic Digestion	This procedure defines the stages and control measures for the anaerobic digestion process
DRP-E05	Environmental Records	This procedure defines the necessary Environmental Permit and Waste Records that are required to be managed by the site to ensure compliance.
DRP-E06	Infrastructure Management and Maintenance	This procedure provides an outline of the inspection and cleaning requirements for the site.
DRP-E07	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.
DRP-E08	Accident Management Plan	This procedures refers to the sites emergency plans and response requirements.

Site Maintenance

Any maintenance activities carried out on site will be carried out in accordance to the manufacturers' recommendations and will be integrated within the company's environmental management system.

The key aspects of the maintenance management programme will 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 will ensure 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 is maintained and kept in good operating condition.

All maintenance activities for each of the key plant components (digestion tank, digestate storage tank, CHP unit etc) will be carried out under contract by suitably qualified and competent third party organisations.

3.4.7 Operator Competence

All personnel working at the facility will be trained in the necessary sections of the Environmental Management System and work under the instruction and management of the Site Manager, who will act as both the competent person at the facility and the main process supervisor.

The Site Manager (or his selected delegate) at the site will be deemed competent through qualification and hold the necessary Level 4 WAMITAB qualifications as required by the WAMITAB competency scheme.

All staff working for, and on the behalf of Derwent Renewable Power Ltd will be suitably trained and competent. (e.g. professional maintenance engineers, electricians, equipment operators etc).

4 EMISSIONS & THEIR ABATEMENT

4.1 Emissions to air

The primary emissions to air (A1) will be from a 500kWe Jenbacher Combined Heat and Power (CHP) Unit. Details of the emissions and emission limits from A1 are provided in the table below.

A biogas boiler which will be available to use if the CHP unit is shut down during routine maintenance so that hot water can still be provided to the heat exchange system to maintain plant process heat.

There will also be a surplus gas burner with a throughput capacity of 250m³/hr to prevent an overpressure situation arising within the gas holder and to ensure that no unburnt gas is released to the atmosphere, in the event that the biogas boiler is also shut down.

Table 4.1: Point Source Emissions to Air

Emission Point	Parameter	Limit	Monitoring
A1	Oxides of Nitrogen	<500 mg/m ³	Annual Monitoring Monitoring equipment, techniques and personnel will have either MCERTS certification or MCERTS accreditation
	Carbon Monoxide	<1400 mg/m ³	
	Sulphur Dioxide	<350 mg/m ³	
	Total Volatile Organic Compounds including Methane	<1000 mg/m ³	
A2 (emergency boiler)	Oxides of Nitrogen	n/a	Record of operating hours
A3 (surplus gas burner)	Oxides of Nitrogen	n/a	Record of operating hours

Derwent Renewable Power will maintain all records of monitoring carried out on site.

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.

4.4 Emissions to Land

There are no emissions to land arising from the Waste Operation.

All digestate material will be used as an agricultural fertiliser on the applicants land.

4.5 Odour

Odour release is anticipated to be minimal due to transfer of the materials from the feeder to the AD digester tank being within fully enclosed pipework. At no time is the material exposed directly to the atmosphere until digested and released as digestate. All digestate has a low odour potential.

The feedstock for the digester is agricultural produce already commonplace at the farm. The solid waste will be stored within an enclosed storage building and the liquid waste will be transferred directly into the enclosed liquid buffer tank. The crops will be stored in clamps which will be covered with polythene in order to maintain the quality of the feedstock and minimising odour.

The AD process causes the breakdown of organic compounds, therefore removing odours before the resulting digestate is spread on land. The odour free digestate produced by the AD facility will be spread to the surrounding land in place of raw and odorous cattle slurry and chicken litter.

Prior to operation the site will have a fully developed Odour Management Plan.

4.6 Noise Impacts

The design of the Derwent Renewable Power facility has taken into account the potential impacts on the environmental and neighboring receptors in regards to noise. The distance between the site and the nearest non-connected residential property is approximately 350m. Activities on site will not give rise to an increase noise level at this distance.

The facility has been deliberately located to reduce the impact of the development, including the maximising of sound screening. The process of anaerobic digestion is silent, running continuously over a 24-hour period.

Intermittent noise will be generated by movements associated with the delivery of feedstock to the site, exportation of digestate and the use of a JCB type loader to transport feedstock to the feeder. Loading of feedstock into the feeder will take place in the morning and will take approximately 1 to 2 hours per day.

These noises are commonplace at the existing farm and are not anticipated to give rise to an impact above and beyond the existing noise levels.

The only continuous noise will emanate from the CHP engine which will be fitted within acoustic housing. The CHP housing has attenuation to a sound level of 75dBA at 1 meter (according to manufacturer's data). The CHP plant has been positioned adjacent to the proposed storage building and close to a mature tree belt which will facilitate effective sound screening.

Annex A – Figures

Annex B – Waste Acceptance Procedures

Annex C – Planning Permission

Annex D – SR2012 NO10 COMPLIANCE TABLE

Annex E – WAMITAB CERTIFICATION