TITLE:	**Environment Management System**
Site:	**Willand Anaerobic Digester.**
Doc Ref:	**Willand Environment Management System**
	3863/2540/Willand EMS V2.2
Address:	**Willand Anaerobic Digester, Willand Road, Willand, Devon,**
Environmental Permit reference:	**EPR/WP3533AJ**
Operator	**Willand O&M Limited**

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Acronyms

AD – Anaerobic Digestion

CHP – Combined Heat and Power Engine

EA – Environment Agency

EMS – Environment Management System

EWC code – European Waste Catalogue code (for waste)

WBG – Willand Biogas Llp

MCERTS - Environment Agency's Monitoring Certification Scheme

OMP – Odour Management Plan

PRV – Pressure Release Valve

PVC – Polyvinyl Chloride

SCADA - Supervisory Control and Data Acquisition (software application program for process control / the gathering of data in real time from remote locations in order to control equipment and conditions)

SSAFO - The Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England) Regulations 2010 and as amended 2013.

WAMITAB – Waste Management Industry Training and Advisory Board

1. Introduction

On 26th May 2015 Devon County Council granted planning permission for an anaerobic digestion plant at Willand, reference 15/00064/DCC, an approved amendment to the design of the plant was granted on 9th June 2016, reference DCC/3850/2016.

The AD plant is designed and built by Amzco Ltd on behalf of WBG , to be operated by Willand O&M Limited.

This Environment Management System has been written to determine the site-specific environmental risks from the AD plant at Willand and to detail how these risks will be minimised. This document reflects existing and proposed site activities. It is a live document that will be reviewed and amended as necessary.

The plant is planned to be upgraded and expanded in 2019 and this EMS has been revised to accompany an application to vary the permit to include:

a) Changes to the permitted waste types

b) The increase of waste inputs to 75,000 tpa

c) Two additional buffer tanks

d) One additional Flare unit.

e) The addition of the digestate de-watering plant as a DAA this includes:

   i) The plant itself and a building to contain it (8 on plan AMZ01_ SP_029b)

   ii) A building to store solid digestate up to 100t (8 on the plan AMZ01_ SP_029b)

   iii) Two additional liquid digestate batch tanks 380m3 each (9 on plan AMZ01_ SP_09b)

   iv) One lime storage cylinder (3 on plan AMZ01_ SP_029b)

   v) One ammonium sulphate solution storage tank (3 on plan AMZ01_ SP_029b)

   vi) An ammonia scrubber and odour control unit with an additional emission point for the scrubbed and deodorised air (8 on plan AMZ01_ SP_029b) .

f) The addition of a discharge of water to Spratford Stream via the surface water system

2. Regulatory Controls

The site planning permission has conditions which are regulated through the County Planning Authority Devon County Council.

The Environmental Permit and any amenity issues are regulated by the Environment Agency. The Environmental Permit for the operation is issued under the Environmental Permitting Regulations 2010.

All waste, including those included in the Environment Agency's position statement 029, entering and leaving the facility is subject to controls under Duty of Care legislation (Environment Protection Act 1990, Section 34).

The site will be subject to all Health and Safety regulation that covers industry from a national perspective and will endeavour to operate within the constraints of the said regulations.

3. Site Location and Sensitivities

The site is:

- Most of the site is in a groundwater source protection outer zone (zone 2). A very small part of the south west area of the site could fall into a zone 1 source protection zone, but due to the scale on the maps available it is unclear from the Environment Agency – What's in your backyard webpages

- Over 100 meters from Spratford Stream (ecological status: moderate) which flows in to the Lower Culm (ecological status: poor).

- Within 50 meters of a groundwater abstraction point to the west of site, which is used by the abattoir for processing. As of 2016 this abstraction point will become disused as the abattoir will use mains water.

- Not in a flood risk area.

- Not within the vicinity of any European protected sites; Ramsar, Special Areas of Conservation, Special Protection Areas. Closest protected area is 'Tidcombe Lane Fen' over 5km to the west of site.

- Not in an Air Quality Management Area as designated by Mid Devon District Council.

- Situated within a groundwater Nitrate Vulnerable Zone.

- Approximately 50 meters to the closest house from the site boundary. There are five houses on Lloyd Maunder Road between the M5 and the site. The town of Willand is immediately beyond the M5.

4. Site Activities

Overview

The purpose of the AD plant is:

- to manage a range of non-hazardous bio-degradable wastes and non-waste crop biomass as specified in table 1B in document 3863/2540/WA.
- to produce renewable energy
- to produce digestate to be used as a fertiliser and soil conditioner on surrounding farms.

The renewable energy produced is helping the UK to meet the 2050 emissions target of 10% of our primary energy needs coming from bioenergy.

The normal retention time for the digester will be a minimum of 50 days.

The digestate produced is rich in valuable nutrients including nitrogen, potassium and phosphate, helping to increase crop yields. Digestate which meets PAS 110 in its liquid form is to be de-watered to produce a solid digestate for use as a soil conditioner and fertiliser with the clean water produced being discharged to Spratford Stream..

It is hoped in the future that dried digestate can be used as a biomass fuel, subject to changes to existing regulatory limitations. Ammonia is recovered from the gaseous emissions from the process as ammonium suphate or ammonium nitrate.

Feedstocks

Total quantities of waste feedstocks accepted on site will amount to a maximum of 75,000 tonnes per annum. The total input to the plant will be up to 100,000tpa when crop feedstock is included. The crop feedstock falls outside the remit of the permit and the control of the EA (para 1.27 - How to comply with your environmental permit. Additional guidance for: Anaerobic Digestion Reference LIT 8737 November 2013 Version 1.0)

Feed systems

Liquid waste is transferred via inlet pipework to the liquids buffer tanks for pre-digestion storage, comprising of 4 number concrete tanks approximately 13 metres in diameter with a capacity of 1100m3 each. The tanks are erected on a reinforced flat concrete base and sealed to the base. The buffer tank is fitted with a submerged mechanical mixer to homogenise the contents. Liquid is automatically pumped into the digester by a positive displacement pump via a macerator to prevent any large object entering the digester.

All arable feedstocks and solid wastes will be processed in the reception building; deliveries will be brought in when required and stored within the building for feeding into the solids feeders within 8 days – a first in first out policy will be in place to ensure the oldest feedstocks are fed first. These feeders will have macerators in order to ensure no objects larger than 20mm can enter the digester. There will be separate feeders for solid waste and for arable feedstocks within the reception building.

Should there be unscheduled failure/ maintenance of the plant deliveries to site will be cancelled. As deliveries are daily and there is only storage capacity for a small amount of arable feedstocks it would mean no waste would be stored in the reception hall during periods of plant shutdown.

The solids feeders are 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 intervals predetermined to maintain optimum gas production.

All deliveries to site will be pre-arranged and the contents of the delivery checked before unloading. Waste transfer notes will be completed for any waste feedstocks and should the feedstock not match the description of what was pre-arranged the load will be rejected.

Vehicles leaving the reception building will go through a Rhino Enforcer wheel wash to disinfect the wheels before leaving site. The water from the wheel wash is collected safely in the wash platform and will be collected and tankered off site to an appropriate permitted site for disposal or recovery.

Semi-Plug Flow Digester

There are two number Semi-Plug flow digesters with a 25.34mm diameter and a capacity of 3800 m3 each. The digester is manufactured from prefabricated concrete panels and is constructed on a reinforced concrete base with the tank base sloping to a central discharge point. The tank is insulated with 100mm polystyrene panels.

The Semi-Plug flow digesters will be fed with arable feedstocks and animal manures from a designated feeder within the reception hall.

The digester is designed so that digesting material moves around the primary digester and then into the centre ring for additional digestion. The biogas produced is stored in gas holders above both digesters – there are also gas holders above the final digestate storage tanks.

The SCADA system allows for monitoring of the system and can provide detection of any leaks in the AD system.

CSTR tanks

The CSTR tanks will be fed with wastes coming from a feeder within the reception hall. There are 4 CSTR tanks made from Trifusion Steel with a capacity of 2300 m3 each, waste will be fed in to two of these tanks and then flow in turn into the next two tanks.

Digester Mixing System

The contents of the digester tanks are mixed by recirculating biogas through a series of nozzles cast into the tank base stratification and layering of digester contents. These mixing systems ensure that the substrate is mixed efficiently, a crust doesn't form on the surface and maximum biogas production is obtained.

Hydrogen Sulphide Removal

Biogas is cleaned in the digester head space by means of sulphate reducing bacteria. The bacteria require a source of oxygen, at low concentrations, to reduce hydrogen sulphide in the biogas to sulphur. The solid sulphur then precipitates out as part of the digestate. Air is injected into the head space of the digesters, at controlled, low concentrations, to provide suitable conditions for the bacteria to carry out this function.

Post-pasteurisation tanks

There are 3 100m3 post pasteurisation tanks on site; two of which are fed from the waste fed CSTR tanks and one of which is fed from the semi-plug flow digesters, fed by agricultural feedstocks. Once the material passes through these tanks it flows to the final digestate stores.

Digestate de-watering system (Morticia)

Digestate is dewatered using a "mortician dewatering system which uses a series of belt presses screw presses a cavitator and a vacuum evaporator system to produce solid digestate and clean water. The water is to be discharged to Spratford Stream via the site surface water system. Solid digestate is stored in a building provided for the purpose prior to removal off site for use as fertiliser. The dewatering system incorporates an ammonia scrubber and odour control system which discharges via an exhaust labelled 8 on Drawing AMZ01_SP_029b

Biogas Holder

The integral gas holders sit above the ring in ring digester tanks and also above the final digestate stores. They consist of a double membrane to ensure they maintain structure while containing the biogas. The membranes are made from PVC coated polyester fabric and have an anticipated lifespan of 18-20 years. The outer membrane is permanently inflated by means of a 1.5kW air blower to maintain a positive pressure on the inner membrane. The pressure on the inner membrane is sufficient to supply gas to the biogas boosters prior to supply to the Combined Heat and Power (CHP) unit. The inner membrane provides containment for the biogas and inflates and deflates according to biogas production and demand.

Combined Heat and Power Unit/ Gas upgrade

During normal plant operation biogas is utilised by the CHP unit on site to generate electricity. A 500kW CHP unit has been specified to accommodate the proposed level of biogas production and usage. The CHP is used to generate electricity for the site.

The hot water for the heat exchanger in the digester will be provided by the CHP unit or gas boilers. Hot water is re-circulated through the heat exchanger via a dedicated circulation pump from the CHP hot water heater.

In the event of CHP plant shut down (e.g. for maintenance operations) the biogas is diverted to one of two surplus gas flare units, which will only be operated in times of plant maintenance or breakdown.

The Biogas not utilised by the CHP will be upgraded in one of two gas upgrade units and sent to the grid.

Pressure and Vacuum Release Valves

The plant is equipped with a pressure release system which, during the unlikely event of excess gas build up, will allow for the excess biogas to be released. Such an occurrence would only take place should all alternatives be unavailable. Pressure and vacuum release valves are located on the digester roof biogas holders which are supplemented by pressure relief through condensate pots at the bottom of the gas line.

During normal operating circumstances the pressure relief valves will not be used. The pressure and vacuum release valves will only be used as a contingency to maintain structural integrity of the plant.

The pressure release valves themselves are not alarmed, however Amzco have fitted pressure transducers on the gas system and an alarm for when the gas system reaches high pressure. This alarm allows for action to be taken before the PRV's open, and allows for the operator to know when they have opened.

Control System

The operation of the biogas plant is fully automated from an on-site central control panel which monitors information transmitted from field instrumentation around the plant. This information can be viewed on site and also remotely including from a central control point Willand Biogas office and remotely at the Head office Cleave Farm, Templeton. Amzco via Biogest, provides a remote monitoring service via an internet connection as a back-up; advice given over the telephone to ensure optimisation of the AD process.

Digestate storage

There are three number digestate storage tanks on site, each with a capacity of 4626m3. These tanks are used to bulk the digestate for testing to PAS110 standards before de-watering or spreading to land directly. The bulk of the digestate will be treated through the de-watering unit the resulting solid digestate will be removed from site from within the storage building and taken to farms and spread to land. Contracts will be in place for farmers to take the digestate. During NVZ closed periods the solid digestate can be stored in field heaps which meet NVZ regulations.

There is appropriate secondary containment on site for the capacity of all the tanks as per regulations.

5. Feedstocks

The total quantity of waste or a combination of waste and non-waste including solids and liquids accepted at the site shall not exceed 500 tonnes in any one day.

Under normal operation the AD plant uses a combination of feed stocks. A full list of the waste feedstocks can be found in Appendix C.

Non-waste feedstocks include but are not limited to the materials below:-

Grass silage **(non-waste)**

Maize silage **(non-waste)**

Beet **(non-waste)**

Wheat grain **(non- waste)**

Other suitable crop/non-waste will be considered if it becomes available.

The total input to the plant is a maximum of 100,000 tonnes per annum. It is expected that waste:non-waste ratio will be around 50:50.

6. Process Monitoring & Regulation

Process monitoring is key to regulating the system and minimising the risk of any polluting emissions.

The SCADA system records:

- Gas quality (composition)
- Gas pressure
- Temperature
- Feeding rate

A sample from the digester is taken monthly and analysed by a suitably accredited laboratory for the following parameters:

- Various intermediate acidic compounds
- Ammonium Nitrate
- pH
- Alkalinity
- Volatile fatty acids

This process monitoring data is used to determine the health of the digester and alter the feeding rate and / or other parameters as necessary

Foam

The potential for foam production is very low given the feeding menu for this plant. If foam does start to become a problem, it will be detected during either:

- Daily visual inspections through the digester windows and/ or
- By the foam detectors on the two condensate traps which, when activated, automatically stop plant feeding.

If foam is detected by either of these means feedstocks and other operational parameters will be reviewed and changed as necessary and foam monitoring increased.

If foam persists antifoam oil will be added in measured amounts to the feedstock in the feeder and fed to the digester as part of the feed. If it is decided to temporarily stop feeding the plant, the anti-foam agent can be added via one of the multifunctional covers on top of the digester. More frequent visual checks will be undertaken to determine the effect of the antifoam additions and the quantities increased or decreased accordingly.

7. Identifying and Minimising Risks of Pollution

The anaerobic digestion operation at Willand has the potential to cause pollution through emissions to air (including odour and noise), emissions to surface water and groundwater and contamination of land.

An environmental risk assessment has been carried out see Appendix A.

8. Emissions to Air

As feedstocks enter the digester, they enter a closed system of tanks and pipes. The final digestate stores for the digestate are sealed concrete tanks.

The whole AD plant infrastructure including all tanks and pipes were fully tested during commissioning and are part of an ongoing inspection and maintenance programme. In addition to this any leaks in the system would be detected through pressure changes noted through the SCADA system and / or observation of a biogas type odour. Any losses of biogas from the system will be repaired as soon as practicably possible.

During normal operations, losses of biogas from the system will be minimal. Process monitoring of the system will ensure that gas production is regulated through an appropriate feeding rate such that the PRVs will not routinely open. There is a daily visual check of the PRVs to check that they are sealed. It is in the interests of Willand O&M Limited to carefully regulate the organic loading rate and other parameters to ensure that biogas production and use is maximised. The AD plant has a consistent feedstock helping to regulate the process.

PRVs are a contingency measure in place in the event that multiple plant components breakdown simultaneously – which is highly unlikely. Should the CHP/ Gas upgrade breakdown and there be an excess of biogas, the flare will burn the excess. Should the flare breakdown at the same time, the biogas will vent from the PRVs.

The provision in the permit variation of a second gas upgrade plant and grid injection point and a second flare unit reduce the likelihood of multiple system and plant failures leading to operation of the PRVs to negligible levels.

Emissions to air from the Purac upgrade unit consists of 98% Carbon Dioxide; under normal operation the exhaust gasses from the upgrade unit will contain < 3ppm H2S, <0.1% O2 + N2, 0.05% CH4 and 1.2% H2O.

During ‘ramp up’ of the plant the biomethane will not immediately meet the gas grind specification. During this period of time there will be flaring of Biogas. During normal operation, should the upgrade unit fail or breakdown the biogas would continue to run the CHP engine and should levels rise above what the CHP requires the biogas will be flared. Any breakdowns to the CHP unit and upgrade unit will be treated as priority to ensure the minimal amount of biogas will be flared.

The auxiliary flare will only be used during times of CHP maintenance and breakdown. The operating hours will be recorded and be available for inspection. The emissions from the flares will be monitored, should operational hours exceed 876 hours (10%) per year, by an MCERTS accredited or MCERTS certified contractor for the parameters in the table below. If the any of the limits are exceeded, a plan of action to bring the emission within the limits will be decided and submitted to the Environment Agency.

The flare units are Uniflare UFQ2164 UF10-1500s which are an enclosed design and can achieve 1000^{o}C with a >3 seconds retention time at this temperature.

Parameter	**Limit (including units)**	**Monitoring standard or method**
Oxides of Nitrogen	150 mg/m3	BS EN 14792
Carbon Monoxide	50 mg/m3	BS EN 15058
Total VOCs	10 mg/m3	BS EN 12619:2013

The emissions from the CHP stack will be monitored annually by an MCERTS accredited or MCERTS certified contractor, for the parameters in the table below. If any of the limits are exceeded, a plan of action to bring the emission within limits will be decided and submitted to the Environment Agency.

There will be appropriate servicing and maintenance of all site components to ensure they maintain efficiency and do not exceed emissions limits.

Parameter	**Limit (including units)**	**Monitoring standard or method**
Oxides of nitrogen	500 mg/m3	BS EN 14792
Carbon monoxide	1400 mg/m3	BS EN 15058
Sulphur dioxide	350 mg/m3	BS EN 14791
Total volatile organic compounds including methane	1000 mg/m3	BS EN 12619:2013

Hydrogen Sulphide (H2S) Reduction

As previously described, the hydrogen sulphide level in the biogas is regulated via the use of a biological desulphurisation net on the digesters supported by air injection. In reducing the levels of hydrogen sulphide in the biogas, this protects the function of the CHP but also reduces emissions of sulphur dioxide through the stack and reduces the odour potential of any release of biogas from PRVs.

Monitoring points

All point source to air emission monitoring points will meet the requirements of guidance note "TGN M1 Sampling requirements for stack emission monitoring"

a) Control of Odour
   It is recognised that the AD operation has the potential to create odour nuisance. As such an Odour Management Plan has been drawn up. This is a document that identifies all the processes in the permitted area that have the potential to generate odour and the receptors that may be affected by odour by windblown emissions. The plan also details what odour mitigation measures are already in place. If the operation causes substantiated odour reports then the operator will provide a more detailed OMP and include additional mitigation if necessary. Reference Willand OMP.

b) Control of Noise
   Vehicle movements and digester operations are the two anticipated sources of noise. Noise caused by the plant operations are considered to be minimal. Additionally, the CHP is housed within a purpose built sound attenuated container. All ancillary plant such as generators, compressors and pumps are positioned so as to cause minimum noise disturbance. Compressors that have been known to cause noise issues on other sites will be housed within a noise attenuating building.

All vehicles and mechanical plant employed at the site shall be maintained in good efficient working order.

Machines in intermittent use are shut down or throttled down in the intervening periods when not in use or throttled down to a minimum.

All fixed and mobile plant based at and operating within the site are fitted with attenuated reversing alarms.

9. Emissions to Surface Water and Groundwater

Biogas condensate is collected and pumped into the buffer tank for processing in the AD.

Every day the AD Plant Manager checks that if there is clean water run off coming off site it is free from any signs of pollution. The surface water and when operational discharge from the de-watering system, will enter a balancing and water collection facility prior to discharge to Spratford Stream This water is harvested for use in the plant and discharge to Spratford Stream will usually occur only as a result of heavy and persistent rainfall. If any malodour, discoloration or fungus is found in the stream or the balancing facility then the Environment Agency will be notified, the source of the pollution will be investigated and appropriate remedial action taken.

The storage of oils, fuels or chemicals for operations will be stored in a lockable container with a 110% secondary containment bund around it in case of any leak. Raw materials used and stored on site are shown in the raw materials table in appendix b.

Digester tanks, digestate store and all associated pipes and pumps will be fully tested prior to plant commissioning by Amzco and Biogest. A full inspection and maintenance plan have been put in place to ensure the ongoing integrity of the plant. The maintenance plan will ensure the plant maintains its integrity and operates efficiently for at least 20 years. Each part of the plant has a different life cycle but any parts with a life cycle of less than 20 years will be replaced as part of the planned maintenance activities. The digesters and final storage tanks have a design life exceeding 20years.

Any leaks in pipework will be detected through pressure gauges on pumps. There is a visual daily check on pump pressures.

The Purac units that are used to upgrade the biogas to biomethane will re-circulate the condensate back through the AD system so there will be no emissions to water from the Purac unit.

The process is closely monitored to ensure the early detection of any changes which may have the potential to put the infrastructure at risk of catastrophic failure (see section 6 Process Monitoring). The plant has telemetry alarms which enables the operator to be notified of any changes within or outside operational hours. Willand head office will also have access to the SCADA system and be able to provide online / telephone support.

The minor leaks and spills will be observed during daily site checks and cleared up as soon as practicably possible. Any spills of organic material will be cleared up and processed through the AD system provided they are not contaminated. Reference CPR9SRP Spill Response Procedure.

Appropriate secondary containment is in place on site and the calculations and layout of this is shown in the Willand bund calculations drawing. The bund will be lined with 2mm thick HDPE liner of landfill specification (Enviroseal). There is a penstock on site to ensure no water is able to escape from the bunded area, each morning visual checks will be carried out to ensure no contamination of the clean water system has occurred after which this water will be released as clean uncontaminated rainwater to the attenuation pond.

Should there be a fire on site the fire water will be secured on site within the bunded area and will be removed from site and removed to an appropriate permitted site

Through the measures described above, the risk of contamination of land through the process is minimised.

9a. Discharge of water from digestate de-watering system.

The Morticia digestate de-watering system uses a vacuum evaporator which produces a clean condensate which is conditioned and re-oxidised through a cyclone. The water is continuously tested as it flows from one tank to the next.

The water is tested for pH, conductivity, ammoniacal N, turbidity and a bacterial screen if these tests meet the discharge criteria it is then released into the surface water drainage system.

If a breach of discharge limits is detected the water from the primary tank is directed to the start of the process until continuous testing of the return line shows it has returned to compliance.

The surface drainage system discharges into the Spratford Stream most of the surface and discharge water is re-used within the site.

A sample is sent once every 6 months for confirmatory testing at an MCERTS accredited laboratory which tests for the screening parameters plus mercury cadmium and BOD (5 day)

The parameters which are tested for and limits derived from table in BAT Conclusions) for waste treatment and a Controlled Waters Risk Assessment (3863-2540-DIS are set out in the table below.

Parameter	Sampling frequency/where undertaken	Discharge limit.
Volume	Continuous	270m^3/day
pH	Every batch/on-site 6 monthly/MCERTS lab	6-8
Conductivity	Every batch/on-site 6 monthly/MCERTS lab	2,000µs/cm
Ammoniacal N	Every batch/on-site 6 monthly/MCERTS lab	0.491mg/l
Turbidity (Expressed as Suspended Solids)	Every batch/on-site 6 monthly/MCERTS lab	30 mg/l
Bacterial Screen	Every batch/on-site 6 monthly/MCERTS lab	To be determined as a comparison to BOD.
Mercury	6 monthly/MCERTS lab	2.428 µg/l
Cadmium	6 monthly/MCERTS lab	7.284 µg/l
BOD(5day)	6 monthly/MCERTS lab	20mg/l (5day)

If at any time the discharge exceeds any of the limits set in the permit it will be reported forthwith to the EA on the form(s) provided in the permit.

10 Other Amenity Impacts

a) Control of Mud
The site access road and main access areas will be finished with stone or scrapings to provide vehicles with easy access and minimise the spread of mud.

b) Control of Pests
Rat bait is deployed at key locations on the site to minimise pest numbers.
In the event that pests are detected on site, immediate action will be taken to eliminate the infestation. Any incident will be recorded in the site diary. Reference Pest Control Policy.

c) Control of Litter
Litter associated with feedstock is not expected. Any waste arising will be stored securely and disposed of appropriately.
In the event that litter does escape the site, action shall be taken to retrieve the litter by the end of each working day.

11. Operations and Maintenance

The operator is responsible for carrying out daily, weekly and monthly checks on the AD plant and associated infrastructure and any emissions. A weekly report is generated by the AD Plant Manager which is sent to management for review and for the completion of any required actions. Reference daily / weekly and monthly checklist.

The plant is under warranty to Amzco and Biogest Ltd until 12 months after Acceptance. Willand O&M Limited will set up necessary specialist service and maintenance contracts following Acceptance of the plant

The plant is operated in accordance with the operating manuals provided by Biogest Limited. These will be incorporated into the site operating manuals which will also detail safety instructions and hazard warnings for each element of the infrastructure including the silage clamps, drainage, weighbridge and drier all of which were not provided by Marches Biogas Limited.

There is a Planned Preventative Maintenance procedure in place in line with Biogest Limited recommendations. Maintenance logs are held in the site office. It is planned to have Critical Spares stored on site.

The CHP is currently serviced and maintained by a third party under contract to Willand Biogas LLP. Willand O&M Limited will extend this contract or contract a similarly qualified specialist contractor after Acceptance of the plant from Biogest Limited.

12. Accident Management Plan

See ‘Accident management Plan Willand’

13. Complaints

It is important to Willand O&M Limited to be a good neighbour and to ensure that the operations at the AD plant do not have an adverse effect on the local community. All complaints will be recorded on CPR3CRF Complaint Record Form and fully investigated. Action will be taken to rectify the situation as necessary and to let the complainant know what this action has been. Reference CPR3CP Complaints Procedure.

14. Staff Training and Competence

Operational Training

The technology providers Marches Biogas Limited have provided a program of operational training through commissioning and start up phases. WBG have a program of training set up for all AD Plant Managers and Operatives which includes all necessary training for health and safety and environmental compliance. The training matrix also includes dates for refreshing and updating training.

A log will be kept in the site office with a training record for each staff member.

Permit Compliance Training

Staff undergo training before commencing site deployment to be sure that they are aware of all requirements of the Permit Conditions and of the procedures laid out in the Environment Management System, and specifically in the aspects which are relevant to their duties.

There will be at least one supervisory staff member that is suitably trained and fully conversant with the requirements of the permit conditions at all times the site is staffed.

A copy of the Environmental Permit is available to all staff members on site for reference purposes.

Technical Competence Training

The company has 2 employees undertaking training for the WAMITAB Certificate of Technical Competence, (MROC5) and we are awaiting results for other employees who have undergone assessment. All Technically Competent Managers will complete Continuing Competence test at the required time every 2 years. The site will be manned by a Technically Competent Manager for at least the minimum attendance period assigned by 'How to Comply with your Environmental Permit.'

15 Site Records

15a. Records of Waste Movement

Records shall be kept of all wastes deliveries to the site. The record shall include the following details:

- Date and time of delivery
- Origin of waste
- Nature of waste received including EWC code
- Quantity of waste (measured on weighbridge)
- Driver name
- Vehicle registration
- Waste Carriers Registration

The operator will submit quarterly waste tonnage returns to the Environment Agency within one month of the end of the quarter. The waste return will specify tonnages of waste accepted and removed from the site.

15b. Records of Waste Treatment

All operations are recorded by data loggers and are regularly downloaded to the plant computer kept on site and sent to WBG.

15c. Dispatch of Product

Where digestate is dispatched, a record shall be kept of all product despatched from the site. The record shall include the following details:

- Quantity and weight of product
- Intended delivery location
- Date and time of despatch
- Driver's name
- Vehicle registration

15d. Discharge to surface water.

The quantity of water discharged from the Morticia de-watering plant to surface discharge is continuously monitored using an MCERTS approved flow meter and this data is inputted into the site control system. This raises an alarm if the flow is nearing permitted levels. If there is any breach of the permit conditions governing the discharge this will be reported to the EA forthwith on the appropriate form from the permit. The volume of discharge will be reported annually.

15e. Site Diary

A site diary is kept secure and will be available for inspection when required by an authorised officer of the Environment Agency. The diary shall include a record of the following events:

- Maintenance
- Breakdowns
- Emergencies
- Any problems with feedstocks and action taken
- Site inspections
- Attendance of Technically Competent Management
- Despatch of records to the Environment Agency
- Complaints about the site operation and actions taken
- Environment problems and remedial actions
- On site daily weather conditions

16. Environmental Compliance Review

The WBG Compliance Team carry out internal audits of environmental compliance and will be regularly reporting the results of these audits to the Board of Directors. All required actions will be minuted and closed out through this process. If any changes are made to operational procedures as a result, the relevant procedure(s) will be amended and reissued in accordance with the CPR2DCP Document Control Procedure.

17. Related & Supporting Documents

Environmental Policy Statement

Accident Management Plan Wiland

Odour Management Plan for Willand Anaerobic Digester

CPR5WM AD Site Waste Management Procedure

Pest Control Policy

Daily / Weekly / Monthly checklist

CPR1IRP Incident Reporting Procedure

CPR1IRF Incident Report Form

CPR6FERP Fire and Explosion Response Plan

CPR7GLRP Gas Leak Response Plan

CPR9SRP Spill Response Procedure

CPR2DCP Document Control Procedure

CPR3CP Complaints Procedure

CPR3CRF Complaint Record Form

Training Records

Gas upgrade spec.

Uniflare spec.

19. Appendices

Appendix A: Environmental Risk Assessment

Data and information					**Judgement**			**Action**	
Receptor	Source	Harm	**Pathway**	**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**	**Risk management**	**Residual risk**
What is at risk? What do I wish to protect?	What is the agent or process with potential to cause harm?	What are the harmful consequences if things go wrong?	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management? (This residual risk will be controlled by Compliance Assessment)**
Local human population.	Releases of NOx from the CHP	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Low	Medium	Medium	There is potential for exposure to anyone living close to the site or at locations where members of the public might be regularly exposed.	Activities shall be managed and operated in accordance with a management system (will include inspection and maintenance of equipment, including engine management systems), point source emissions to air	Low

Data and information					**Judgement**			**Action**	
Receptor	Source	Harm	**Pathway**	**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**	**Risk management**	**Residual risk**
								with emission limits for NOx (annual emissions to air monitoring to be carried out by MCERTS accredited contractor). The site is not located in an Air Quality Management Area.	
Local human population.	Releases of CO and other gases from the CHP	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Low	Medium	Low	Monitoring of CO levels in biogas driven CHP plants has shown CO to be typically present at below benchmark levels as indicated in Agency Guidance LFTGN08.	As above and point source emissions to air with emission limits for CO.	Low

Data and information					**Judgement**			**Action**	
Receptor	Source	Harm	**Pathway**	**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**	**Risk management**	**Residual risk**
Local human population.	Release of dust and microorganisms (bioaerosols).	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Medium	High	Medium	Potential for release at silage clamps if not maintained appropriately.	Liquid and solid digestate stores undercover.	Low
Local human population.	Odour	Nuisance, loss of amenity.	Air transport then inhalation.	Medium	Medium	Medium	Local residents often sensitive to odour. Waste types/odours are typical to those already used on agricultural premises.	The operation is run in accordance with an odour management plan. Using appropriate measures (e.g. regulation of AD process through process monitoring) emissions of biogas are minimised.	Low
Local human population.	Noise and vibration.	Nuisance, loss of amenity, loss of sleep.	Noise through the air and vibration through the ground.	Medium	Medium	Medium	Noise and vibrations not expected to be excessive but AD is a 24 hour a day process.	Noise and vibration shall be minimised and not cause nuisance. A noise and vibration management plan will be	Low

Data and information					**Judgement**			**Action**	
Receptor	Source	Harm	**Pathway**	**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**	**Risk management**	**Residual risk**
								written and actioned if necessary. The proposed de-watering plant will have no additional impact on noise at the site boundary.	
Local human population and / or livestock after gaining unauthorised access to the installation.	All on-site hazards: machinery.	Bodily injury.	Direct physical contact.	Low	Medium	Low	Direct physical contact is minimised by activity being carried out within enclosed digesters so a low magnitude risk is estimated.	Activities are managed and operated in accordance with a management system (will include site security measures to prevent unauthorised access).	Low
Local human population and local environment.	Arson and / or vandalism causing the release of polluting materials to air (smoke or	Respiratory irritation, illness and nuisance to local population. Injury to staff, fire	Air transport of smoke. Spillages and contaminated firewater by direct run-off from site and via surface	Low	High	Medium	Although biogas is flammable, risk of direct physical contact is reduced by activity being	An accident management plan is required as part of management system (includes fire and spillages).	Low

Data and information					**Judgement**			**Action**	
Receptor	Source	Harm	**Pathway**	**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**	**Risk management**	**Residual risk**
	fumes), water or land.	fighters or arsonists/vandals. Pollution of water or land.	water drains and ditches.				carried out within enclosed systems. As well as security measures in place to secure the site from the public.		
Local human population and local environment.	Accidental explosion of biogas.	Respiratory irritation, illness and nuisance to local population. Injury to staff, fire fighters or arsonists/vandals. Pollution of water or land.	Air transport. Spillages and digestate direct run-off from site and via surface water drains and ditches.	Low	High	Medium	Unlikely to happen - reduce by effective management systems.	Management systems in place to ensure regulation of process. Monitoring and telemetry to give early warming of any issues.	Low

Data and information					**Judgement**			**Action**	
Receptor	Source	Harm	**Pathway**	**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**	**Risk management**	**Residual risk**
Local human population and local environment.	Accidental fire causing the release of polluting materials to air (smoke or fumes), water or land.	Respiratory irritation, illness and nuisance to local population. Injury to staff or fire fighters. Pollution of water or land.	As above.	Low	Medium	Medium	Risk of accidental combustion of waste is moderate.	All staff and contractors trained in Health and Safety procedures.	Low
All surface waters close to and downstream of site.	Spillage of liquids, including oil.	Acute effects: fish kill.	Direct run-off from site across ground surface, via surface water drains, ditches etc.	Low	Medium	Low	Potential for spillage from digestions tanks and storage vessels.	Digestion tanks built to appropriate standard, All biogas condensate shall be discharged into a sealed drainage system. Impervious surface for storage of all wastes with sealed drainage system.	Low

Data and information					**Judgement**			**Action**	
Receptor	Source	Harm	**Pathway**	**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**	**Risk management**	**Residual risk**
All surface waters close to and downstream of site.	As above.	Chronic effects: deterioration of water quality.	As above. Indirect run-off via the soil layer.	Low	Medium	Low	As above	As above	Low
Abstraction from watercourse downstream of facility (for agricultural or potable use).	As above.	Acute effects, closure of abstraction intakes.	Direct run-off from site across ground surface, via surface water drains, ditches etc. then abstraction.	Low	Medium	Medium	As above	As above	Low
Spratford Stream	Discharge of water from de-watering plant	Chronic effects: deterioration of water quality. Acute effects, closure of abstraction intakes.	Discharge to Spratford stream via surface water drainage system	Low	Medium	Medium	Discharge limits and reporting of breaches set in the permit	Continuous monitoring of every discharge on-site to ensure it meets the limits set in the permit at all times. Check monitoring every 6 months.	Low

Data and information					**Judgement**			**Action**	
Receptor	Source	Harm	**Pathway**	**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**	**Risk management**	**Residual risk**
Groundwater	Spillage of liquids	Chronic effects: contamination of groundwater, requiring treatment of water or closure of borehole.	Transport through soil/groundwater then extraction at borehole.	Low	Medium	Low	Potential for spillage from digestions tanks and storage vessels.	Potentially polluting materials retained in pressure tested and impermeable structures. Site has impermeable secondary containment in line with EA guidance on secondary containment.	Low
Protected nature conservation sites - European sites and SSSIs.	Any, but principally NOx.	Harm to protected site through toxic contamination, nutrient enrichment, disturbance etc.	Any	Low	Medium	Low	Emissions to air may cause harm to and deterioration of nature conservation sites.	Site is more than 200 metres from any protected nature conservation sites; potential hazards from the permitted activities pose a low risk to the broad sensitivity of species and habitats groups. Emission to air limits for stack	Low

Data and information					**Judgement**			**Action**	
Receptor	Source	Harm	**Pathway**	**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**	**Risk management**	**Residual risk**
								gases are specified.	

Appendix B Raw Materials Table Q Form C3 - Q3c Tab 5 and Q6d

Equipment	Description	Manufacturer	Type	Media	Plant quantity	Annual usage	Max amount in store
Gas upgrade units (2No.) (Purac)	Capture Liquid	Dow Sveridge AB	Ucarsol AP Solvent 814	Liquid 50% solution with demineralised water	2800l	200l	
	Glycol	Brenntag Nordic AB	Zitrec-20 FAT 205kg/Ethyleneglycol (35%)	Mixed with water	200	<1l	
	Antifoam	Dow Sveridge AB	Ucarsol GT-10 Antifoam	Liquid	100l	<1l	
	Activated Carbon	Chemviron Carbon	SOLCARB KS3	Beads	2,000kg	2,000kg	
	Salt tablets	Inowroclawskie Kompanie	Salt Tablets	Tablets	200kg	100kg	
	Solid Material for gas drying PSA	GRACE Gmbh &Co. KG	Sylobead MS 546C	Granular	0.6m^3	0.12m^3 (changed every 5 years)	n/a
	Compressor Oil	Gardner Denver	Gear Lube 150	Oil	160kg	160kg	n/a
CHP (Jenbacher)	Engine Oil			Oil	450l	2700l	
	Glycol Inhibitor			Liquid	200l	0.12m^3 (changed every 2 years)	n/a
Gas Enrty Units (2 No.) (Siemens)	Nitrogen			Gas	100l	100l	
	Propane			Liquid	27,600l	200,000m^3 (gas)	
	Helium			Gas	200l	200l	
	OFGEM Calibration Gasses			Gas	100l	100l	
	C6+ Cal Gas			Gas	20l	20l	
	BIO EL Cal Gas			Gas	20l	20l	
	Gas Odorant			Gas	100l	40l	
AD Plant	Ferric Chloride 20%			Liquid	2000l	2000l	
	General Oil			Oil	50l	50l	
	General Greases			Grease	60l	60l	
Dewatering Plant (Morticia)	Hydrated Lime			Solid	n/a	756t	70m^3
	Sulphuric Acid		1 mol solution	Liquid	n/a	68t	7t
	Polyacrylamide (PAM)			Liquid	n/a	45t	7t

Appendix C Waste types

3784/701/WA Form C3 Table 1b Wastes Accepted (Installation Permit)

Waste types	
Maximum quantities The total quantity of waste accepted at the site shall be no more than 75,000 tonnes per year.	
Waste Codes	**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 − vegetables, fruit and other crops
02 01 02	animal tissue waste
02 01 03	plant tissue waste
02 01 06	animal faeces, urine, manure (including spoiled straw) only[1]
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 02 99	sludges from gelatine production, animal gut contents
02 03	**wastes from fruit, vegetables, cereals, edible oils, cocoa, coffee, tea and tobacco preparation and processing; conserve production; yeast and yeast extract production, molasses preparation and fermentation**
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 03 99	sludge from production of edible fats and oils to include seasoning residues, molasses residues, residues from production of potato, corn or rice starch

Waste Codes	Description
02 04 03	sludges from on-site effluent treatment
02 04 99	other biodegradable wastes
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 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 treatment
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 treatment
02 07 99	spent grains, hops and whisky filter sheets/ cloths, yeast and yeast like residues, sludge from production process
19	**WASTE FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE**
19 02	**wastes from physiochemical treatments of waste**
19 02 10	glycerol not designated as hazardous i.e excludes EWC code 19 02 08
19 06	**waste from anaerobic treatment of waste**
20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS**
20 01	**municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions**
20 01 08	biodegradable kitchen and canteen waste
20 01 25	edible oil and fat

Waste Codes	Description
20 02 01	biodegradable waste
20 03	**other municipal wastes**
20 03 01	mixed municipal waste − only separately collected wastes of types listed within this table, Table 2.3
20 03 02	wastes from markets, allowed only if source segregated biodegradable fractions e.g. plant material, fruit and vegetables

1. The waste type currently permitted.

APPENDIX D

Waste arising on site.

All wastes are dealt with in accordance with the waste hierarchy.

Office and sundry wastes are removed to a suitably permitted facility for sorting for recycling/energy recovery.

The process wastes are all re-entered into the AD process.

Any non-degradable wastes arising from the AD process are removed to a suitably permitted facility for sorting for preparation for re-use, recycling or energy recovery.

DOCUMENT CHANGE RECORD

Issue Number: 2.1 **Issue Date: 05/2019** **Changed by: RD/CH**	*Reason for issue/Changes to document* *Amendment for expanded waste types and installation of de-watering plant.*