

Prepared for Natural Resources Wales

Silent Valley Landfill Site and Gas Utilisation Plant

Site Management Plan

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1 Introduction

The Site Management Plan sets out the site-specific operational procedures to be used to manage the Activities at the Silent Valley Landfill Site gas utilisation plant.

The Site is shown in Figures 1 and 2 in Appendix A. The site comprises one off containerised generating set with an electrical capacity of 600 kWe (equivalent of 1.5 MW thermal capacity). Landfill gas fuel will be delivered to the engine from the Gas Plant on the site via buried MDPE gas main. The Silent Valley Landfill Site gas utilisation plant will also have a standby flare installed to flare landfill gas from the site should the engine not require it.

2 Site Infrastructure

The Site layout is shown in Appendix A. The principal sections of plant are:

- Gas plant and flare
- Gas delivery main
- Generating set
- Electrical system
- Condensate drains
- Ancillaries

2.1 Gas Plant

This comprises extraction fans, pipework, instruments, controls and flare to safely extract landfill gas from the landfill site and deliver it to either the generator or combust it safely within the flare. The plant consists of two gas boosters driven by an electric motor. These provide suction to the gas collection system and deliver the extracted gas under pressure to the generators via the gas delivery main. Pressure control is maintained by varying the spill to the flare.

The flare has a capacity of 500 Nm³/hr and a turn down ratio of 5:1. The flare controls the combustion air via louvers to maintain a temperature of 1000 degrees over these flow rates. The flare has a minimum residence time of 0.3 secs.

A valved condensate drain connects into the condensate system from the incoming Condensate Collection Pot on the gas plant.

Power is supplied to the gas plant from the three-phase distribution board in the LV room.

2.2 Gas Delivery Main

The gas delivery main is installed in 200 and 160 mm diameter black MDPE pipe with a SDR of 17.6. Isolation valves are provided on the exit from the gas plant and the inlet to the engine.

A valved positive pressure condensate drain connects into the condensate system from the low spot on the gas delivery main.

2.3 Generating Sets

One containerised gas generating set will be installed at the site. This consists of an MWM spark ignition engine and an alternator set with the necessary controls and instrumentation to operate on landfill gas and export electricity to the local grid. The generator has an engine capacity of 600 kW_e. At full load the generators will consume 325 Nm³/hr of landfill gas at 50% methane. Ancillary systems will be fitted to the container, including gas delivery, lubrication oil, cooling (including radiators), and electrical (including the synchronising breaker and control panel).

The generator will export electricity via the site electrical system.

The generator will be connected to a mobile phone modem to provide remote monitoring. The generator container will be bunded and has sufficient capacity to hold at least 110% the lube oil capacity of the generator.

The manuals for the generating set will be held on site in the container with further copies held in the Head Offices of Silent Valley Waste Services Limited and Renewable Power Systems Limited.

2.4 Lube Oil Storage

Bulk oil storage tanks will be present in the container for the new and used lube oil. The tanks are within the bunded container.

Additional bunded storage will be provided on site for ancillary chemicals and fluids (such as anti-freeze and deionised water) in the form of a covered bunded barrel store. These are capable of taking four 205l barrels or a single 1000l IBC and have a spill capacity of 1100l.

2.5 Electrical System

The electrical system consists of two transformers and switchgear to transform the electricity to 11000 volts from 415V at the generator. This is then exported to the WPD local network via HV Metering switchgear.

A supply will be taken from both transformer LV sides to provide three phase power to the ancillary systems on the site and to provide power to the landfill site via a changeover switch. If the generator is not running the site can import power from the WPD network to run all the ancillary systems on the site.

A 3 Phase LV supply will be provided to the gas plant and a compressor.

Single phase power will be provided to the buildings and the lighting.

The manuals for the electrical system will be held on site in the Site Office with a copy held in the RPS Head Office.

2.6 Condensate Drains

The condensate drains will be installed in 32 mm MDPE and connected to KOP on the gas collection system to drain condensate from the plant. The system operates using the suction from the gas plant to draw condensate into the KOP. Condensate is removed from the KOP by a pump.

All condensate drains are manual and will be opened as part of the normal maintenance procedures.

2.7 Ancillaries

The ancillaries will comprise the LV room, fencing, security and signage. The LV room also doubles as a store and compressor housing.

The compound is surrounded by a palisade fence with a single set of access gates. Warning signs are posted on the gate.

Service ducts are installed in the compound for signal and electrical cables.

Concrete bases have been installed for each building and piece of plant.

3 Environmental Management

3.1 Baseline

3.1.1 Environmental Impact

3.1.1.1 Energy

Silent Valley Landfill Site gas utilisation plant produces electricity from landfill gas (up to 0.6 MW at full load). The amount is set by the extraction rate of landfill gas from the landfill site which is controlled by the production rate. The generator will also be off for planned and unplanned maintenance (when it will not be able to produce electricity).

The generator is up to 40% efficient at full load in converting the landfill gas into electricity. The generating sets reject significant amounts of heat from the jacket water circuit via the radiators and via the exhaust.

Parasitic losses are set by the energy consumption of the gas plant and ancillary systems on the generators.

The site will import electricity when the engines are not running.

Baseline data is available for energy production and consumption (please refer to the public register on the Natural Resources Wales website for historical Annual Permit Reports¹).

3.1.1.2 Raw Materials

Raw material consumption is principally landfill gas. The generating set also uses lubrication oil that must be changed regularly to prevent the build-up of contaminants in the engines from contaminants in the landfill gas (such as siloxanes and acid gases). In addition, water and glycol will be used to top up the radiator circuits on the generating sets.

Baseline data is available for the consumption of these products (please refer to the public register on the Natural Resources Wales website for historical Engine Emissions Reports²).

¹

<https://publicregister.naturalresources.wales/Search/Results?SearchTerm=ZP3535SQ&sortBy=Relevance&filters%5BLocation%5D=&filters%5BLocalAuthority%5D=>

²

<https://publicregister.naturalresources.wales/Search/Results?SearchTerm=ZP3535SQ&sortBy=Relevance&filters%5BLocation%5D=&filters%5BLocalAuthority%5D=>

3.1.1.3 Waste

Waste engine lubrication oil will be produced when the oil is changed in a generator due to contamination. Additionally waste rags and the like will also be produced (e.g. from cleaning up oil spills).

Baseline data is available for the production of waste (please refer to the public register on the Natural Resources Wales website for historical Engine Emissions Reports³).

3.1.2 Risks

The principal risks to the environment from operations on the site are:

- Accidental release of raw landfill gas from the pipework system and sample points causing odour and greenhouse gas emissions
- Accidental spill of lubrication oil (new/used) on transfer and on delivery/collection leading to contamination of the ground
- Out of specification emissions to air by the generator leading to local air pollution

3

<https://publicregister.naturalresources.wales/Search/Results?SearchTerm=ZP3535SQ&sortBy=Relevance&filters%5BLocation%5D=&filters%5BLocalAuthority%5D=>

3.2 Legislation and Regulations

The following legislation applies to the Silent Valley Landfill Site gas utilisation plant.

3.2.1 The Environmental Permitting (England and Wales)

Regulations 2007, 2016, 2018

Establishes a pollution control regime for certain installations or mobile plant.

Sets out a permitting regime based on Best Available Techniques for regulating installations and activities. The Silent Valley Landfill Site gas utilisation plant must comply with the Landfill Site Permit issued under this legislation.

3.2.2 The Environmental Protection (Duty of Care) Regulations 1991

Creates a duty of care for controlled waste that requires all producers, carriers and managers of waste to keep records and use waste transfer notes.

Businesses must:

- store waste appropriately and securely so it does not escape;
- check that waste is transported and handled by people or businesses that are authorised to do so.

- complete waste transfer notes (WTNs) to document all waste transferred and keep them as a record for at least two years.
- check that the site waste is taken to is authorised to accept it.

Waste oil and other wastes must be stored on site securely, collected by a registered carrier for appropriate reprocessing and waste transfer notes filled in and kept.

3.2.3 Waste Batteries and Accumulators Regulations 2009 SI 890

Establishes a legal framework and schemes for collecting, treating and recycling portable, industrial and vehicle batteries. Disposal of waste industrial and automotive batteries by landfill or by incineration has been banned from 1 January 2010.

Used batteries from the generators must be stored securely, collected by a registered carrier for appropriate reprocessing and waste transfer notes filled in and kept.

3.2.4 The Landfill (England and Wales) Regulations 2002

Introduces permits to create and operate a landfill, and sets out which categories of waste can be accepted at each class of landfill site. Also sets out a pollution control regime. Prevents the disposal of liquid wastes to landfill.

Waste oil and batteries should not be disposed of to landfill.

3.3 Environmental Policy

The Environmental Policy for Blaenau Gwent County Borough Council (of which Silent Valley Waste Services Limited is a subsidiary) is set out in the link below:

- <https://www.blaenau-gwent.gov.uk/en/council/policies-plans-strategies>

- https://www.blaenau-gwent.gov.uk/media/f05p31mq/bgcbc_decarbonisation_plan_2030__council_version_.pdf

3.4 Environmental Performance Targets

Targets must be specific, measurable, achievable, realistic and time-limited.

3.4.1 Energy

The target for energy production is to achieve availability of 8,000 hours on the generating set where there is sufficient gas available to operate the set.

3.4.2 Raw Materials

The aim is to utilise the landfill gas in the first year of operation at a net efficiency of 35% after parasitic usage and import energy.

3.4.3 Waste

Waste production is set by the requirement to change the oil, over which there is no control as it is due to contaminant levels in the landfill gas therefore no target will be set for waste production.

3.4.4 Environmental Incidents

The target is to have zero environmental incidents i.e. the generator set exceeding the emissions limits or major spills of oil.

The target is to have less than six minor spills which require clean up with a spill kit but no removal of contaminated ground.

4 Site Management and Control Procedures

4.1 Site Access

The site is to be kept locked unless an Authorised Operative is present. All personnel working on the site or visiting the site independently of an Authorised Operative are to have an induction. Authorised Operatives are those persons working for Silent Valley Waste Services Limited or one of their agents or subcontractors who has had an induction. The site shall be kept locked when no personnel are in the compound to prevent unauthorised access.

4.1.1 Inductions

Inductions will be presented by Silent Valley Waste Services' Site Manager. The induction shall cover the basics of the plant operation, emergency procedures and permit requirements

4.1.2 Signing In

All visitors and workers are to sign in and out in the signing in sheets in the LV Room

4.1.3 Sub-Contractors

A number of sub-contractors are to be employed on the site to carry out maintenance and monitoring tasks:

- Renewable Power Systems (RPS) – supply technicians to monitor site
- Electrical Power Solutions (EPS) – Electrical System O&M
- Landfill Systems Maintenance (LSM) – Gas Plant O&M

Others may be employed from time to time for other minor works.

4.2 Routine Maintenance and Inspection

A daily check of the generating sets will be performed by telemetry and a weekly check of the site will be performed by the RPS Technician, who will report any key findings or issues to the Council's Site Manager.

4.2.1 Daily Site Checks

RPS will dial into the generator every day to check that the generating set is running. Any problems identified by the checks will be actioned by the on-call RPS Site Engineer.

4.2.2 Weekly Site Inspection

The RPS Technician will carry out a weekly check of the site.

- Record export meter and consumption data
- Record generating set data
- Record gas plant data
- Drain all condensate points
- Carry out visual inspection of the compound for oil spills and rubbish
- Carry out site walk over for odours and noise.
- Make visual inspection of generator exhausts for smoke/particulates

Results of the inspection shall be recorded electronically. Any non-conformance events will be recorded and reported to the RPS Site Manager who will action the necessary contractor, and will notify any significant issues to the Council's Site Manager.

4.2.3 Gas Plant and Flare

The gas plant will be serviced on a six-monthly basis by LSM in accordance with the manufacturers' instruction. A record of the service shall be stored in the Site Office.

4.2.4 Gas Delivery Main

No ongoing maintenance is required or envisaged. The gas delivery mains are pressure tested as part of the commissioning procedures. Should weekly odour monitoring suggest any leakage a new pressure test will be undertaken. Once per year a visual inspection of the exposed system will be undertaken and a soap and water test carried out on all exposed joints.

4.2.5 Generating Set

The generating set will be maintained according to the manufacturers' instructions by RPS Site Engineers. The manuals will be stored on site in the container.

4.2.6 Electrical System

An annual inspection and testing of the electrical system will be carried out on the EPS according to the manufacturers' instructions. A record of the inspection and testing will be retained in the Site Office.

4.2.7 Lube Oil Storage

Transfer and deliveries of oil will be conducted as follows:

4.2.7.1 Deliveries of lubrication oil to site

- Delivered by oil tanker with 1200 litres on board
- The tanker will be met by a RPS Site Engineer
- The tanker will connect the feed pipe to the threaded fitting on the tank

and the valve opened

- There is a level alarm if over filling does occur
- The tank over flow is into the integral bund if over filling occurs

4.2.7.2 Removal of used lubrication oil from site

- Removed by oil tanker with a pump
- The tanker will be met by a RPS Site Engineer
- The tanker will connect the removal pipe to the threaded fitting on the tank and open the valve.
- The tank will then be pumped out into the tanker.

4.2.8 Condensate Drains

No ongoing maintenance is required or envisaged. Once per year a visual inspection of the system will be carried out.

4.2.9 Ancillaries

The compound will be weeded on an annual basis.

The paint work on the site office will be touched up once per year to prevent rust.

4.3 Waste Disposal

4.3.1 Used Lubrication Oil

The removal company will collect it from the waste lube oil tank by tanker. It is filtered and processed into industrial fuel oil. Transfer notes will be filled in and stored in the offices of RPS.

4.3.2 Used Batteries

Used batteries will be stored in the container prior to collection. They will be bulked up by the removal company and sent for reprocessing by a specialist company. Transfer notes will be filled in and stored in the Offices of RPS.

4.3.3 Oil Contaminated Wastes and General Waste.

These will be stored in an emptied oil barrel in the container. The removal company will send the oil filters to be cleaned and the steel carcass sent for recycling.

4.4 Energy and Raw Materials

4.4.1 Landfill Gas Usage

The gas flow meter on the gas plant will be read once per week by the RPS Technician to keep a running total of the gas consumed on the site.

4.4.2 Electricity Production and Consumption

The meters are read every month and the data supplied to the Electricity Suppliers who will forward this on to the RPS Site Manager. This records the energy export and usage in half hourly intervals.

4.5 Site Operations

Day to day operations will be carried out by the RPS Technician and the under the supervision of Silent Valley Waste Services Limited's Site Manager and

RPS Site Manager. The gas flow rate from the site will be set by the RPS Technician using the inlet valve on the gas plant. From that flow rate the RPS Site Manager will set the appropriate load for the generating set. .

5 Emergency / Incident Procedures

In the event of an emergency:

5.1 Fire

- Call the fire brigade (999)
- Isolate the relevant piece of plant from the landfill gas delivery main if possible using the appropriate valve.
- If not accessible stop the gas plant using the emergency stop button.
- If this is not accessible isolate the gas plant supply in the LV Room.
- If this is not accessible isolate the main site supply at the HV Room switch using the emergency stop button.
- If this is not accessible contact Southern Electricity 24 hour emergency line (08457 708090) to isolate the site remotely.
- If someone is injured
 - Call the ambulance if serious (999)
 - Make the patient safe if possible
 - Stabilise the patient if possible
- Evacuate the site to the muster point outside the front gate.
- Inform the RPS Site Manager
- RPS Site Manager to inform Silent Valley Waste Services' Site Manager, Blaenau Gwent County Borough Council, NRW and HSE if required.

5.2 Electrical Fault

- If on the LV system isolate the relevant piece of plant from the electrical system in the LV Control Room or relevant generator panel.
- If this is not possible or the fault is at HV isolate the main site supply in the using the emergency stop button. This will isolate the site from the Southern Electric network in the HV Room.
- If this is not accessible contact WPD 24 hour emergency line (0800 096 3080) to isolate the site remotely.
- If someone is injured
 - Call the ambulance
 - Make the patient safe if possible
 - Stabilise the patient if possible
- Inform the RPS Site Manager
- RPS Site Manager to inform the Council's Site Manager and HSE.

5.3 Environmental Incident (e.g. spillage)

- Attempt to isolate the source of the spillage (e.g. stopping a pump or closing a valve)
- Inform the RPS Site Manager
- Attempt to treat the spillage (e.g. with oil spill kit stored in the Site Office)
- The RPS Site Manager (or representative) will inform Silent Valley Waste Services' Site Manager, CSG and assess the level of damage and any environmental impact of any incident.
- A report on the environmental impact of the incident and any further measures required to minimise the impact will be submitted to the NRW within 5 working days of the incident.

6 Environmental Monitoring Techniques and Procedures

6.1 Point Source Emissions

6.1.1 Temperature

The generator exhaust temperature will be monitored continuously. If the temperature is outside the normal operative band an alarm will be dialled out to RPS Engineer who will attend the site to investigate. If the Temperature is outside the safe working limits the engine will shut down and dial out to the RPS Engineer to attend the site to investigate.

6.1.2 Flow

The flow of landfill gas on the gas plant will be displayed continuously on the gas plant.

6.1.3 Emissions

Two emission points will be identified. These are the exhaust of the generator (Generator 1) and the enclosed flare (Flare 1). Monitoring for Oxides of

Nitrogen, Carbon Monoxide and VOC will be carried out on a yearly basis in accordance with NRW guidance.

The emissions limits for these points are as follows

Emission Point Reference	Source	Parameter	Quantity Unit	Unit
Generator 1 MWM	Engine	NOx	500	mg/m3 at reference conditions
	Exhaust	CO	1400	
		VOCs	1000	
Flare	Enclosed	NOx	150	mg/m3 at reference conditions
	Flare	CO	100	
		VOCs	50	

Reference conditions are 5% O2, STP and dry gas

The emissions set out in the table above will be measured in two ways:

- An MCERTS company will be employed to monitor the generator and flare emissions on an annual basis. If the flare runs less than 10% of

the time the emissions will not be monitored annually in line with EA guidance

- The emissions from the generators shall be measured quarterly by a hand-held instrument for NO_x and CO

For annual monitoring the following tests shall be performed to the standards as shown:

- Oxides of Nitrogen (as NO₂) BS EN 14792
- Carbon Monoxide (CO) BS EN 15058
- Volatile Organic Compounds (VOCs) BS EN 12619
- Moisture (H₂O) BS EN 14790
- Oxygen (O₂) BS EN 14789

All tests will be included in the UKAS and MCERTS accreditation schedules for the testing company.

The analysis methods shall be as follows:

- VOCs to be determined by using a portable FID analyser.
- Oxides of nitrogen to be determined using a Horiba PG 250 portable analyser.

- Carbon monoxide to be determined using a Horiba PG 250 portable analyser.

The following guidance will be used:

- EA Technical Guidance Document M1
- EA Technical Guidance Document M2
- EA MCERTS Performance Standards for Organisations
- EA Method Implementation Documents e.g. MID13284-1, MID15713, MID14181
- A MCERTS Level 2 Team Leader with Technical Endorsements (TE1, TE3 & TE4) will undertake the site monitoring and all subsequent reporting.

Monitoring points comply with EA guidance LFTGN3 and LFTGN8 and M1 guidance on monitoring emissions.

Generator 1 and Generator 2 are materially similar and monitoring is carried out from the exhaust. Monitoring will be carried out post turbo in the vertical exhaust gas pipework. The sample point will be a 20 mm port accessed via the generator container. The stack will have an internal diameter of 0.30 m and is circular in cross section.

BS EN 15259 stipulates that the exhaust gases emitted from combustion processes are tested to ensure homogeneity and that a representative sample is obtained during the monitoring, subject to a number of caveats as elucidated in Environment Agency guidance MID15259. Homogeneity testing is only required on stacks exceeding 1.13 m diameter, as specified in MID 15259. Homogeneity is therefore assumed & single point sampling is acceptable.

Monitoring of the flare shall be carried from the top exit point accessed via a portable mast. This gives access and egress at ground level and eliminates all risks associated with working at height and from heat blow down. Due to the health & safety implications of working on a live flare homogeneity is assumed and a single point sampling is acceptable.

The RPS Site Manager shall arrange for the testing, receive the results and send three hard copies to the NRW and a soft copy by email within 45 days of carrying out the tests. The tests will be witnessed and supervised by the RPS Site Technician, who will report any key findings or issues to the Silent Valley Waste Services' Site Manager.

6.1.4 Emissions Assessment

Emissions shall be assessed according to LFTGN05 and LFTN08. The following uncertainties shall be applied to the generator emissions in accordance with LFTGN08:

Determinand	Measurement Uncertainty
NO _x	+/- 30%
CO	+/- 20%
VOC	+/- 40%

Table 5.7 Measurement uncertainties for emissions monitoring

A result greater than the emission limit but less than the limit once uncertainties above are applied shall be deemed to be approaching the limit.

6.2 Fugitive Emissions

The RPS Technician will check for fugitive emissions during the weekly site inspection and record any findings on the weekly sheet.

6.3 Odour Management Procedures

Two possible sources of odour exist on the site from the landfill gas or from the condensate. Both systems are entirely sealed with no normal way for gas or condensate to escape to create odour. Sampling of the landfill gas is done via Tefen sample valves to prevent the unscheduled release of landfill gas. Each week during the Site Inspection the RPS Technician will check for odours, who will report key findings or issues to the Silent Valley Waste Services' Site Manager.

6.4 Noise and Vibration Monitoring and Management

Procedures

The noise emissions of the generators and gas plant will be checked as part of the commissioning procedures. It is not anticipated that any noise problems will result from the site but during the Weekly Site Inspection, notwithstanding the RPS Technician will listen for any unusual noise on site. The generator will be run with the doors closed except during maintenance. The gas plant will be run with the acoustic enclosure doors closed except during maintenance.

6.5 Dusts and Particulates Monitoring and Management

Procedures

It is not anticipated that any dust will be produced by the processes on site. A visual inspection of the compound will be done on a weekly basis as part of the site inspection by the RPS Technician who will report any key findings or issues to Silent Valley Waste Services' Site Manager.

7 Site Closure Management Procedures

Once the site is no longer generating electricity the site's landfill gas electricity generation infrastructure will be removed.

Most of the plant is semi portable and will be removed using a crane (generator, transformer, site office). The Generator will be drained of fluids and these will be disposed of as normal. Components will be loaded onto flat bed lorries for installation/refurbishment elsewhere.

The HV switch, transformer, LV Room and the gas plant will remain in place as they will be required for continuing gas extraction from the landfill site.

Remaining bases will be removed and hardstanding reinstated.

Any patches of oil contaminated ground will be dug out and removed to landfill by an appropriate contractor.

8 Site Protection and Monitoring Programme

If there is little likelihood that pollution of leaks to land will occur during the future life time of the installation the SPMP will only require a testing, inspection and maintenance programme to ensure that the site's pollution prevention and control measure are maintained and continue to be effective.

However, if there is a reasonable possibility of current or future pollution of the land, groundwater or surface water from the installation then the SPMP will need to be far broader in its scope. This includes the collection of reference data in the form of an intrusive investigation and the undertaking of long-term environmental monitoring. The site does not fall within the category of reasonable likelihood of pollution therefore reference data is not required.

Periodic inspection for oil spills will be undertaken by the RPS Technician as part of the Site Inspection, who will report key findings to the Silent Valley Waste Services' Site Manager. Any spills identified will be cleaned up/removed. An annual assessment of the site will be made with reference to the integrity of the oil and chemical storage facilities and areas of hard standing to check for possible oil contamination using the form shown in appendix 6c – Oil Storage Assessment Form.

Appendix Forms

- 6b. Weekly Site Inspection Form
- 6c. Oil Storage Assessment Form
- 6d. Annual Permit Compliance Report
- 6e. Annual Engine Emissions Report