

Application for an Environmental Permit Variation
Supporting Information

Silent Valley Landfill Site



Prepared on behalf of:
Silent Valley Waste Services Limited

Table of Contents

1. Non-Technical Summary	
2. Technical Ability	
3. Summary of Environmental Management System	
3.1	Introduction
3.2	Site Setting and Location
3.3	Site Plans and Drawings
3.4	Roles and Responsibilities
3.5	Site Activities
3.6	Managing Documents and Records
3.7	Management Reviews
4. Site Condition Report Section 1-3	
1.0	Site Details
2.0	Condition of the land at permit issue
3.0	Permitted activities
5. Environmental Risk Assessment	
5.1	Introduction
5.2	The Environmental Context of the Site
5.3	Potential Pollution Sources
5.4	Identification of Potentially Sensitive Receptors
5.5	Screening of Identified Environmental Risks
5.6	Environmental Accident Risk Assessment
5.7	Techniques for Pollution Control
5.8	Emissions Control and Abatement
5.9	Conclusion
6. Emissions Assessment Report	
1.	Introduction
2.	Emissions Assessment Methodology
3.	Source Emission Levels
4.	Environmental Assessment Levels
5.	Initial Emissions Screening Assessment
6.	Summary
7.	References
7. List of wastes	
8. Operating techniques	
9. Sampling location assessment	
Appendices	
Appendix 1	- Location of Installation
Appendix 2	- Environmental Permit Boundary Map
Appendix 3	- Site Plan – Gas Utilisation Plant
Appendix 4	- Location of Sensitive Receptors to Silent Valley Gas Utilisation Plant
Appendix 5	- Engine Generating Set

1. Non-Technical Summary

1. Silent Valley Waste Services Limited ("SVWS") wishes to apply to vary an existing environmental permit ref EPR/MP3835SV to include the ability to operate a landfill gas combustion plant and equipment within a compound located at Silent Valley Landfill Site. The purpose of the plant and equipment is to provide environmental control for the landfill gas generated from the Silent Valley Landfill Site. The proposed plant and equipment will comprise of a landfill gas engine, which shall be used for the generation of electricity that will be supplied to the National Grid, and a high temperature flare for the safe combustion of landfill gas during engine downtime; and the associated plant items including a gas booster, oil tanks, transformers, connecting pipework, cabling and a control systems.
2. The landfill gas compound is located at Silent Valley Landfill Site in Ebbw Vale in Wales. The proposed environmental permit boundary is shown in Appendix 2. The location of the compound in relation to its surroundings is shown in Appendix 1.
3. The gas compound has previously been operated for the same purpose as that proposed in this variation application, using equivalent plant and equipment. The compound has been constructed formerly under planning permission issued by Blaenau Gwent County Borough Council on 28 September 1999 under reference number 99/0266.
4. The landfill gas arising from the Silent Valley Landfill Site has historically been managed by Novera Energy Generation No. 2 Limited (formerly known as United Utilities Green Energy Limited) under a sublease dated 12 December 2002, which expired on 11 December 2022. Novera Energy Generation No. 2 Limited currently holds the Environmental Permit (reference number: EPR/ZP3535SQ) for the Silent Valley Gas Utilisation Plant, however, they have now vacated the premises and ceased to be the competent operator from 12 December 2022. Consequently, SVWS has become the operator of the premises from 12 December 2022, and Novera Energy Generation No. 2 Limited's Environment Permit will need to be voluntarily surrendered or revoked by Natural Resources Wales as soon as practicable.
5. The landfill gas engine(s) or flare shall operate on a 24-hour basis and shall achieve effective combustion of contaminants present within the landfill gas stream to within specified levels for point-source emissions to air. No point source emission to land or controlled waters are permitted in the operation of the plant/equipment. Design measures shall be employed to mitigate against the release of any fugitive emissions. The engine(s) will use oil which shall be replaced routinely. The storage of clean and dirty oils within the compound shall be conducted in accordance with the Oil Storage Regulations. The design, installation, operation and maintenance of the plant and equipment shall be done in accordance with the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) and all other applicable safety and environmental regulations.
6. Monitoring of point source emissions to air shall be conducted annually to confirm that the plant is being operated in accordance with the thresholds specified by the environmental permit. The engines' operational status shall be monitored by telemetry at all times. The performance of the plant and equipment installed shall be subject to formal inspection and management under a written environmental management system.

2. Technical Ability

1. Mr Noel Chard of Silent Valley Waste Services is a Level 4 WAMITAB Landfill Operator Certificate holder. He is the Technically Competent Person for the Silent Valley Landfill Site and shall be the nominated Technically Competent Person for Silent Valley Landfill Site. His original WAMITAB certificate and recent certificate of continuing technical competency are provided on the pages overleaf.
2. Further, Renewable Power Systems Limited (RPS) will be involved in the operation of the plant and RPS currently operates 32 similar landfill gas utilisation plants across the UK, as shown below (including three smaller projects in Wales) and is therefore well known to the environmental authorities for successfully operating such projects:

No	Gas Utilisation Plant Name	Name of Operator	Country	Technology
1	Aughrim Landfill Gas (Phase 1)	Renewable Power Systems (RPS)	Northern Ireland	Landfill Gas Electricity Generation
2	Hazel Lane Landfill Gas	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
3	Nether Dallachy Renewable Energy	Renewable Power Systems (RPS)	Scotland	Landfill Gas Electricity Generation
4	Port Clarence Generation Project	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
5	Levenseat Renewable Energy	Renewable Power Systems (RPS)	Scotland	Landfill Gas Electricity Generation
6	Wyrley Landfill - A	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
7	Apsley Farm Renewable Energy - A	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
8	Tullyvar Landfill Gas	Renewable Power Systems (RPS)	Northern Ireland	Landfill Gas Electricity Generation
9	Finmere	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
10	Aughnagun Landfill Gas	Renewable Power Systems (RPS)	Northern Ireland	Landfill Gas Electricity Generation
11	Wood Lane Renewable Energy	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
12	Glapwell	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
13	Pound Bottom Landfill	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
14	Lower Polmaise Landfill Gas	Renewable Power Systems (RPS)	Scotland	Landfill Gas Electricity Generation
15	Sutton Wick Renewable Energy - A,C	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
16	Marks Quarry Landfill Site - A	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
17	Taddington Generation -A,C	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
18	Ruabon	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
19	Ferry Road	Renewable Power Systems (RPS)	Wales	Landfill Gas Electricity Generation
20	Pennyhill - A	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
21	Magheraglass Landfill Gas	Renewable Power Systems (RPS)	Northern Ireland	Landfill Gas Electricity Generation
22	Ffridd Rasus Microgeneration	Renewable Power Systems (RPS)	Wales	Landfill Gas Electricity Generation
23	Nant Y Gwyddon Microgeneration	Renewable Power Systems (RPS)	Wales	Landfill Gas Electricity Generation
24	Lingerton Microgeneration Project	Renewable Power Systems (RPS)	Scotland	Landfill Gas Electricity Generation
25	Longman Microgeneration	Renewable Power Systems (RPS)	Scotland	Landfill Gas Electricity Generation
26	Seater Microgeneration	Renewable Power Systems (RPS)	Scotland	Landfill Gas Electricity Generation
27	Crow's Nest Microgeneration Project	Renewable Power Systems (RPS)	Scotland	Landfill Gas Electricity Generation
28	Henthorn Microgeneration	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
29	Deerplay Microgeneration	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
30	Somersham Microgeneration	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
31	Beighton Microgeneration Project	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation
32	Barnsley Lane Microgeneration	Renewable Power Systems (RPS)	England	Landfill Gas Electricity Generation

WAMITAB

WASTE MANAGEMENT INDUSTRY TRAINING AND ADVISORY BOARD

CERTIFICATE No: 2713

CERTIFICATE OF TECHNICAL COMPETENCE

This Certificate confirms that

Noel Chard

has demonstrated the standard of technical competence required for the management of
a facility of the type set out below

Facility Type:

~~Managing Landfill Operations - Special Waste~~

~~(Level 4) - LS4~~



Authorising Signatures:

Director General

Director

Date of issue:

[Signature]
[Signature]
06 June 2000

Continuing Competence Certificate

This certificate confirms that

Noel Chard

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current for two years from 21/02/2022

LH	Landfill - Hazardous Waste
TSH	Transfer - Hazardous Waste

Expiry Date:
21/02/2024

Verification date: 09/02/2022

Authorised:

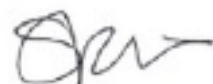


Professional Services Director

Learner ID: 8642

Certificate No.: 5193275

Date of Issue: 21/02/2022



CIWM Chief Executive Officer



The Chartered Institution
of Wastes Management



3. Summary of Environmental Management System

3.1 Introduction

1. Silent Valley Waste Services ("SVWS") currently manages the Silent Valley Closed Landfill. SVWS is wholly owned by the Council and the Council has decided to hive up SVWS' operations and aims to take SVWS back in house during the first quarter of 2023.
2. To enable the variation of the current landfill site environmental permit ref: EPR/MP3835SV, SVWS is required to provide an Environmental Management System for Silent Valley Landfill Site.
3. Silent Valley Landfill Site closed in August 2011 and an extensive programme of capping and restoration was completed in November 2015 allowing definitive closure to be granted by Natural Resources Wales. The site then entered the aftercare phase, and has been continuously managed by SVWS from August 1994 to date.
4. Directly adjacent to the closed landfill site is the landfill gas utilisation plant compound, which has been operated by a third party contractor, Novera Energy Generation No. 2 Limited on behalf of SVWS since July 2003 under a separate environmental permit number EPR/ZP3535SQ. The sublease for the landfill gas utilisation plant was granted to Novera Energy Generation No. 2 Limited in 2002, and this lease terminated on 11 December 2022. The compound used by Novera Energy Generation No.2 Limited for the operation of the gas utilisation plant has therefore become a vacant possession.
5. Therefore, Silent Valley Landfill Site is currently being operated by SVWS, under permit number EPR/MP3835SV. For clarity, permit ref: EPR/MP3835SV shall be known as 'Silent Valley Closed Landfill Site' permit (SVCLP).
6. Permit ref: EPR/MP3835SV was issued to SVWS in February 1994 under a Waste Disposal Licence for disposal to landfill facility. Prior to landfilling, the site was extensively mined for coal. The Site was originally used as a disposal facility as early as the 1930s, when steel slag, a by-product of the nearby steel making process at Ebbw Vale, was disposed of in the valley floor. Records indicate that this practice continued up until 1980, in tandem with a steel slag recovery operation which began circa 1960 removing millions of tonnes of steel slag up until the late 1970s.
7. Ownership of the site passed from British Steel to Blaenau Gwent County Borough Council in 1981. The latter acquired the site to develop the Phase 1 landfill in the valley to receive municipal waste which was placed on the remaining underlying steel slag. Blaenau Gwent County Borough Council operated the landfill site until 1994 when waste disposal operations were transferred to the SVWS, being the Council's Waste Management Company.

8. The operation of an Environmental Management System (EMS) is an assurance to the regulator, neighbouring businesses, stakeholders, and others alike that the facility operation is undertaken in strict compliance with the regulations in force and with the management seeking continual improvements. It requires the operator to work in a transparent way, to maintain and improve the confidence of regulators and neighbours, and to have a proactive approach to environmental improvement.
9. This EMS has been written in accordance with the GOV.UK Guidance document 'Development a management system: environmental permits' (Updated 17th December 2019).

Management system

10. SVWS owns and operates the Silent Valley Landfill Site under permit ref: EPR/MP3835SV, which is currently being transferred into Blaenau Gwent County Borough Council's name. The landfill site closed in 2011 and is now restored. SVWS is required to provide an Environmental Management System and associated documents as required by Natural Resources Wales to enable compliance with the environmental permit at Silent Valley Landfill Site.
11. This EMS consists of the following sections in accordance with the Environment Agency's guidance template:
 - SOP 1 - Identifying and minimising the risks of pollution
 - SOP 2 - Operations and maintenance
 - SOP 3 - Accidents/Incidents and non-conformances
 - SOP 4 - Complaints
 - SOP 5 - Staff training and competence
 - SOP 6 - Odour, dust and emissions management
 - SOP 7 - Monitoring
 - SOP 8 – Documents, Site Records & Legislation
12. The 'Management of Documents and Records' detailed in section 3.6 of this document provides information on holding copies of the planning permission, environmental permit and other legislative requirements at Silent Valley Landfill Site.
13. 'Management Reviews' are also included in Section 3 in further detail below.
14. As part of the management system, a 'Site Management Plan' is also provided to support and link into the overarching requirements of a management system.
15. To ensure appropriate operation of all site activities, the Council will develop documented management procedures and written work instructions which incorporate environmental considerations into the construction and operation of the facility.

3.2 Site Setting and Location

1. The application site is located at Silent Valley Landfill Site is located to the South east of Merthyr Tydfil, just off the A4046 nr Waun. The site is centred on OS grid reference: SO 18410 06518 in Appendix 1. The site is accessed via the road to the landfill site off Cemetery Road from Cwm Road (the A4046).
2. The landfill site is currently managed by Silent Valley Waste Services under permit ref EPR/MP3835SV and the land is ultimately owned by Blaenau Gwent County Borough Council.
3. The landfill gas utilisation plant overlies the closed Silent Valley co-disposal landfill (now grassed over), which was used for inert waste disposal.
4. The area to the west of the site is Greenfield open space and the land north of the site sloping upwards is also Greenfield open space currently used for grazing sheep. The landfill area extends to the east and south beyond the installation boundary, sloping downwards and is no longer operational.
5. Two areas of woodland located within 1km to the east and south of the landfill are designated as a biological Site of Specific Scientific Interest (SSSI) and the area encompassing the woodland is also a nature reserve.
6. The nearest town Ebbw Vale is located approximately 4km north of the site via the A4046 road. The site location is presented in Appendix 1.

Geological setting

7. From the British Geological Survey (BGS) 1:625,000 solid geology map the underlying bedrock is Upper Westphalian Coal Measures (including Pennant Measures) comprising the Rhondda Beds, overlain by the Brithdir Beds. The lower beds are weak sedimentary rock strata which are prone to much instability. There are no recorded superficial deposits at the site.
8. Information obtained from the Coal Authority Mining Report Service indicates that the site is in an area which may be affected by coal mining activity. The BGS have assessed the risk of shallow mining hazards at the site as low to moderate.

Hydrogeological setting

9. The Environment Agency Groundwater Vulnerability Map (1:100,000 Sheet 36, Mid Glamorgan) indicates that the site is underlain by a Minor Aquifer of variable permeability. This stratum can comprise fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of varying permeability including unconsolidated deposits. These aquifers do not produce large quantities of water for abstraction but are important for local supplies and in supplying base flow to rivers.

Hydrological Setting

10. The nearest surface watercourse are the Ebbw Fawr located within 1km west of the site and the Nant Merddog stream some 500m south of the site. The Ebbw Fawr was classified by the Environment Agency as having overall River Quality C (Fairly Good) in 2000 at the sampling point 'Confluence Nant Merddog to Culvert Inlet'. A subsequent river quality results produced for this stretch of the Ebbw Fawr in 2002 were biochemical oxygen demand (BOD) grade E (poor), ammonia grade A (very good) and dissolved oxygen grade C (fairly good). The Ebbw Fawr is culverted as it flows past the town of Victoria with the exception of a 250m stretch where the water sampling point is located.
11. The Ebbw Fawr starts with several small streams and tributaries north of the Carno Reservoir in the Brecon Beacons. The Ebbw itself is formed where the Ebbw Fawr and Ebbw Fach converge in Aberbeeg a few kilometres south of the study site. The Ebbw then flows south and converges with the Usk where it flows to Newport and discharges into the Severn Estuary.
12. Surface water issues in the grassland area a few metres west of the site (opposite the site access road) and flows southwest. Surface water drains to the south of the landfill, some 500m south of the site, feed the Cwm Merddog.

Radon Affected Areas

13. Information obtained from the National Radiological Protection Board (NRPB) indicates that less than 1% of homes in the vicinity of the study site are above the Action Level for radon.
14. The BGS recommend that full radon protective measures be installed at the study site.

3.3 Site Plans and Drawings

1. A copy of the Site Plans and Operational Layout is detailed in Appendix 1.
2. Any updates/changes to the site plans and drawings will be inserted as an EMS revision and the relevant regulatory bodies will be made aware of the changes to the site.

3.4 Roles and Responsibilities

1. The management responsibilities for Silent Valley Landfill Site are as detailed below:

Site Technical Manager

2. Noel Chard (Silent Valley Waste Services): Holds the records and ensures that they are complete and, where possible, compliant with permit requirements.

3. Noel Chard also ensures that sufficient resources are made available to safely complete monitoring tasks; reviews monitoring data to ensure that results and trends are compliant with permit requirements and is responsible for notifying NRW of any permit compliance limit exceedances. Ensures that monitoring and maintenance is completed in a safe and timely manner. Is responsible for review of the system efficiency and organisation of upgrade/repairs/remediation as and when required.

Flare Manager

4. Service contract currently undertaken by Renewable Power Systems Limited. Quarterly service visits undertaken, and as required in response to alarm (24/7 call-out contract).

Engine Manager

5. Service engineers from Renewable Power Systems Limited: Ensure that the engine is maintained and serviced in accordance with contract.

Technician (in-waste and perimeter gas)

6. Noel Chard is responsible for sampling and analysis of gas fields and systems in accordance with the requirements of the landfill site permit. Basic and routine system maintenance is undertaken (of gas well headworks, locks, signs/identification labels and dedicated sampling installations) and balancing/adjustment in accordance with the landfill site permit. He is also responsible for sampling and analysis of perimeter gas boreholes in accordance with the requirements of the landfill site permit, and shall undertake basic repairs to boreholes (of headworks, locks, signs/identification labels and dedicated sampling installations).

Leachate Collection and Treatment System

7. Noel Chard (Silent Valley Waste Services) monitors and manages the treatment of landfill leachate in accordance with the landfill site permit.
8. Renewable Power Systems, under the supervision and ultimate control of SVWS, is responsible for the landfill gas engine and electricity generation and SVWS takes responsibility for all operational aspects of the landfill gas management.
9. To clarify, these are the various responsible individuals for all aspects of the landfill gas and leachate extraction system under normal, abnormal and emergency scenarios.

3.5 Site Activities

1. As a closed landfill site, the main site activities/operations relate to monitoring, leachate and gas management and infrastructure checks as detailed in Table 1 below:

Table 1: Site Activities and Operations at Silent Valley Landfill Site

Day	Activity
Monday & Friday	Site Operative leachate systems checks: 1. pumps turned on/off as necessary; 2. addition of pH buffer 3. top-up of antifoam 4. recording of flow meter readings 5. air compressor checks Monitoring of gas migration wells & gas flow meter reading
Tuesday & Thursday	COTC site visits General site walkover and inspection Leachate system quality testing: ammonia and pH
Fortnightly checks	Gas field balance carried out by Renewable Power Systems under the supervision and control of the Site Technical Manager.
Monthly	Leachate level monitoring Groundwater and Surface water quality monitoring

2. Landfill Gas Management, optimising gas extraction, monitoring and balancing of the gas extraction field is undertaken fortnightly. To ensure that landfill gas extraction is optimised, extraction rates are reviewed quarterly.
3. Leachate management and extraction is optimised including surface water runoff management and leachate management (infrastructure provision, maintenance, operation and monitoring). Leachate level monitoring is undertaken monthly by site technicians. Leachate extraction rates are reviewed quarterly and adjusted if required.
4. Groundwater and surface water quality samples are collected monthly for chemical analysis. Results are reviewed annually to determine if there is any impact from the landfill leachate on the surrounding water bodies and underlying groundwater.
5. Unless the site is being accessed for any monitoring or maintenance works, the site remains locked and secured to prevent unauthorised access. The site can be accessed between the hours of 7 to 5 Monday to Friday, relevant staff hold site keys and can access the site during out of hours e.g. for emergency response. Further details on site activities, monitoring and operations are included in the Site Management Plan.

3.6 Managing Documents and Records

1. A copy of the Environment Management System file will be kept in the main site office and electronically. All records as a result of any operating activities, complaints, maintenance will be kept on site in either/both hard or electronic copies in the main site office.
2. All records, risk assessments, management and procedure plans are kept on file in the main site office. It is the responsibility of the Site Technical Manager to ensure that all records are being maintained and kept up to date and readily presented to the regulatory bodies on request.
3. Copies of planning permissions, environmental permits and other relevant permissions are kept either as paper records or electronically.
4. Any incidents or non-conformances will be recorded in the daily site records. A daily site inspection is carried out by the Site Technical Manager and staff are also encouraged to report any issues to the Site Technical Manager.
5. All records will be kept for the following:
 - Permits issued to the site
 - Legal requirements
 - Risk Assessments
 - Management System Plans
 - Plans required by the permit
 - All operating procedures
 - Staff competence and training
 - Emissions and any other monitoring required/carried out
 - Compliance checks, CAR forms, investigations and actions taken
 - Complaints made – investigations and actions taken
 - Audits of management systems, findings and actions taken
 - Management reviews and any changes made

3.7 Management Reviews

1. Management periodically reviews the environmental performance of the organisation through their review of environmental audit reports and the daily site records.
2. The Environment Management System (EMS) will be reviewed on an annual basis and will be attended by Senior Management. The EMS is a dynamic document which will reflect any changes made to the operation and activities of the site. Any changes made to the EMS will be made by the Site Technical Management or authorised consultant on behalf of the Council.

3. Any revisions made will be documented and scheduled and placed at the front of this document, recording the date, the revision made, authorised by whom and a revision number. At the end of year, any revisions made will be incorporated in the EMS.
4. To summarise, a review of the management system will be made in the event in any of the following:
 - Changes to the site, operations, activities or equipment covered by the permit;
 - When any amendments or variations are made to the permit;
 - Following an accident, complaint or breach to the permit, and;
 - Arising of new environmental problem or issues and new control measures required.
5. Records of any major changes to the EMS will be kept of the following:
 - Variation to the maximum amount of waste stored/accepted on site;
 - New waste treatment equipment
 - New Site development/infrastructure
 - Implementation of new control measures.
6. It will be the responsibility of the Site Technical Manager to keep all regulatory bodies informed of any changes to the activities on site via the EMS. Any changes to the EMS will be made available to the regulatory bodies on request.

4. Site Condition Report Section 1-3

SITE CONDITION REPORT TEMPLATE

For full details, see H5 *SCR guide for applicants* v3.0 October 2014

COMPLETE SECTIONS 1-3 AND SUBMIT WITH APPLICATION DURING THE LIFE OF THE PERMIT:

MAINTAIN SECTIONS 4-7

AT SURRENDER: ADD NEW DOC REFERENCE IN 1.0; COMPLETE SECTIONS 8-10; & SUBMIT WITH YOUR SURRENDER APPLICATION.

1.0 Site Details	
Name of the applicant	Silent Valley Waste Services Limited
Activity address	Silent Valley Landfill Site Cwm Ebbw Vale Gwent NP23 6PZ
National grid reference	318350 207160
Document reference and dates for Site Condition Report at permit application and surrender	Site Condition Report Section 12 December 2022
Document references for site plans (including location and boundaries)	Appendix 1

Note:

In Part A of the application form you must give us details of the site's location and provide us with a site plan. We need a detailed site plan (or plans) showing:

- Site location, the area covered by the site condition report, and the location and nature of the activities and/or waste facilities on the site.
- Locations of receptors, sources of emissions/releases, and monitoring points.
- Site drainage.
- Site surfacing.

If this information is not shown on the site plan required by Part A of the application form then you should submit the additional plan or plans with this site condition report.

2.0 Condition of the land at permit issue	
Environmental setting including: • geology • hydrogeology • surface waters	The site and surrounding area was Greenfield land until it was first developed as an opencast coal quarry around the 1930s, then redeveloped as a waste disposal site in the 1980s.

Smaller mineral or coal workings were present in the surrounding area from the late 1800s through to the mid 1900s.

The historical maps show the rise and subsequent decline of heavy industry from the early 1900s to the 1980s in the town of Ebbw Vale to the northwest of the site.

Currently the site is developed as landfill gas utilisation plant overlying an area of former inert waste co-disposal landfill (now grassed over), which was used for inert waste disposal. The surrounding area is largely greenfield open space.

The area to the west of the site is Greenfield open space and the land north of the site sloping upwards is also Greenfield open space currently used for grazing sheep. The landfill area extends to the east and south beyond the installation boundary, sloping downwards and is no longer operational.

Two areas of woodland located within 1km to the east and south of the landfill are designated as a biological Site of Specific Scientific Interest (SSSI) and the area encompassing the woodland is also a nature reserve.

The nearest town Ebbw Vale is located approximately 4km north of the site via the A4046 road. The site location is presented in Appendix 1.

Geological setting

From the British Geological Survey (BGS) 1:625,000 solid geology map the underlying bedrock is Upper Westphalian Coal Measures (including Pennant Measures) comprising the Rhondda Beds, overlain by the Brithdir Beds. The lower beds are weak

sedimentary rock strata which are prone to much instability. There are no recorded superficial deposits at the site.

Information obtained from the Coal Authority Mining Report Service indicates that the site is in an area which may be affected by coal mining activity. The BGS have assessed the risk of shallow mining hazards at the site as low to moderate.

Hydrogeological setting

The Environment Agency Groundwater Vulnerability Map (1:100,000 Sheet 36, Mid Glamorgan) indicates that the site is underlain by a Minor Aquifer of variable permeability. This stratum can comprise fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of varying permeability including unconsolidated deposits. These aquifers do not produce large quantities of water for abstraction but are important for local supplies and in supplying base flow to rivers.

Hydrological Setting

The nearest surface watercourse are the Ebbw Fawr located within 1km west of the site and the Nant Merddog stream some 500m south of the site. The Ebbw Fawr was classified by the Environment Agency as having overall River Quality C (Fairly Good) in 2000 at the sampling point 'Confluence Nant Merddog to Culvert Inlet'. A subsequent river quality results produced for this stretch of the Ebbw Fawr in 2002 were biochemical oxygen demand (BOD) grade E (poor), ammonia grade A (very good) and dissolved oxygen grade C (fairly good). The Ebbw Fawr is culverted as it flows past the town of Victoria with the

exception of a 250m stretch where the water sampling point is located.

The Ebbw Fawr starts with several small streams and tributaries north of the Carno Reservoir in the Brecon Beacons. The Ebbw itself is formed where the Ebbw Fawr and Ebbw Fach converge in Aberbeeg a few kilometres south of the study site. The Ebbw then flows south and converges with the Usk where it flows to Newport and discharges into the Severn Estuary.

Surface water issues in the grassland area a few metres west of the site (opposite the site access road) and flows southwest. Surface water drains to the south of the landfill, some 500m south of the site.

The Ebbw Fawr was classified by the Environment Agency as having an overall River Quality C (Fairly Good) in 2000 at the sampling point 'Confluence Nant Merddog to Culvert Inlet'. The most recent river quality results produced for this stretch of the Ebbw Fawr in 2002 were biochemical oxygen demand (BOD) grade E (poor), ammonia grade A (very good) and dissolved oxygen grade C (fairly good). The Ebbw Fawr is culverted as it flows past the town of Victoria with the exception of a 250m stretch where the water sampling point is located.

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	Surface water issues in the grassland area a few metres west of the site (opposite the site access road) and flows southwest. Surface water drains to the south of the landfill, some 500m south of the site, feed the Cwm Merddog.
Pollution history including: • pollution incidents that may have affected land • historical land-uses and associated contaminants • any visual/olfactory evidence of existing contamination • evidence of damage to pollution prevention measures	The Environment Agency records 1 No. Pollution Incident to Controlled Waters within 800m – 1km west of the site, classified as Category 2 (Significant Incident). The incident occurred on 15th June 1996 and involved accidental spillage/leakage of chemicals (acid). The location of the pollution incident is recorded as the Marine Colliery. The Environment Agency record 2 No entries to the Substantiated Pollution Incident Register, one located 559m southeast of the site and another 944m south of the site. The former incident occurred on 9th July 2001 and relates to pollution from household waste having Category 3 (Minor Incident) impact to water and no impacts to air or land. The latter incident occurred on 14th May 2001 relating to inert waste having a Category 3 impact to land and no impacts to air or water.
Evidence of historic contamination, for example, historical site investigation, assessment, remediation and verification reports (where available)	There have been no major pollution incidents on or relating to the application site. The single incident discussed below wherein oil escaped at pressure from the gas engine may have impacted the immediately surrounding soils and perched groundwater if present. However due to the small volume of oil contained within the engine at a given time it is considered very unlikely that migration of hydrocarbon contamination

	offsite would have occurred following this incident. It was also noted that measures to prevent a recurrence of this incident have been taken. Some localised hydrocarbon contamination may be present around the gas engine. An area of aged oily staining was previously observed on the concrete plinth beneath the gas engine. This relates to an oil escape which occurred within the engine container. Information obtained indicated that on a single occasion during a period of hot weather, oil expanded within the engine housing causing an increase in pressure and a release of oil from the sealed engine unit. The engine container is designed to contain any spillage, however as the oil was under high pressure it escaped via the air vent at the side of the engine container. It is understood that measures to prevent this reoccurring were subsequently undertaken with the pipe connecting the engine to the waste oil tank always left open to allow for any oil expansion.
Baseline soil and groundwater reference data	None available
Supporting information	• Source information identifying environmental setting and pollution incidents • Historical Ordnance Survey plans • Site reconnaissance • Historical investigation / assessment / remediation / verification reports • Baseline soil and groundwater reference data

3.0 Permitted activities

Permitted activities	Operation of landfill gas utilisation plant and equipment comprising landfill gas engine(s), a flare unit and associated boosters, transformers, connecting pipework, cabling and a control cabin.
Non-permitted activities undertaken	Welfare and supplies unit
Document references for: ● plan showing activity layout; and ● environmental risk assessment.	Appendix 3 (Site Plans) Environmental Risk Assessment

Note:

In Part B of the application form you must tell us about the activities that you will undertake at the site. You must also give us an environmental risk assessment. This risk assessment must be based on our guidance (*Environmental Risk Assessment - EPR H1*) or use an equivalent approach.

It is essential that you identify in your environmental risk assessment all the substances used and produced that could pollute the soil or groundwater if there were an accident, or if measures to protect land fail.

These include substances that would be classified as 'dangerous' under the Control of Major Accident Hazards (COMAH) regulations and also raw materials, fuels, intermediates, products, wastes and effluents.

If your submitted environmental risk assessment does not adequately address the risks to soil and groundwater we may need to request further information from you or even refuse your permit application.

4.0 Changes to the activity

Have there been any changes to the activity boundary?	If yes, provide a plan showing the changes to the activity boundary.
Have there been any changes to the permitted activities?	If yes, provide a description of the changes to the permitted activities
Have any 'dangerous substances' not identified in the Application Site Condition Report been used or produced as a result of the permitted activities?	If yes, list of them

Checklist of supporting information	• Plan showing any changes to the boundary (where relevant) • Description of the changes to the permitted activities (where relevant) • List of 'dangerous substances' used/produced by the permitted activities that were not identified in the Application Site Condition Report (where relevant)
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5.0 Measures taken to protect land

Use records that you collected during the life of the permit to summarise whether pollution prevention measures worked. If you can't, you need to collect land and/or groundwater data to assess whether the land has deteriorated.

Checklist of supporting information	• Inspection records and summary of findings of inspections for all pollution prevention measures • Records of maintenance, repair and replacement of pollution prevention measures
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6.0 Pollution incidents that may have had an impact on land, and their remediation

Summarise any pollution incidents that may have damaged the land. Describe how you investigated and remedied each one. If you can't, you need to collect land and /or groundwater reference data to assess whether the land has deteriorated while you've been there.

Checklist of supporting information	• Records of pollution incidents that may have impacted on land • Records of their investigation and remediation
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7.0 Soil gas and water quality monitoring (where undertaken)

Provide details of any soil gas and/or water monitoring you did. Include a summary of the findings. Say whether it shows that the land deteriorated as a result of the permitted activities. If it did, outline how you investigated and remedied this.

Checklist of supporting information	• Description of soil gas and/or water monitoring undertaken • Monitoring results (including graphs)
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8.0 Decommissioning and removal of pollution risk

Describe how the site was decommissioned. Demonstrate that all sources of pollution risk have been removed. Describe whether the decommissioning had any impact on the land. Outline how you investigated and remedied this.

Checklist of supporting information

- Site closure plan
- List of potential sources of pollution risk
- Investigation and remediation reports (where relevant)

9.0 Reference data and remediation (where relevant)

Say whether you had to collect land and/or groundwater data. Or say that you didn't need to because the information from sections 3, 4, 5 and 6 of the Surrender Site Condition Report shows that the land has not deteriorated.

If you did collect land and/or groundwater reference data, summarise what this entailed, and what your data found. Say whether the data shows that the condition of the land has deteriorated, or whether the land at the site is in a "satisfactory state". If it isn't, summarise what you did to remedy this. Confirm that the land is now in a "satisfactory state" at surrender.

Checklist of supporting information

- Land and/or groundwater data collected at application (if collected)
- Land and/or groundwater data collected at surrender (where needed)
- Assessment of satisfactory state
- Remediation and verification reports (where undertaken)

10.0 Statement of site condition

Using the information from sections 3 to 7, give a statement about the condition of the land at the site. This should confirm that:

- the permitted activities have stopped
- decommissioning is complete, and the pollution risk has been removed
- the land is in a satisfactory condition.

5. Environmental Risk Assessment

5.1 Introduction

1. This Environmental Risk Assessment (ERA) has been prepared to consider the potential for environmental harm to occur from the proposed waste activity at the Silent Valley Landfill Site.

5.2 The Environmental Context of the Site

The Site Location

1. The environmental permit application boundary and the location of this site in the context of its surroundings are shown in **Appendix 1**.
2. The facility is located in Silent Valley Landfill Site, Newport, Gwent in South Wales at National Grid Reference (NGR) 318350 207160. The site is accessed via the access road to the landfill site off Cemetery Road from Cwm Road (the A4046). The nearest postcode is NP23 6PZ.
3. The installation is located on an elevated flat area overlying the closed Silent Valley co-disposal landfill (now grassed over), which was (when operated) used for inert waste disposal.
4. The area to the west and north of the site is Greenfield open space. The landfill area extends to the east and south beyond the installation boundary, sloping downwards and is still operational. The nearest town Ebbw Vale is located approximately 4km north of the site via the A4046 road.

Site Environmental Setting

Geology, hydrogeology and hydrology

5. Please refer to section 3.2 (Site Settings and Location) of this report.

Land-based designations and air quality

6. Information obtained from the Countryside Council for Wales indicates that there is one designated Site of Special Scientific Interest (SSSI) located within 500m of the study site. The SSSI comprises multiple areas of the Cwm Merddog Woodlands and is a biological classification.

7. Silent Valley is also designated by Blaenau Gwent County Borough Council as a Local Nature Reserve (this area encompasses the SSSI).
8. No accurate, up-to-date information on background air quality pollution levels for the area around the gas utilisation plant is currently available from the National Environmental Technology Centre (NETCEN).

Flood risk

9. A review of flood maps¹ confirm that the application site boundary has a flood risk of:
 1. less than 0.1% chance of flooding from rivers each year (very low risk)
 2. less than 0.1% chance of flooding from the sea (very low risk)
 3. greater than 3.3% chance of flooding from surface water and small watercourses (high risk)

Site History

10. The site and surrounding area was Greenfield land until it was first developed as an opencast coal quarry around the 1930s, then redeveloped as a waste disposal site in the 1980s. Smaller mineral or coal workings were present in the surrounding area from the late 1800s through to the mid 1900s. The historical maps show the rise and subsequent decline of heavy industry from the early 1900s to the 1980s in the town of Ebbw Vale to the northwest of the site.
11. The site has most recently been used as a landfill gas utilisation plant overlying a former inert co-waste disposal (landfill). The surrounding area is largely greenfield open space. However, on the 11th December 2022, the gas engines were decommissioned and removed from the site by the incumbent operator (Novera Energy Generation No.2 Limited). Therefore, the site is currently flaring landfill gas continuously using a diesel generator, which is due to be removed on the 9th January 2023.
12. There have been no major pollution incidents on or relating to the application site.

5.3 Potential Pollution Sources

1. The waste activities that are proposed involve the combustion of landfill gas, sourced from the Silent Valley Landfill Site, in engine(s) or a flare. A landfill gas transmission pipeline currently exists that connects the landfill to the gas compound. The activities that shall take place within the gas utilisation compound involves:
 1. The routing of landfill gas within the gas compound in pipelines,

¹ <https://naturalresources.wales/flooding/check-your-flood-risk-on-a-map-flood-risk-assessment-wales-map/?lang=en>

2. The removal of condensate within the landfill gas and discharging it back to the landfill via a dedicated return pipeline,
 3. The operation of engine/s and a flare,
 4. The operation of associated plant items including gas booster, oil tanks, transformers, connecting pipework, cabling and control systems.
2. No point source emissions to air, land or water are proposed as part of the proposed activities with the exception of the stack emission points to air from the engine(s) and flare.

Potential Pollution Pathways

3. The waste activities shall only take place on areas that have an impermeable surface complete with sealed drainage systems, therefore no fugitive release of emission to ground or groundwaters will be permitted to occur.
4. The potential pollution pathways from the site include:
 1. Fugitive release of pollutants to the drainage system,
 2. Fugitive release of pollutants to air, including odour, and Direct transmission of noise and vibration.
5. The major raw material is landfill gas, this is piped to the site by underground pipes. Fugitive releases of landfill gas are limited to the isolation valves and intermittent safety release valves on the gas system. The gas pipes above ground and the isolation valves are inspected daily and any failures repaired. The oxygen within the gas main is continuously recorded and since the system is under vacuum any increase in oxygen content will indicate air ingress into the gas collection system and this will be used as an indicator of a problem, and action to repair the leak will be taken.

5.4 Identification of Potentially Sensitive Receptors

1. The closest sensitive receptors to Silent Valley Landfill Site are listed below, and are indicated in Appendix 4:
 1. Houses on Hillside Terrace, 500m SW;
 2. Houses on Garn Terrace, 550m W
 3. Caersalem Baptist Church, 900m NW

Complaint History

2. It is understood that no complaints due to noise from the Silent Valley Landfill Site have been received since during the past 20 years.

Identification of Sources Relevant to Complaints and Sensitive Receptors

3. The engine will be contained within acoustic enclosures on the site that minimise the leakage of operational noise to limit the potential for annoyance.

Initial Risk Assessment

4. In the past 20 years of operation, the SVWS has not received a noise related complaint with regard to the Silent Valley Landfill Site. Due to the historical containerisation of the landfill gas engine(s), noise annoyance is unlikely at the nearest sensitive receptors on Hillside Terrace, 500m SW of the Silent Valley Landfill Site. It can therefore be reasonably concluded that, with respect to noise, the landfill gas engine gives rise to “no pollution” as defined in the relevant regulations.
5. SVWS accepts that the continued monitoring of noise related complaints is required and should any complaints be received in the 12 months following permit issue, a comprehensive noise assessment shall be undertaken to ascertain the level of noise at the sensitive receptors.
6. There is no potential for vibration from the site to impact on the sensitive receptors. It can therefore also be reasonably concluded that, with respect to vibration, the landfill gas engine gives rise to “no pollution” as defined in the relevant regulations.

5.5 Screening of Identified Environmental Risks

1. The proposed gas utilisation plant and equipment shall involve a point-source emission to air from the engine(s) and flare. An emissions assessment report has been prepared by Renewable Power Systems Limited on behalf of SVWS. The report for this assessment is provided in section 6 of this report.
2. Screening of potential fugitive emissions from the proposed activities is summarised in Table 1 below.

Table 1: Assessment of fugitive emissions risk

Hazard	Pathway	Receptor	Risk Management techniques to be employed	Probability of exposure	Severity of Consequence	What is the overall risk?
To Air Release of fugitive emissions to air - including odour and flammable environments	Local atmosphere	Potentially sensitive receptors living in the vicinity of the site and sensitive habitats	• Use of proprietary plant and equipment designed and maintained to operate full combustion of landfill gas, thereby reducing the risk of odour release. • All plant and equipment to be designed and constructed to provide full containment of landfill gas at all times. • Plant and equipment to be subject to routine and frequent inspections to confirm that the efficiency of the plant is maintained at an acceptable level and that no leaks occur. • All key items of plant and equipment to be subject to a preventative maintenance schedule.	Low	Low	Low
To Land Release of fugitive waste emissions to controlled waters	Ground	Local soil and groundwater	• Oils to be stored in accordance with the Oil Storage Regulations. • Oils to be handled and transferred in accordance with a risk assessment and operational procedure. • Plant and equipment to be subject to routine and frequent inspections to confirm that the efficiency of the plant is maintained at an acceptable level and that no leaks occur. • All key items of plant and equipment to be subject to a preventative maintenance schedule.	Low	Low	Low

Table 2 Assessment of noise and vibration risk

Hazard	Pathway	Receptor	Risk Management techniques to be employed	Probability of exposure	Severity of Consequence	What is the overall risk?
Engine or flare noise	Atmosphere	Potentially sensitive receptors living in the vicinity of the site	Potential noise emissions have been assessed as part of the planning permission for Silent Valley Landfill Site. The noise limits specified in that assessment shall be treated as performance criteria for the proposed plant and equipment that shall be installed.			

5.6 Environmental Accident Risk Assessment

1. Accidents that may have environmental consequences have been assessed to inform all design and management aspects of the site and the activities proposed. The accident risk assessment seeks to identify all potential hazards and environmental accident scenarios and to determine the potential likelihood and severity of the environmental accident occurring. Where the risk is determined to be significant, mitigation measures are identified.

Accident Hazard Identification

2. The potential accident hazard associated with the proposed activities is the uncontrolled release of emissions into the environment resulting in pollution of the environment and/or personal harm.
3. The accident scenarios that could result in the hazard occurring include:
 1. Leakage of landfill gas during operation,
 2. Failure of waste oil containment systems,
 3. Ignition of leaking landfill gas resulting in a fire or explosion.
4. The potential causes of the potential accident scenarios include:
 1. lack of awareness of the properties of the dangerous substances;
 2. operator error, due to lack of training and other human factors;
 3. inappropriate storage conditions with respect to the hazards of the substances;
 4. inadequate design, installation or maintenance of buildings and equipment;
 5. exposure to heat from a nearby fire or other heat source;
 6. poor control of ignition sources, including smoking and smoking materials, electrical equipment, etc; and
 7. horseplay, vandalism and arson.
5. The potential environmental consequences of an accident include the pollution of controlled waters, land or air and personal harm.

Risk Estimation

6. This Environmental Accident Risk Assessment has adopted a risk assessment approach to each potential environmental hazard scenario, the potential cause, pathway and receptor; and the risk management measures that are designed to reduce the likelihood of occurrence that shall be applied. By considering these against the probability and consequence of the accident an estimation of the perceived risk is given. The assessment is set out in Table 3 below.

Table 3: Environmental Accident Risk Assessment

Accident scenario	Potential cause	Pathway	Receptor	General risk management techniques to be employed	Probability of exposure	Severity of Consequence	What is the overall risk?
Leakage of landfill gas during operation	Inadequate design, installation or maintenance	Pollution of air	Nearby sensitive receptors	• Staff training programme • Design approval procedures • TCP system • Plant management and inspection protocol • Firefighting measures	Low	Low	Low
Failure of waste oil containment	As above	Pollution of ground and groundwater	Surrounding ground, ground-water and nearby receptors	• As above	Low	Low	Low
Ignition of leaking landfill gas resulting in a fire or explosion.	As above	Pollution of air, ground and groundwater	Nearby sensitive receptors and surrounding ground and groundwater	• As above • Only ATEX rated plant and equipment to be used in DSEAR rated areas of the Gas Compound	Low	Low	Low

5.7 Techniques for Pollution Control

Process Summary

1. The landfill gas utilisation plant at Silent Valley Landfill Site will consist of one containerised landfill gas spark ignition engine. Typically landfill gas will comprise a mixture of methane (CH₄) and carbon dioxide (CO₂) with a wide range of trace components. The methane is typically 50% of the landfill gas and is used as the fuel for the engine. The Landfill Regulations (England and Wales) 2002 requires the collection of landfill gas and that gas should be used to generate electricity wherever it is possible and this can be considered to be the Best Available Technique (BAT) for the control of emissions of landfill gas. Where this is not the case the gas must be flared.
2. The combustion gases from the engine will be vented to the atmosphere via a single 6-metre-high stack mounted on top of the engine container after the silencer. A simplified process flow diagram is shown in Appendix 3. A photograph of the previous installation is shown in Appendix 3. This photograph shows two landfill gas engines.
3. Engines offer a number of advantages for this type of application including high levels of availability and reliability. Typical monthly availability figures for the proposed engine is expected to be >90% availability.
4. Typically, maintenance varies from a minor service that takes half a day every 1,000 hours to a full engine overhaul after 48,000 hours of operation (6 years) when the engine is unavailable for 2 weeks. To maintain maximum performance and to control emissions, the manufacturer of the engine specifies these intervals and specialist technicians carry out the engine servicing. During periods when the engine is non-operational, the excess landfill gas is spilled directly to the flare.

Engine

5. The engine covered by this permit application will be installed and commissioned in January 2023, and is a landfill gas spark ignition engine. The engine burns landfill gas, which is transported to site via underground polyethylene pipes from the gas collection system on the adjacent landfill site.
6. The principle of lean-burn combustion offers a combination of high power, high efficiency and reduced exhaust emissions. This is achieved through the controlled combustion of an homogenous and lean mixture of gas and air in a compact combustion chamber. The gas feed pressure can be varied to keep the energy supply to the engine constant. To improve the performance of the engine a turbo charger is

used to boost the air pressure hence allowing more fuel to be used and increased power outputs.

7. The engine will be connected to an electrical generator with an output of approximately 0.6 MW. The engine unit also has an air blast cooler mounted on top of the engine container. A simplified diagram of the engine is shown in Appendix 5.

5.8 Emissions Control and Abatement

Point Sources Emissions to Air

1. Emissions to air shall be controlled by ensuring that the engine(s) and flare operate efficiency at all times. This will be achieved by:
 1. Ensuring that the plant is appropriately scaled to the quantity of available landfill gas;
 2. Servicing and maintaining the plant in accordance with preventative maintenance schedules; and
 3. inspecting the plant routinely to identify and rectify any breakdowns or faults promptly;
 4. Conducting periodic emissions monitoring to confirm that the emissions released are within the prescribed emission limit benchmarks and making any necessary adjustments to the plant to achieve compliance with the benchmarks should they be exceeded.
2. The main emissions to air arise from the combustion of landfill gas in the engine. When operating the plant consumes approximately 930m³ of landfill gas per hour under normal operating load. The main constituents of the landfill gas at Silent Valley are methane at approximately 50% and carbon dioxide at 35% with trace concentrations of volatile and semi-volatile organic compounds. There is no additional abatement of the engine emissions other than that achieved by good design, operation, maintenance and control. The engine will operate over a wide range of methane contents from 35% to 100%. To control the combustion within the engine an electronic engine management system (EMS) is used.
3. The key parameters that will be monitored by the control system that are used to manage the operation of the Silent Valley Landfill Site (and hence can be considered to be surrogate environmental monitors) are summarised below;
 1. Landfill gas flow
 2. Gas pressure and temperature at inlet manifold

3. Engine speed
 4. Generator output (kW).
4. During commissioning, additional parameters are monitored and used to set up an operating profile for the engine. These included the following:
 1. Emission concentrations
 2. Methane content of landfill gas
 3. Oxygen content of landfill gas.
5. These measurements will be used to adjust the Tecjet valve that adjusts the fuel flow before it is mixed with air flow from the turbocharger. This can be set to achieve maximum power or to operate in lean burner mode reducing emissions. The engine will be operated in lean burn mode, reducing emissions of oxides of nitrogen.
6. If any of the measured process parameters exceed levels specified in the process control manuals an alarm will be raised and the operators informed. In serious fault conditions the plant will shut down to prevent uncontrolled emissions and the landfill gas will be dealt with accordingly.
7. For less serious fault conditions, once the fault is cleared, the engine can automatically restart. If the alarm is raised during periods when the site is unmanned the automatic telemetry contacts the maintenance contractors to inform them of the fault condition and they will aim to attend the site within 2 hours of notification.
8. During start-up and shutdown, the process emissions may change, however the time taken for the plant condition to change is relatively short, and any peak emissions are also short term. Typically, the engine will take 5-10 minutes to reach operating conditions from a cold start and therefore the emissions may exceed the proposed emission limit values for this short period.

Main constituents of releases to air

9. The main constituents of releases to air are detailed below.

Oxides of Nitrogen

10. Oxides of Nitrogen (NO_x) are produced by any process in which fuel is burnt in air. The level of NO_x is affected by flame temperature, flame shape and the physical parameters of the combustion zone. These thermally produced oxides can be limited by the design of the combustion systems to reduce maximum flame temperatures. With the landfill gas containing only approximately 50% methane the engine operates in lean burn mode that will limit flame temperatures hence reducing NO_x formation.

11. During the emissions monitoring tests, the normal emissions from the process will be monitored.
12. No additional method of control is therefore expected to be required; this will be confirmed once the results of the emissions tests are known.

Sulphur Dioxide

13. Sulphur Dioxide emissions from the combustion process are expected to be negligible due to the typically low sulphur content of landfill gas from a mature landfill site such as Silent Valley Landfill Site. Further, the emissions of sulphur dioxide will be measured during the proposed monitoring of emission to air.

Carbon Dioxide

14. Landfill gas, being a hydrocarbon (principally CH₄, CO₂ and water vapour) produces carbon dioxide during combustion. The total emission of carbon dioxide will include both the combustion generated carbon dioxide and the landfill gas carbon dioxide. Carbon dioxide is a known greenhouse gas however, the conversion of methane to carbon dioxide significantly reduces the global warming potential of landfill gas, by a factor of 21. As the combustion process is a recommended control system for generated landfill gas no additional method of control is therefore required.

Particulate Matter

15. The engine will be fired on landfill gas and there is no provision for alternative fuels. There is negligible particulate matter within the landfill gas and the combustion air both of which are filtered before entry to the turbocharger. Control of the combustion will ensure that the emission of particulate matter will be negligible. No additional method of control is therefore expected to be required.

Carbon Monoxide

16. CO is a gas formed by the incomplete combustion of carbon containing fuels. In the presence of an adequate supply of oxygen any CO produced during combustion is rapidly oxidised to carbon dioxide. Control of the combustion will ensure that CO emissions during normal operation will be kept as low as practicable. No additional method of control is therefore expected to be required; this will be confirmed once the results of the emissions tests are known.

Unburnt Hydrocarbons

17. Hydrocarbon emissions arise mainly due to incomplete combustion, and from leakage of landfill gas from distribution systems. Good management of the combustion process and effective containment of landfill gas during transportation to the plant site will ensure that the release of hydrocarbons into the atmosphere are controlled.

No additional method of control is therefore expected to be required; this will be confirmed once the results of the emissions tests are known.

Methane

18. Methane is a chemically active gas and is the major component of landfill gas. The main release of methane from the plant would be leakage from gas pipelines within the installation boundary.
19. However, the gas system is under pressure and any failure of the gas pipeline will cause a drop in the gas flow or methane content, this would be measured at the Silent Valley Landfill Site and action to rectify the issue instigated.
20. The gas supply pipework is designed to operate safely at a pressure of 6 bar, whereas during normal operations the maximum delivery pressure will be 0.3 bar. This has built in a significant safety factor to minimise the potential for uncontrolled releases of methane.
21. Another source would be incomplete combustion of the landfill gas, good management and planned maintenance will minimise emissions from the engine stacks.
22. A number of intermittent operations in support of normal plant operation will be carried out on site which will result in minor emissions of methane. These include gas venting of lines during start-up and shut-down to avoid dangerous air/gas mixtures being present at critical operations.
23. All these releases will be intermittent and a function of the operating regime of the generation plant. The levels of total volatile organic compounds including methane, produced during normal operation will be monitored during the proposed routine emissions monitoring.

Releases to the atmosphere from air blast coolers

24. The air blast coolers will not produce any emissions to air or visible plumes. The air blast coolers operate as a closed loop system and the hot water from the engine does not come into contact with the atmosphere.

Other releases to air

25. A number of intermittent operations in support of plant operation will be carried out on site and these are expected to result in minor emissions.
26. All of these will be intermittent and a function of the operation of the generation plant. These will be minimised by operating procedures commensurate with the safe operation of the plant.

27. In the event of plant failure of the engine, the gas would be diverted to the adjacent flare. The flare will comply with the requirements of NRW's guidance on landfill gas flaring and the operations of the flare are currently covered within the Silent Valley Landfill Site environmental permit ref: EPR/MP3835SV.
28. The volume flow rate for the engine will be calculated from the inlet gas flow rate, and the temperature of the outlet will be monitored electronically as part of the engine electronic engine management system (EMS).

Point Source Emissions to Surface Water and Sewer

Storm Water

29. Storm water arising from the drainage of roofs and hardstanding areas discharge to ground via natural soak away. Chemicals stored outside of the main buildings are stored on concrete hard standing. Oil tanks are double skinned storage tanks and any spillage will be removed by a licensed contractor.

Sewer

30. There is no sewerage discharge from the site.

Condensate Drain System

31. Landfill gas contains a significant amount of moisture. Therefore, before the gas can be burnt in the engine, the moisture will be removed by knock out pots and discharged to the adjacent landfill site.

Leachate Treatment System

32. The operation of the leachate collection and treatment system is covered by the existing landfill site environmental permit ref: EPR/MP3835SV.

Point Source Emissions to Groundwater

33. There will be no direct or indirect emissions to groundwater of List I or list II substances from this installation.
34. Mineral oils are the only list I or list II substances that will be kept on site and there is little potential for these to be released into groundwater directly.

Control of Fugitive Emissions to Air

35. The major raw material is landfill gas, this is piped to the site by underground pipes. Fugitive releases of landfill gas are limited to the isolation valves and intermittent

safety release valves on the gas system. The gas pipes above ground and the isolation valves will be inspected daily and any failures repaired. The oxygen within the gas main will be continuously recorded and since the system is under vacuum any increase in oxygen content will indicate air ingress into the gas collection system and this will be used as an indicator of a problem, and action to repair the leak will be taken.

Control of Fugitive Emissions to Surface Water and Sewer

36. There is no potential fugitive discharge to surface water and sewer on site.

Groundwater

37. There are no direct or indirect emissions from the gas utilisation plant at Silent Valley Landfill Site to groundwater of List I or List II substances as set out in the Groundwater Regulations 1998.

Odour

38. The condensate knock out pots and the landfill gas supply pipes isolation valves will be the main potential sources of fugitive odour. However, these are covered by the existing landfill site permit.
39. Potential odour sources at the site are deemed to be insignificant with existing procedural systems considered to provide an appropriate level of control.
40. It is not considered necessary to undertake an environmental impact assessment for odour as there have been no odour complaints received and the nearest sensitive receptor is approximately 500 m from the potential sources of odour.

Controlling noise and vibration emissions

41. The level of noise and vibration that may be emitted by the plant has been defined by a noise assessment and emission limits are specified in the planning permission for the site. Levels of noise and vibration emitted by the plant shall meet those levels and shall be maintained by the routine inspection and maintenance of the plant in accordance with the preventative maintenance schedules.

Storage of Substances

42. All substances shall be stored in appropriate areas in accordance with current regulations and best practice in accordance with a written procedure. Measures shall include the requirement for double bunding of the storage of all substances that are potentially harmful to the environment.

Waste management

43. Where disposal is necessary, this shall be undertaken in a manner that minimises its impact on the environment. The collection and removal of waste oil from the gas compound shall be done in accordance with a written risk assessment and operational procedure.

Extent of the operational area

44. The operational area within which the permitted activity shall take place shall not exceed that area as defined in the environmental permit.

Security

45. The gas compound shall be secure from unauthorised entry at all times. It is equipped with a palisade fence around its perimeter and flood lighting. The fencing and locks shall be visually inspected during every site visit. In the event that fencing or locks are damaged these are replaced or repaired immediately.

Monitoring and Maintenance Procedures

46. Plant and equipment shall be maintained in accordance with a log and record of maintenance conducted.
47. Environmental emissions monitoring shall be conducted from the monitoring location(s) as defined in the environmental permit.
48. Environmental emissions monitoring shall only be conducted by a certified or accredited MCERTS monitoring contractor. The MCERTS contractor shall use certified or accredited equipment, techniques personnel and organisation as appropriate. Where required by environmental permit, annual monitoring of landfill gas constituents shall be conducted by a certified monitoring contractor. The monitored emissions as defined in the contractor's report shall be reviewed against the emission limits defined in the environmental permit. In the event that the emission limits are breached, Natural Resources Wales will be notified using the requisite forms as defined in the environmental permit.

5.9 Conclusion

1. This Environmental Risk Assessment has been prepared to consider the potential for environmental harm to occur from the proposed waste activity at the gas utilisation

plant at Silent Valley Landfill Site. It has set out the environmental context of the site with respect to sensitive receptors and habitats.

2. The potential pollution sources and pathways from the proposed activities have also been identified. A risk assessment of these aspects has been conducted using the Source-pathway-receptor model.
3. The assessment has taken consideration of the mitigation measures that shall be applied as part of the operational techniques employed in the management and operation of the gas utilisation plant.
4. Renewable Power Systems has conducted an emissions assessment, which concluded that the potential impact of emissions from the proposed gas utilisation plant on sensitive receptors is not of potential significance.
5. Therefore, SVWS believes that the environmental impacts are unlikely to be significant from the proposed activity.

6. Emissions Assessment Report

Silent Valley Landfill Site

Emissions Assessment of Proposed Landfill Gas Powered Electricity Generating Plant

December 2022

VERSION 1.0

Prepared by:

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Table of Contents

1. Introduction
2. Emissions Assessment Methodology
3. Source Emission Levels
4. Environmental Assessment Levels
5. Initial Emissions Screening Assessment
6. Summary
7. References

1. Introduction

Silent Valley Waste Services are applying to vary the environmental permit for the Silent Valley landfill site to incorporate electricity generation from the landfill gas produced at the site. The scheme shall consist of a spark ignition landfill gas generator which shall give rise to aerial emissions. The scheme gives rise to NO_x and CO emissions from the generator. The document assesses the emissions from the generator to determine if they are significant and require further modelling or control measures put in place.

2. Emissions Assessment Methodology

The methodology is set out in the Environment Agency horizontal guidance note H1 (Environment Agency 2010), H1 Annex F (Environment Agency 2011) and the Environment Agency's guidance note "Screening method for emissions to air from Landfill Sites" (Environment Agency 2004). The source emission rate is first calculated from the generator specification. The distance to receptors and height of the exhaust stack are then used to calculate the worst-case process contribution at any neighbouring receptors. If the long-term process contribution is less than 1% of the relevant long term Environmental Assessment Level (EAL) and also less than 10% of the short term EAL then the emission can be considered insignificant. Further modelling may be required if the long-term process contribution and background level combined is over 70% of the relevant EAL or the short-term process contribution and background level is over 20% of the relevant EAL. Otherwise, the contribution is considered insignificant.

3. Source Emission Levels

The proposal is for the installation of a single generating set. The generator will consume approximately 300 m³/hr of landfill gas at 50% methane (or equivalent). The generator will comply with the emission limits set out in the Environment Agency guidance as shown in Table 3.1 at reference conditions of 101.3 kPa, 0 C and O₂ 5% (dry gas)

Table 3.1 Maximum Exhaust Emission Levels from the Generation Plant

Determinand	Emission Limit (mg/m ³)
NO _x	500
CO	1400

The release rate for NO_x and CO for the generators can therefore be calculated from the maximum emission concentration multiplied by the gas throughput of the exhaust. The release rate for NO_x is calculated as a maximum of 0.24 g/s and CO is calculated as a maximum of 0.66 g/s. The Environment Agency guidance assumes that 50% of NO_x is converted to NO₂. This therefore gives a release rate of NO₂ of 0.12 g/s.

Flare stack emissions have not been assessed in detail. This is because the stack will not be combusting landfill gas at the same time as the generator and it is already covered by the landfill permit. It will therefore not increase the overall emissions from the site. When the generators are off its worst-case emissions are significantly lower than the generators. This

is due to the lower emission limits imposed by the EA (150 compared to 500 mg/m³ for NO_x for example) and the greater dispersion provided by the stack (since it is both higher and hotter). Therefore, the generator emissions represent the worst case.

The landfill gas contains various additional trace components. Most are hydrocarbons and will thus be converted to CO₂ and water in the generators.

4. Environmental Assessment Levels

Environment Agency horizontal guidance note H1 includes the EALs set out in Table 4.1. These shall be used as the short-term and long-term EALs for NO₂ and CO at the neighbouring receptors.

Two units of Cwm Merddog Woodland SSSI are adjacent to the landfill site at a distance of 500 metres from the generator release point. The long-term vegetation EAL for NO₂ will therefore be used for this location. No other statutory wildlife site or SSSI is within 3 km.

Table 4.1 Air Quality Objectives

Determinand	Averaging Period	Objective/Limit Values ($\mu\text{g}/\text{m}^3$)
Nitrogen Dioxide (NO_2)	1 Hour (short term)	200
	Annual (long term)	40
	Vegetation (long term)	30
CO	8 Hour (short term)	10,000
	Annual (long term)	350

5. Initial Emissions Screening Assessment

The Environment Agency guidance provides tables for calculating the maximum annual mean ground level concentration and the maximum hourly ground level concentration beyond a given distance from a typical landfill gas engine ($\mu\text{g}/\text{m}^3$ per g/s emitted). These correspond to the long-term and short-term EALs. In order to calculate the worst-case long term and short-term process contribution for each determinand, the relevant concentration is multiplied by the emission rate. The concentration is obtained by correlating the height of the exhaust and the distance to the receptor.

The generator exhaust stack is 6 m high, therefore, the 6 m column has been used. The closest short-term receptor is a path to the west of the compound at a distance of 100 m. The 100 m row has therefore been used for the short-term calculations. The closest long-term receptor to the generators is Hillside Terrace in Waun Lwyd at a distance of 500m. The 500 m row has therefore been used for the long-term calculations. The SSSI for the vegetation limits is 500 m away. The 500 m row has been used.

The results are shown in Table 5.1. From Table 5.1 it can be seen that the worst case NO₂ and CO emissions from the proposed generating facility are less than 10% of the respective short term EALs. NO₂ and CO emissions are less than 1% of the respective long term EALs for the domestic and SSSI receptor.

Table 5.1 Initial Emissions Screening

Determinand	Release Rate (g/s)	Process Contribution ($\mu\text{g}/\text{m}^3$)	EAL ($\mu\text{g}/\text{m}^3$)	Process Contribution %
NO ₂ (Long Term)	0.12	0.2	40	0.7%
NO ₂ (Short Term)		16.6	200	8.3%
NO ₂ (Vegetation)		0.2	30	0.8%
CO (Long Term)	0.66	1.3	350	0.4%
CO (Short Term)		92.9	10,000	0.9%

Because the emissions are insignificant according to the Environment Agency's guidance, further modelling is not required.

6. Summary

An assessment has been undertaken according to the Environment Agency's guidance for NO₂ and CO emissions. Suitable Environmental Assessment Levels (EALs) have been taken from local authority objectives. The generator exhaust level specification and exhaust gas volumes have been used to calculate the emission rates. Initial screening shows that both the short-term and long-term levels at the receptors are insignificant when compared to the EALs. The conclusion is therefore that the potential impact of emissions from the proposed plant on sensitive receptors is not of potential significance.

7. References

- Environment Agency (2010). H1 Environmental Assessment and Appraisal of BAT. *Environment Agency Horizontal Guidance Note.*
- Environment Agency (2004). Screening Method for Emissions to Air for Landfill Sites. *Environment Agency Air Quality Modelling and Assessment Unit.*
- Environment Agency (2011). H1 Annex F Air Emissions. *Environment Agency Horizontal Guidance Note.*

7. List of wastes

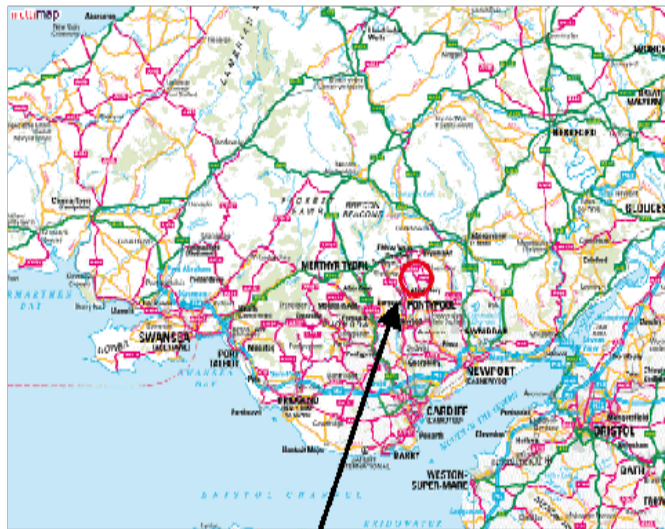
1. The gas compound shall receive only landfill gas from the nearby Silent Valley Landfill Site. Landfill gas is not listed within the List of Wastes, as specified under the Hazardous Wastes (England and Wales) Regulations 2005 and/or List of Wastes (England) Regulations 2005.

8. Operating techniques

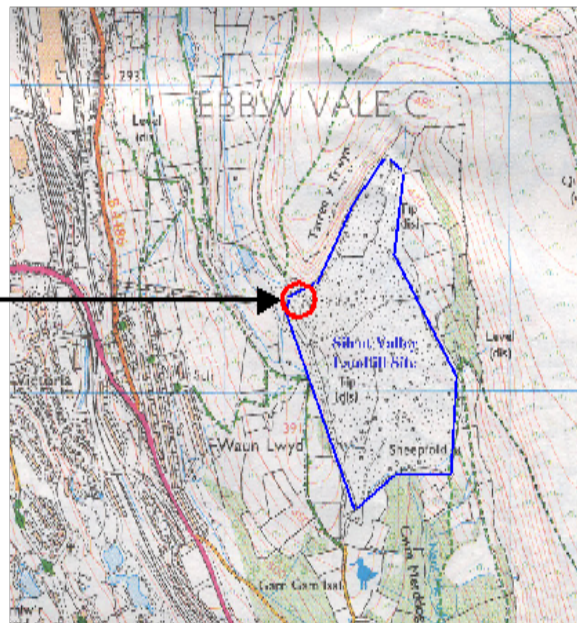
1. The Silent Valley gas utilisation plant shall be managed and operated in accordance with a written Site Management Plan (see Appendix 6).
2. The gas compound shall be used for the operation of gas engines to generate and supply electricity to the local electricity distribution network while it is financially viable to do so. The primary items of plant to be operated within the gas compound shall include landfill gas engine(s) and a landfill gas flare.
3. The engine(s) installed shall be specified at a size that is sufficient to optimise the amount of landfill gas that is converted to electricity. The engine units shall be installed within a proprietary enclosure e.g. shipping containers.
4. The flare unit shall be installed to serve as a means to safely combust landfill gas in the event that the engines are unable to operate e.g. during planned maintenance works. The flare unit shall comprise a high- temperature ground flare which shall be capable of combusting the maximum sustainable rate of landfill gas generated by the Silent Valley Landfill Site.
5. In addition to the engine(s) and flare, the gas compound shall also incorporate gas transmission pipework, condensate collection and dewatering, gas booster fan(s), operating control systems including telemetry, electrical cabling, transformer(s) and connections to the National Grid.
6. An indicative general layout of the key items of the plant is provided in Appendices 3 and 5 of this application.
7. The gas compound shall be operated under full-time remote supervision to ensure that the operation of the engine(s) are optimised. The gas compound operational control system shall be programmed to ensure that in the event of an unexpected shutdown of the engine(s), the flare shall operate automatically so that environmental control of the Silent Valley Landfill Site is maintained.
8. The gas compound shall be subject to a written environmental management system, which shall seek to minimise the risk of environmental harm and drive environmental improvements. Environmental improvements in the operating techniques of the gas compound shall include but not be limited to the improvement of energy efficiency in operating and maintenance procedures, control of excessive heating and cooling losses and building services.

9. Sampling location assessment

1. The sampling locations to be used to measure point source emissions to air include:
 1. Engine – this location will comprise an engine stack equipped for manual stack emission monitoring
 2. Flare – this location will comprise a flare stack equipped for manual stack emission monitoring
2. An assessment of these locations has been assessed in reference to the requirements set out in the Environment Agency's Technical Guidance Note (Monitoring) M1 *Sampling requirements for stack emission monitoring* v8 published in August 2017.
3. The gas utilisation plant shall be designed and built in a way that shall allow an MCERTS monitoring contractor safe access to the sampling ports.

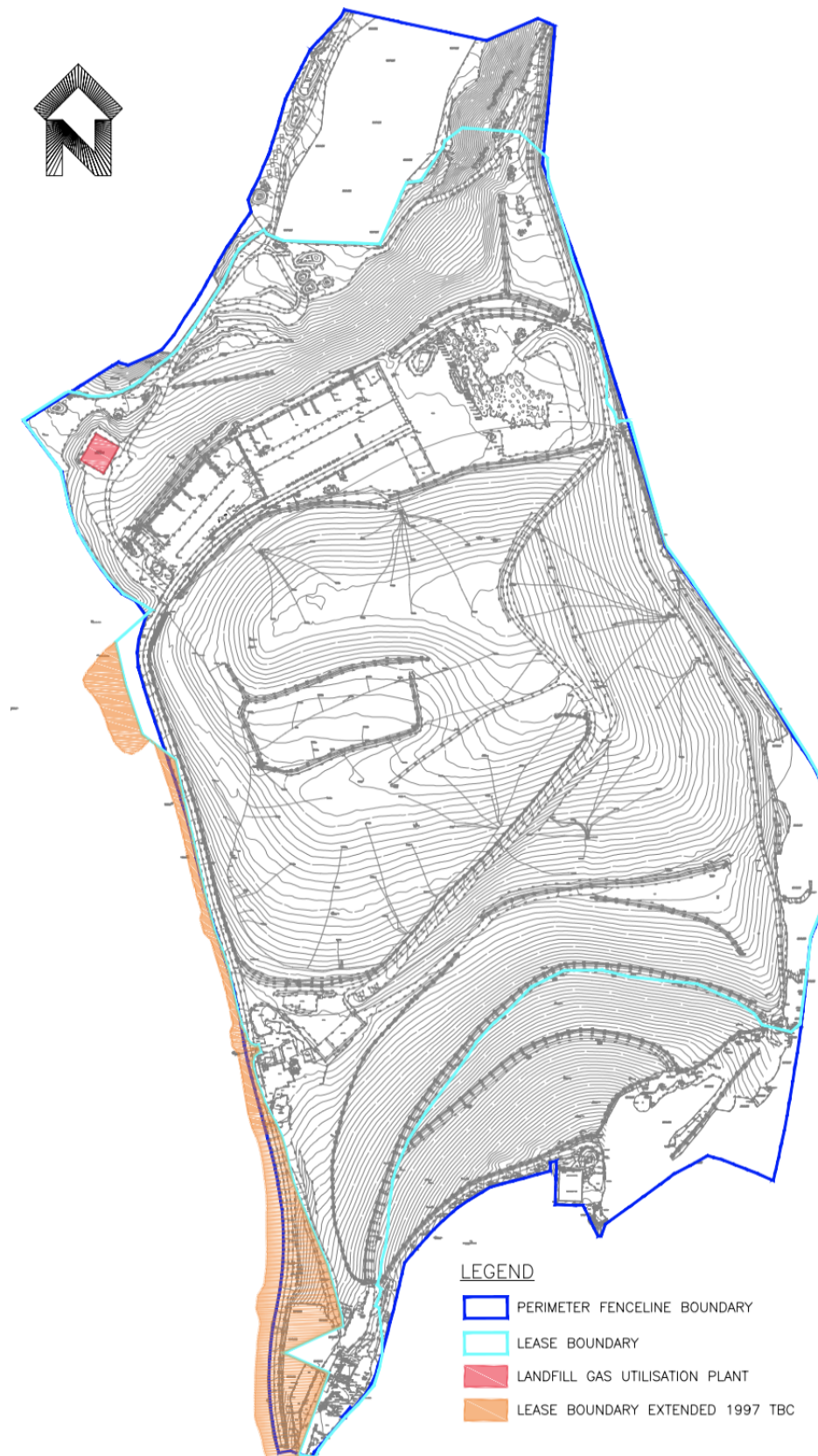


Silent Valley
Landfill Site



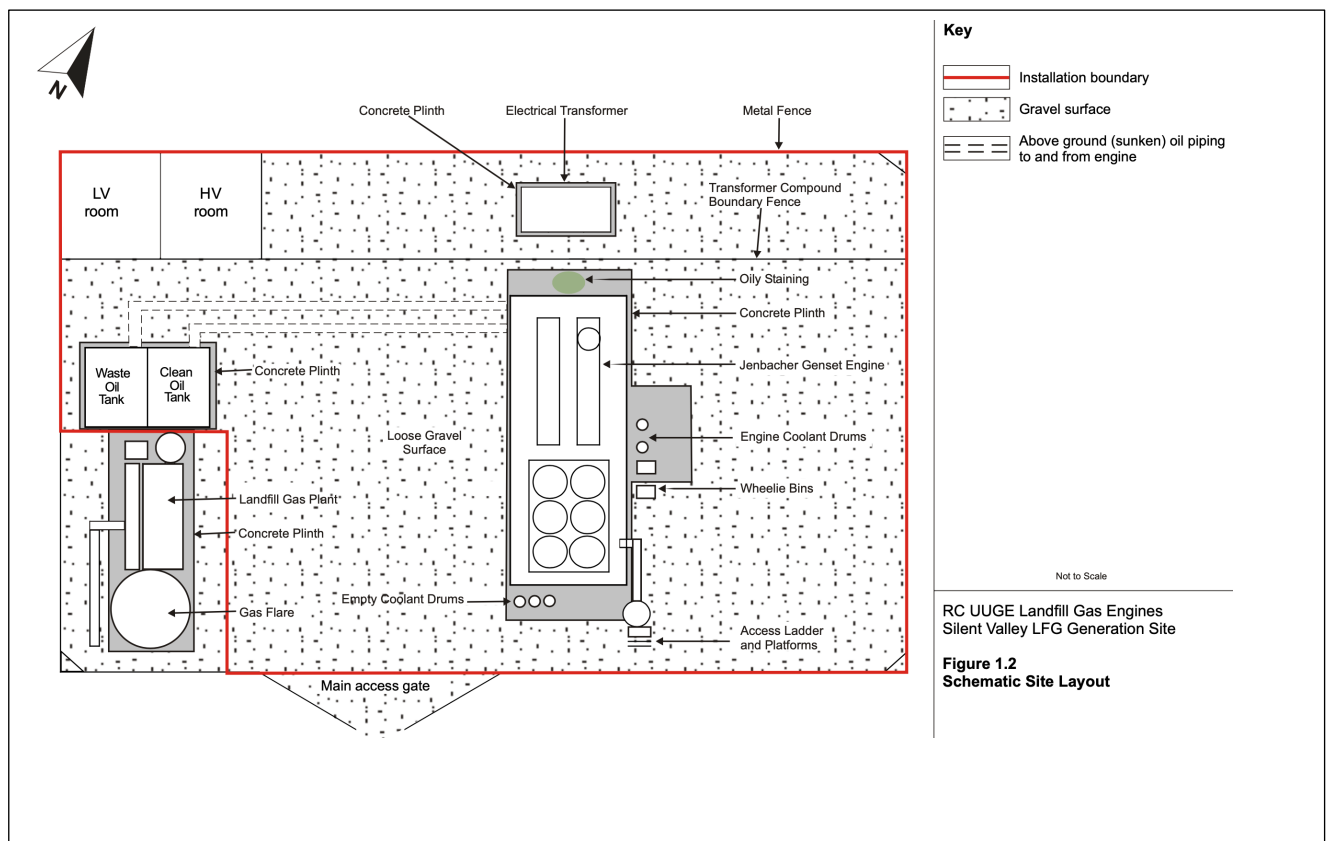
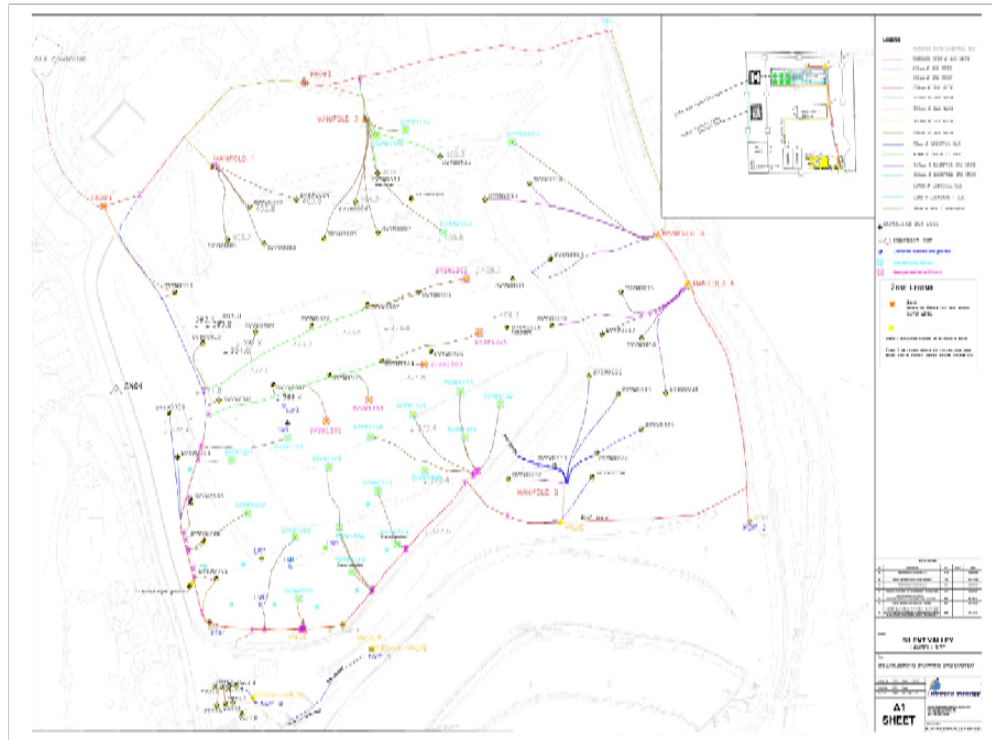
Silent Valley
Generating Plant

Appendix 2 – Environmental Permit Boundary Map



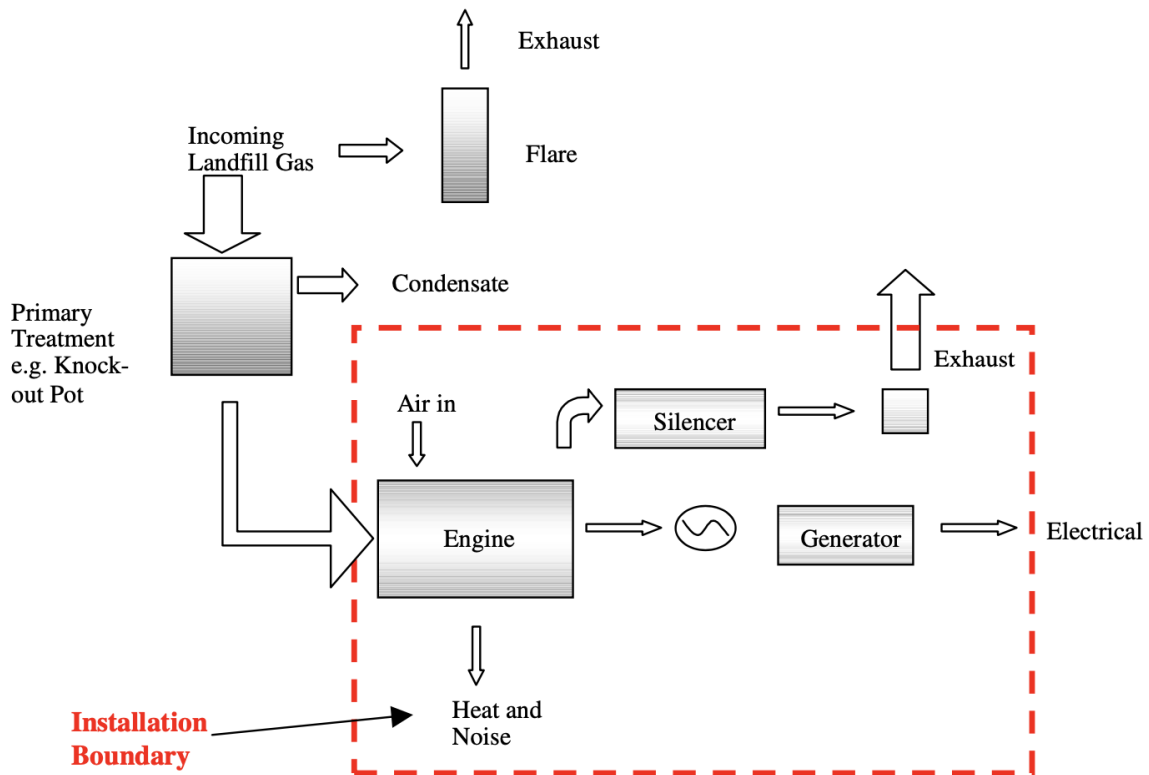
Appendix 3 - Site Plan – Gas Utilisation Plant and Silent Valley Landfill Site

The plan below shows the location of the Gas Utilisation Plant in relation to the Silent Valley Landfill.



Appendix 3 - Site Plan – Gas Utilisation Plant and Silent Valley Landfill Site (Continued...)

Schematic diagram of the Silent Valley Generating Plant

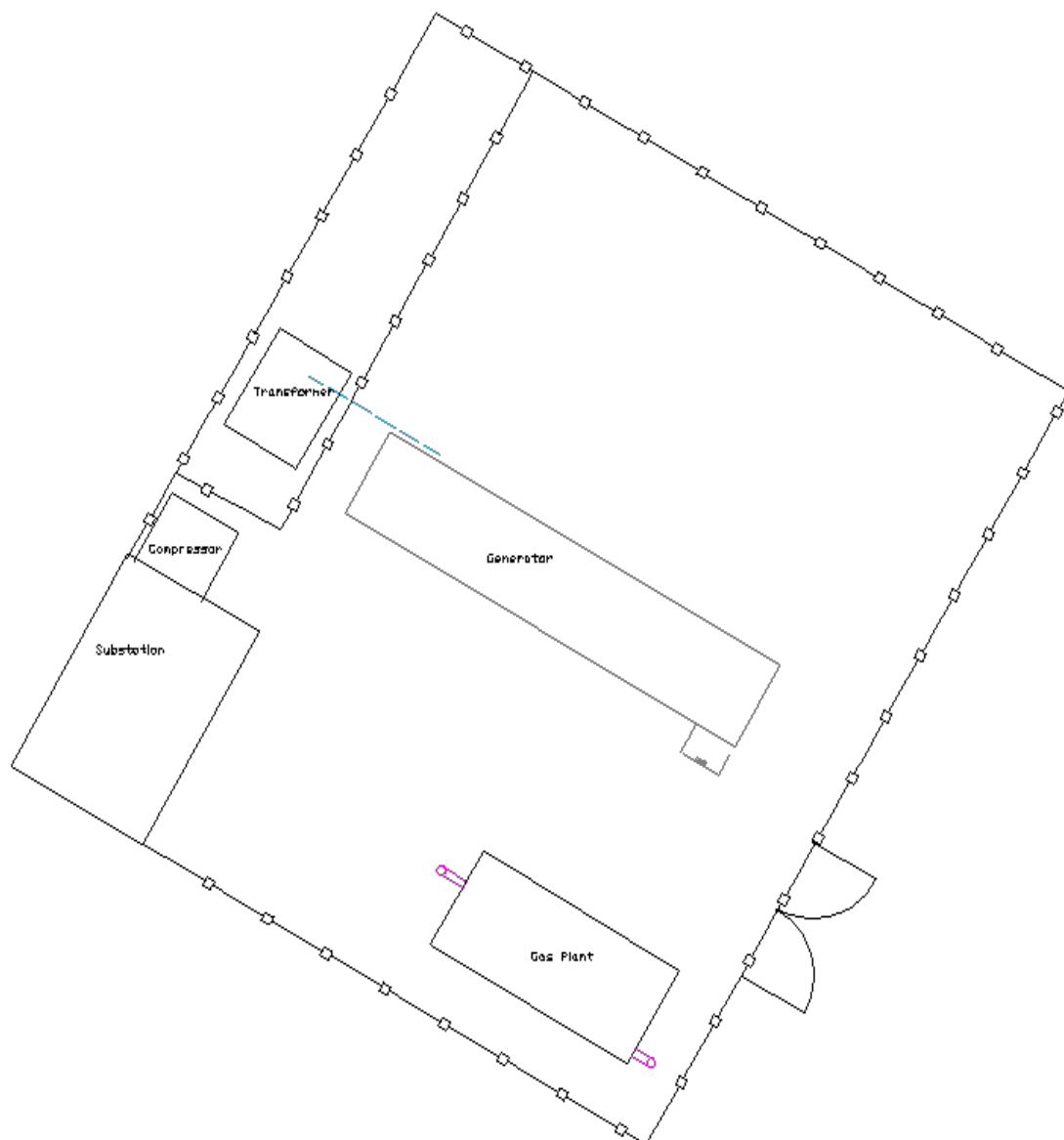


Photograph of the Existing Silent Valley Generating Plant



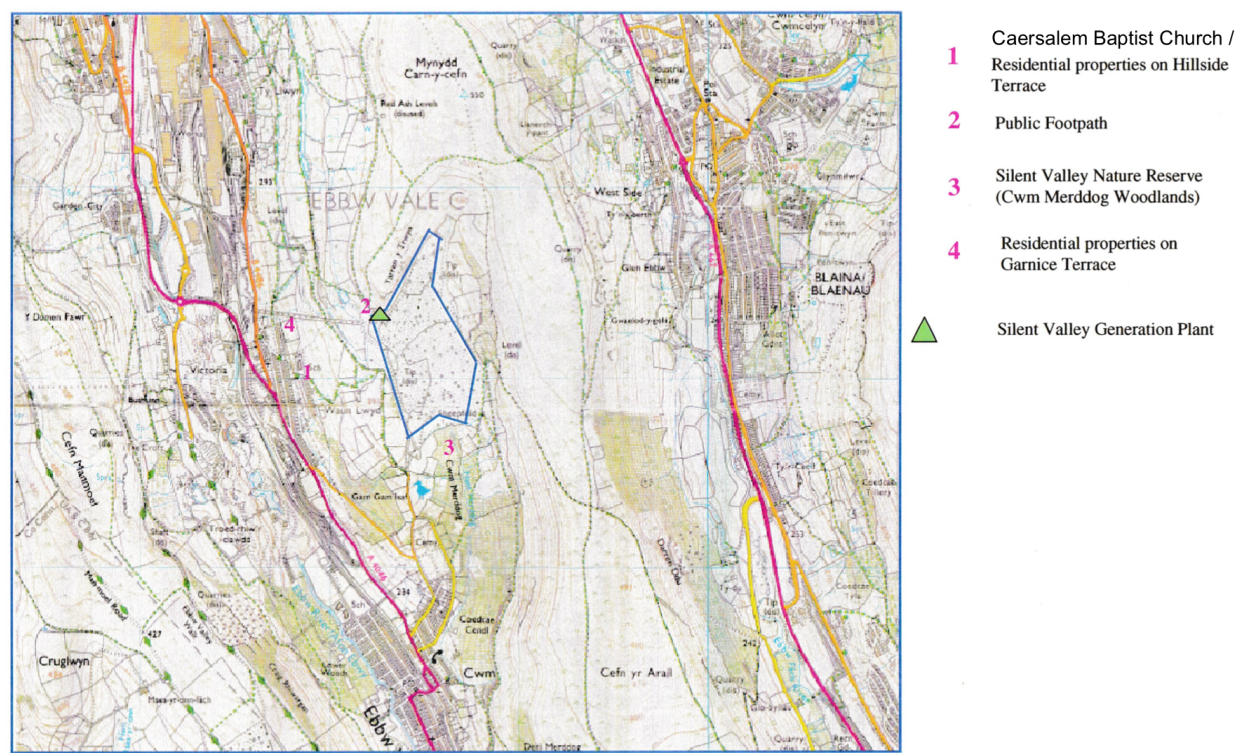
Appendix 3 - Site Plan – Gas Utilisation Plant at Silent Valley Landfill Site (Continued...)

Indicative Layout Plan / Proposed Simplification to Gas Utilisation Compound



	RPS Unit 11 Bedford Business Centre Mile Road Bedford MK42 9TW Tel: 01234 271700 Fax: 01234 271709	TITLE: SILENT VALLEY GENERATOR COMPOUND LAYOUT		
		DATE:	09-12-2022	DRAWING NO. FIGURE 1
		DRAWN BY:	J Mellor	
		SCALE:	1:125	DATE: 09-12-2022

Appendix 4 - Location of Sensitive Receptors to Silent Valley Landfill Site



Appendix 5 - Engine Generating Set

