Odour Management Plan to Support a Planning Application for a Proposed Anaerobic Digestion (AD) Site at Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH

On behalf of: Farm Biomethane Ltd

ETL997/2025

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Abbreviations

ACPH	Air changes per hour
AD	Anaerobic Digester/ Digestion
BAT	Best Available Techniques
BUP	Biogas Upgrading Plant
CHP	Combined heat and power (engine)
EA	Environment Agency
ETL	Earthcare Technical Ltd
FIFO	First-in First-out
GFS	Global Forecast System
H_2S	Hydrogen sulphide
HDV	Heavy duty vehicle
kWe	Kilowatts electrical output
kWtho	Kilowatts thermal output
LDAR	Leak detection and repair
MWth	Megawatts thermal input
MWtho	Megawatts thermal output
n/a	Not applicable
NH_3	Ammonia
NGR	National Grid Reference
O_2	Oxygen
OCU	Odour Control Unit
OCS	Odour Control System
OGI	Optical Gas Imaging
PRV	Pressure relief valve
PVRV	Pressure and vacuum relief valve
SCADA	Supervisory Control and Data Acquisition
SO_2	Sulphur dioxide
TPA	Tonnes per annum
TVOC	Total gaseous and vaporous organic substances, expressed as total organic carbon

1 Introduction

This Odour Management Plan (OMP) is produced to support a planning application for the construction of an agricultural Anaerobic Digestion (AD) Facility on land on land at Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH, on land centred at National Grid Reference (NGR) SJ24130655 ('the AD Plant Site'). Development of the above infrastructure, is hereafter referred to collectively as 'the Proposed Development.' The planning application will be submitted to Powys County Council (PCC).

The AD Plant Site will treat 133,000 tonnes per annum (tpa) of energy crops (silage) and livestock manures and produce approximately 24,465 tpa of solid digestate and 96,004 tpa of liquid digestate. The design of the AD Plant Site incorporates the latest approaches to covering and containing feedstocks and digestate, and treating odorous air, reducing odour before air is released to atmosphere.

1.1 Site description

Figure 1 shows the AD Plant Site location and Figure 2 the Site layout including infrastructure.

The AD Plant Site lies approximately 2.1km east of the centre of Welshpool, 1.4km north of Leighton and 2.2km southwest of Buttington, bounded by the B4381 to the north and the B4388 to the east. The Site is currently in arable use and land in the immediate vicinity is in agricultural use. There are nearby agricultural and industrial uses: Leighton Farm, Welshpool substation. The prevalence of farming in the vicinity will influence baseline odour at the AD Plant Site. Potential odour due to the AD Plant Site will be 'agricultural' in nature.

Human receptors within 1km of the site are listed in Table 2 and are shown in Figure 1. The receptors include residential properties, workplaces, tracks and footpaths.

The Site lies to the west of Afon Hafren/ River Severn, on the edge of the wide valley which runs south-southwest to north-northeast. Receptors that lie to the north or west of the AD Plant Site are at a similar elevation to the Site; receptors that lie to the east, including those to the southeast and northeast along the B4388, are on higher ground, at elevations up to just over 120m.

The closest residential receptor to the red line boundary is H5, Lower Leighton, 77m to the east and H6, Cattle Grid 100m to the northeast. Lower Leighton Village Hall and Leighton CP School lie 100m and 113m respectively to the south, along the B4388. A footpath currently crosses the Site. Users of the footpath would be expected not to spend any longer on the footpath than it takes to walk along it, therefore their exposure would be limited in time. They would also have a low expectation of amenity with respect to odour as they are using a footpath in an agricultural area.

1.2 Maintenance and review of the OMP

The site will require an environmental permit to operate and will be regulated by the Environment Agency. The site will have a written Environmental Management System of which the OMP is a key document. The OMP will therefore be checked and approved by the EA as part of the permitting process. The EA will be responsible for ensuring the Operator's ongoing compliance with the OMP. The OMP will be subject to routine review to ensure that it remains relevant and effective, with its contents updated as necessary for subsequent approval by the Environment Agency (EA). The OMP will be available electronically and in paper form, reviewed annually or after any incidents, complaints, or operational changes. The EA will be notified of any revisions.

The Site Manager will be fully aware of the contents of the OMP and is responsible for updating, and training staff on tit. The Site Manager ensures all relevant personnel are competent through education, training, or experience, and maintains records of competency. They will identify training needs related to the OMP and site operations. New staff will be trained on the OMP, and any changes will be communicated via Toolbox Talks. All training and talks will be logged.

1.3 Relevant sector guidance on which this OMP is based

This OMP follows the outline of the EA suggested OMP format and has been produced in accordance EA H4 Odour Management guidance (2011)[1] adopted by Natural Resources Wales (NRW) The EA H4 guidance is intended for permit holders and applicants, to advise them on how to comply with odour conditions set by the permit. It includes measures to assess, reduce, take control measures, and monitor pollution.

Reference is also made to the Waste Treatment BREF (2018)[2], a reference document on indicative Best Available Techniques (BAT) for anaerobic digestion, and Appropriate measures guidance: Biological feedstock treatment: appropriate measures for permitted facilities (2022)[3], that applies to aerobic and anaerobic processes including AD.

[1] Environment Agency (2011) H4 Odour Management – How to Comply with your Permit. Horizontal Guidance Note IPPC H4.
[2] Best Available Techniques (BAT) Reference Document for Waste Treatment, European IPPC Bureau, 2018
[3] Environment Agency (21 September 2022) Biological waste treatment: appropriate measures for permitted facilities. (https://www.gov.uk/guidance/biological-waste-treatment-appropriate-measures-for-permitted-facilities/1-when-appropriate-measures-apply).

2 Receptors

2.1 Receptor list

Receptors which may be sensitive to odour within approximately 1km of the Site have been identified in Table 1 and Figure 1.

Table 1 Human receptors

Receptor	Type	Description	Easting	Northing	Distance from the Site*	Bearing from the Site
H0	Footpath	Footpath through Site	324262	306568	0	n/a
H1	Agricultural	Lower Leighton Farm 1	324389	306566	15	SE
H2	Substation	Welshpool substation	324123	306770	16	NE
H3	Agricultural	Lower Leighton Farm 2	324317	306452	40	SE
H4	Leisure	Tennis courts	324234	306333	44	S
H5	Residential	Lower Leighton B4388	324473	306592	77	E
H6	Residential	Cattle Grid B4388	324489	306658	100	NE
H7	Village Hall	Leighton Village Hall	324231	306263	113	S
H8	Primary School	Leighton CP School actual	324220	306234	142	S
H9	Residential	Bytake Cottages	324153	306901	147	NE
H10	Residential	Oaklea	324271	306236	148	S
H11	Business (Veterinary)	Llinthwaite Nant Y Coed	324516	306706	148	NE
H12	Residential	Castle View	324109	306207	185	S
H13	Residential	Brynhafren B4388	324547	306751	200	NE
H14	Residential	Severn Banks	323856	306959	301	NW
H15	Residential	Severn Lodge	323787	306877	321	W
H16	Residential	Shire Oaks	323968	306087	329	S
H17	Residential	Castle Court	324013	306077	329	S
H18	Residential	Rivendell House	323995	306062	347	S
H19	Residential	Church Close	324381	306022	387	SE
H20	Church	Holy Trinity Church	324251	305964	413	S
H21	Industrial/ Business	Castle Court workshops	324022	305986	417	S
H22	Residential	The Wain House Pentre Mill	324804	306417	450	NE
H23	Residential	Walcot B4388	324036	305856	543	S
H24	Residential	Taflog B4388	324036	305856	543	S
H25	Residential	Pentre House	324417	305864	547	S
H26	Residential	Leighton Arches	323584	307009	560	NW
H27	Residential	The White House B4388	324019	305813	588	S
H28	Residential	West View	324758	307135	631	NE
H29	Residential	Gravel Lodge	323615	305930	652	SW
H30	Residential	Severnleigh B4388	323987	305708	697	S

Receptor	Type	Description	Easting	Northing	Distance from the Site*	Bearing from the Site
H31	Industrial/ Business	CDT Sidoli	323364	307061	782	W
H32	Sewage Works	Welshpool STW	323421	307291	849	NW
H33	Residential	Severn Lane	323279	307053	859	W
H34	Agricultural	Hope Farm Barns	324762	307410	873	NE
H35	Residential	Severn Farm	323237	306976	877	W
H36	Residential	3 Henfaes Lane	323230	307190	957	NW
H37	Residential	Ivy Cottage Hope Road	325226	307139	979	NE
H38	Industrial/ Business	Severn Farm Indl Estate	323046	306769	1,023	W
H39	Agricultural/ Livestock	Yorton Farm incl stud	324263	305291	1,086	S
H40	Industrial/ Business	Technocover	323476	307690	1,107	NW
H41	Residential	Old Hope Hope Road	325201	307465	1,169	NE
H42	Residential	Little Hope Hope Road	324975	307690	1,219	NE
Notes: *Distances rounded to the nearest 5m						

2.2 Wind rose and source of meteorological data

Five years' meteorological data were obtained from AS Modelling and Data Ltd[4] for the period 2020-2024 for the area surrounding the Site location (Latitude 52.651°, Longitude -3.119°), from a Numerical Weather Prediction system known as the Global Forecast System (GFS). The GFS is a spectral model, and data are archived at a horizontal resolution of 0.5 degrees longitude, or approximately 50 km over the UK (latterly 0.25 degrees, or approximately 25 km).

A 5-year wind rose from the Global Forecast System (GFS) data shows the prevailing wind direction is from the southwest (Figure 3). The prevalence of winds from these directions means that those receptors that lie to the northeast of the site will be those most frequently 'downwind' of the site and therefore most likely to be impacted by odour emissions from the operation.

Site operatives will record daily weather conditions in an electronic Site Diary using data from online resources. Meteorological data will be considered during routine odour surveys and operations that may cause off-site odour impacts.

[4] https://asmodata.co.uk/

3 Process description and odour sources

This section provides a summary of the processes on site to identify the emissions to air. Figure 2 shows the Site Layout.

The AD plant integrates both physical infrastructure and management practices to ensure that the storage capacities for process volumes are not exceeded to minimise odour risks.

Table 2 lists all materials entering and leaving the site and those potentially becoming odorous due to on-site processes.

3.1 Odorous materials entering and leaving site

3.1.1. Feedstock delivery and handling

The AD plant will process approximately 133,000 tpa of energy crops (silage) and livestock manures.

The energy crop feedstock will be brought in from nearby land by Heavy Duty Vehicles (HDVs) during the harvest period to be stored in the clamps. As fresh cut crops, the silage does not have a significant odour. Loads will be deposited into the **2No. Clamps** (each 90m x 35m, 20,600t total capacity) where they are compressed for storage (ensiled) and covered with an impermeable membrane to exclude oxygen. Only the **working face** of the silage clamp is exposed, as the silage is fed to the AD Plant, which will be a source of odour, moderate in intensity when disturbed.

Manure will be delivered throughout the year in covered HDVs and will be tipped and stored in bunkers in the **Waste Reception Building** once the roller door is shut. Manure is loaded into the Primary Digesters from the **2No. Feed hoppers** inside the Waste Reception Building where the potentially odorous air is treated (odour reduced) before exhaust to atmosphere. Odour will be treated by the Waste Reception Building Odour Control System (OCS) before release to atmosphere via the **OCS exhaust**.

Liquid feedstocks such as slurry, will be delivered by a combination of pipeline from Lower Leighton Farm and via tanker throughout the year. Liquid manures will be pumped from the 1No. **Slurry Storage Tank** (785m^3) or the 1No. **Liquid Reception Tank** (785m^3). The air displaced from the storage tanks would exhaust to the Waste Reception Building where the potentially odorous air is treated (odour reduced) in the OCS before exhaust to atmosphere. No other liquid feedstocks are currently planned.

3.1.2. Digestate removal

As detailed further within section 3.2.5, whole digestate is separated in the Waste Reception Building into a liquid fraction and a fibre fraction, with separated solids collected and temporarily stored within the enclosed building. The air from the building is treated via the OCS prior to release to atmosphere. Fibre is removed off-site for temporary storage within field heaps and application to land as a soil improver typically via internal estate tracks. Solid digestate odour is of low to moderate intensity and offensiveness.

The liquid digestate (liquor) will either be re-circulated within the AD system, stored in **2No. Existing Storage Tanks,** the 1No. **Thin Fraction Buffer Tank**-or will be transferred via a sealed pipeline to the 1No. covered **Digestate Lagoon** (3,170m^3). Odour from the Existing Storage Tanks, the Thin Fraction Buffer Tank and the Digestate Lagoon will be treated by the Waste Reception Building OCS before release to atmosphere via the OCS exhaust.

Liquid digestate from the Digestate Lagoon will be removed from the **Offtake** point from where it will be taken by tankers for use as a biofertiliser. During filling, air from the tanker will be displaced to atmosphere. Filling of tankers at the Offtake will be a small, intermittent source of odour.

3.1.3. Managing process volumes

On-site storage facilities such as the silage clamps, solid feedstock Waste Reception Building, and liquid feedstock tanks are designed to match forecasted feedstock volumes, with buffer capacity included to handle seasonal fluctuations or delivery delays. The capacity of the Digestate lagoon is aligned with process outputs and land application schedules, while separate containment systems and SCADA (Supervisory Control and Data Acquisition) linked sensors ensure accurate, real-time monitoring of volumes.

Management controls rely on forecasting and scheduling based on livestock production and crop data, supported by supply contracts with local providers and flexible daily input adjustments to match digestion rates. Operational monitoring combines SCADA, weighbridge documentation, and daily checks, reinforced by automated alerts, visual inspections, and manual validations to detect anomalies. Contingency measures, including temporary storage or diversion strategies, provide additional safeguards, ensuring that feedstock and digestate flows remain balanced.

3.2 Odorous materials (without mitigation)

Table 2 Odorous Materials

Odorous and potentially odorous material (any solid, liquid or gas)	Odour potential (High Risk / Medium Risk / Low Risk)	Maximum quantity on site at any given day	Maximum time held on site (hours or days)	Location of odorous materials on site	Additional comments
Energy crops (including straw)	Medium Risk (ensiled material)	Approx. 20,600t capacity	12 months	2No. Clamps	Grown under farm contracts. Fresh-cut crop - low intensity and offensiveness, sweet/ fermented odour. Potential for moderate odour release from ensiled material during cutting/ transfer from clamps.
Manure (cattle, poultry)	High Risk	Approx. 288 tonnes	5 days	Waste Reception Building	Local farms, contracts in place with suppliers. Manure will be used in the process at a rate of 58 tonnes per day. Delivery of solid feedstocks to the Waste Reception Building.
Non-hazardous liquid wastes	High Risk	Approx. 1,044m^3	3 days	1 No. Slurry Storage Tank (785m^3) 1No. Liquid Input Tank (785m^3)	Contracts in place with suppliers. The Liquid Storage Tanks will have vents will be connected to the Waste Reception Building OCS.
Silage effluent	Low / Medium Risk	In storage: 80m^3	3 days	Silage drainage channels Leachate Tank (80 m^3) and then to the liquid feedstock tank(s) then fed within the process	Sealed drainage channels for silage effluent arising from the clamps drains to the leachate tank from which the leachate is transferred to the Liquid Storage Tank(s).

Odorous and potentially odorous material (any solid, liquid or gas)	Odour potential (High Risk / Medium Risk / Low Risk)	Maximum quantity on site at any given day	Maximum time held on site (hours or days)	Location of odorous materials on site	Additional comments
Dirty water	Low Risk	In storage: 368 m^3	14 days (a)	Drainage channels Covered Dirty Water Tank (288m^3) Leachate Tank (80m^3)	Includes surface run-off / dirty water from external drainage systems.
Digester contents undergoing treatment	High Risk	Total: 22,000m^3	Total: 57-day hydraulic retention time	2No. Primary digester tanks: 5,200 m^3 (each) 2No. Post Digester tanks: 5,800 m^3 (each)	Sealed tanks: biogas released only during digester tank pressure and vacuum relief valve (PVRV) operation in over-pressure scenarios only.
Biogas	High Risk	Digester void space: 300 m^3 Available storage in excess of 4 hours of production.	Biogas production 1,200 Nm^3/h (average) 1,300 Nm^3/h (maximum)	Digester void spaces (including gas dome). Abnormal operation of digester PVRVs.	Sealed tanks. Each digester will have PVRVs. Biogas released from PVRVs in over-pressure scenarios only.
Liquid digestate	Medium Risk	Approx. 14,000m^3	6 months' storage	Thin Fraction Buffer Tank (20m^3) 2No. Existing Storage Tanks 5,444m^3 Digestate Storage Lagoon – 3,170m^3	Residual emissions from Lagoons captured and directed to the Waste Reception Building OCS. Emissions from the Thin Fraction Buffer Tank are vented through a carbon filter.
Solid fibre digestate	Medium Risk	2,050 tonnes	1 month	Waste Reception Building	Approx. 67 tonnes produced per day. Emissions captured and directed to the Waste Reception Building OCS.
'Cleaned' biogas	Negligible / Low Risk	Biomethane production capacity:	N/A	BUU PRV CO_2 recovery stack and PRV	Off-gas directed to carbon capture equipment. CO_2 emission from stack if carbon capture equipment not operational.

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Odorous and potentially odorous material (any solid, liquid or gas)	Odour potential (High Risk / Medium Risk / Low Risk)	Maximum quantity on site at any given day	Maximum time held on site (hours or days)	Location of odorous materials on site	Additional comments
		650 Nm^3/hr average 700 Nm^3/hr maximum			
Combusted gas	Negligible / Low Risk	Flare: 2,000 Nm^3/h (maximum AD plant production capacity, used <3% of the year)	N/A	1No. CHP (1,600 kWel) (natural gas) Emergency flare (2,000 Nm^3/hr of biogas) Biogas boiler (600 kWtho)	Low residual odour from unburnt Non-methane Volatile Organic Carbon (NMVOCs).
Emissions from air treatment systems	Low - Medium Risk	Continuous (68,600m^3/hr)	Sufficient extraction rate to maintain negative pressure within the building.	15.5 m stack for emissions abatement plant (for Waste Reception Building)	Emissions abatement system designed to reduce/ eliminate odorous compounds prior to discharge.
	Low - Medium Risk	27 m^3 tanker	/	Liquid digestate offtake	Small, intermittent release of odour from tanker vent during filling
Notes: (a) Storage times will be highly dependent on rainfall.					

3.3 Overview of odorous processes and emissions

3.3.1. Processing energy crops

Compacted silage will be cut from the clamp face using a top loader; it will be slightly moist and therefore not give rise to dust. It will be transferred once or twice each day from the working face of the clamps to the 2No. feed hoppers in the Waste Reception Building, from where it is loaded into the primary digesters. Each loading phase will take approximately 2 hours/day. Standard operating procedures will include the clearing of any silage deposits dropped during loading.

The **working face of the clamps** will be a source of odour; both moderate in intensity and offensiveness when disturbed/ during loading. Each loading phase will take approximately two hours/day. Standard operating procedures will include the clearing of any silage deposits dropped during loading.

3.3.2. Processing waste feedstocks

Other solid feedstocks will be temporarily stored and transferred within the Waste Reception Building into the Feed Hoppers and hence to the Primary Digesters. The Waste Reception Building will have an abatement system to abate odour emissions; they will be exhausted via the **Waste Reception Building OCS stack**; it will be a source of odour.

Liquid feedstocks will be stored within tanks. All storage tanks will be fed directly into the digesters via a closed system with no emissions to air.

3.3.3. Processing dirty water

Runoff from the hardstanding and bunded area will drain to the 1No. **Dirty Water Tank**, from where it will be reused in the process. The Dirty Water Tank will vent to the Waste Reception Building where the potentially odorous air is treated (odour is reduced) before exhaust to atmosphere. The Dirty Water Tank will not be a source of odour.

2No. **Surface Water Lagoons** (2,195m^3, 288m^3 capacity) will hold rainwater from other hardstanding areas and will not be a source of odour.

3.3.4. Leachate tank

Leachate is produced from the ensiled material. The leachate runs forwards (from southeast to northwest) within the clamps into the silage drainage channels and then to the underground leachate tank (80,000 litres capacity). The **Leachate Tank Vent** will exhaust passively to air and will be a source of odour.

3.3.5. Biogas generation, use and upgrading

In the **2No. Primary Digesters** and **2No. Post Digesters** biogas is generated from the AD process and is stored in the domes above the digesters. The digester tanks will each have pressure and vacuum relief valves (PVRVs) as a safety measure to emit biogas or take in air if there is an over-pressure or under-pressure event respectively. PVRVs will not operate during normal operation, only as an emergency contingency and so releases of biogas and the associated odour from the PVRVs would be short-lived.

There will be a desulphurisation process at the AD Plant. The injection of low levels of oxygen and the addition of ferric chloride will reduce hydrogen sulphide (H_2S) levels within the digester tanks.

The 1No. 1,600kWe combined heat and power plant (**CHP**) will use natural gas and will provide heat and power to the facility; it is expected to operate 8,600 hours per year. The 600kWtho biogas-fired **Boiler** will provide heat to the facility if the CHP is unable to provide sufficient heat. An emergency **Flare** will operate to burn up to 2,000Nm^3/h biogas in the event of an over-pressure in the digesters, conservatively assumed to operate <250 hours per year.

An emergency standby diesel generator will supply power whenever both the CHP system and the electrical grid are unavailable. The generator would be used only as an emergency backup operating typically less than 12 hours per year (for testing each month) and operating less than 500 hours per year as a 3-year rolling average. The combustion sources are not expected to be a source of odour.

The remainder (majority) of the biogas will be directed to the **Biogas Upgrading Plant (BUP)** where it will be upgraded to biomethane and injected into the gas grid. The BUP will incorporate a PVRV for over-pressure situations as a safety feature and when activated there would be an intermittent release of odorous biogas or odourless biomethane, CO_2 (odourless at ambient temperature) and oxygen (O_2). The CO_2 removed as part of the biogas upgrade process will be upgraded and recovered for distribution via road tankers.

3.3.6. Digestate separation and storage

Whole digestate from the AD process will be pumped to 4No. **Screw Press Separators** in the Waste Reception Building, for separation into a digestate liquor and a fibre fraction. The use of a two-stage digestion process with a 51-day hydraulic retention time reduces the residual biogas potential of the digestate. Further process monitoring and management of the AD process ensures that this is achieved. This is the primary control to ensure that a stable digestate is produced.

Solid digestate drops onto the floor and is stored until it is removed from the AD Plant Site in covered vehicles for use as a soil improver. Odour will be treated by the Waste Reception Building OCS before release to atmosphere via the OCS exhaust.

The liquid digestate (liquor) will either be re-circulated within the AD system, stored in 2No. **Existing Storage Tanks**, the **Thin Fraction Buffer Tank** or will be transferred via a sealed pipeline to one of 1No. **Digestate Lagoon**. Odour from the Existing Storage Tanks, the Thin Fraction Buffer Tank and the Digestate Lagoon will be treated by the Waste Reception Building OCS before release to atmosphere via the OCS exhaust.

The Digestate Lagoon will have engineered covers which will be made gas-tight by a concrete ring between the lining and cover. Any gas captured from the space between the digestate and the cover will be extracted and fed back into the Waste Reception Building OCS. Odour will be treated by the Waste Reception Building OCS before release to atmosphere via the OCS exhaust. The cover will be fitted with PVRVs which would operate in the unlikely event of an under-pressure or an over-pressure event. There will be no emissions to air and hence no odour from the lagoon during normal operation.

Liquid digestate from the Digestate Lagoon will be piped to the **Offtake** point from where it may be further piped to surrounding land, or, taken by tractor/tanker via internal farm tracks and roads and or via public road. When tankers are filled with liquid digestate, air from the tanker vents to atmosphere as it is displaced. Filling of tankers at the Offtake will be a small, intermittent source of odour, low to moderate in intensity and offensiveness.

3.3.7. Odour control of emissions in the Waste Reception Building

Vehicles will access the Waste Reception Building via fast-acting roller shutter doors. The building will be served by an **Odour Control System (OCS)** with at least two air change per hour (acph) providing a slight negative pressure with respect to the outside, meaning air from inside the building will tend not to leave the building even if the door is open. The air will pass through a wet **Scrubber** and an **Activated Carbon Filter**, before exhausting to atmosphere at 15.5m in height. The OCS will serve to abate emissions of odour, ammonia (NH_3) and hydrogen sulphide (H_2S). The OCS will be a source of residual odour.

3.3.8. Housekeeping

The Housekeeping Procedure will outline measures to control odour across the site through routine inspections, cleaning, and rapid spill management. Daily checks ensure walkways, equipment areas, access roads, pipework, and tanks remain clean and leak-free, while any spills from vehicles, tanks, or pipes are immediately addressed using absorbents or barriers under the Spill Procedure.

Silage clamps are maintained by removing organic debris, flushing drainage channels, and monitoring effluent tank levels. In the Manure Reception Building, solid feedstock handling areas are managed through organised stockpiles, spilled feedstock is cleared, manoeuvring areas are swept, vehicle wheels are pressure washed when required, and stockpiles are carefully managed. Ventilation and extraction systems undergo daily inspection and cleaning to maintain airflow and negative pressure. Digestate handling areas are managed through equipment cleaning, sweeping of loading zones, and daily lagoon level checks, with any liquid spills promptly cleaned. These practices ensure site hygiene is maintained, and odour emissions are minimised.

4 Control measures

Table 3 details the odorous materials and processes on-site, along with controls and actions to minimise odour, including containment, abatement, Appropriate Measures, and Best Available Techniques (BAT). It also outlines the monitoring frequency, process parameters, optimum performance levels, trigger levels for identifying higher odour risks, and actions for when results are outside optimum levels.

The following trigger limits, that indicate when the site is operating outside of optimum performance prompting an investigation and remedial actions, will apply:

1. Receipt of an odour complaint (Section 5.1)
2. Boundary and/or off-site odour (odour intensity 3 or above) as detected during routine (daily) odour monitoring ('sniff test' method) (Section 5.3)
3. Strong odour (odour intensity 4 or above) reported by staff/ visitors on arrival at the site (Section 5.3)

The details of all monitoring carried out in response to the above will be recorded accordingly.

Table 3 Monitoring procedures for Appropriate Measures/ BAT

Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
Vehicle movements (imports/exports)	**Containment**: All vehicles covered/sealed on public roads (except those from adjacent pig unit)	**Continuous**	Visual: Vehicles covered	Visual: Uncovered vehicles	**Weighbridge:** Log incident; caution driver. **Site Manager:** notify supplier; repeated breaches result in review/ termination of contract.
Spilled material	**Management**: Immediate clearance; routine cleaning; AD plant checks **Monitoring**: odour	**Continuous**	Visual: Areas clear of spills/debris	Visual: Spilled material/debris	**Feedstock Manager:** directs **immediate** clearance.
		Daily	Odour survey: Odour intensity ≤4 at source	Odour intensity ≥4 at source or ≥3 downwind; complaints	**Site Manager:** Investigate and rectify.
Solid feedstock receipt	**Containment**: Enclosed building under negative pressure; fast-action doors; emissions abatement system **Management**: Supervised un/loading **Monitoring**: Sampling and testing of feedstock, odour	**Continuous**	Document checks: Supplier known; waste type permitted; correct documentation	Unknown supplier; non-conforming waste; undocumented	**Feedstock Manager:** Reject and re-load **immediately.**
		Continuous	Visual: Material compliant; correct form; no contamination	Non-compliant feedstock	**Feedstock Manager:** Reload/reject or quarantine.
		Daily	Odour: No very strong odours (≤5) before/after unloading	Odour intensity ≥5	**Feedstock Manager:** reload/reject or immediate use. **Site Manager** to log incident; contact supplier.

Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
		Monthly / 6-monthly / Annual	On-site and external analysis: parameters within optimum ranges	One or more parameters outside range	**Site Manager** to notify supplier; repeated breaches result in review/ termination of contract.
Access doors to Waste Reception Building	**Containment**: Negative pressure **Management**: Fast-acting roller doors; maintenance contract **Monitoring**: odour	**Continuous**	Visual: doors closed when not in use	Doors stuck open	**Site Manager** to rectify **immediately** or call engineer; cease feedstock intake until fixed.
		Continuous	Roller door speed and hang time within set limits	Speed/hang time outside limits	**Site Manager** to contact engineer before end of shift to reset.
		Daily	Odour: No very strong odours (≤5) before/after unloading	Odour intensity ≥5	**Feedstock Manager:** to direct reloading/rejection or **immediate** use; log incident; contact supplier.
Waste feedstock storage	**Containment**: Enclosed building with OCS **Management**: Separate bays, First-in First-out procedure (FIFO), housekeeping **Monitoring**: Feedstock tonnage tracking, odour	**Continuous**	Visual: Oldest material used first; newer bays <50% full	Oldest material not used; newer bays >50% full	**Site Manager:** Cease deliveries until storage under control.
		Daily	Tracking: Stored manure ≤288 tonnes; residence time 5 days	Scheduled deliveries exceed capacity	**Site Manager:** Cease deliveries until storage under control.
		Daily	Odour: No very strong odours (≤5)	Odour intensity ≥5	**Feedstock Manager:** to direct **immediate** use or removal.

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Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
Waste feedstock processing	**Containment**: Feed hoppers inside building with OCS **Management**: Loading procedure **Monitoring**: SCADA, odour	**Continuous**	Visual: Material below maximum fill level	Hopper overfilled	**Feedstock Manager:** Stop loading; remove excess; check sensor.
		Continuous	SCADA: Normal feed rate; no alerts	SCADA alerts: Overfill, blockage, malfunction	**Feedstock Manager:** Clear obstruction; diagnose issue; escalate if needed.
Silage feedstock receipt	**Containment**: Silage in covered clamps **Management**: Pre-acceptance procedure; supervised loading **Monitoring**: odour	**Continuous**	Visual: Material compliant; no contamination	Non-compliant feedstock	**Feedstock Manager:** to direct **immediate** reloading/rejection.
		Daily	Tracking: Stored silage within clamp limits	Scheduled deliveries exceed available capacity	**Site Manager:** Cease deliveries until storage under control.
		Daily	Odour: No unpleasant odours (≤3) before/after unloading	Odour intensity >3	**Feedstock Manager:** to direct **immediate** rejection or use of odorous feedstock.
Silage storage	**Containment**: Covered clamps; effluent to tank **Management**: Separate clamps, compaction	**Continuous**	Visual: Cover intact	Torn/damaged cover	**Site Manager:** Repair cover as priority (safe access permitting).
		Daily	Visual: Clamp drainage channels	Overflow or blockage	**Site Manager:** to direct **immediate** clearing of channels.

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Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
	Monitoring: Feedstock tracking, odour	**Continuous**	SCADA: Silage effluent tank level	SCADA alert	**Site Manager:** to direct emptying of tank **immediately**; review feed rates.
Silage & straw loading	**Containment**: Clamp covered except working face; loaded within building **Management**: Limited loading period (4 hrs/day total), hopper weigh cells **Monitoring**: SCADA, odour	**Continuous**	Visual: Hopper not overfilled	Hopper overfilled	**Feedstock Manager:** Stop loading; remove excess; check sensor.
		Continuous	SCADA: normal feed rate, no alerts	SCADA alerts: Overfill, blockage, malfunction	**Feedstock Manager:** Clear obstruction; diagnose issue; escalate if needed.
		Daily	Odour: Ensiled crop odour ≤4	Odour intensity >4	**Site Manager:** Investigate clamp process failure within **72 hours.**
Emissions abatement plant/ stack (Waste Reception Building) Treats emissions from: 1. Storage/ transfer activities inside the building	**Management**: Preventive maintenance; spare parts on site **Monitoring**: Continuous SCADA logging; sampling point for emissions, odour	**Continuous**	SCADA: parameters within optimum ranges	One or more parameters outside range	**Site Manager: Immediate** corrective actions; log incident; sniff test; if unresolved, contact technology provider; divert manure deliveries if downtime >24 hours.
		Daily	Inspect fan, filters	Faults or defects observed	**Site Manager:** Investigate and implement corrective actions; liaise with technology provider.

Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
2. Slurry Storage Tank 3. Liquid Input Reception Tank 4. Digestate separation process 5. Solid digestate storage 6. 1No. Liquid Digestate Lagoon 7. 1No. Thin Fraction Buffer Tank 8. 2No. Existing Storage Tanks 9. Dirty Water Tank		**Per delivery**	Documentation: Permit compliant feedstock	Non-compliant feedstock	**Feedstock Manager: immediate** rejection of load.
		Daily	Tracking: Storage volumes and residence times within limits	Exceeds limits or residence time; scheduled deliveries exceed capacity	**Site Manager:** Cease deliveries until storage under control.
		Daily	Odour: No strong odours (≤4) at source; none beyond site boundary (≤3)	Odour intensity >4 at source or >3 beyond boundary	Notify **Site Manager**; full odour survey; record actions.
		Monthly / 6-monthly / Annual	On-site and external analysis of feedstock/ digestate: parameters within optimum ranges	One or more parameters outside optimum range	**Site Manager:** Notify supplier; repeated breaches result in review/ termination of contract.
		6-monthly	MCERTS monitoring: Odour ≤1,000 ou_E/Nm^3; NH_3 ≤20 mg/m^3	Odour >1,000 ou_E/Nm^3; NH_3 >20 mg/m^3	**Site Manager:** Investigate and implement corrective actions; liaise with technology provider.
Digesters	**Containment**: Sealed system **Management**: Daily checks	**Continuous**	SCADA: Temperature / pH	Parameters out of range	**Site Manager: Immediate** corrective action: adjust feed rates, restore conditions, monitor microbial response.

Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
	Monitoring: Sampling, SCADA, LDAR, odour	**Daily**	Visual: No crusting	Crust formation	**Site Manager:** Restore mixing; remove crust; check feedstock; inspect equipment.
		Daily	On-site and external analysis: Parameters within optimum ranges	One or more parameters outside range	**Site Manager:** Adjust feedstock; modify loading; enhance mixing; follow-up sampling.
		Daily	Odour: No strong odours (≤4) at source; none beyond site boundary (≤3)	Odour intensity >4 at source or >3 beyond boundary	Notify **Site Manager**; full odour survey; record actions.
		Monthly / 6-monthly / Annual	LDAR survey with OGI camera: No leaks	Leaks identified	**Site Manager:** Direct **immediate** repair; follow-up survey after repairs.
Digestate separation	**Containment**: Separators in enclosed Waste Reception Building with OCS	**Daily**	Visual: Separators functioning; processing at specified rate	Separator malfunction; leaks; blockages	**Site Manager:** Stop separators; investigate cause; consult maintenance manual; escalate if needed.
Solid digestate storage	**Containment**: Fibre stored in enclosed Building with OCS	**Daily**	Visual: Storage bays not overfilled	Bays full and not emptied	**Site Manager:** Cease separation; arrange removal until storage under control..

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Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
	Management: PAS110 standard **Monitoring**: odour	**Daily**	Odour: No very strong odours (≤4) before/after unloading	Odour intensity ≥4	**Site Manager:** Halt operation; remove malodorous digestate within **12 hours**; investigate cause.
Solid digestate transfer	**Containment**: Roller doors opened only during dispatch **Management**: Follow handling and housekeeping procedures **Monitoring**: Sampling & lab testing	**During loading**	Visual: Area clean	Visual: Spillage	**Site Manager:** Direct clearance of spilled digestate after loading.
		Daily	Odour: No strong odours (≤4) before/after unloading	Odour intensity ≥4	**Site Manager:** Halt operation; remove load within **12 hours**; investigate cause.
		Monthly	External analysis: Parameters within range	Parameters outside range	**Site Manager:** Investigate cause; take corrective actions.
Liquid digestate storage	**Containment**: Fully contained; emissions via Waste Reception Building OCS	**Continuous**	Visual: Lagoon cover, pipework	Damage to cover/pipe	**Site Manager:** Repair or replace parts; follow spillage procedure.
		Daily	Odour: No strong odours (≤4) at source; none beyond site boundary (≤3)	Odour intensity >4 at source or >3 beyond boundary	Notify **Site Manager**; full odour survey; record actions.

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Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
	Management: Stable digestate **Monitoring**: Flow meter, visual checks, leak detection, sampling	**Daily**	Visual: Fill level below maximum fill line (750 mm freeboard)	Level near maximum fill line	Notify **Site Manager**; Review capacity; cease input or arrange transfer.
		Daily	Visual: No leaks	Leaks detected	**Site Manager:** Initiate Spill Control; inform EA; engage engineer.
		Monthly	External sample analysis: Parameters within range	Parameters outside range	**Site Manager:** Investigate cause; corrective actions.
Liquid digestate transfer (off-take)	**Containment**: Sealed tankers; pipe coupling; spillage captured **Management**: Trained operatives	**Continuous**	Visual: Pipework/hoses/seals intact	Damaged hoses/leaks	Enact Spill Control. **Site Manager:** inform EA; repair **immediately.**
		Daily	Odour: No strong odours (≤4) from tanker vent filter	Odour intensity ≥4	Notify **Site Manager**; odour survey; review abatement; replace filter if needed.
		Weekly	Gas analyser: NH_3 at tanker vent (≤ 20 mg/m^3)	NH_3 >15 mg/m^3	**Site Manager:** Investigate cause; take corrective actions.
Drainage system	**Containment**: Sealed drainage; recirculation	**Continuous**	Visual: Water levels, channels clear	Overflow or debris blocking channels	**Site Manager:** Directs clearance/flushing of drainage system within **24 hours.**

Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
	Monitoring: Water levels **Management**: Pump control, cleaning	**Daily**	Odour: Detectable but not strong (≤4)	Odour intensity ≥4	**Site Manager:** Directs clearance/flushing of drainage system within **24 hours.**
Dirty Water Storage	**Containment**: Fully contained; emissions via Waste Reception Building OCS **Monitoring**: Water levels, odour	**Daily**	Odour: No strong odours (≤4) at source; none beyond site boundary (≤3)	Odour intensity >4 at source or >3 beyond boundary	Notify **Site Manager**; full odour survey; record actions.
Silage Effluent Storage	**Containment**: Sealed storage (with vent); recirculation **Monitoring**: effluent levels **Management**: Pump control	**Continuous**	Visual: Effluent levels less than maximum fill level	Approaching maximum fill level or overflow	**Site Manager:** Directs immediate emptying and investigate reason for overfilling.
		Daily	Odour: Detectable but not strong (≤4)	Odour intensity ≥4	**Site Manager:** Directs clearance/flushing of drainage system within **24 hours.**
Biogas (digester tanks, storage)	**Containment**: Airtight tanks	**Continuous**	SCADA: Normal gas use, PVRVs not in use, optimum gas flow/quality	SCADA alerts: Excess gas, flare use, PVRVs	Notify **Site Manager**; check PVRVs; engineers resolve **immediately.**

Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
	Abatement: Oxygen injection and ferric hydroxide for H_2S **Process Control:** SCADA **Management**: Routine checks, flare excess gas **Monitoring**: SCADA, LDAR surveys, odour			active, reduced gas quality	
		Annual	LDAR survey using OGI camera OGI camera: No leaks from sources surveyed	Leaks identified	**Site Manager:** direct repairs to address leaks identified during the LDAR survey. Repairs should be carried out immediately or as soon as is practical.
		Continuous	Personal gas alarm: CH_4, H_2S, O_2, CO within limits	CH_4 ≥1.5%, H_2S ≥15 ppm, O_2 <19.5% or >23.5%, CO ≥70 ppm	**Site Manager:** Evacuate area; activate emergency protocols; check gas type and concentration.
		Daily	Odour: No raw biogas odour (intensity ≤2)	Odour intensity >2	**Site Manager:** Initiate Biogas Leak Response; check ambient gas concentrations.
		Monthly / 6-monthly / Annual	LDAR: No leaks	Leaks identified	**Site Manager:** Repair **immediate**ly; follow-up survey after repairs.
Biogas upgrade unit (BUU) vent		**Continuous**	SCADA: Gas analyser for CH_4, H_2S, CO_2, O_2	SCADA alerts for gas quality	Notify **Site Manager**; check PRVs; engineers resolve **immediately.**

Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
	Process Control: Regulate gas flow; PRV for over-pressure **Monitoring**: SCADA, LDAR survey, odour	**Daily**	Odour: No biogas odour (intensity ≤2)	Odour intensity >2	**Site Manager:** Investigate; call service contractors if emissions become odorous.
		Annual	LDAR survey using OGI camera OGI camera: No leaks from sources surveyed	Leaks identified	**Site Manager:** direct repairs to address leaks identified during the LDAR survey. Repairs should be carried out immediately or as soon as is practical.
		Continuous	Personal gas alarm: CH_4, H_2S, O_2, CO within limits	Same as above	**Site Manager:** Evacuate area; activate emergency protocols
		Daily	Odour: No biogas odour (intensity ≤2)	Odour intensity >2	**Site Manager:** Investigate; call service contractors if emissions become odorous.
CHP stack emissions	**Process Control:** Combustion destroys odours; SCADA monitoring **Abatement:** Dispersion: 10m stack	**Continuous**	SCADA: Continuous monitoring, gas quality analyses	SCADA alerts for CH_4, H_2S, CO_2, O_2	SCADA manages treatment and flare.
		Continuous	Personal gas alarm: CH_4, H_2S, O_2, CO within limits	Same as above	**Site Manager:** Evacuate area; activate emergency protocols.

Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
	Monitoring: Gas flow, MCERTS testing, odour **Management**: Maintenance, leak checks	**Daily**	Odour: No odour (intensity ≤2)	Odour intensity >2	**Site Manager:** Investigate; call service contractors if emissions become odorous.
		Annual	MCERTS emissions monitoring	Exceedance of permitted limits	**Site Manager:** Liaise with CHP provider; inform EA; repeat testing after remedial actions.
Biogas boiler emissions	**Process Control:** Combustion destroys odours; SCADA monitoring **Abatement:** H_2S reduction; Dispersion: 6m stack **Monitoring**: Gas flow, MCERTS testing, odour **Management**: Maintenance	**Continuous**	SCADA: Continuous monitoring, gas quality analyses	SCADA alerts for CH_4, H_2S, CO_2, O_2	SCADA manages treatment and flare.
		Continuous	Personal gas alarm: CH_4, H_2S, O_2, CO within limits	Same as above	**Site Manager:** Evacuate area; activate emergency protocols.
		Daily	Odour: No biogas odour (intensity ≤2)	Odour intensity >2	**Site Manager:** Investigate; call service contractors if emissions become odorous.
		Annual	MCERTS emissions monitoring	Exceedance of permitted limits	**Site Manager:** Liaise with CHP provider; inform EA; repeat testing after remedial actions.

Odorous and potentially odorous process / material	Control measures (Appropriate Measure / BAT)	Monitoring frequency	Monitoring procedure and optimum process parameters	Trigger level	Action taken if outside optimum process parameters
Emergency flare stack	**Process Control:** Automatic flare at set pressure **Monitoring**: SCADA, odour **Management**: Combustion of odorous compounds	**Continuous**	SCADA: Process monitoring; gas quality analyses	SCADA alert: Flare activation	SCADA manages treatment and flare.
		Continuous	Personal gas alarm: CH_4, H_2S, O_2, CO within limits	Same as above	**Site Manager:** Evacuate area; activate emergency protocols.
		Daily	Odour: No biogas odour (intensity ≤2)	Odour intensity >2	**Site Manager:** Investigate; call service contractors if emissions become odorous.
		Annual	MCERTS emissions monitoring	Exceedance of permitted limits	**Site Manager:** Liaise with flare provider; inform EA; repeat testing after remedial actions.

5 Odour reporting

5.1 Odour complaints management and reporting

The Operator will address odour complaints in a prompt and comprehensive manner to resolve any issue as quickly as possible. If an odour complaint is received during operational hours, it is investigated immediately.

Local residents will be encouraged to immediately contact the site in the event of an off-site odour to enable site personnel to verify the presence, extent, and cause of the odour. The Site telephone number will be displayed clearly at the site entrance.

3.3.9. Complaints investigation and control measures

Complaints will be managed by the Operator as follows:

Immediate (Preliminary) Investigation

- **Response:** The Site Manager (or deputy) investigates the complaint as soon as possible upon receipt of odour survey results or complaints.
- **Validation:** The Site Manager reviews: routine monitoring data; weather conditions; and checks possible odour sources (see Table 3) to identify the cause. If possible, the Site Manager will perform a "sniff test" at the complaint location Validate complaint based on observations. If the site is not the odour source the investigation stops.
- **Liaison with EA**: Complete Odour Complaint Form (Appendix B). Inform the EA of the complaint(s), details of the problem, and the action taken (if any) within 24 hours.
- **Record Keeping:** Complaints are logged, checked monthly, and kept until the Permit ends. Records are available for EA review.

Detailed Investigation

If the screening process confirms the site is identified as the odour source, a more detailed investigation is undertaken and control measures implemented. Measures to bring the source under control, include:

- **Cease activity:** Stop the activity causing the abnormal situation and/or arrange for the immediate removal of odorous materials.
- **Eliminate cause:** Take immediate steps to eliminate the cause of the abnormal situation.
- **Contact contractor**: If necessary, contact the relevant maintenance contractor.

If the default procedure does not provide a satisfactory resolution, the following actions will be considered until the problem is resolved:

- **Restrict feedstock acceptance:** Temporarily limit the acceptance of feedstock at the site.
- **Reduce feedstock throughput:** Temporarily decrease the feedstock throughput.

3.3.10. Review and improvement

Once the cause of the problem is identified and the improvements implemented, the follow-up actions will include:

- **Odour survey**: Conduct a further odour survey to assess if the improvements have addressed the elevated odour levels.
- **Employee re-training**: If the cause is due to inadequately followed odour management controls, re-train employees to ensure compliance with required standards.
- **Review of controls**: If odour management controls are inadequate, raise the issue as part of the review of control measures detailed in the OMP.
- **Notification**: The Site Manager will notify all affected parties of the cause, actions taken to minimise the potential for re-occurrence, and resolutions.

5.2 Community engagement

The objective of community engagement is to encourage feedback to the Operator directly so that problems can be identified and resolved quickly.

- **Liaison**: The Site Manager will keep both the community and EA informed regarding activities that may generate significant odour emissions or occur outside normal operating conditions or hours.
- **Community monitoring**: If complaints do not match sniff test results over an extended period, selected residents may help by completing an offsite 'Odour Diary'.
- **Record keeping**: All community interactions and odour diaries will be logged and stored for future reference.

5.3 Pro-active odour monitoring

3.3.11. Meteorological Monitoring

Meteorological conditions are crucial for understanding potential odour impacts. An on-site weather station will log data automatically, supported by online resources.

Monitoring will be conducted:

- During routine odour checks and abnormal events.
- To predict poor odour dispersion conditions and adjust operations accordingly.
- For complaints investigation and identifying when plant settings need modification.

3.3.12. Monitoring Odorous Releases

Staff will remain vigilant about odours and report issues to the Site Manager. Additional monitoring procedures include:

- **Questionnaire System:** Visitors complete an odour evaluation on arrival. Reports of strong odours trigger investigations, with findings logged.
- **Routine Daily Monitoring:** Daily odour checks follow the Odour Monitoring Procedure (Appendix A) and include fixed and flexible monitoring locations. Weekly surveys will

occur at the nearest downwind off-site receptor to address odour impacts. Observations will be recorded on Odour Monitoring Form.

The following predetermined monitoring locations should be surveyed on every occasion, with upwind locations surveyed first:

- **OMP1** - Proposed AD Plant, northern boundary
- **OMP2** - Proposed AD Plant, eastern boundary
- **OMP3** – Proposed AD Plant, southern boundary
- **OMP4** – Proposed AD Plant, western boundary

Two flexible downwind monitoring locations to be undertaken daily will be chosen if required according to conditions at the time of the survey:

- **OMP5** – Flexible location: a location on the downwind site boundary (if this is not already included as a fixed monitoring location listed above)
- **OMP6** – Flexible location: the nearest downwind receptor if the odour intensity at the site boundary is >3)

Once a week, an additional survey will be conducted at the nearest downwind off-site receptor (**OMP7**), even if no odours are detected at the site boundary. This accounts for the possibility that odours may ground beyond the site boundary, even when undetected nearby.

Monitoring will be undertaken at different times each day during operational hours to capture a range of conditions. Additional odour monitoring surveys will be undertaken during the following circumstances:

- During high-risk times (e.g., poor dispersion conditions, maintenance).
- To trace off-site odour sources.
- Post-contingency, to verify the success of remedial measures.

The results will be recorded on the **Odour Monitoring Form** (Appendix B) and the **Site Diary**.

3.3.13. Odour Monitoring

The procedure for routine odour monitoring is provided as Appendix A. Olfactory monitoring ('sniff tests') is subjective, with hedonic tone and intensity experienced differently by different people. The Hedonic Scale and Odour Intensity Scale are included in Appendix A.

Monitoring staff must not be desensitised to odour. A variety of trained personnel should be used, preferably office-based staff who are unlikely to have been exposed to on-site odours. If routine odour testing suggests site personnel cannot detect odour, independent contractors may be used for sniff testing until the issue is resolved.

5.4 Reactive Odour Monitoring

Following reports of odour from receptors, odour monitoring will be undertaken as per the stepwise procedure for odour complaints investigation (section 5.1.1) and control measures implemented as appropriate.

Reactive monitoring will also be undertaken to establish/ confirm an odour source/ extent in the event of an odour release. If a distinct odour (intensity 3 or above) is detected at off-site receptors remedial measures will be implemented. If odour generation cannot be prevented with additional mitigation in place, consideration will be given to the suspension of the activity, where safety and operational constraints allow, until appropriate action, as agreed with the EA, can be agreed. Details of the odour monitoring will be recorded using the Odour Monitoring Form.

Table 4 summarises the schedule for proactive and reactive odour monitoring ('sniff tests').

Table 4 Schedule of Reactive and Proactive Odour Monitoring

Frequency	Person Responsible	Method	Reason	Records	Actions
Proactive (daily)	Trained **office-based** staff or **non-operational** staff or, if unavailable, by **operational staff at the start of a working shift**	Sniff test at specific locations (section 5.3.2)	Routine monitoring to establish normal working conditions and check for odour issues	**Odour Monitoring Form**	If a distinct odour (intensity 3 or above) is detected at site boundary/ at off-site receptor investigate and establish source and identify the requirement for remedial measures.
Proactive (ad-hoc)	**Site visitors** and **site personnel**	**Site visitors** - perform sniff test on arrival at site **Site personnel** – odour monitoring during shift	To establish odour issues; or during operations where there is an increased risk of odour release	**Sign-in app (Site Office)** **Odour Monitoring Form**	An alert is sent to the **Site Manager** if a strong odour (intensity 4 or above) is reported by visitors. Investigate and establish source and identify the requirement for remedial measures.
Reactive (ad-hoc)	**Site Manager** (or deputy)	Perform sniff test at relevant receptor locations, boundary locations and at suspected on-site sources	In response to reports of odour from receptors/ odour complaint(s)	**Odour Monitoring Form** **Odour Complaint Form**	Follow stepwise approach (Section 5.1.1).
Reactive (ad-hoc)	Trained **office-based** staff or **non-operational** staff	Perform sniff test at relevant receptor locations, boundary locations and at suspected on-site sources	To establish/ confirm odour source/ extent in the event of an odour release	**Odour Monitoring Form**	If a strong odour (intensity level 3 or higher) is detected at off-site receptors, remedial measures must be implemented. If odour cannot be controlled, the activity may be suspended - where safe and operationally feasible - until appropriate corrective action is agreed with the EA.

6 Abnormal events

Foreseeable situations that may compromise the Operator's ability to prevent and/or minimise odorous releases from the process and the response requirements to minimise the impact to abnormal event scenarios are also summarised in Table 5.

It is expected that, any emissions arising due to abnormal operations, incidents and/or due to periods of maintenance at the site would not occur frequently and would not be sustained or of prolonged duration.

When maintenance work is undertaken, there is the potential that the facility is more vulnerable, or there is a risk of a small odour release, e.g., removing a pump, replacing a pipeline, or rodding/flushing a pipe/chamber etc.

Table 5 Abnormal events

Abnormal event	Contingency measures
AD plant infrastructure compromised (gas / liquid release)	• **SCADA system**: Includes level sensors on all tanks, system alerts, overrides, and fail-safes for blockages, high/low pressure stops, and valve interlocks. • **On-duty personnel**: Site personnel always available to attend to issues (e.g., stop pumps, close valves). Portable monitors used to check gas type and concentration. • **Critical spare parts**: Supply of critical spare parts held on-site. • **Engineer support**: Emergency breakdown/repairs supported by engineers and pre-approved third-party engineers. • **Suction pump**: Available on-site at all times; vacuum tanker can be called in to retrieve liquids. Clean affected area with squeegee, apply absorbents, and clean equipment surfaces. • **Feedstock diversion**: Feedstock diverted to authorised disposal facility until repairs are completed.
General plant/ equipment Breakdown/ unplanned maintenance	• **Hazard and critical control point plan**: Refer to this plan for guidance. • **Safe shutdown procedure**: Follow procedure as required. • **Routine and emergency maintenance contracts:** in place with relevant contractors for plant/equipment. • **On-duty personnel**: Site personnel available at all times to attend to issues (e.g., stop pumps, close valves). • **Critical spare parts**: Supply of critical spare parts held on-site. • **Feedstock diversion**: Feedstock will be diverted to an authorised disposal facility until repairs are completed.
Emissions abatement plant system (for Waste Reception Building) breakdown	• **Trained personnel**: Maintenance will be undertaken by suitably trained and competent personnel to minimise the likelihood of breakdowns. • **Breakdown actions**: Actions depend on the specific situation or significance of the breakdown/malfunction, such as mechanical

	failure of fan, accidental damage to system components, or exhaustion of filter media. Actions may include: • Replacement/repair of parts/filter media by trained personnel (refer to Table 3 for Action Levels). • If required, repair/replacement of components by specialist engineers. • **Temporary cessation**: In the event of a breakdown preventing the emissions abatement system from functioning as intended, manure deliveries will be stopped temporarily until the system is repaired and fully operational. Manure already within the Waste Reception Building will be fed into the system, and door openings will be minimised during this time.
Power failure	• **Main Power Outage Response Procedure**: Invoke this procedure in the event of a power failure. • **Emergency power**: Power is provided by the on-site emergency diesel generator in case of failure. • **Feedstock diversion**: Feedstock will be diverted to an authorised recovery or disposal facility until repairs are completed.
Absence of key staff	**Personnel Management** • **Availability**: Deputy/technically competent personnel will be available at all times. • **Primary contact**: The Site Manager is the primary point of contact for all matters related to site operations and environmental performance. • **Training**: Odour awareness and contingency measures are included in all staff inductions and re-training, including for drivers. **Contingency Measures** • **Automated monitoring**: System processes will be automated and monitored remotely by the technology provider. • **Short-term reassignment**: Other staff members will be reassigned to critical operations in the short term. • **Temporary staff**: In the event of prolonged absence of staff members, temporary staff will be recruited and trained to fulfil non-critical roles while experienced staff are reassigned.
Flood	**Flood Response** • **Flood response procedure**: Invoke the Flood Response Procedure as appropriate. **Spill Control** • **Man-made incident**: If flooding is due to a man-made incident, follow the Spill Control Procedure. • **Liquid retrieval**: Use a suction tanker to retrieve liquids from sumps and subsequently load them into the process as appropriate.
Fire and/or explosion	• **Response procedure**: Follow the Fire & Explosion Response Procedure.

	• **Contact Emergency Services**: Contact the Fire and Rescue services immediately. • **Extinguish fire**: If safe to do so, attempt to extinguish the fire using the fire response equipment available on-site.
Unavailability of transfer vehicles	• **Oversight**: The Site Manager is responsible for overseeing the supplier policy and contingency plan. • **Short-term storage**: Sufficient capacity is available on-site for additional short-term storage. • **Transfer vehicles**: Additional transfer vehicles are available for use.

Figures

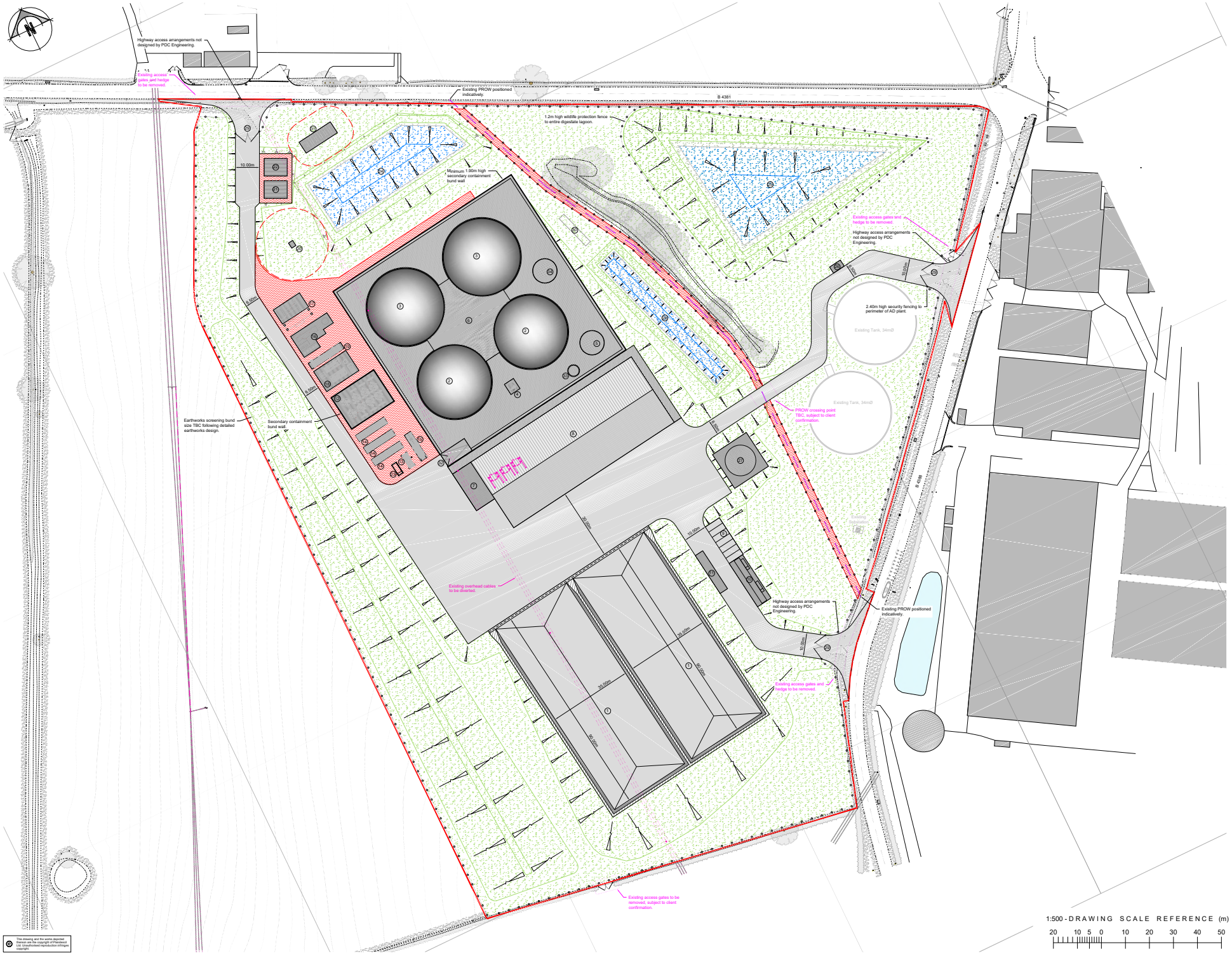
Figure 1 Site location and receptors

Background image ©OpenStreetMap contributors www.openstreetmap.org/copyright

Figure 2 Site Layout Plan

Drawing reference:

PDC Planning Design Civil, Proposed Site Layout, 29754/910 Rev E, 23-12-25, original size A0



GENERAL NOTES:

1. All dimensions noted are in metres unless stated otherwise.
2. All levels to be above Ordnance Survey Datum defined levels (A.O.Dm) unless noted otherwise.
3. Do not scale from this drawing, if dimensions are not clear ask.
4. This document has been created in accordance with PDC Engineering Terms & Conditions along with the scope of works provided by the client to PDC Engineering. Any use of this document other than for its original purpose is prohibited, PDC Engineering accept no liability for any third party uses of this document.
5. PDC Engineering to be immediately notified of any suspected omissions or discrepancies.
6. This drawing is to be read in conjunction with all other relevant PDC Engineering drawings, documents and schedules relating to the project.
   - 29754/001 - Topographical Survey - October 2025
7. This drawing is to be read in conjunction with all other relevant received drawings, documents and schedules relating to the project.
   - Swing Biomethane Ltd. drawing "LowerLeighton 07-2025 V4bis2-Modal" (pdf), received 07/10/2025.

PROPOSED PLANT LEGEND:

1	Silage Clamp (2No. 90m x 35m, Approximate 20,600t Capacity Total)
2	Digester (2No. 30.50mØ, 16.50m High)
3	Post Digester (2No. 32.00mØ, 16.50m High)
4	Ferric Chloride Tank
5	Slurry Storage Tank (10.00mØ, 8.00m High)
6	Technical Building
7	Odour Control Unit
8	Reception & Digestate Storage Building (80.00m x 32.65m)
9	Car Park Spaces (7No.)
10	Site Office
11	Weighbridge
12	Heated Tanks & Buffer Tanks (Bunded)
13	Boiler
14	Heat Recovery Container (3No.)
15	CHP
16	CO_2 Recovery
17	CO_2 Liquefaction
18	Gas Pre-Treatment Container
19	Gas Upgrading
20	Flare (15.00m Exclusion Zone)
21	GEU
22	Transformer
23	Emergency Generator
24	Surface Water Storage Lagoon
25	Digestate Storage Lagoon (Approximate 3,170m³ Capacity)
26	Digestate Off-take Point
27	Fire Water Above Ground Storage Tank (350m³)
28	Surface Water Storage Lagoon
29	Site Access Gate (3No.)
30	Leachate Tank (Below Ground, 80,000l Storage)
31	Propane Storage Tanks
32	Containment Bund Access Gate
33	Thin Friction Buffer Tank (4.50mØ, 6.00m High)
34	Liquid Reception Tank (10.00mØ, 8.00m High)

GENERAL KEY:

- Site Boundary - 81,040m²/8.10ha (TBC by Client)
- Proposed Hardstanding
- Proposed Concrete Surfacing
- Proposed Hardcore Surfacing
- Proposed Landscaping
- Existing Overhead Electric Cables
- Existing PROW (Shown Indicatively)
- Proposed Site Fencing

ISSUED FOR CLIENT REVIEW

Rev	Date	Rev By	Chkd	Description
E	22-12-25	KDW	TCH	Amended to Suit Client Comments
D	12-12-25	KDW	JHB	Updated to Suit Earthworks Design
C	28-11-25	KDW	JA	Minor Amendments
B	27-11-25	KDW	JA	Amended to Suit Client Comments
A	26-11-25	KDW	AF	Amended to Suit Client Comments
0	13-11-25	-	JA	First Issue

PLANNING DESIGN CIVIL

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civil • structural • environmental • surveying

Client

Farm Biomethane Ltd.

Project

Lower Leighton AD Plant,
Land off B4388 & B4381,
Welshpool, SY21 8HQ

Drawing Title

Proposed Site Layout

1:500 - DRAWING SCALE REFERENCE (m)

20 10 5 0 10 20 30 40 50

Scale U.N.O.	Date	Drawn By
1:500 (A0)	November 2025	KDW

Drawing No. 29754/910 Rev E

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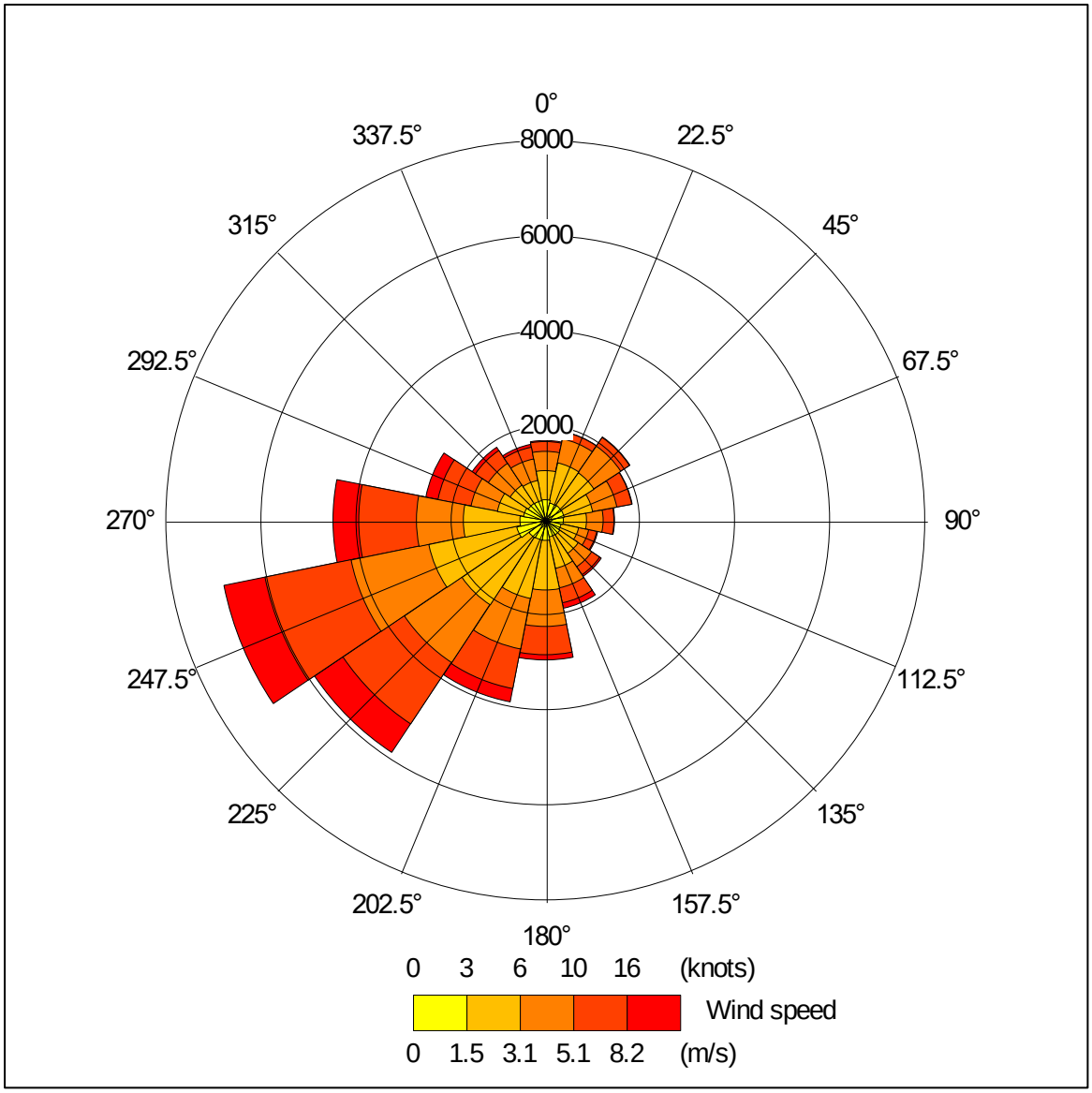
Figure 3 GFS meteorological data (latitude 52.651°, longitude -3.119°) windrose 2020-2024



Data supplied by AS Modelling & Data Ltd.

Appendix A Odour Monitoring Procedure

Odour Monitoring Procedure

Issue 1 – December 2025

Version Control

Issue	Date	Revision Details / Summary of Changes	Author	Approved by
1	Dec 2025	Odour Monitoring Procedure	Earthcare Technical Ltd	

Document owner

[Department i.e., Engineering & Delivery]

Management approval

[i.e., Director of Engineering and Delivery]

ROUTINE ODOUR MONITORING (DAILY)

1. The Odour Assessor

You must only undertake routine odour monitoring if you are not desensitised to odour i.e., you have not been subject to significant odour in the 30-minutes prior to the assessment or have not consumed strongly flavoured food or drink within this time.

2. Recording

The reporting forms used will depend on the level of odour investigation required. Observations should be recorded on:

Odour Monitoring Form

- Record weather conditions and time
- Record details of the routine (daily) odour survey at the 'fixed' monitoring locations (nos. 1 – 4) using the **Odour Monitoring Form**

Site Diary

- The Site Diary is filled in every day
- On completion of the odour survey at the 'fixed' monitoring locations enter either 'OK' or 'not OK' if odour issues are noted e.g., odours of moderate intensity (i.e., a score of 3 and above) are detected at receptor locations

3. Weather

Site operatives are responsible for recording the weather conditions before/ during the survey using onsite weather station data or an online resource and cross-checked against field observations during the survey. Observations should include wind direction, wind speed, and air temperature.

4. Odour 'sniff tests'

Routine (daily) monitoring should be undertaken at the 'fixed' locations as identified in the **OMP**. Additional monitoring (i.e., at other locations or at another time during the working shift) may need to be undertaken:

- At the relevant downwind site boundary

- If a distinct odour (intensity of 3 and above) is detected at the downwind site boundary a sniff test should also be undertaken at the nearest downwind receptor location (if not already covered by the fixed monitoring locations)
- In the event of an odour complaint
- During any on-site operations where there is an increased risk of odour release

If a distinct odour (intensity of 3 or above) is detected at a receptor location the source of the odour should be traced and investigated.

If the source of the odour is found to be due to site activities, measures should be implemented to bring the odour release back under control and/or the activity should be stopped until the issue is resolved and/or prevailing weather conditions are more suitable.

Record data using both the Odour Monitoring Form and the Daily Check sheet.

Table 1 - Routine (Daily) Odour Monitoring Locations

Daily ('fixed') Proposed AD Plant boundary locations	
OMP1	N boundary
OMP2	E boundary
OMP3	S boundary
OMP4	W boundary
Daily Flexible locations	
OMP5	Flexible location: a location on the downwind site boundary (if this is not already included as a fixed monitoring location listed above)
OMP6	Flexible location: the nearest downwind receptor if the odour intensity at the site boundary is >3)
Weekly Flexible location	
OMP7	Flexible location - nearest off-site downwind receptor location(s) (even if odours are not detected at site boundary)

4.1 Sniff test method

Start at off-site locations and/or upwind locations. Walk slowly, breathing normally. If an odour cannot be detected in this way, periodically stand still and inhale deeply facing upwind.

Use the guidelines below to compete the odour sniff test and record findings on the **Odour Monitoring Form:**

Odour intensity is scored between 0 - 6 as follows:

0	**No detectable odour**
1	**Very faint odour** e.g. if odour is detected but there is some doubt as to whether an odour is present
2	**Faint odour** e.g. if an odour is detected but cannot be described using precise words or terms
3	**Moderate odour** e.g. odour is detected while walking and the odour character is recognisable
4	**Strong odour** e.g. if the odour character is easily recognisable
5	**Very strong** e.g. very strong but bearable
6	**Extremely strong** e.g. an instinctive reaction is to reduce personal exposure to the odour

Odour duration is scored between 1 – 5 as follows:

1	**No detectable odour**
2	**Transient odour** e.g. whiff (only detectable for brief intermittent spells).
3	**Sporadic discrete odour** <5 to 10 minutes or <50% of total assessment time at that location if less than 30 minutes
4	**Persistent odour** greater than 50% of the assessment time but not continuous, fairly localised
5	**Continuous** present throughout the assessment period

Receptor sensitivity is scored between 1 – 3 as follows

1	**Low** e.g. footpath, road
2	**Medium** e.g. industrial or commercial workplaces
3	**High** e.g. housing, pub/hotel, etc.

Description of odour

Provide a **description** of what the odour smells like. These include, for example:

- Raw biogas (pungent, sulphurous/ eggy, sweet)
- Silage (fruity/ sweet/ floral)

State the **hedonic tone** of the odour.

The hedonic score refers to the type of smell and how pleasant or unpleasant it is irrespective of its strength (intensity) and can help to decide how offensive an odour may be. As shown in Table 2, the hedonic scale ranges from +4 (pleasant) through zero (neutral) to -4 (unpleasant).

Table 2 – Hedonic Tone

Hedonic Tone	Verbal Description
-4	Extremely unpleasant
-3	Moderate unpleasant
-2	Unpleasant
-1	Slightly unpleasant
0	Neutral
+1	Slightly pleasant
+2	Pleasant
+3	Moderate pleasant
+4	Extremely pleasant

If known, the suspected or confirmed source of the odour should be entered into the **'Operational status'** section.

Abnormal site operating conditions at the time of the survey e.g., maintenance to process equipment should also be recorded.

5. Site plan showing odour monitoring locations [TBC]

Appendix B Forms

- Odour Complaint Form
- Odour Monitoring Form

Earthcare TECHNICAL

Lower Leighton AD Plant - Odour Complaint Form	
Time and date of complaint:	**Name and address of complainant:**
Telephone number of complainant:	
Date and time of odour:	
Location of odour, if not at the above address:	
Weather conditions (*i.e.*, dry, rain, fog, snow):	
Temperature (very warm, warm, mild, cold or degrees if known):	
Wind strength (none, light, steady, strong, gusting):	
Wind direction (*e.g.* from the NE):	
Complainant's description of odour: • **What does it smell like?**	
• **Intensity (see below)**	
• **Duration (time)**	
• **Constant or intermittent in this period:**	
• **Does the complainant have any other comments about the odour?**	
Are there any complaints relating to the installation, or to that location? (either previously or relating to the same exposure):	
Any other relevant information:	
Do you accept that odour is likely to be from your activities?	
What was happening on site at the time that the odour occurred?	
Operating conditions at the time that the odour occurred	
Actions taken:	
Form completed by:	**Date:**
Signed:	

Odour Intensity

0	No odour	3	Moderate odour	6	Extremely Strong odour
1	Very faint odour	4	Strong Odour		
2	Faint odour	5	Very strong odour		

Survey Locations	LOWER LEIGHTON AD PLANT	Version: 1
	Odour Monitoring Form	Week Commencing:

Date	Time	Location	Odour Intensity (0 – 6)	Odour Duration (1 – 5)	Sensitivity (1 – 3)	Odour Description	Wind direction	Ave. wind Speed (mph)	Temp. (°C)	Operational Status/ Comments	Assessor
Mon		1									
		2									
		3									
		4									
		5									
		6									
		7									
Tue		1									
		2									
		3									
		4									
		5									
		6									
		7									

Odour Intensity Scale is from 0 – 6

0. No detectable odour
1. Very faint odour (odour detectable but doubt as to whether present)
2. Faint odour (need to inhale facing into the wind)
3. Moderate odour (easily detected)
4. Strong odour (bearable)
5. Very strong odour
6. Extremely strong odour (e.g., possibly causing nausea)

Odour Duration Scale is from 1 – 5

1. No detectable odour
2. Transient odour e.g., whiff (only detectable for brief intermittent spells).
3. Sporadic discrete odour: <50% of total assessment time at that location
4. Persistent odour greater than 50% of the assessment time but not continuous, fairly localised
5. Continuous, present throughout the assessment period

Sensitivity

1. Low (e.g., footpath, road)
2. Medium (e.g., industrial or commercial workplaces)
3. High (e.g., housing, pub/hotel, etc.)

Monitoring Locations:

1. OMP1 – N boundary
2. OMP2 – E boundary
3. OMP3 – S boundary
4. OMP4 – W boundary
5. OMP5 – A location on the downwind site boundary (if this is not already included as a fixed monitoring location as above)
6. OMP6– The nearest downwind receptor (if the odour intensity at the site boundary is >3)
7. **OMP7 - Weekly only:** Flexible location - nearest off-site downwind receptor location(s) (even if odours are not detected at site boundary)

Earthcare TECHNICAL

Date	Time	Location	Odour Intensity	Odour Duration	Sensitivity	Odour Description	Wind direction	Wind speed	Conditions/ Temp.	Operational Status/ Comments	Assessor
Wed		1									
		2									
		3									
		4									
		5									
		6									
		7									
Thurs		1									
		2									
		3									
		4									
		5									
		6									
		7									
Fri		1									
		2									
		3									
		4									
		5									
		6									
		7									
Sat		1									
		2									
		3									
		4									
		5									
		6									
		7									
Sun		1									
		2									
		3									
		4									
		5									

		6									
		7									

Earthcare TECHNICAL

Additional Survey Locations	LOWER LEIGHTON AD PLANT	Version: 1
	Odour Monitoring Form	Week Commencing:

Date	Time	Location	Odour Intensity	Odour Duration	Sensitivity	Odour Description	Wind direction	Wind speed	Conditions/ Temp.	Operational Status/ Comments	Assessor