HBP-OD-07 Odour Management Plan

Herriard Bio Power Ltd.

Bushywarren Lane, Herriard, Basingstoke, RG25 2NS

Produced in conjunction with Earthcare Technical Ltd.

Version No.: 2.0

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List of revisions

Version No.	Authorised by	Change(s)	Revision By
1.0	Kieran Purkis	New document	Earthcare Technical Ltd
2.0	Kieran Purkis	Change to document references within wider management system. Update to process flow diagram.	Earthcare Technical Ltd

Odour Management Plan

Site details

Site name: Herriard Bio Power Anaerobic Digestion Plant

Site address: Bushywarren Lane, Herriard, Basingstoke, RG25 2NS

Operator name: Herriard Bio Power Limited

Permit number: EPR/AB3807KW

Who this plan is for:

Site Management and all operational staff: will receive appropriate training on the OMP using the EMS and documented procedures. Changes made to the OMP will be communicated to all operational staff via a Toolbox Talk.

Contractors working on site: all contractors will receive a site induction outlining the requirement to prevent/ minimise the potential for odour impact outside the boundary.

Environment Agency officers: the Environment Agency will be notified of a revision to the OMP and a copy of the revised OMP will be submitted to the Environment Agency for approval.

A paper copy of the latest version of the OMP is held in the Site Office. A copy will also be maintained electronically.

Contents

Abbreviations

ACPH	Air changes per hour
AD	Anaerobic Digester
BAT	Best Available Techniques
BREF	BAT reference documents
BUP	Biogas upgrade plant
CH_4	Methane
CHP	Combined heat and power engine
CO_2	Carbon dioxide
DSEAR	Dangerous Substances and Explosive Atmospheres
EA	Environment Agency
EMS	Environmental Management System
FIFO	First in first out
GFS	Global Forecast System
H4	Environment Agency Horizontal Guidance Note H4
H_2S	Hydrogen sulphide
HBP	Herriard Bio Power Limited
IAQM	Institute of Air Quality Management
kWthi	Kilowatts of thermal input
LDAR	Leak Detection and Repair
n/a	Not applicable
N	Nitrogen
NGR	National Grid Reference
NH_3	Ammonia
NMVOCs	Non-methane volatile organic compounds
O_2	Oxygen
OMP	Odour Management Plan
PRV	Pressure relief valve
PVRV	Pressure and vacuum relief valve
RWBT	Raw waste buffer tank
SCADA	Supervisory Control and Data Acquisition system
SCC	Suffolk County Council
TCM	Technically Competent Manager
TG	Technical Guidance
TPA	Tonnes per annum
TVOC	Total gaseous and vaporous organic substances, expressed as total organic carbon
UV	Ultra Violet
VOC	Volatile organic compounds

1 Introduction

This Odour Management Plan (OMP), written on behalf of Herriard Bio Power Limited (HBP) by Earthcare Technical Ltd., forms part of the Environmental Management System (EMS) for the anaerobic digestion (AD) plant, including the use of resultant biogas, at Herriard Bio Power Anaerobic Digestion Plant, Bushywarren Lane, Herriard, Basingstoke, RG25 2NS herein termed 'the Site'. The plant is operated by Herriard Bio Power Limited, herein termed 'the Operator'.

The bespoke waste operation permit for the site was issued by the Environment Agency (EA) on 20 January 2014 (EPR/AB3807KW). At the time of writing an application is with the EA to vary the permit to a bespoke installation permit (Permit Reference: EPR/AB3807KW/V001) to reflect the higher treatment capacity of over 100 tonnes per day, site expansion and improvement work.

1.1 Process summary

The process is depicted in a Process Flow Diagram included as Appendix 1 of this document. A full process description is provided in Section 5 of the EMS Manual **(HBP-OD-01).**

Feedstocks comprise crop feedstocks which are ensiled on site in 2 No. silage clamps and waste comprising prepared food soup, composting liquor, liquid wastes and food wastes. Solid waste inputs are handled within the Waste Reception Building. There is a pre-treatment technology in place for packaged food waste. Prepared solid waste and liquid waste are fed into the Raw Waste Buffer Tank (RWBT) which is heated and mixed.

There are three primary digesters and one post digester; all are operated within the mesophilic temperature range. There is one primary digester (Digester 1) which is fed predominantly on energy crops (up to 12,500 tonnes per annum) in addition to some food waste, silage effluent and dirty water generated on-site.

There are two primary digesters (Digesters 2 & 3) operating in parallel utilising solid and liquid waste feedstocks in addition to dirty water and silage effluent. The three primary digesters all feed into a shared post digester (Digester 4).

Biogas is stored within double membrane gas storage roofs above the RWBT (up to 340m^3) and all four digesters (up to 1,250m^3 each) providing a maximum total biogas storage capacity of 5,340m^3.

Digestate is screened to 12mm, then pasteurised before passing through 2 No. FAN Screw Press separators to produce separated fibre digestate and a separated digestate liquor. The fibre is temporarily stored in a bay and taken off site for storage in destination field heaps and the liquor digestate is stored in two covered lagoons (covers awaiting installation at time of writing). Both products are used on Herriard Estates as a biofertiliser.

1.2 Site description

The Site is located to the south of Basingstoke, 3.9km at the nearest point from the M3 motorway which borders Basingstoke to the south; the centre of the Site is at approximate National Grid Reference (NGR) SU 65490 46638, as shown in Figure 1. The surrounding land use is agricultural and horticultural, grassland and ancient woodland.

The immediate surrounding area is sparsely populated however, Veolia Environmental Service's green waste composting site, Little Bushy Warren Composting Facility lies adjacent to the Site to the northeast. It is an open windrow composting facility accepting up to 100,000 TPA of green waste. It has an office block to the south of the site and employees may work across the site managing the windrows. A solar farm lies to the west of the Site. The next nearest residential receptors lie in the village of Herriard, the centre of which lies approximately 1km to the southeast of the Site. Figure 2.1 also shows the representative human receptors closest to the Site.

The site is staffed at all times. Waste shall only be delivered to the Site between the hours of 07:00 and 18:00 Monday to Friday, between 07:00 and 12:00 on Saturday mornings and between 7:00 and 15:00 on Bank Holidays except Christmas Day and Easter Sunday.

Full details of the odorous processes are described in Section 3.3.

1.3 Infrastructure

The site infrastructure comprises:

- Access road
- Weighbridge
- 2 No. silage clamps (7,500m^3 capacity each) and associated silage effluent storage tank
- 1 No. external solids feeder (Crop / 57m^3 capacity)
- Waste Reception Building comprising:
    - Mavitec depackaging line – paddle de-pack with hopper (4m^3 capacity) with 4 No. screens; 2 No. 25mm & 2 No. 20mm
    - Liquid waste delivery point
- Odour abatement system for Waste Reception Building (carbon filter)
- Secondary containment area containing:
    - Raw waste buffer tank (RWBT) (452m^3) with mixing and gas storage and a Pressure Vacuum Relief Valve (PVRV)
    - 3 No. primary digester (2,440m^3 each) with mixing, heating, and double membrane gas storage and 1 no. PVRV each
    - 1 No. post digester (2,440m^3) with mixing, heating, and double membrane gas storage and 1 No. PVRV.
    - 1 No. single tank pasteuriser (180m^3) and 1 No. PVRV
- 2. No FAN Screw Press separators with fibre storage bay (4.5m x 5.3m x 1.85m high) below
- 2 No. covered digestate storage lagoons (16,500m^3 each) with gas treatment and associated pipework (Work to cover the lagoons is pending)
- 13 No. gas compressors (for tank mixing system)
- 1 No. carbon filter prior to combined heat and power engine (CHP)
- 1 No. CHP (1,200kWel)
- 4 No. gas boosters
- 2 No. emergency flare (500Nm^3/hour & (1,000Nm^3/hour))
- Emergency diesel generator (363kW)
- 5 No. heat exchangers
- Control room
- Site office

- 2 No. carbon filters in series serving biogas upgrading plant
- Biogas upgrading plant including vent to atmosphere.
- 1 No. Biomethane compressor
- 3 No. Biomethane trailer bays
- Biomethane vehicle fuel dispensing pump

1.4 Maintenance and review of the OMP

It is the responsibility of the HBP AD Plant Manager to be fully aware of the contents of the OMP, to trigger updates to the OMP and to provide relevant training to staff. The Operations & Commercial Assistant is responsible for document control. The role of the Technically Competent Manager (TCM) is fulfilled by the HBP AD Plant Manager.

A paper copy of the OMP is held in the Site Office such that all employees have access to the latest version. A copy will also be maintained electronically.

The OMP will be reviewed on an annual basis (as a minimum) or immediately following any incident, complaints or a change in the operation or infrastructure to ensure that it continues to remain relevant to the site activities and in line with current guidance.

In the event of a revision to the OMP the Environment Agency (EA) will be notified, and a copy will be submitted for approval to them.

The Plant Manager will ensure all persons performing tasks for the organisation or on its behalf, whose work may have a significant impact on the environment, are competent based on appropriate education, training and/or experience, and will retain associated records.

The Plant Manager has established and implemented procedures to identify the training needs associated with the OMP, the operation of the site and the retention of staff competencies. The training requirements for new staff will be determined following the Training Procedure **(HBP-SOP-17).**

It is essential that all staff are fully aware of the OMP to ensure that procedures and controls are upheld. All new staff joining Herriard Bio Power Limited will receive appropriate training on the OMP using the EMS and documented procedures to understand and reduce impact of the odour. Thereafter, any changes made to the OMP will be communicated to all operational staff via a Toolbox Talk.

All formal training and Toolbox Talks received will be logged in Training Matrix **(HBP-OD-10).**

1.5 Relevant sector guidance

This OMP has been produced in accordance with:

- EA H4 Odour Management guidance[1]

  The guidance from EA is intended for permit holders and applicants, to advise them on how to comply with odour conditions set by the permit. It covers assessing odour pollution, measures to reduce pollution, control measures, and monitoring. It contains advice on odour thresholds or benchmarks for assessment.

- EA Appropriate measures for biological treatment of waste

[1] Environment Agency (2011) H4 Odour Management – How to Comply with your Permit. Horizontal Guidance Note IPPC H4.

This guidance explains the standards (appropriate measures) that are relevant to permitted waste management facilities that handle organic waste, also known as biowaste.[2]

- Waste Treatment BREF[3]

  This document is a reference document on indicative Best Available Techniques (BAT) for the waste treatment sector. This includes BAT for the anaerobic treatment of waste, the associated emission levels (and other environmental performance levels) and the associated monitoring.

[2] https://www.gov.uk/guidance/biological-waste-treatment-appropriate-measures-for-permitted-facilities

[3] Best Available Techniques (BAT) Reference Document for Waste Treatment, European IPPC Bureau, 2018

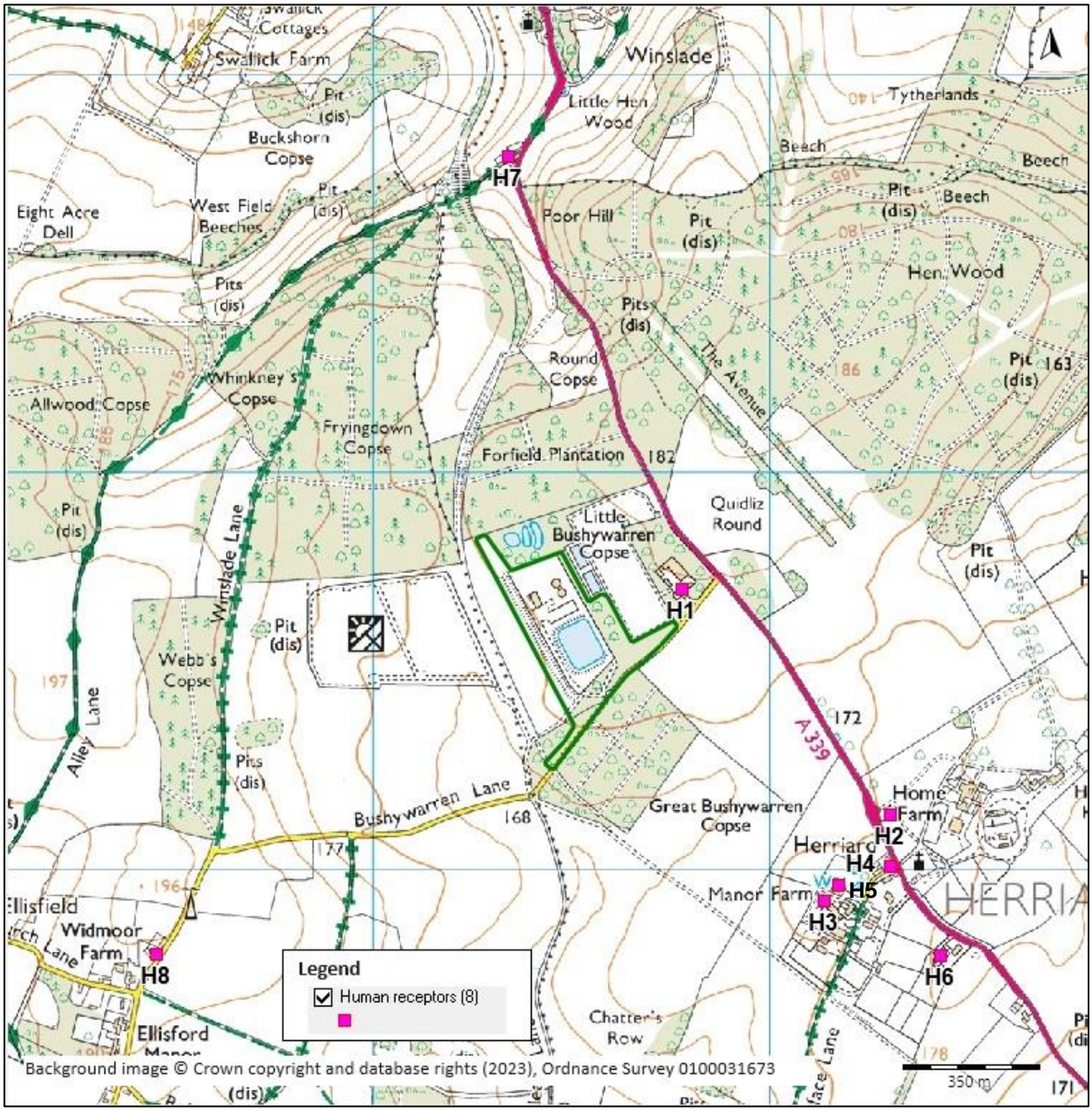
2 Receptors

Table 1 below lists receptors within c.a. 1km of the site and Figure 1 below shows a map of their locations.

Table 1 Receptor list

Receptor Ref.	Land use e.g. house, school, hospital, commercial	Direction from site	Approximate distance to site boundary (m)	Sensitivity to odour Low (e.g. footpath/road) Medium (e.g. industrial / commercial workplace) High (e.g. housing / pub / hotel etc.)
H1	Workplace (green waste, open windrow composting facility)	E	79	Low/Medium
H2	Workplace	SE	714	Medium
H3	Workplace	SE	744	Medium
H4	Residential	SE	745	High
H5	Residential	SE	806	High
H6	Residential	SE	1,061	High
H7	Residential	N	952	High
H8	Residential	SW	1,095	High

Figure 1 Map of site locations and receptors

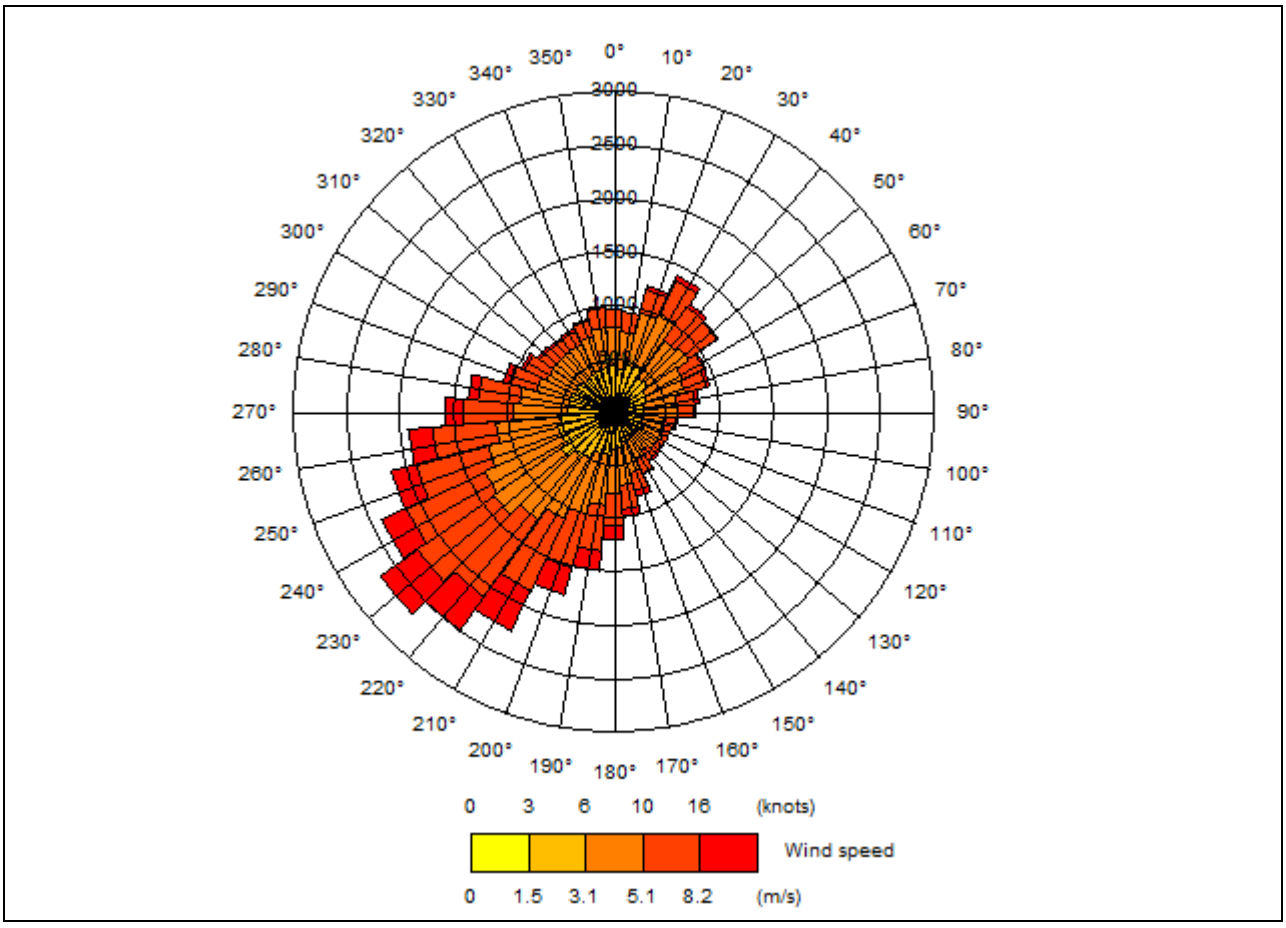


2.1 Wind rose and source of weather data

Meteorological data for the Site location (Latitude 51.215°, Longitude -1.063°), were obtained from a Numerical Weather Prediction system known as the Global Forecast System. A wind rose of the meteorological data for a 5-year period shows the prevailing wind direction at the Site is from the south-west (Figure 2). 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.

Daily weather conditions are recorded using the on-site weather station. Meteorological data should be considered during routine odour surveys and prior to and during operations that have the potential to give rise to off-site odour impacts.

Figure 2 Wind rose data (2018-2022)



Data source: AS Modelling & Data Ltd

3 Sources of odour and site processes

3.1 Odorous materials entering and leaving site

All feedstock material will be transported to and from site by road. The Commercial Manager is responsible for booking energy crop and waste into site, in consultation with the Plant Manager.

Product liquid digestate is transferred by pipeline to the neighbouring Herriard Estate and Product or waste fibre digestate is transferred by tractor and trailer to destination field heaps.

3.1.1 Feedstock acceptance and rejection

Energy crop feedstocks are checked in accordance with the Crop Acceptance & Rejection Procedure **(HBP-SOP-05)** when brought to site**.** Energy crop dry matter levels are tested to confirm if their quality is acceptable. Feedstocks are visually checked for the presence of stones or other physical contaminants. If found, they are either removed by hand or the load may be rejected if deemed unsuitable for treatment. Energy crops (silage) will be stored within the clamps for a maximum duration of 12 months.

All waste accepted on site will be subject to pre-acceptance checks in accordance with the Waste Pre-Acceptance Procedure (**HBP-SOP-01**). This procedure includes waste feedstock sample pre-analysis and verification analysis. These checks will be the responsibility of the Plant Manager, supported by the Managing Director when required. Only waste that has passed pre-acceptance checks and is booked in will be accepted on site.

When waste is delivered to site further checks will be carried out in accordance with the Waste Acceptance and Rejection Procedure (**HBP-SOP-02**), in place to ensure rejection of highly odorous wastes. This includes paperwork checks by the Weighbridge Operator, visual checks by Plant Operatives and verification waste sampling and analysis when necessary. A Waste Loading & Management Procedure (**HBP-SOP-04**) is in place to ensure that a first in first out (FIFO) procedure for waste is followed.

If an abnormally odorous load is received at the site i.e. loads with a 'very strong' odour (i.e. odour intensity 5 and above), it will either be rejected and removed or immediately used and the delivery vehicle will be washed down prior to leaving the site.

Odours from feedstock delivery within the Waste Reception Building will be extracted and treated by the carbon filter abatement system prior to release via an area source outside the Waste Reception Building on the northwest side.

3.1.2 Feedstock delivered

3.1.2.1 Energy crop feedstock

Energy crops including maize and rye silage will be delivered to the Site by tractor and trailer or HGV during the harvest period (around 8 weeks per year). It will be compacted and stored in the two clamps, each with a capacity of 7,500m^3, covered with plastic under-sheeting and then silage membrane sheet to form an airtight and water-tight layer. It is important that the silage is maintained anaerobically to maintain its effectiveness as a feedstock. Leachate from the clamps will drain to an underground leachate tank with a capacity of 126m^3 and vents to air via a grate approximately 0.3m x 0.6m, at ground level.

3.1.2.2 Solid waste feedstock

All vehicles delivering waste will be covered/ sealed. There will be up to 18 waste deliveries per day.

There shall be no more than 36 HGV vehicle movements (18 in and 18 out) per day to and from the site. They will enter the Waste Reception Building via fast-acting roller shutter doors that have a maximum opening speed of 0.5m/s and a closing speed of 0.3m/s.

Solid food waste will be received within the Waste Reception Building only. The Waste Loading and Management Procedure **(HBP-SOP-04)** will be in place to ensure that the fast-acting roller shutter doors are only opened to allow vehicles in and out of the building. All waste vehicles will be washed down prior to exiting the Waste Reception Building in accordance with Animal by Product Regulations requirements. The roller shutter doors are on the southeast side of the Waste Reception Building.

Loads are deposited within the Waste Reception Building. The maximum solid waste stored at any time will be 315 tonnes and the maximum length of time that waste may be stored is 72 hours. The Mavitec depackaging plant inside the Waste Reception Building will separate packaging from organic food wastes to produce a pumpable mixture; the resulting feedstock will then be pumped to the Raw Waste Buffer Tank (RWBT) where it will be blended with directly received liquid waste. Packaging removed by the depackaging plant will be washed and then passed through a screw press compactor into a container inside the Waste Reception Building for removal offsite for recovery.

3.1.2.3 Liquid waste feedstock

Liquid waste, delivered in tankers, is dispatched via tanker coupling within the Waste Reception Building such that any off gas from tankers will be contained and abated by the building's odour abatement system and from there is piped to the RWBT. There will be up to approximately 5 No. tanker deliveries per day.

The RWBT has a PVRV as a safety measure. In the RWBT the liquid waste will be blended with prepared liquid feedstock before the blended mixture is pumped to a primary digester.

When liquid waste is delivered to site further checks that include verification of waste sampling and analysis will be carried out, when necessary, in accordance with the Waste Acceptance and Rejection Procedure **(HBP-SOP-02).**

3.1.3 Digestate removal

The site will export from Site 7,000 TPA of fibre digestate and 40,000 of digestate liquor.

3.1.3.1 Separated fibre digestate

Separated fibre will collect within the fibre storage bay; the Separator and storage bay will have a tented structure over and around three sides. The front will be open for removal of fibre digestate to the silage clamps for short-term onsite storage or removed from site to destination field heaps on farm.

3.1.3.2 Separated liquor digestate

Separated liquor is stored within the two digestate storage lagoons (capacity 16,500m^3 per lagoon). Liquid digestate is removed from Site by a pipeline to be spread on Herriard Estate land.

3.2 Odorous materials held/stored on site

Table 2 below lists all odorous material delivered to site and all materials with the potential to become odorous as a result of processes on-site.

Table 2 Odorous materials that may be stored on site.

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 (tonnes per day or litres per day)	Maximum time held on site (hours or days)	Location of odorous materials on site	Additional comments
Maize and Rye silage	Low/ Medium Risk	12,500 tonnes	12 months	• Silage clamps	Contract in place with Herriard Estates to supply all the crop feedstocks. Stored under cover for preservation.
Silage leachate	Medium Risk	126 m^3	Approx. 10 days[(a)]	• 1 No. Aquaspira below-ground leachate storage tanks • Drainage system and underground sump	Leachate tanks vents to air via ground level grating
Dirty water	Low/ Medium Risk	200 m^3	n/a	• 2 No. Process water tanks each 100m^3 capacity (proposed at the time of writing).	Dirty water from the Waste Reception Building, other dirty areas and the secondary containment sump is collected and reused in the process.
Loose or packaged food waste	High Risk	315 tonnes	72 hours [(b)]	• Within the Waste Reception Building	Contracts in place with major waste operator and local authorities.
Plastic and packaging material rejects	High Risk	30 tonnes	7 days	• Stored within a container within the Waste Reception Building.	Stored within Waste Reception building benefitting from odour abatement.
Liquid waste	High Risk	452 tonnes	7 days	• 1 No. RWBT within the secondary containment area.	Liquid waste is dispatched via a tanker coupling point within the Waste Reception Building which benefits from odour abatement.

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 (tonnes per day or litres per day)	Maximum time held on site (hours or days)	Location of odorous materials on site	Additional comments
Digester contents: **D1 Primary** **D2 & D3 Primary** **D4 Post Digester** **(AD Plant)**	Medium Risk	Total 9,760m^3	D1 (28 days) D2 and D3 (40 days in parallel). D4 (13 days)	• Primary digesters D1, 2 & 3 and D4 Post digester (2,440m^3 each)	Contained within sealed vessel with PVRVs.
'Raw' biogas **(AD Plant)**	High Risk	Total 5,340m^3	Storage provision equates to 5.3 hrs of biogas production.	• 340m^3 of biogas storage in the RWBT • 1,250m^3 of biogas storage above each digester	Sealed tanks; biogas released only during PVRV operation in over-pressure scenarios.
Liquid digestate	Medium Risk	33,000m^3	12 months	• 2 No. Digestate Lagoons (16,500 m^3 each)	Stored in lagoons. Fitting of floating covers and emission abatement system pending. Off gas from the 6 vents per lagoon will be channelled via carbon filters to the lagoon vent, it will be passed through 2 carbon filters in series for treatment before venting. Liquid digestate complies with the BSI PAS110:2014 Specification.
Solid digestate	Medium Risk	23 tonnes (7,000 TPA)	2 days	• Fibre digestate storage bay and short-term storage in clamps prior to removal by tractor and trailer.	Fibre digestate complies with the BSI PAS110:2014 Specification.
Biomethane **(Biomethane Hub)**	Low Risk	750Nm^3/hr biogas equivalent to 412m^3 of biomethane (maximum production capacity)	n/a	• Biogas from the gas holders will pass through two active carbon filters to reduce NH_3 and H_2S levels before passing into the Pentair biogas upgrading plant (BUP).	Carbon dioxide is vented from the BUP.

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 (tonnes per day or litres per day)	Maximum time held on site (hours or days)	Location of odorous materials on site	Additional comments
Combusted biogas **(Biomethane Hub)**	Low Risk	n/a	n/a	• CHP (2.8MWth, 1,015Nm^3/h biogas). • Emergency flares (500Nm^3/hr and 1,000Nm^3/hr of biogas)	Low residual odour from unburnt NMVOCs

Notes:

(a) Except during periods of high rainfall.

(b) Solid food waste and sludges will be typically stored for no longer than 3 days; however, in exceptional circumstances the storage time may be up to 5 days.

3.3 Overview of odorous processes and emissions

The AD plant will process up to 40,000 TPA of liquid and solid waste and 12,500 TPA of crop material. A site layout plan showing the locations of potentially odorous processes, storage and emission locations is provided as Figure 3 below. The Process Flow Diagram is provided in Appendix 1.

3.3.1 Processing energy crops

The silage clamps will only be exposed, at the 'working face,' for removal of energy crop feedstocks. The MT Alligator Plus, 40 tonne feed hopper, will be filled twice a day to maintain it at 40 tonnes full fill. The feed hopper feeds silage to primary digester 1 only. Loading of silage from the working face of the clamps and loading into the feed hopper will take approximately 2h/day.

3.3.2 Processing waste feedstocks

The Mavitec depackaging plant inside the Waste Reception Building will separate packaging from organic food wastes; the resulting feedstock will then be pumped to the RWBT where it will be blended with organic waste liquids before the blended mixture is pumped to the primary digesters (primary digesters 2 and 3 are for food waste only). Packaging removed by the depackaging plant will go to a screw press compactor and then a container for disposal.

The RWBT has a pressure and vacuum relief valve (PVRV). These valves only operate as a final safety measure; the pressure threshold for release is set higher than the pressure threshold for flaring therefore, the flare would be operational and deal with any over-pressure without the need for the PVRVs to operate.

Run-off from dirty areas of the site including the secondary containment area will be collected within the two process water storage tanks (100m^3 each) and used within the process. These tanks which do not vent to atmosphere and do not have a PVRV.

There will be four digesters in total (three digesters and one post-digester) to treat waste feedstock materials, although Digester 1 primarily treats energy crops. Each digester has a PVRV 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 and over-pressure is managed by operation of the flare before the PVRVs.

3.3.3 Digestate

Digested feedstock from digesters 1, 2 and 3 is passed into the post digester. Digestate from the post digester will be macerated, screened to 12mm, and pasteurised at over 70°C for one hour before being cooled and pumped to the separator. The pasteuriser will have a PVRV.

The separator comprises two FAN screw press separators fed by a separator buffer tank with a working capacity of 100m^3 which has one vent in a tented roof. Fibre digestate will fall into a bunker (4.5m x 5.3m x 1.85m high). The total fibre stored at any time will be approximately 23t, 1 day's production of fibre digestate. The separators will be enclosed in a tented structure, open on one side to allow easy access for vehicles to remove fibre digester which will be removed from the Site to farm destination field heaps (work pending at the time of writing).

Liquid digestate is piped to the 2 No. lagoons (each 16,500m^3). Each lagoon will have an impermeable floating cover with six vents. Emissions from the lagoons will be channelled via two carbon filters in sequence to one lagoon vent, located between the lagoons on the western side. It will be pass through two carbon filters in series to remove NH_3 and odour before being discharged from the lagoon vent.

3.3.4 Biogas and biomethane

Biogas will be stored above the digesters in the double membrane gas storage domes all of which have desulphurisation nets and injection of low-level oxygen to reduce H_2S levels. Ferric hydroxide powder will be dosed into the feeders as a further measure to manage and reduce H_2S levels. Biogas from the gas holders will pass through two active carbon filters to reduce NH_3 and H_2S levels before passing into the Pentair biogas upgrading plant (BUP). The medium in the BUP cannot operate properly unless the odorous trace gases (NH_3, H_2S) are removed.

Biogas (60% CH_4, 40% CO_2 by volume) will be treated in the BUP to create biomethane (100% CH_4 by volume). The BUP separates the biogas to methane (CH_4) and CO_2. The biomethane is compressed and stored prior to dispatch from the site via gas tankers to a grid injection point. The CO_2 is vented to atmosphere via Emission Point 7 (EP7).

Biogas will be used to fuel CHPs on site to generate heat and electricity for site operations. The CHPs will emit pollutants (SO_2, TVOC, NOx and CO) from 7m stacks. The burning of biogas should not give rise to odour.

Biogas may be burnt within either of the two flares under abnormal operating conditions such as during extended maintenance or malfunction of the BUP or malfunction of the CHPs. Odorous compounds should be combusted and not emitted when the flares are operational.

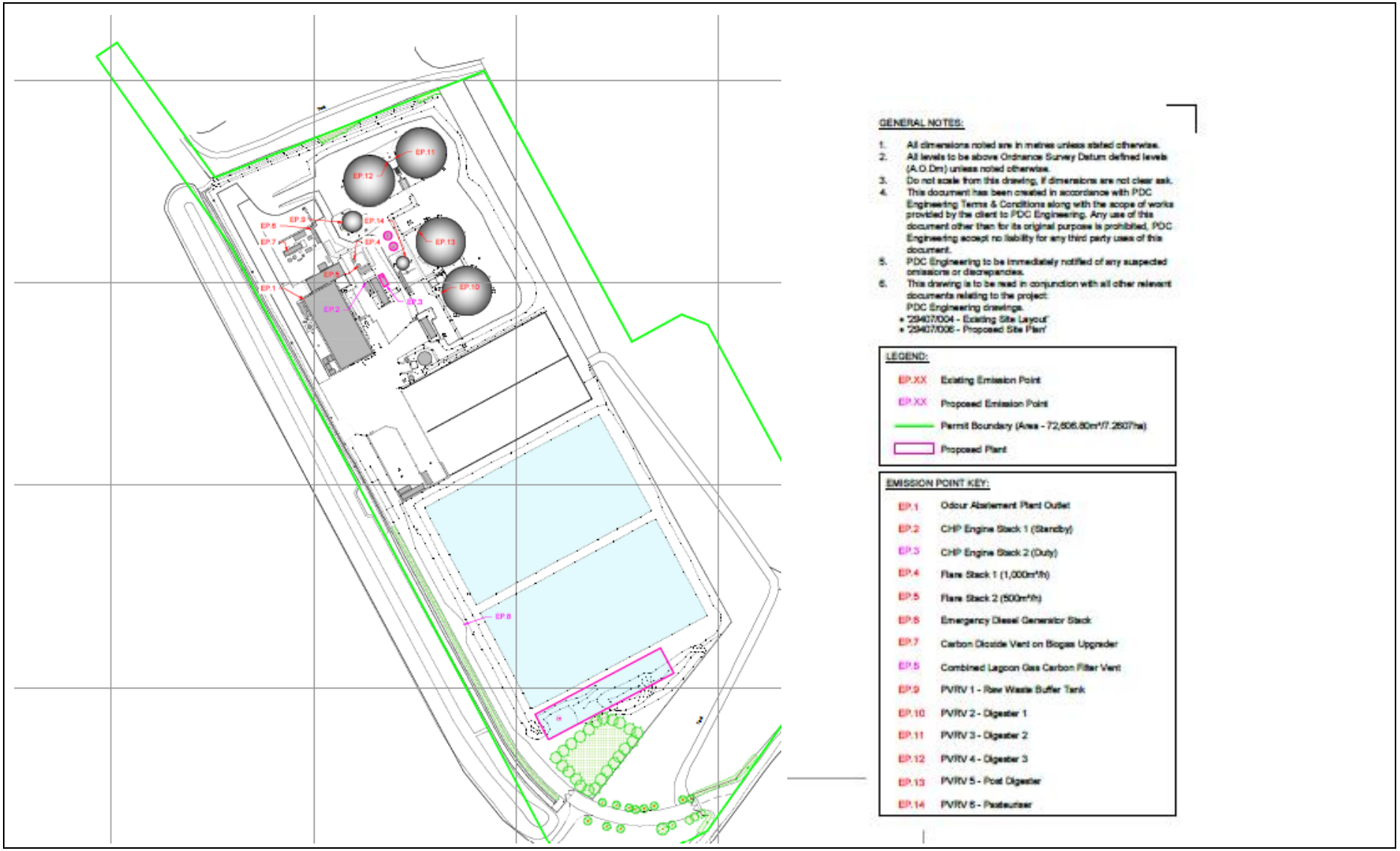
3.3.5 Odour control of emission in the Waste Reception Building

Odour emissions from the Waste Reception Building are controlled using an air handling and odour abatement system and fast-acting roller shutters on the vehicle access doors of the building. The air handling system will deliver at least three air changes per hour (acph) which will maintain a negative pressure in the building, thereby reducing the potential for fugitive emissions from the roller shutter doors in the short time they are open. The maximum opening speed of the roller shutters is 0.5m/s and the closing speed is 0.3m/s.

The odour abatement system is a carbon filter which releases treated air at Emission Point 1 (EP1).

Technical information and drawings of the odour abatement system are included in Appendix 2.

Figure 3 Site plan showing odorous process/storage or emissions locations



4 Control measures and process monitoring

4.1 Appropriate Measures / BAT

Table 3 lists the odorous and potentially odorous processes and materials on site and the relevant controls and actions that the operator will take to prevent or minimise odour from these sources. These measures include containment, abatement, and consider the requirements of Appropriate Measures, and Best Available Techniques (BAT).

Table 3 also sets out: how often these control measures on site are monitored; the process parameters that are monitored (including the optimum performance levels for each parameter); associated trigger levels (that will help identify that the process is under control and there is potentially a higher risk of odour); and actions to be taken if the monitoring shows results outside of the optimum performance levels.

In each case, the following trigger limits will also apply that indicate that an aspect of the site is operating outside of optimum performance levels, that will initiate an investigation as to the odour source and implementation of appropriate remedial action(s):

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 5.5)
3. Strong odour (odour intensity 4 or above) reported by staff/ visitors on arrival at the site (Section 5.4.1)

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)	**Management** • Waste pre-acceptance Procedure (**HBP-SOP-01**) Waste Acceptance and Rejection Procedure (**HBP-SOP-02**). • Restricted waste quantities and storage times permitted; Waste Loading & Management Procedure **(HBP-SOP-04)** **Containment** • Liquid waste feedstock transferred in sealed tankers. • Solid waste feedstock transferred in sealed vehicles. • Fibre digestate transferred via covered trailer.	**Constant** • Dynamic visual and odour observations by staff **Daily** • Routine odour monitoring	Visual inspection (of vehicles) Odour 'sniff tests' (Section 5.5)	Very strong odour from vehicle prior to unloading (intensity 4 or above)	Rejection of highly odorous waste in accordance with Waste Acceptance and Rejection Procedure (**HBP-SOP-02**). The supplier will be contacted to advise of non-compliance. In the event of re-occurrence, the contract arrangements with the supplier will be reviewed/ terminated as necessary. Review cleaning frequency and 'wash out' procedures of transfer vehicles.
Silage receipt/ storage	**Management** • Crops received in open trailers. • Restricted local suppliers, types, and quality • Adherence to Crop Acceptance and Rejection Procedure (**HBP-SOP-05**) • Restricted waste quantities and storage times permitted. • Weekly cleaning (minimum) of operational areas (apron)	**Constant** • Dynamic visual and odour observations by staff **Daily** • AD Plant Daily Inspection • Routine odour monitoring	Visual inspection to ensure the cover is intact. Odour 'sniff tests' (Section 5.5)	Exposed silage when not in use	Clamp cover repaired/ reinstated.

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
	Containment • Crops compacted and covered to reduce rates of evaporation by containing humidity and eliminating airflow over the surface to reduce odour. • Freshly stocked clamps will not be opened before fermentation has stabilised.				
Silage transfer	**Management** • Carried out in accordance with the Crop Loading Procedure (**HBP-SOP-06**) that promotes good clamp management (i.e., not disturbing the material excessively and as minimal a face as possible to preserve the feedstock) • Any spilled material will be completely cleared at the end of the loading phase. • Short transfer distance from clamps to feeder. **Monitoring** • The hopper has weigh cells which are connected to the SCADA system which enables accurate monitoring and control of feed amounts.	**Constant** • Dynamic visual and odour observations by staff • SCADA (feed quantity) **Daily** • Weather monitoring • Routine odour monitoring	Daily visual checks to ensure operational areas kept clear of debris/ clean. Feed Manager monitors SCADA system Odour 'sniff tests' (Section 5.5)	Where a safety risk is identified. Feedstock spillage	Sweep clean operational areas.
Silage leachate storage	**Containment** • Silage leachate collected in silage clamp drainage systems may give rise to odour in hot weather conditions. • Silage leachate is contained within a sealed tank (with vent) prior to re-use within the AD process.	**Daily** • Routine odour monitoring • Monitor leachate levels.	Visual inspection (of leachate level)	Very strong odour from tank vent(s) (intensity 4 or above)	Clean down silage clamp channels of accumulated dried effluent if giving rise to odour under hot weather conditions.

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 • The frequency with which the leachate tank will be cleaned and/or emptied will be determined in accordance with monitoring of leachate levels and odour observations.		Odour 'sniff tests' (Section 5.5)		Investigate reason e.g., high solids content of leachate. Empty tanks: if issue reoccurs clean tanks.
Waste receipt in Waste Reception Building	**Containment** • All liquid and solid waste deliveries undertaken inside building with air extraction to abatement (carbon filter odour abatement system) which releases treated air at Emission Point 1 (EP1). **Abatement** • The odour control system for the Waste Reception Building will achieve over 3 air changes per hour as required. **Management** • Adherence to Waste Pre-acceptance Procedure (**HBP-SOP-01**) • Receipt of liquid waste managed in accordance with Liquid Waste Reception Procedure (**HBP-SOP-03**). Plant Operatives need to check the lorry "wash out" certificate or declaration of previous load to ensure it has been washed out from the previous load, to avoid cross contamination from an unacceptable waste. • Highly odorous wastes will not be accepted in accordance with the Waste Acceptance & Rejection Procedure (**HBP-SOP-02**)	**Constant** • Visual checks by Plant Manager to ensure site does not become over-supplied. • Dynamic odour observations by staff **Daily** • Tracking of waste receipt • AD Plant Daily Inspection • Routine odour monitoring **Periodic** • Waste feedstock sampling.	Visual inspection (of waste) Waste Tracking Spreadsheet Representative samples of waste feedstocks will be undertaken in accordance with Sampling & Analysis Procedure (**HBP-SOP-13**) which includes the planned frequency and method of sampling for each feedstock types.	Waste booked in for next 24 hours exceeds storage capacity in Waste Reception Building. Wastes with high odour concentrations (intensity 5 and above) Extremely odorous waste (intensity score 6)	If reception storage is reaching capacity, waste deliveries will be ceased until process back under control. Wastes with high odour concentrations will be used immediately. Extremely odorous wastes will be rejected. The supplier will be contacted to advise of non-compliance. In the event of re-occurrence, the contract arrangements with the supplier will be reviewed/ terminated as necessary.

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 tonnages will be monitored and controlled through the Daily Site Data Spreadsheet **(HBP-RC-02)** and verified through a Daily Checks (**HBP-RC-02**). • Pressure wash backs of tipping vehicles and wheels inside the units before they leave the premises. • The Waste Reception Building will be cleaned down daily in accordance with the Cleaning & Disinfection Regime **(HBP-RC-10).**		Odour 'sniff tests' (Section 5.5)		
Waste treatment/ storage in Waste Reception Building	**Containment** • Solid waste will be deposited inside the Waste Reception Building. It will not be stored for more than 72 hours. • Emissions from the unloading will be treated by the building's odour abatement system. **Abatement** • The odour control system for the Waste Reception Building will achieve over 3 air changes per hour as required. **Management** • Packaged and de-packaged food waste can be stored separately. • FIFO procedure will be adopted in accordance with the Waste Loading & Management Procedure (**HBP-SOP-04**) however, odorous materials that are deemed acceptable will be processed first.	**Constant** • Visual checks by Plant Manager • Dynamic odour observations by staff **Daily** • Tracking of waste receipt • AD Plant Daily Inspection • Routine odour monitoring	Visual/ odour inspection of waste for signs of degradation. Waste Tracking Spreadsheet Visual inspection to ensure that the oldest material is used first. Odour 'sniff tests' (Section 5.5)	Waste booked in for next 24 hours exceeds storage capacity in Waste Reception Building. Wastes with high odour concentrations (intensity 5 and above) Extremely odorous waste (intensity score 6)	If reception storage is reaching capacity, waste deliveries will be ceased until process back under control. Increase the frequency of cleaning. In the event of plant failure, feedstocks would not be delivered to site to prevent build-up of feedstock.

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 tonnages will be monitored and controlled through the Daily Site Data Spreadsheet **(HBP-RC-02)** and verified through a Daily Checks (**HBP-RC-02**). • Regular maintenance of depackaging plant to prevent build-up of food waste material. • Implementation of strict housekeeping regime inside and outside the building in accordance with the Cleaning & Disinfection Regime **(HBP-RC-10)**. • Odour awareness and contingency measures included within staff inductions and training.				
Odour Control System/ Carbon filter	**Process Control** • The odour abatement system at the AD plant is a carbon filter, located to the northeast of the building. **Management** • Planned preventative maintenance programme in place in line with supplier inspection and maintenance recommendations. Maintenance is carried out in accordance with the Computerised Maintenance Management System (CMMS) **Monitoring** • There will be a sampling point on the common discharge stack to audit the performance of the system based upon the emission levels to atmosphere. • Emission parameters set by the technology provider are at or below BAT-associated emission levels (BAT-AELs) for channelled emissions of odour (200 - 1,000ou_E/Nm^3) and NH_3 (0.3 – 20mg/m^3)	**Constant** • Dynamic visual and odour observations by staff during shift **Daily** • Check carbon filter function and waste reception building structure. • AD Plant Daily Inspection • Routine odour monitoring **6-monthly** • MCERTS monitoring of NH_3 or odour concentration (it is proposed that NH_3 and H_2S monitoring will be carried out)	Maintenance Inspection of carbon filter odour abatement system: MCERTS monitoring (emission parameters specified by technology provider): Odour: <1000ou/m^3 NH_3: < 2 ppm H_2S: < 0.1 ppm PM_{10}: < 5 mg/m^3	Optimum process parameters are out of range: • MCERTS emission monitoring results exceed limit: Odour: >1000ou/m^3 NH_3: >2ppm	On detection of notable odour from the carbon filter serving the Waste Reception Building: Check abatement system inspection record to diagnose the cause e.g., fault in system. If problem cannot be rectified by site staff, the supplier will be contracted to investigate the Integrity of the carbon filter, and remedial actions taken immediately where necessary.

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
		Quarterly • Site measurement of gases relevant to odour to evaluate performance. **Annual** • Reception building structure integrity. • Carbon filter odour abatement plant efficiency.	Exit temperature: 10-35°C Exit velocity: 14m/s Odour 'sniff tests' (Section 5.5)		If odour complaints are attributed to this source, the Operator will, through discussion with the supplier and the EA, prepare a programme of improvements for agreement with the EA.
Opening of access doors to the Waste Reception Building	**Containment** • Fast acting roller shutter doors (maximum opening speed of 0.5m/s and a closing speed of 0.3m/s) are installed on the Waste Reception Building. • Waste Reception Building will benefit from an air handling system which will keep the building air under negative pressure. **Management** • Odour awareness and contingency measures included within staff inductions and training. • Maintenance and service contract in place with supplier • Adherence to the Waste Loading & Management Procedure (**HBP-SOP-04**).	**Constant** • Dynamic visual observations by staff during shift **Daily** • AD Plant Daily Inspection • Routine odour monitoring	Maximum opening speed of 0.5m/s and a closing speed of 0.3m/s. Odour 'sniff tests' (Section 5.5)	Door shutter speed 0.5m/s An appropriate hang time for each access door will be set. Door(s) stuck open	Hang time for doors can be adjusted as required. Call engineer if Operator unable to resolve. Diversion of waste in the event of plant/ door failure to prevent build-up of material.

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
Liquid waste in Waste Reception Building	**Containment** • Transported in sealed tankers. • Liquid waste, delivered in tankers, inside the Waste Reception Building such that any off gas from tankers is contained and abated by the building's odour abatement system. • Received in Waste Reception Building with odour abatement system (carbon filter) and transferred in sealed pipework to RWBT. • The headspaces of the pre-storage tanks are linked to the biogas system to ensure any fugitive emissions are contained within the system. **Management** • Compliance with spill control procedure in event of a spill • Minimum weekly cleaning of operational areas next to RWBT and inside Waste Reception Building.	**Constant** • Dynamic visual observations by staff during shift **Daily** • AD Plant Daily Inspection • Routine odour monitoring	Odour 'sniff tests' (Section 5.5)	Liquid waste spillage Decreased efficiency of carbon filter odour abatement plant.	Initiate Spill Control Procedure (**HBP-SOP-20**). Check waste feedstock sample pre-analysis and verification analysis and adherence to Waste Acceptance Criteria. Check carbon filter odour abatement plant inspection record.
Fibre digestate storage and transfer	**Containment** • Fibre digestate will fall into a bunker (4.5m x 5.3m x 1.85m high). The separator will be enclosed in a tented structure, open on one side to allow easy access for vehicles to remove fibre digestate which may be stored temporarily on the clamps before being removed from the Site to farm destination field heaps. **Management** • Digestate Handling Procedure (**HBP-SOP-08**) • Each batch is subject to short holding times on-site (approximately <48 hours).	**Constant** • Dynamic odour observations by staff **Daily** • Visual inspection • AD Plant Daily Inspection (separator bay) • Routine odour monitoring **Bi-annual** • 6 monthly samples on fibre digestate prior to seasonal use	Visual checks of the digestate separator/ loading bay and to ensure operational areas kept clear of debris/ clean.	Digestate spillage Very strong odour from fibre digestate (intensity 4 or above)	Initiate Spill Control Procedure (**HBP-SOP-20**). Halt the operation. Remove the malodorous load from site and investigate why the fibre is particularly odorous.

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 monitoring and management to ensure stable digestate produced with low residual biogas potential. The digestate separation area will be regularly cleaned and maintained in accordance with observations made during the daily checks (minimum weekly)		Fibre digestate sampled and analysed in accordance with the Sampling & Analysis Procedure **(HBP-SOP-13)** Odour 'sniff tests' (Section 5.5)		Undertake operations when meteorological conditions, in particular wind direction, are less likely to cause on odour nuisance to nearby sensitive receptors.
Liquid digestate storage	**Containment** • Liquid digestate is fully contained the network of sealed pipework until it is discharged to the covered lagoons that have impermeable covers (each lagoon has six vents) to reduce evaporation and emissions from lagoon surface. **Management** • Process monitoring and management to ensure stable digestate produced with low residual biogas potential.	**Constant** • Dynamic visual observations • Dynamic odour observations by staff **Daily** • AD Plant Daily Inspection (storage lagoon) • Routine odour monitoring • Quarterly • Sampling of digestate liquor	Visual inspection of storage lagoon (damage to lagoon cover). Liquid digestate sampled and analysed to determine appropriate spreading rates as per the Sampling & Analysis Procedure **(HBP-SOP-13)**. Odour 'sniff tests' (Section 5.5)	Very strong odour from lagoon (intensity 4 or above)	Check pipework/ cover for damage.

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
'Raw' biogas (AD gas storage tanks)	**Containment** • Odour control is a key feature of the design as capture and recovery of the biogas is central to the plant's efficiency. The likelihood of gas leaks is therefore very low. • All digester tanks are bonded to the flexible membrane biogas stores to ensure digestion process takes place in sealed, airtight vessels and that there are no fugitive emissions. **Abatement** • The digester tanks are equipped with desulphurisation nets and low-level oxygen injection to encourage microbial growth to reduce hydrogen sulphide (H_2S) levels and precipitate sulphur. • Levels within tanks are monitored and ferric hydroxide powder may be added to process via feed hoppers to correct high H_2S levels. **Process Control** • The AD process is fully regulated using a SCADA process control monitoring system. **Monitoring** • The gas in the gas holder roofs of the Digesters and the Post Digester will be monitored (SCADA) • Releases from the PVRVs will be recorded on SCADA.	**Constant** • Gas pressure measurements on SCADA continuous and site staffed 24 hours a day. • Personal gas alarms worn by Plant Operatives. • Dynamic odour observations by staff **Daily** • AD Plant Daily Inspection • Routine odour monitoring. **Periodic** • LDAR programme for site.	Continuous systems monitoring (SCADA) including excess biogas use in the CHP, flare systems or operation of PVRVs. Monitoring gas flow/ quality to the engines: • Methane (CH_4) • Oxygen (O_2) • Hydrogen sulphide (H_2S) • Carbon dioxide (CO_2) Gas concentrations may be checked using a hand-held gas monitor. • Odour 'sniff tests' (Section 5.5)	Personal gas alarm alert 'Raw' biogas odour detectable on-site (intensity 3 or above)	Notify Plant Manager immediately. Check operation of PVRVs on all tanks. Portable monitors will be used to check gas type and concentration. If required, the plant engineers will be contacted to resolve the issue 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
	• Herriard Bio Power Ltd has established a Leak Detection and Repair (LDAR) Plan **(HBP-OD-22)** to measure diffuse emissions of ammonia, VOCs including methane and odour from all sources identified in the LDAR Plan **(HBP-OD-22)**. This includes but is not limited to gas storage membrane and PVRVs. **Management** • Routine inspection and maintenance schedule for the AD tanks and integrity of associated infrastructure • Training and Permit to Work is required. Risk assessment undertaken when work is required. TCM will oversee work. • In the event of planned generator plant outages for maintenance or repair, the production of biogas is slowed down in advance by reducing the quantity of feedstock into the digester and by halting the stirrer activity. • Any excess gas will be flared in preference to releases of raw biogas to ensure that there will be no fugitive emissions of odorous gas.		• Site 'Sign-in App' for visitors/ contractors		
Biogas Upgrade Plant (BUP) vent	**Abatement** • Emissions are comprised of odourless CO_2. Thus, the emissions from the plant are odour neutral. Odorous compounds within the biogas, principally H_2S, are removed in the desulphurisation process and activated carbon filters prior to emission and further reducing the odour potential of any condensate.	**Constant** • SCADA • Dynamic odour observations by staff • personal gas alarms worn by Plant Operatives. **Periodic**	Continuous systems monitoring (SCADA).	Personal gas alarm alert DSEAR limits for explosive atmospheres 'Raw' biogas odour detectable on-site (intensity 3 or above).	Notify Plant Manager immediately. Portable monitors will be used to check gas type and concentration. If required, the plant engineers will be contacted to resolve the issue 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
	Monitoring • There will be continuous process control monitoring of CH_4 to ensure the BUP is operating at optimum efficiency and to ensure maximum removal of odorous compounds. • One central gas quality measurement / gas analyser will be installed (connected to the gas pipe before and after the biogas conditioning unit and the carbon filter and in front of the BUP inlet). **Management** • All filters will be subject to planned maintenance. Odour abatement performance testing procedure for carbon filters. Will only be removed and discharged by an authorised company. **Process Control** • The regulation of gas flow to the BUP will ensure that its capacity is not exceeded, and that gas is not released direct to the atmosphere. • The BUP has an emergency vent for pressure adjustment on restart following an emergency stop. This will release biomethane for s short period under emergency conditions.	• 'Biosense' in-line gas analyser – interval at each measuring point will be between 60 and 90 mins. **Daily** • Routine odour monitoring • AD Plant Daily Inspection **Weekly** • BUP (draining of the condensate vent pipe) **Annual** • LDAR Programme.	'Biosense' gas analyser to measure and allow control on the quality of incoming gas: • Methane (CH_4) • hydrogen (H) • sulphide (S) • carbon dioxide (CO2) • oxygen (O) Odour 'sniff tests' (Section 5.5)		
CHP stack emissions	**Process Controls** • The combustion of biogas by the CHP engines will destroy any potential odorous compounds. • AD plant automated systems (process control) monitoring (SCADA). • The flares are used on an auxiliary basis to combust excess biogas.	**Constant** • SCADA - gas quality analysis • Dynamic odour observations by staff • Personal gas alarms worn by Plant Operatives. **Daily**	Continuous systems monitoring (SCADA) (process control monitoring / periodic gas quality analyses).	SCADA alert 'Raw' biogas odour detectable on-site (intensity 3 or above)	Combusted biogas emissions from the CHP engine will not give rise to an off-site odour impact. In the event that 'raw' biogas is detected, rather than combusted biogas, refer to the above procedure for 'raw biogas'.

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 • Desulphurisation of biogas via a gas cooling system to reduce moisture, then through a scrubber which uses sulphuric acid to remove ammonia (NH_3) and finally thorough a carbon filter to remove any excess hydrogen sulphide (H_2S) and Volatile Organic Compounds (VOCs). **Dispersion** • CHP emissions released from 7m stack to ensure effective residual odour dispersal. **Monitoring** • Capacity to burn biogas within CHPs exceeds site production levels. • MCERTS monitoring of stack emissions conform to emission limit values (ELVs) specified by the manufacturer and are within the site's permit. **Management** • CHP subject to routine services and maintenance plan, that includes leak detection and MCERTS emissions testing undertaken by specialist contractors. • Biogas can be used within both CHPs each can burn 100% of site production capacity if required. If CHPs are down the biogas can be stored and directed to the BUP or under unusual operating conditions flared.	• Routine odour monitoring **Annual** • MCERTS emissions monitoring • LDAR Programme.	Odour 'sniff tests' (Section 5.5) MCERTS monitoring of emissions to air to check compliance with limits: NOx – 500 mg/m^3 CO – 1,400 mg/m^3 TVOCs – 1,000 mg/m^3 Duty CHP: SO_2 – 107 mg/m^3 Standby CHP: SO_2 – 350mg/m^3 Third-party leak detection and repair survey in accordance with LDAR Plan **(HBP-OD-22).**		If the nature of the combusted emissions gives cause for concern i.e., become odorous, Plant Manager to call respective contractors to further investigate and undertake remedial action. Flare all biogas until issue resolved.

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
Flare stack emissions (AD Plant)	**Process Controls** • The combustion of excess biogas by the flare will destroy any potential odorous compounds. • The flares will start up automatically at a set pressure / gas storage volume. **Monitoring** • There will be continuous process control monitoring. Hours of operation of the flare will be recorded on SCADA. • The gas flow to the flare will be regularly inspected by the service engineer. • In the event that the flare is operated >10% of the year (876 hours) MCERTS monitoring of stack emissions will be undertaken to check compliance with permit limits **Management** • Combustion emissions released at height that will ensure effective odour dispersal.	**Constant** • SCADA - gas quality analysis • Dynamic odour observations by staff • Personal gas alarms worn by Plant Operatives. **Daily** • Routine odour monitoring **Annual** • MCERTS emissions monitoring (if either flare operated >876 hrs)	Continuous systems monitoring (SCADA) (process control monitoring / periodic gas quality analyses). Odour 'sniff tests' (Section 5.5) MCERTS monitoring of emissions to air to check compliance with limits: NOx – 150 mg/m^3 CO – 50 mg/m^3 TVOCs – 10 mg/m^3	SCADA alert 'Raw' biogas odour detectable on-site (intensity 3 or above)	If the nature of the combusted emissions gives cause for concern i.e., become odorous, Plant Manager will call flare contractors for an emergency call-out to further investigate and undertake remedial action.

5 Odour reporting

5.1 Complaints reporting

Complaints data is recognised by the EA as the most direct and reliable form of monitoring which odours are causing a problem outside of the site boundary. HBP understands the importance of addressing both internal and external complaints in a prompt and comprehensive manner to resolve any issue as quickly as possible.

All complaints will be collected, registered, and validated following the Complaints Procedure (**HBP-SOP-15**). If an odour complaint is received, the Plant Manager or deputy will complete an Odour Complaint Form **(HBP-FT-05**).

In order that odour complaints can be substantiated it is imperative that the site is immediately informed either by the complainant themselves or by the EA. 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 Plant Manager's telephone number will be displayed at the site entrance.

A stepwise approach to odour complaint investigation and reporting is presented in Figure 4.

The complaint investigation will start with an initial screening exercise to verify the odour incident to screen out those odour complaints that are unlikely to be due to the facility. The initial screening exercise will consider the following:

- potential odour sources at the facility (Table 3.2);
- routine/ additional odour monitoring data; and
- meteorological conditions considered in relation to the location of the complainant.

If the Plant Manager can attend the complaint location quickly, it may be possible to carry out effective appraisal of the complaints independently by a 'sniff test'. This is further described in Section 5.5 'Reactive Odour Monitoring'.

After recording the complaint on the Odour Complaint Form (**HBP-FT-05**) and completing an appropriate level of investigation the Plant Manager will discuss the matter with the Managing Director.

The Odour Complaint Form (**HBP-FT-05**) will be forwarded to the EA together with the outcome of the investigation within 24-hours of investigation and validation and any corrective and preventative actions taken in response to the complaint.

The Operator will maintain a system of complaints monitoring and analysis. Complaints will be registered on a database, validated where possible and reviewed on a monthly basis.

All complaints forms will be kept until the surrender of the Permit. All records will be available for inspection by EA representatives.

5.1.1 Problem resolution

The complaint investigation will involve identifying the odour source and implementing measures to bring the source under control. The corresponding odour investigation report will detail the actions taken to minimise the potential for re-occurrence.

In order to bring the process back under control the following will be considered:

- Cease the activity causing the abnormal situation and/or if necessary, arrange for the immediate removal of any odorous materials giving rise to the problems.
- take immediate steps to eliminate the cause of the abnormal situation;

- contact the relevant maintenance contractor if necessary;
- record the response to the situation and the remedial actions taken; and
- advise the EA of the complaint(s), details of the problem, and mitigation/improvement measures undertaken.

5.1.2 Temporary problem rectification

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

- Temporarily restrict feedstock acceptance at the site; and/or
- Temporarily reduce volumes of feedstock treated.

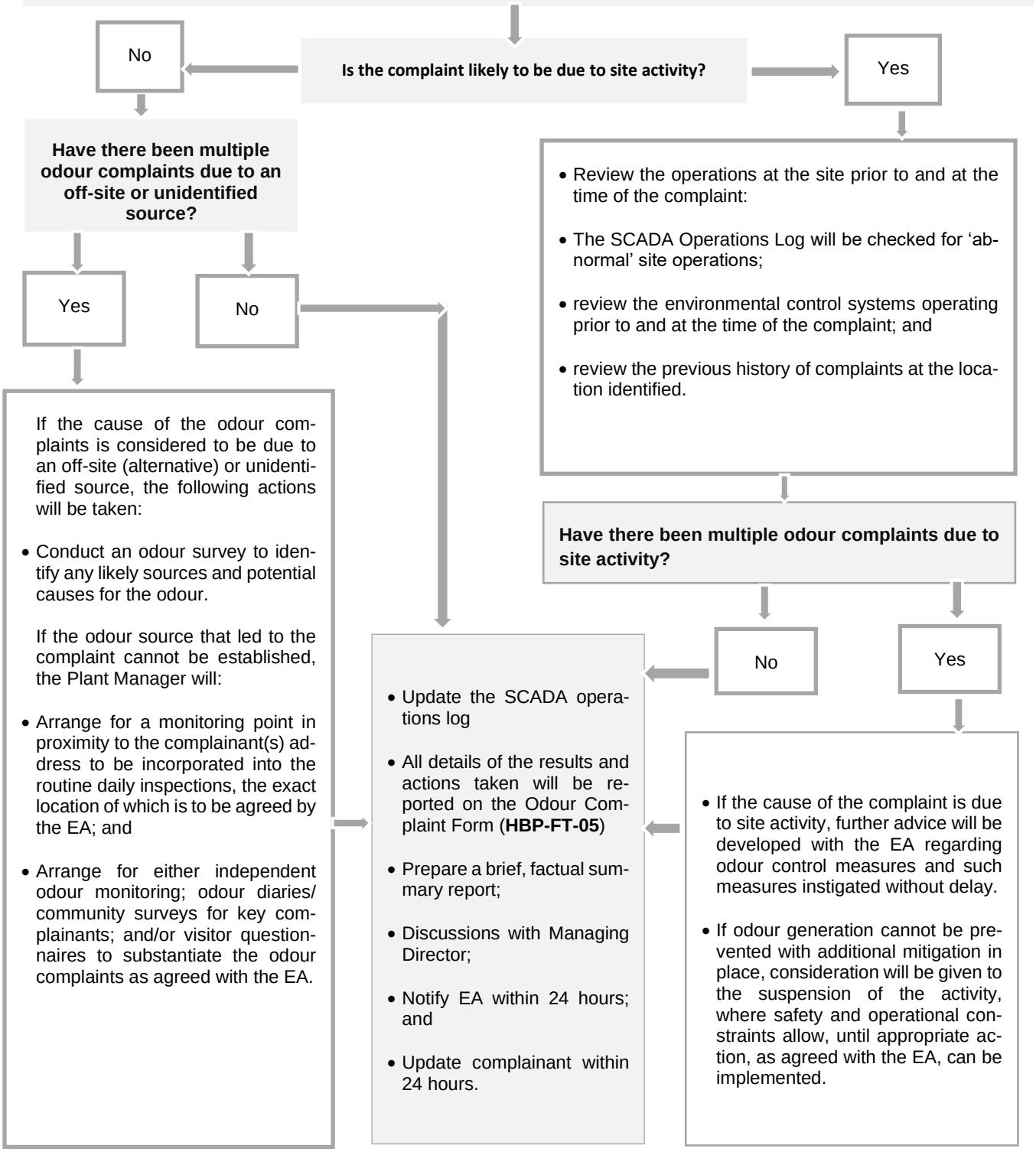
5.1.3 Review and improvement following complaints.

Once the cause of the problem is identified and the improvements implemented, the following actions will be undertaken:

- A further odour survey will be completed to assess if the improvements have addressed the source of the elevated levels.
- If the cause is due to inadequately followed odour management controls re-training of employees will take place to ensure that all employees operate to the required standards.
- If the odour management controls are determined to be inadequate it will be raised as part of the review of control measures detailed in the OMP; and
- All parties affected by the problem event will be notified of the cause, actions, and resolutions by the Plant Manager.

Figure 4 Odour complaints stepwise procedure

- On receipt of an odour complaint at the site, the Plant Manager will be notified immediately.
- The Plant Manager to visit the location of perceived off-site odour without delay, on the basis that the EA has provided the approximate location of the odour complaint, to determine odour presence/absence, odour characteristics and intensity.
- Conclude complaint 'screening' stage. Inform EA of outcome.
- Note observations on the Odour Complaint Form (**HBP-FT-04**)



5.2 Community engagement

The Operator will ensure that they are always approachable and open to discussion, the primary objective being to encourage complainants to feel comfortable to contact the Operator in the first instance so that problems can be identified and rectified at the earliest opportunity. Liaison with local residents in closest proximity to the site operations (subset of the receptors given in Table 2.1) and the EA will be co-ordinated through the Managing Director. Both parties will be notified of activities that have the potential to generate significant odour emissions, and of any activities programmed to take place outside of normal site operating conditions or hours.

In circumstances where, over an extended period, odour complaints from the community do not match the results of the regular sniff-test monitoring HBP will engage with members of the community, in key locations, to participate in a period of community monitoring. These designated residents would perform offsite surveys, recording the data in an Odour Diary for an agreed length of time. HBP will maintain logs of community involvement and keep all completed odour diaries for future reference.

5.3 Pro-active odour monitoring

5.3.1 Meteorological Monitoring

Meteorological conditions are key to understanding the potential odour impacts to downwind receptors. Meteorological monitoring at the site will therefore be performed:

- during routine odour monitoring
- to predict periods when conditions for the dispersion of odour are likely to be poor, enabling planned maintenance operations to be re-scheduled to avoid such times.
- at the time of abnormal events to predict where odour impacts could potentially occur
- to identify times when plant conditions and/or odour abatement techniques need to be adjusted to account for adverse conditions.
- for the investigation of odour complaints.

Meteorological data will be sourced by Plant Operatives from the on-line resources e.g. metcheck.com.

5.4 Monitoring Odorous Releases

Site staff will be trained to be continuously aware of odour during the working shift and to report any issues to the Plant Manager. This section of the OMP sets out the additional monitoring procedures that will be implemented, during normal operations.

5.4.1 Questionnaire System

Visitors to site are required to complete a site odour evaluation when signing-in. An alert is sent to the HBP Plant Manager if a strong odour (intensity 4 or above) is reported by visitors.

The Plant Manager will direct an investigation to establish the source and identify the requirement for remedial measures. Record the details of the odour using the Odour Monitoring Form (**HBP-FT-06**).

5.4.2 Routine (Daily) Olfactometry Monitoring

HBP will carry out routine daily odour checks in accordance with the Odour Monitoring Procedure (**HBP-SOP-10**)_Appendix 3. Observations will be recorded on Odour Monitoring Form (**HBP-FT-06**).

Predetermined monitoring locations (that includes locations listed below from M1 to M6 inclusive) should be surveyed on every occasion.

An additional flexible downwind monitoring location (location M7) will be visited once weekly at the nearest downwind off-site receptor location(s) even if odours are not detected at site boundary. This is to acknowledge that odours may ground beyond the site boundary even where no on-site or site boundary odour is detected.

As a minimum monitoring will be undertaken at the following (with upwind locations to be surveyed first):

To be undertaken **daily**:

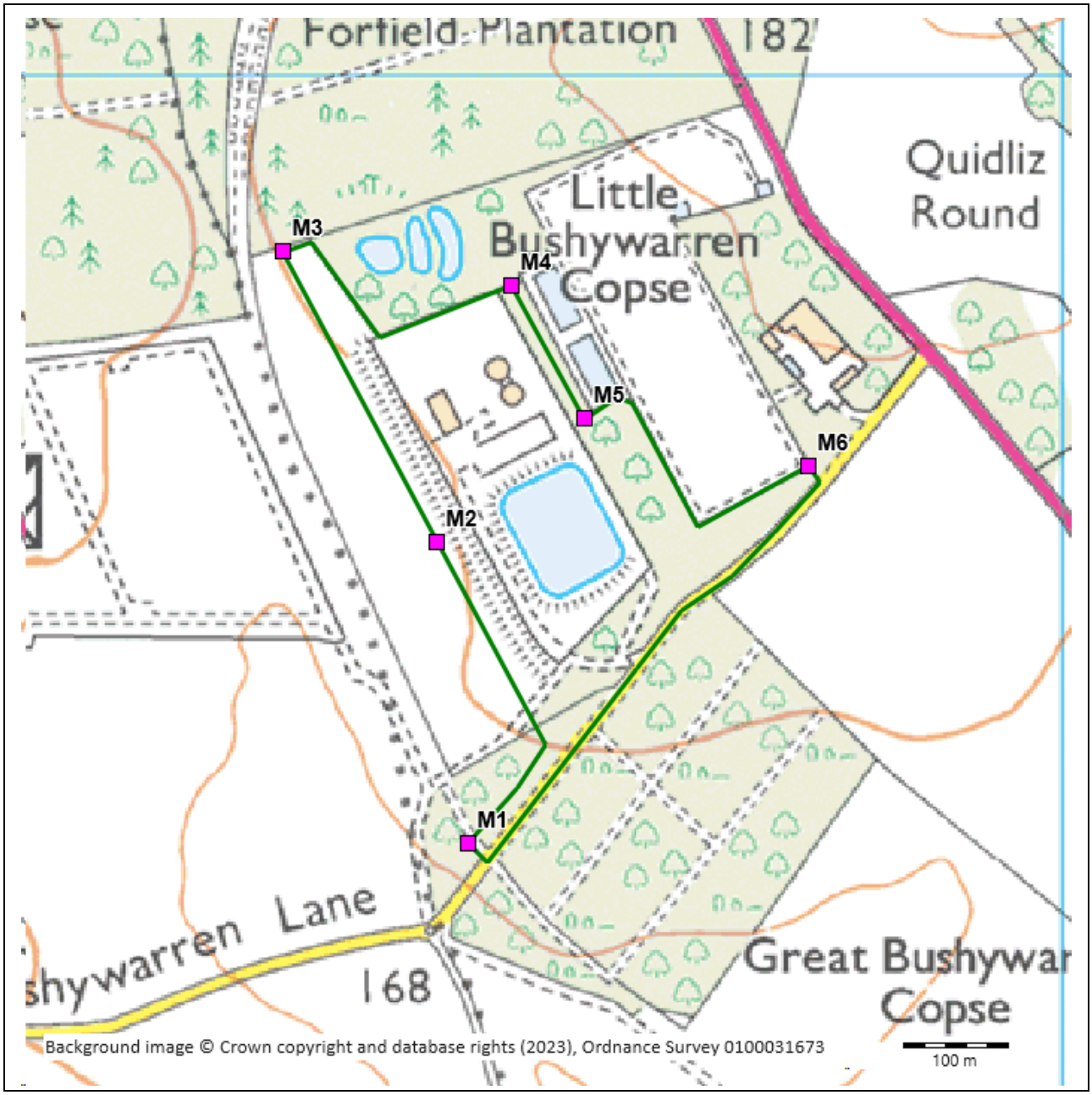
- M1 - Site Boundary South-west (X, Y: 465434,146268)
- M2 - Site Boundary West (X, Y: 465403,146556)
- M3 - Site Boundary North-west (X, Y: 465257,146833)
- M4 - Site Boundary North-east (X, Y: 465475,146801)
- M5 - Site Boundary East (X, Y: 465544,146673)
- M6 - Site Boundary South-east (X, Y: 465758,146628)

To be undertaken **weekly**:

- M7 - Flexible location - nearest off-site downwind receptor location(s) (even if odours are not detected at site boundary)

Figure 5 below provides a plan of predetermined Odour Monitoring Locations.

Figure 5 Odour monitoring locations



Monitoring will be undertaken at different times each day during operational hours to capture a range of conditions and at times when there is a risk of off-site odour impact, for example due to operational changes or due to weather conditions. Additional odour monitoring surveys will be undertaken during the following circumstances:

- During operational hours, where the risk of odour dispersion is towards off-site receptors. This may be due to prevailing wind direction and/or during periods of still air conditions.
- During these periods an odour survey will be conducted at the downwind site boundary and at the downwind off-site receptor location(s). Any off-site odours will be traced to their potential source which may include a full inspection on-site of the area of operations.
- During routine operations where there is an increased risk of odour release.
- During periods of maintenance and/or abnormal operating conditions (Table 6.1) where there is increased risk of odour release. During these periods an odour survey will be conducted at the downwind site boundary and at the downwind off-site receptor location(s) to establish the presence of odour off-site.
- To verify the success of any contingency measures implemented on-site to control odour, in response to either the detection of abnormal odour release during routine odour monitoring, or because of measures implemented in response to verified odour complaint(s). The survey will be undertaken on-site at the location of the verified odour source(s), at the downwind site boundary and at the off-site affected receptor location(s).
- To qualify the presence or absence of odour from other sources beyond the site boundary if there is no established pathway between the site but odour has been detected at a potential offsite sensitive receptor.

The results will be recorded on the Odour Monitoring Form (**HBP-FT-06**) and SCADA Site Operations Log . This data can be used to inform proactive odour management.

5.4.3 The Odour Assessor

Monitoring staff must not be desensitised to odour. A variety of trained odour monitoring personnel should be used and, where possible, selected from office-based staff who are unlikely to have been exposed to on-site odours.

The odour assessor must not be subject to significant odour in the 30-minutes prior to the assessment or consume strongly flavoured food or drink within this time period. This is to ensure that the assessor is not suffering from odour fatigue and will be sensitive to on-site odours. If odour complaints are received, and the results of routine odour testing suggest that site personnel are unable to detect odour whilst on-site the Operator will consider using independent contractors for sniff testing until the source of the odour is established and/or issue is resolved.

It is important to note that olfactory monitoring ('sniff tests') are subjective and both the hedonic tone and intensity may be experienced differently by different people. The Hedonic Scale and Odour Intensity Scale is included in the Odour Monitoring Procedure (**HBP-SOP-10**), Appendix 3.

5.4.4 Method for routine odour monitoring

1. The tester will walk slowly, breathing normally, and starting at points with least expectation of odour (at the downwind site boundary). If an odour cannot be detected in this way, the inspector will periodically stand still and inhale deeply facing upwind.

If no odour is perceptible in this manner, then the intensity will be 0. If odour is detected but there is some doubt as to whether an odour is present, then the intensity will be recorded as 1 (very faint). If odour is detected but cannot be described using precise words or terms, then intensity will be recorded as 2 (faint). If odour is detected while walking and the odour character is recognisable, the intensity will be recorded as at least 3 (distinct). If the odour character is easily recognisable then the intensity is 4 (strong). If the odour is considered offensive the intensity is 5 (very strong) and if the odour is offensive and possibly nauseous i.e. an instinctive reaction is to reduce personal exposure to the odour, then the intensity is 6 (extremely strong). The score used to classify odour are provided on the Odour Monitoring Form (**HBP-FT-06**).

2. If a recognisable or 'distinct' odour or stronger (i.e. intensity of 3 and above) is detected at the downwind site boundary and/or at off-site receptor locations, an on-site inspection of operations will be carried out to trace any observed off-site or site boundary odour to the source, or identification of the direction of an off-site odour, so that appropriate corrective action can be taken.

3. On reporting results, it is important that additional observations including time, date, weather conditions, odour type, location, intensity, extent, and sensitivity are recorded in the Odour Monitoring Form (**HBP-FT-06**).

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

5.5 Reactive odour monitoring

5.5.1 Actions in the Event of Abnormal Emissions

5.5.1.1 Investigate Pollution Incident and Cause

If odour monitoring or odour complaint(s) indicates that abnormal emissions from the facility are taking place the Plant Manager (or deputy) will investigate the complaint as soon as possible on receipt of the results/ complaint.

The Plant Manager will check relevant items of odour control equipment to identify the possible cause of the abnormal emission and/or attend the complaint location to carry out a 'sniff test'.

HBP will liaise with the EA immediately to inform of the outcome of the screening assessment (Figure 4) and whether any action is to be taken. If the site is not confirmed to be the odour source, then the investigation will stop at that point.

If the screening process confirms the odour incident, then a more detailed investigation will be carried out.

The actions outlined in Figure 4 will be followed if the site is identified as the origin/cause of the odour complained about. Figure 4 also outlines the actions that will be undertaken by HBP in circumstances where the source of the odour cannot be confirmed.

If the odour complaint is received during operational hours the complaint will be investigated immediately.

Table 4 below summarises the schedule for proactive and reactive odour monitoring.

Table 4 Schedule of odour monitoring 'sniff tests'

Frequency	Person Responsible	Method	Reason	Records	Actions
Proactive (daily)	Trained office-based staff or non-operational staff	Perform sniff test at locations indicated on **Figure 4.**	Routine monitoring to establish normal working conditions and check for odour emissions/ issues.	Odour Monitoring Form (**HBP-FT-06**)	If a distinct odour (intensity 3 or above) is detected at site boundary/ at off-site receptor investigate and establish source during the survey and identify the requirement for remedial measures. Record the details of the odour using the Odour Monitoring Form (**HBP-FT-06**).
Proactive (ad hoc)	Site visitors and site personnel	Site visitors - perform sniff test on arrival at site. Site personnel – dynamic odour monitoring during shift.	To establish odour emissions/ issues; or during operations where there is an increased risk of odour release	Sign-in App (Site Office)	An alert is sent to the Plant Manager if a strong odour (intensity 4 or above) is reported by visitors. Investigate and establish source and identify the requirement for remedial measures. Record the details of the odour using the Odour Monitoring Form (**HBP-FT-06**).
Reactive (ad hoc)	Plant Manager (or deputy)	Perform sniff test at relevant receptor locations, boundary locations and at suspected on-site sources	In response to odour complaint	Odour Monitoring Form (**HBP-FT-06**) Odour Complaint Form **(HBP-FT-05)**	Follow stepwise approach (Figure 4).
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 in the event of an odour release	Odour Monitoring Form (**HBP-FT-06**)	If a distinct odour (intensity 3 or above) is detected at off-site receptors identify appropriate remedial measures. 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 implemented. Record the details of the odour using the Odour Monitoring Form (**HBP-FT-06**).

5.6 Abnormal events

Table 5 provides a summary of foreseeable abnormal events that may compromise the Operator's ability to prevent and/or minimise odorous releases from the process and response requirements.

Potential odour sources under abnormal operating conditions, may include:

- AD plant infrastructure compromised (leading to gas/ liquid release)
- Plant breakdown
- Absence of key staff
- Flood
- Fire/ explosion
- Lack of transfer vehicle availability

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 for prolonged periods.

When maintenance work is undertaken, there is potential for increased risk of odour release e.g., removing a pump, replacing a pipeline, or rodding/flushing a pipe/chamber etc. Suitably qualified and competent contractors will complete maintenance works. Rules/work permits will be required for all contractors working on site. Sections of the plant which require maintenance will be sealed off from the main process to control and limit the potential release of odours during maintenance works.

The Operator will immediately inform the EA when planned or emergency maintenance must be carried out if there is a likelihood of odour being released to atmosphere to the degree that an adverse off-site impact may occur. The Operator will provide details of the event, actions being taken to resolve the issue and likely timescale to rectify.

A list of contingency contacts in the event of abnormal operations/ critical failures is provided in Accident Management Plan Manual (**HBP-OD-08)**.

In the event of a critical failure of the facility which results in restricted feedstock reception capacity, additional mitigation measures will be put in place to minimise the impact of the incident. These will include:

- Stop receipt of feedstock
- Containment of spillages or odour releases
- Clean-up/ wash-down procedures
- Containment of waste either into sealed containers/by covering or removal to an alternative facility within 24-hours.

In the case of operational difficulties, feedstock would be redirected to an alternative facility before arriving at site. In the event of serious odour issues and disaster or emergency situations, measures are also in place to divert or remove wastes for landfill disposal as a last resort.

A backup generator is available on-site to avoid a grid power outage impacting the operation. The generator will be subject to routine servicing. Water supply will be available from the clean water lagoon or mains supply. There is no business-critical gas usage on site. Deputies are available for any individual key staff member should they be unavailable for any reason.

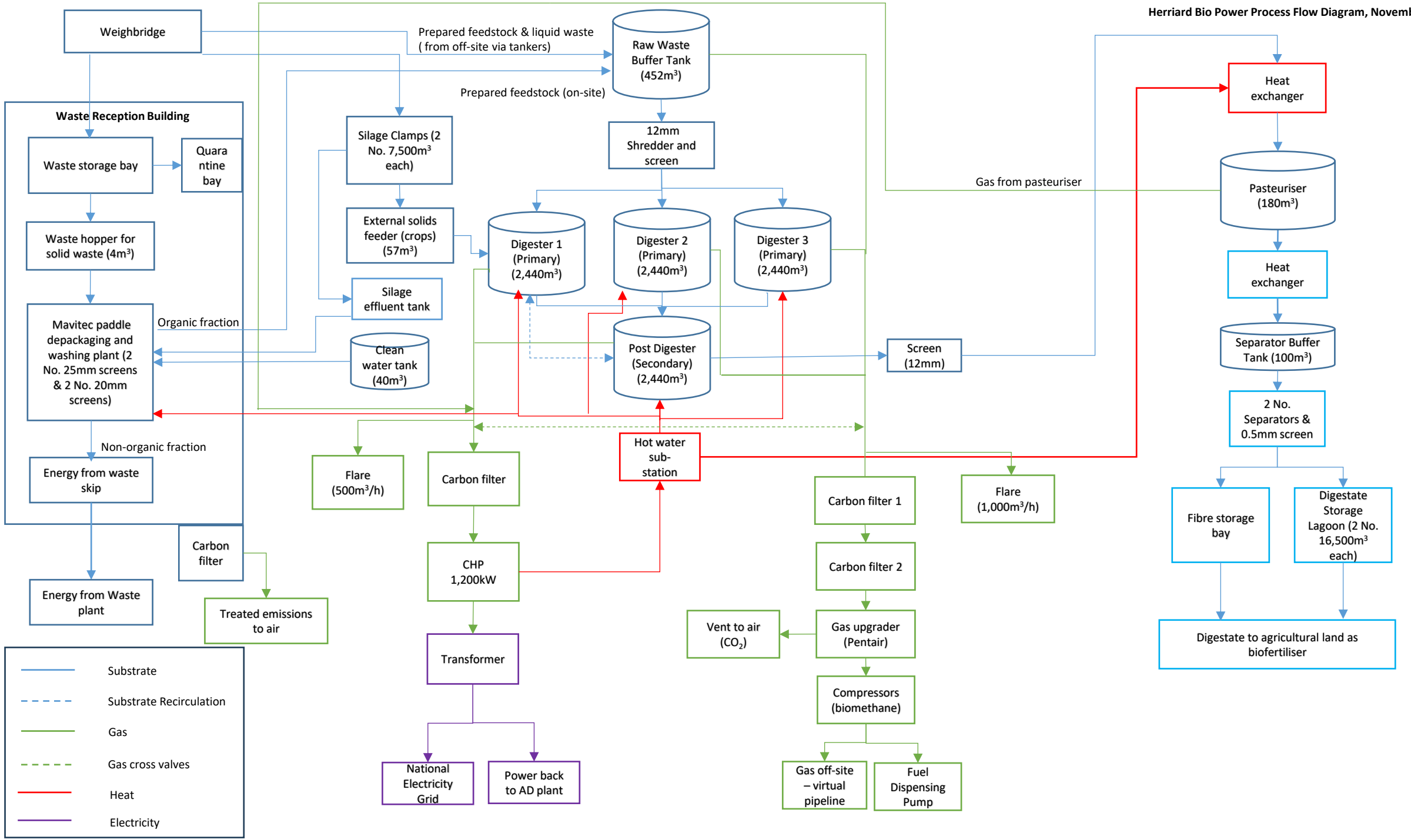
Table 5 Possible abnormal events

Abnormal event	Recovery steps
AD plant infrastructure compromised. **(gas / liquid release)**	• The SCADA system, which includes leak detection, will enable identification of the issue. Systems alerts, and overrides are integral to the automated system. The system fitted with fail-safes for blockages, high or low pressure stops and valve interlocks. • Member of site personnel on duty always to attend site (e.g., to stop pumps/ close valves etc., as necessary). Portable monitors will be used to check gas type and concentration. • Supply of critical spare parts held on-site. • Service contract with engineer in place for emergency breakdown/ repairs • A suction tanker is available on-site at all times to retrieve liquids. Clean affected area with squeegee, apply absorbents. Clean equipment surfaces. • Waste will be diverted to authorised disposal facility until repaired.
Plant/ equipment Breakdown	• Routine and emergency maintenance contracts in place with associated contractor for plant/ equipment. • Member of site personnel on duty always to attend site e.g., to stop pumps/ close valves as necessary. • Supply of critical spare parts held on-site. • Waste will be diverted to authorised disposal facility until repaired.
Power failure	• In the case of power failure power is provided by the on-site stand-by diesel generator • Waste will be diverted to authorised disposal facility until repaired.
Absence of key staff	• Deputy/ technically competent personnel will be always available. • HBP's primary point of contact will be the Plant Manager for the site on all matters associated with site operations and its environmental performance. • Odour awareness and contingency measures included within all staff inductions and training, including that for drivers. • System processes will be automated and monitored remotely by technology provider. • In the short-term, other staff members will be reassigned to critical operations. • In the event of prolonged absence of staff members, temporary staff will be recruited and appropriately trained to fulfil non- critical roles whilst other more experienced staff members are reassigned.
Flood **(the site is situated in a location which has a low probability of flooding)**	• The site is situated in a location which has a low probability of flooding. In the event of a flood, invoke AMP as appropriate. • The site can remove groundwater rising by pumping the clean water into a nearby ditch. • If due to a man-made incident, follow Spill Control Procedure (**HBP-SOP-07).** Use suction tanker to retrieve liquids from sumps and subsequently load to process as appropriate.

Fire and/or explosion	• Invoke AMP Manual **(HBP-OD-08)** • Contact the Fire and Rescue services. • If safe to do so, attempts should be made to extinguish the fire using fire response equipment held on-site.
Unavailability of transfer vehicles	• Several farm trailers are available from the adjacent farm for use on-site. • The Plant Manager is responsible for overseeing the supplier policy and a contingency plan. • Herriard Bio Power Ltd can work with local farmers to arrange for off-site contingency storage for crop feedstock materials and fibre digestate if required.

Appendix 1 – Process Flow Diagram

Herriard Bio Power Process Flow Diagram, November 2024, V3.0



Appendix 2 – Waste Reception Building Odour Control System

Carbon Filter Odour Abatement Plant Specification

DESOTEC

AIRCON® H

The AIRCON® is a mobile replaceable adsorption filter which has been specially developed for air and gas treatment and purification.

H x W x D: 2.6 m x 2.6 m x 7.4 m

The filter colour may differ from what is shown on this page and reflects either our old or new brand design.
For more information, please contact your Desotec representative.

Key features

- Quick and easy to install and connect (plug & play)
- Can be rented without investment & maintenance cost (via daily contracts)
- No handling of activated carbon on-site
- Combined transport vessel and filter
- Option to test and evaluate new applications without capital investement
- Efficient design (low pressure drop/high kinetics), can be installed in series or in parallel

Special features

- Easy to place horizontally, even on uneven surfaces
- Sampling point for saturated activated carbon
- High flowrate per filter module
- Hoisting with spreader bar and straps

AIRCON® H

This filter is protect by a EU registered community design right, reference 001723511-0002.
This filter is protect by a UK registered community design right, reference 90008982670001.

SAFETY

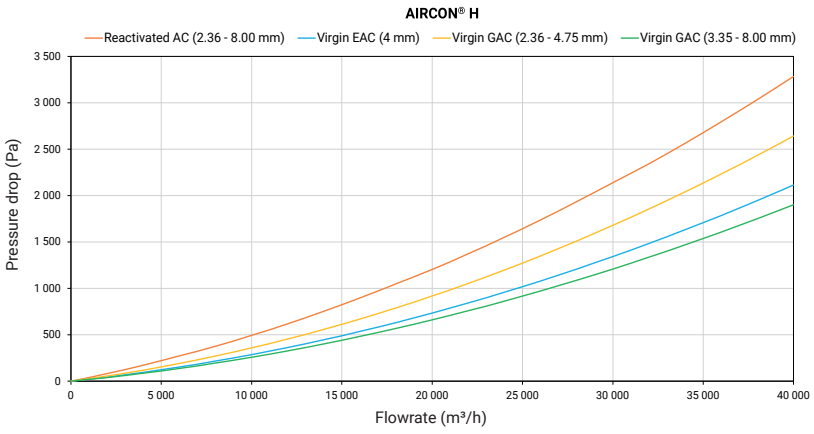
Wet activated carbon preferentially removes oxygen from air. In closed or partially closed containers and vessels, oxygen depletion may reach hazardous levels. If workers are to enter a vessel containing activated carbon, appropriate sampling and work procedures including local requirements for potentially low-oxygen spaces should be followed. For certain groups of chemical products, the reaction with or adsorption by the activated carbon surface can be accompanied by the release of a large quantity of exothermic heat, which could give rise to hotspots in the activated carbon bed. In the event of the generally rare occurrence of such hotspots, it is recommended that the activated carbon bed be inertised with a gas such as nitrogen.

PRESSURE DROP CURVE

You can use the pressure-drop graph to calculate and predict the pressure drop (extra info on demand). The pressure drop is dependent on the particle size and the design of the filter itself, and should only be used as a guideline. For PF5 products, please add a 15% security compared to the impregnated virgin products. For dimensioning, please always take a 30% security into account.

MAXIMUM FLOW RATE	40 000 m³/h
MINIMUM FLOW RATE	4 000 m³/h
[1] MATERIAL	Steel
COATING	Finliner
DIMENSIONS (H x W x D)	2.6 m x 2.6 m x 7.4 m
TOTAL VOLUME	40.0 m³
MAXIMUM FILL VOLUME	13.5 m³
MAXIMUM WEIGHT, DRAINED	17.5 tonnes
MAXIMUM FULL LOAD	17.5 tonnes
TARE	4 700 kg
MAXIMUM ALLOWABLE WORKING PRESSURE	100 mbar
EXCESS PRESSURE PROTECTION	To be provided by the customer
MAXIMUM NEGATIVE PRESSURE	100 mbar
NEGATIVE PRESSURE PROTECTION	To be provided by the customer
OPERATING TEMPERATURE	40°C
[2] MAXIMUM DESIGN TEMPERATURE	60°C
[3] INLET	800 diameter
[3] OUTLET	800 diameter
[3] DRAIN	1" brass/PTFE ball valve
SEALS	EPDM
PIPEWORK	-
SHUT-OFF VALVE	-
WATER / AIR SAMPLING CUSTOMER	-
EARTHING	Yes
VENTING	-
VENTING DATA TYPE	-
SIPHON BREAKER	-
PED 2014/68/EU	-

It is the customer's responsibility to determine the suitability of the filter materials for the process flow.
Air tightness is not tested before shipment.
1. Filtration internals are made of standard stainless steel 304.
2. A higher temperature should always be discussed upfront with the sales department and requires extra safety measures by the customer.
3. Connections available according to customer requirements.



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Appendix 3 – Odour Monitoring Procedure (HBP-SOP-10)

STANDARD OPERATING PROCEDURE

Title: Odour Monitoring Procedure

Ref: HBP-SOP-10

PPE REQUIRED								
HI-VIZ	BOOTS	HELMET	GAS MONITOR					
								

THE PROCEDURE - STEP BY STEP	
The **Plant Operative** is responsible for carrying out the steps below on a daily basis using the Odour Monitoring Form **(HBP-FT-06)**:	
1	Record weather conditions (using weather station) and date/time.
2	Record details of the routine (daily) odour survey at the 'fixed' monitoring locations (nos. M1 – M6) and weekly flexible downwind location(s) (no. M7).
3	If odour present at intensity 3 or above at receptor location(s): • investigate the source of the odour. • Use extra lines on the Odour Monitoring Form to record the additional locations surveyed as part of investigation into odour source. • If known, the suspected or confirmed source of the odour should be entered into the 'Operational status'. • report results to **Plant Manager**
4	On completion of the odour survey at the fixed (M1 - M6) and flexible monitoring location (M7) enter either 'OK' or 'not OK' if odour issues are noted on the Daily Checks **(HBP-RC-03).**
5	If odour issues are noted report results to **Plant Manager**.

NOTES

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:

a. Odour Monitoring Form **(HBP-FT-06)**

- Record weather conditions and date/time
- Record details of the routine (daily) odour survey at the 'fixed' monitoring locations (nos. M1 – M6) and flexible location (M7) using the Odour Monitoring Form

b. **Daily Checks (HBP-RC-03)**

- The Daily Checks 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 an online resource (e.g. www.bbc.co.uk/weather) that can be cross-checked against field observations during the survey. Observations should include wind direction, wind speed, atmospheric pressure, and air temperature.

4. Odour 'sniff tests'

Routine (daily) monitoring should be undertaken at the 'fixed' locations shown in Figure 4.1 in the Odour Management Plan (**HBP-OD-07**). 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 an investigation regarding the source of the odour should be undertaken and the odour traced back to source.
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 Checks (**HBP-RC-03**).

Table 1 - Routine Odour Monitoring Locations – see Figure 1

Daily ('fixed') locations	
M1	Site Boundary - South-west
M2	Site Boundary - West
M3	Site Boundary - North-west
M4	Site Boundary - North-east
M5	Site Boundary - East
M6	Site Boundary - South-east
Weekly Flexible location	
M7	Flexible location - nearest off-site downwind receptor location(s) (even if odours are not detected at site boundary)

Figure 1 Odour Monitoring point plan

5. 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:**

a. **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).

b. **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 if < 30 minutes at location)
4	**Persistent odour** (> 50% of the assessment time but not continuous, fairly localised)
5	**Continuous** (present throughout the assessment period)

c. **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.)

d. **Odour description**

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 as per Table 2 below. 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	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.

BY SIGNING BELOW, I CONFIRM THAT I HAVE FULLY READ AND UNDERSTOOD THIS PROCEDURE

If in Doubt Stop the job for Safety!

NAME	SIGNED	DATE

Appendix 4 – Forms

Odour Complaint Form (HBP-FT-05)

Odour Monitoring Form (HBP-FT-06)

HBP-FT-05 - 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:	

herriard bio power

HBP-FT-06 - Odour Monitoring Form	Week Commencing:

FOR ODOUR INTENSITY, ODOUR DURATION, SENSITIVTY, MONITORING LOCATIONS, SEE SCALES BELOW THIS TABLE

Date	Time	Survey Location	Odour Intensity (0 – 6)	Odour Duration (1 – 5)	Sensitivity (1 – 3)	Odour Description	Wind direction	Av. wind Speed (mph)	Temp. (°C)	Operational Status/ Comments	Assessor
Mon		M1									
		M2									
		M3									
		M4									
		M5									
		M6									
Tue		M1									
		M2									
		M3									
		M4									
		M5									
		M6									
Wed		M1									
		M2									
		M3									
		M4									
		M5									
		M6									
Thur		M1									
		M2									
		M3									
		M4									
		M5									
		M6									

Date	Time	Location	Odour Intensity	Odour Duration	Sensitivity	Odour Description	Wind direction	Wind speed	Conditions/ Temp.	Operational Status/ Comments	Assessor
Fri		M1									
		M2									
		M3									
		M4									
		M5									
		M6									
Sat		M1									
		M2									
		M3									
		M4									
		M5									
		M6									
Sun		M1									
		M2									
		M3									
		M4									
		M5									
		M6									

Monitoring Locations:
M1 – Site Boundary (Southwest) M2 – Site Boundary (West) M3 – Site Boundary (Northwest) M4 – Site Boundary (Northeast) M5 – Site Boundary (East) M6 – Site Boundary (Southeast)
M7 - Flexible location

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.)

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