



Duranta Teesside Limited

Odour Management Plan



Report produced for **Duranta Teesside Limited**

Provided by Walker Resource Management Ltd (WRM)

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1.0 BACKGROUND

The Environment Agency has a duty to regulate odour from certain industrial processes and waste sites. This is to protect and improve public health and wellbeing.

The British Standard EN 13725:2022 defines odour as a:

“sensation perceived by means of the olfactory organ in sniffing certain volatile substances.”

The standard also defines an odorant as a:

“substance which, when volatilised in neutral gas, has the potential to stimulate the human olfactory system so that an odour is perceived”

The Environmental Permitting (England and Wales) Regulations 2016 define pollution as:

“any emission as a result of human activity which may:

- (a) be harmful to human health or the quality of the environment,*
- (b) cause offence to a human sense,*
- (c) result in damage to material property, or*
- (d) impair or interfere with amenities or other legitimate uses of the environment”*

The Environment Agency will treat odorous emissions in the same way as any other polluting emission.

“If odour pollution is happening and you are not taking appropriate measures, you may be breaching your permit condition, which is a criminal offence.”

2.0 INTRODUCTION

2.1 Site Address

Duranta Teesside Ltd
Forty Foot Road
Middlesbrough
Teesside
TS2 1HG

2.2 Operational Location

Site Grid Reference: 448885 (Easting), 521091 (Northing).

2.3 Odour Requirements

Walker Resource Management Limited (WRM) have been commissioned by Duranta Teesside Limited to prepare an odour management plan (OMP) for their anaerobic digestion facility (AD) located on Forty Foot Road, Riverside Park Industrial Estate, Middlesbrough. The facility consists of an anaerobic digestion plant, designed to process up to 157,000 tonnes of biodegradable waste per annum, creating biogas and digestate. The gas is collected from the digesters and upgraded to biomethane for injection into the grid, alternatively gas can also be used to power onsite Combined Heat and Power (CHP) Engines, generating electricity and heat. The energy generated is initially used onsite to power and heat the AD treatment process, excess electricity can be supplied to the National Grid and the apportionment of gas is dictated by market rates for energy. The plant produces a single fraction of whole, pumpable digestate with a dry matter content of up to 8% after digestion from the inputs received at the site. Digestate is supplied to local agricultural outlets through a long-term supply contract.

The digestion of 157,000 tonnes per annum (tpa) of biodegradable waste can inevitably lead to the generation of odour due to the nature of material and the processes involved. Effective operation and management of such facilities is therefore required to minimise the odour emissions from routine operations and minimise the risk from abnormal operational conditions which may result in an increased risk of odour generation at the site. The facility is located in an industrial area, with a number of sensitive receptors nearby.

This Odour Management Plan (OMP) has been produced in accordance with Environment Agency (EA) guidance on OMPs¹ and EPR H4 Odour Management².

This OMP is aimed at assisting the operator in effectively managing potential odour releases associated with the biological treatment of organic wastes at the Duranta site and minimising the risk of abnormal operational conditions, which could result in increased risk of odour generation at the site.

¹ Appendix 8 of Application for an environmental permit - Guidance notes on part B3 new bespoke installation permit. EPB3 Version 1, January 2010. Environment Agency.

² Environment Agency Technical Guidance Note H4 – Odour management. March 2011.

2.4 Current Permitted Activity

Duranta Teesside Ltd (Duranta) is currently permitted to treat a variety of organic materials at the Teesside Anaerobic Digestion Power Plant, under a Bespoke Environmental Permit (EPR/YP3433VR/V002). Permitted activities are as stated below:

- Recovery and biologic treatment of non-hazardous waste (Not exceeding 157,000 tonnes per annum).

2.5 Hours of Operation

Site operational hours, including maintenance activities, are defined in Table 1 below.

Table 1 - Hours of operation

Day	Waste Acceptance	Waste Treatment
Weekday	07:00 – 19:00	00:00 – 24:00
Weekend	07:00 – 19:00	00:00 – 24:00

2.6 Structure, Purpose and Availability of the Odour Management Plan

This OMP is a working document. Intended to be used as a reference document for operational staff on a day today basis. It provides a schedule of actions that will be taken to minimise odour impact associated with the AD process, and details site management procedures for the management and monitoring of odour. All new employees shall be trained on the contents and purpose of the OMP as part of their site induction. Regular toolbox talks shall be held with all staff to remind them of the detail of the OMP, and a toolbox talk shall be held following any change that may be made to the OMP.

This OMP available to the local authority, Environment Agency and all site personnel. The document is stored electronically on the site's 'Box' server. A physical copy of the OMP is also held at the site office.

The structure of the OMP is laid out in accordance with the EA guidance and considers:

- Feedstock Inventory;
- Process Management;
- Evaporation;
- Containment and Abatement;
- Dispersion;
- Sensitive Receptors; and,
- Incidents and Emergencies.

2.7 Roles and Responsibilities

The implementation of this OMP is the responsibility of the Directors of Duranta Teesside, supported by the Operations and Maintenance Manager. The Operations and Maintenance Manager can delegate certain tasks to site operatives as required, although ultimate responsibility will remain with the Directors. The OMP is reviewed annually or as part of the

implementation of a significant change in the process. Any changes are communicated to the site staff via toolbox talks.

For changes made to the OMP which necessitate further training, this will be undertaken as required.

2.8 Scope

This management plan relates to all activities at the Teesside AD plant that have the potential to give rise to offensive odours discernible outside the site boundary.

2.9 Material Recovery Operations

The site employs a wet mesophilic anaerobic digestion process to animal by-product and non-animal-by product liquid food wastes, non-animal by-product solid wastes and agricultural materials including farm slurries. This is a two-phase digestion process with primary and post digestion, followed by a pasteurisation phase, which produces renewable power and biomethane that can be injected into the gas grid. A whole digestate product is also produced and sold as an organic fertiliser through a contractor.

This OMP assesses the possible sources of odour generation and outlines the best practice and mitigation measures that shall be employed, where practicable, to minimise odours emitted from site.

The likelihood and frequency of exposure to odour arising from the facility is determined by a combination of the magnitude of release, the prevailing meteorological conditions, and the distance and direction of receptors in relation to the facility. Each of these factors are discussed in the following sections.

2.10 AD Technology

The plant operates a two-stage anaerobic digestion process for the treatment of organic waste. This process was selected for use at Duranta, based upon the technology meeting the following criteria:

- Technology suitable for treating mixed wastes of varying solids and organic contents;
- Provided a proven solution for generating an output with an established end of waste criteria and to which there are a range of end markets available;
- A solution that has efficient gas yield production, low environmental impact and minimal potential nuisance.

2.11 Conceptual Model

The conceptual model for pollutant linkages identified for the release of odours from the anaerobic digestion facility is identified in Figure 1 below.

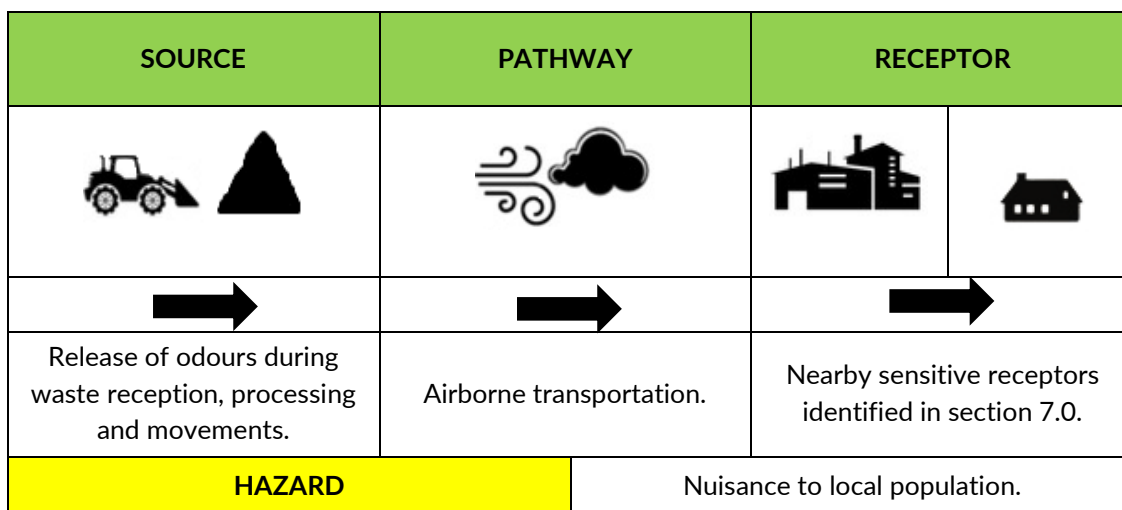


Figure 1 – Conceptual Model for Pollutant Linkages

2.12 Dispersion Modelling

Modelling can be a useful source of predictive information to assess the likely impact of odour. However, there may be much greater uncertainties associated with odour modelling than with the modelling of other pollutants for the following reasons³:

- The human nose responds to odour exposure over a 1 to 5 second interval. Average exposure levels may very well be below the detection threshold but still expose people to short term concentrations which are much higher.
- UK odour benchmark levels are based on research at one particular type of site under distinct dispersion conditions (e.g. ground level emissions in generally flat terrain).

Further uncertainty is added to the modelling process through the determination of appropriate odour concentrations based upon several factors⁴ including:

- The state and type of raw materials used on site and how they are delivered and stored;
- The process e.g. the control of moisture, temperature and oxygen content; and
- The scale of the operation, e.g. the surface area of the anaerobic digestion process, the quantity and quality of (intermediate) products.

In this instance, it was deemed appropriate to undertake modelling as part of the original permit application. Please see the Odour Impact Assessment for the results of this modelling.

³ Environment Agency (2011) Technical Guidance Note H4 – Odour management. Appendix 3.

⁴ DEFRA (2009) Good Practice and Regulatory Guidance on Composting and Odour Control for Local Authorities. Defra: London.

3.0 FEEDSTOCK INVENTORY

The site operates a waste recovery operation through the anaerobic digestion of mixed organic waste, to produce biogas and whole digestate that is quality assured to PAS110⁵ standard. The organic waste digestion process treats biodegradable material which have the potential to generate odours. In order to understand the odour potential of the different waste streams that enter these processes, a feedstock inventory has been provided for the various waste types.

Table 2 below provides an assessment of each potentially odorous material accepted by Duranta on a regular basis, identifying the typical and abnormal compositions of those waste types and providing an overall odour potential of that feedstock based upon the likelihood of abnormal compositions being encountered at site.

Table 2 - Assessment of Odour Potential from Feedstock Inventory

Waste Type	Waste Source	Typical Composition	Abnormal Composition	Likelihood	Odour Potential
Liquid Food Waste	Commercial	Usually singular liquid food waste with a low solids content.	Singular liquid food waste with a higher organic content that is several weeks old.	Low potential for large variation between deliveries given the typical source and constituents.	Low/Med – Liquid wastes typically have a lower odour potential than solids given the lower organic matter content.
Semi-solid Food Waste	Commercial	Semi-solid food wastes with a dry matter content of 8%	Mixture of food waste with a high moisture content that is several days old and has started to degrade.	Material which is several days old is occasionally received from suppliers.	High – Material is often wet and may have already started to degrade given the potential age of material.
Non-ABP Solid Materials	Commercial	Non-ABP solid food waste, cereal waste, waste animal feeds, off-cuts from vegetable and fruit and other vegetation waste.	Non-ABP solid food waste cereal, waste animal feeds, off-cuts from vegetable and fruit and other vegetation waste which has severely degraded.	Material which is several days old is occasionally received from suppliers.	Low – Material received is often quite fresh with mild odour.

⁵ BSi (2010) *PAS 110: Specification for whole digestate, separated liquor and separated fibre derived from the anaerobic digestion of source-segregated biodegradable materials*. British Standards Institution: London.

Waste Type	Waste Source	Typical Composition	Abnormal Composition	Likelihood	Odour Potential
Bloods	Commercial	Fresh blood, no more than one week old.	Blood over one week old which has started to decompose.	Material is often received which is under one week old.	High – Blood has a distinct smell once it has started to decompose.
Trade Waste Effluents	Commercial	Waste milk, potato sludge, brewery waste and grease trap waste. These can vary between thin and thick liquids and are usually a couple of days old (apart from grease which can be a couple of weeks old).	Wastes which have started to go septic and have a pungent smell.	Material is occasionally received from sources which is several days old (apart from grease waste).	Low – Material received is often quite fresh with mild odour.
Glycerol	Commercial	Thick viscous dark liquid which may be warm.	Liquid containing high MONG content.	Material usually delivered with low MONG content.	Medium – Material has a greater odour potential if material is delivered at a high temperature.
Green Waste	Pre-shredded garden and landscape waste Agriculture	Fresh grass clippings / turf. Green Waste is a seasonal material; mostly treated over summer months (April – Sept) but may be treated over winter months where available (such as silage).	Mixture of grass clippings and plant material that has been stagnant for weeks.	Material would be delivered shortly after being collected.	High – Material may be wet and have already started to degrade given the potential age of the cut material. Small but offensive odour.
Agricultural Slurry/FYM	Agriculture	Mixture of farm waste in a single form	If material has been deposited for too long, then it may have started to grow	Material is often delivered fresh in a single form. If mould	High - Nature of the material means odorous potential is

Waste Type	Waste Source	Typical Composition	Abnormal Composition	Likelihood	Odour Potential
		(either liquid or solid).	mould. There may also be hidden carcasses in material.	or carcasses are observed material will be rejected.	high even at low concentrations or low levels of exposure.

3.1 Expected Waste Types

Feedstocks will only consist of waste types that are allowed to be processed under the site permit. Waste delivered to the site will be subject to stringent pre-acceptance and acceptance procedures, waste that does not meet the requirements will be rejected from the site.

4.0 CONTROL MEASURES AND PROCESS MANAGEMENT AND MONITORING

The following sections outline the waste recovery processes operated at Duranta for the production of biogas, biomethane and digestate. The monitoring parameters, critical limits, process controls and records at each stage of the recovery process for the mitigation or minimisation of the production of odours are provided herein.

4.1 Pre-Waste Acceptance Procedures

Duranta personnel shall ensure that the site has the required number of qualified staff on site prior to the waste acceptance and rejection procedures. Personnel shall ensure that the site has capacity to store and treat any incoming waste. Personnel shall ensure that the site will not exceed Permit conditions when accepting any incoming wastes.

Prior to the delivery of any loads, the operator shall obtain and agree a written supply agreement for the input materials, with each input material supplier (this only applies to regular suppliers and not the spot market). The agreement shall provide the following:

- The waste type and specified source location(s) of the material;
- What the criteria of the incoming waste should be to allow acceptance of deliveries (e.g. visual assessment or testing samples);
- The quantity of waste that will be delivered per week;
- The delivery schedule;
- The quality of the material, including limits for specific parameters;
- The sampling process required on delivery;
- The Gate fee and payment terms;

This process should occur for all new waste streams and new suppliers introduced to site (this only applies to regular suppliers and not the spot market). In the case of long-term supply arrangements with clients / suppliers, the above details are only required to be obtained once for each particular waste stream received, except the quantity of waste which must be recorded in the Deliveries Record Sheet per individual delivery and the relevant Duty of Care documentation (Waste Transfer Notes).

If the Operations and Maintenance Manager deems it necessary, an assessment of potentially odorous feedstocks will be carried out by using a trial load to assess the risk of odour release. The assessment will be documented as per the pre-acceptance practises of the operator. Following this assessment, if required, specific controls can be developed and documented in order to ensure odour release is prevented. If odour release cannot be prevented, no further deliveries of this feedstock shall be permitted.

4.2 Waste Reception

Wastes are delivered to site by road tanker or bulk carrier, depending on the type of load, and transferred to the relevant reception area. The plant is accessed via Forty Foot Road. On arrival at the site, vehicles are parked, and drivers report to the weighbridge office. Site operatives check all relevant documentation to ensure that the delivery aligns with the delivery schedule and has an EWC which is stated on the Allowable Inputs Sheet. Following this the vehicle will be directed to the correct tipping point and weighed on one of the two site weighbridges within information recorded onto either the Food Waste or Glycerol Deliveries Record Sheets. This includes:

- Date & time;
- Net weight
- Vehicle registration
- Sample number
- WBG and EWC Code; and,
- The reception tank into which the material has been discharged.

The driver delivering the load and the Duranta operative receiving the load are required to sign against each delivery to confirm the accuracy of details. Materials are then discharged from delivery vehicles into the reception area of the plant.

Liquid waste is pumped directly into tanks within the reception building by road tankers; semi-solid waste is tipped into a mixing pit inside the reception building and mixed with other liquid waste to make a pumpable feedstock. Pre-shredded green waste is tipped onto a reception pad and directly put into the solid matter charger. The charger is filled continuously during daytime operating reception hours, excess green waste is transferred into the solids storage building to be stored temporarily. Agricultural and non-ABP slurries are delivered to a reception tank where they are temporarily stored, prior to feeding directly into the system.

No waste shall be stored outside of designated storage areas. No green materials shall be allowed to accumulate on site for more than 24 hours. In the event of over-delivery, the facility will reserve the right to refuse or return the delivery.

All deliveries must be scheduled in advance and be from licensed waste carriers only, to ensure that vehicles are not waiting on or near site for longer than necessary, to reduce the risk of odour from deliveries. Waste carriers are made aware of their duty to reduce odour and new drivers will be required to read and sign site instructions. All relevant staff are trained in the waste acceptance procedures, the feedstock schedule will be adhered to. In the event that an unscheduled delivery arrives, or the waste delivered exceeds the amount agreed upon, Duranta reserves the right to decline and return waste deliveries. Any non-conforming wastes are rejected immediately upon detection. Non-conforming wastes are extremely unusual due to rigorous pre-acceptance procedures in place at site.

The site only accepts input materials in line with allowable inputs as defined on the site Environmental Permit and section 2 of the Anaerobic digestate resource framework ⁶.

WASTE RECEPTION				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Delivery of feedstocks to reception hall containing highly degraded and odorous organic material.	Visual Assessment.	N/A	The majority of feedstocks are delivered and stored within the reception building. The building has a dedicated negative aeration biofiltration system. The air extraction rate is set at 2 room changes per hour, whilst feed reception procedures are being implemented this rate increases to 4 room changes per hour. The air	Duty of Care Transfer Note.

⁶ Environment Agency (2025) *Anaerobic digestate: resource framework*. Available at: <https://www.gov.uk/guidance/anaerobic-digestate-resource-framework>

WASTE RECEPTION				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
			from the building is directed through the biofilter situated next to the building. Doors on the building shall also remain closed at all times apart from when deliveries of feedstock are being made. The reception hall doors are also interlocked with the pit lid mechanism to ensure that the doors are only open when necessary, this reduces the amount of fugitive emissions caused by opening the reception building doors	
Unsecure load. Leaking tankers, uncovered feedstocks.	Visual Inspection.	N/A	Pre-notification of all incoming waste. Only licensed waste carriers used. All drivers will be inducted to site rules. Reception hall fitted with abatement system to manage any odours present.	Weekly Load Notification Sheet.
Poor turn around in getting solids in the mixing pit converted to slurry and pumped into a holding tank.	Correct Process Operation.	N/A	Air is extracted to the biofilter. Control of incoming feedstock. Four room air changes per hour treated through biofilter. Staff trained on feedstock acceptance procedures.	Training Matrix.
Acceptance of incorrect feedstocks.	Visual Inspection.	N/A	Wastes are accepted or rejected as necessary, in line with Duranta's Waste Acceptance Procedure. No waste shall leave the reception tanks until the waste has sufficiently satisfied the waste acceptance criteria. At no point is any reception tank utilised to feed the digestion system whilst it is being charged with material from a vehicular delivery. Staff trained on feedstock acceptance procedures. On a weekly basis, or as required, all tanks and pipework within the system will be inspected for leaks and checked to ensure all systems are working correctly.	Duty of Care Transfer Note.
Odour from tank containing slurry.	Maintenance Checks.	N/A	The tank containing slurry is filled via sealed connectors a transfer hose with a closed pump system, operating from the road tanker. The slurry filling	Maintenance Schedule.

WASTE RECEPTION				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
			station includes a malodour unit to treat the displaced headspace vapour. The connection points and malodour unit are checked weekly to ensure they are working effectively; the Operations and Maintenance Manager determines when the media requires replacement. Daily odour checks take place around the site boundary.	
Odour from externally stored green waste.	Visual Inspection.	N/A	Waste is not allowed to be stored on site for long periods of time. Green waste is deposited in the waste storage area, within an enclosed solids storage building. The solids waste charger is enclosed, except for the charging hopper that has an opening hatch which is required to be open during vessel charging but otherwise remains closed. The solid waste charger system will be inspected weekly to ensure that it is operating effectively and is sufficiently enclosed. Daily odour checks take place around the site.	Maintenance Schedule.
Delivery of highly odorous material.	Visual Inspection.	Present.	Reject load and inform waste supplier.	Duty of Care Transfer Note.

4.3 Pre-Treatment

Materials are delivered to the Duranta site without packing contamination, the pre-treatment phase is designed to blend the input materials together. After the delivery of wastes and their mixing in the relevant reception tanks, the tanks (four waste food tanks and two glycerol tanks) are monitored daily for:

- Dry matter content;
- pH;
- Chemical Oxygen Demand; and,
- Sulphate levels

No wastes leave the reception area until the tank tests have confirmed that material meets the waste acceptance criteria. The waste is passed through a 15mm chopper pump that ensures particles are the correct size to form a pumpable feedstock. Glycerol is pumped directly into the AD system as it does not require further refinement

Glycerol, and some other liquid feedstocks, can degrade quickly, which impacts fermentation. To achieve optimal fermentation conditions, feedstocks shall be continuously mixed directly into the digesters under controlled conditions.

All reception tanks contain a trap to collect solid sediment in the feedstock including stones, sharps and grit. During the time where materials in the tanks are being sampled and analysed, the solids settle out and are retained in the bottom 8% of the tank then are periodically removed from each tank. The off-take pipes in each tank are positioned at a level higher than this bottom 8% section, allowing feedstock to be removed from the tank without also extracting the heavier sediment.

PRE-TREATMENT				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Delay in pre-treatment of feedstock materials producing odours due to breakdown of equipment or operator error.	N/A	N/A	Air from reception building and from the storage tanks is directed through the biofilter situated next to the facilities building. Staff trained on feedstock acceptance procedures. Routine maintenance is undertaken on the equipment involved at the pre-treatment stage.	Staff training records. Maintenance Schedule.

4.4 Digestion Phase

The plant operates a two-stage digestion process. Three primary digesters (two with a capacity of 5,800m³ each, and working volumes of 5,400m³, and one with an operating level of 8,000 m³) are fed from material held in the reception tanks, separated feed systems connect the food waste tanks, glycerol tanks, and the solids feeder to the digesters.

The primary digesters operate in parallel, and Duranta can feed each digester independently of the other. The secondary digester, which has a working capacity of 4,800m³, is sequential to the primary digesters.

The delivery of feedstock to the digesters is carefully controlled by senior operators using the SCADA system, determining the waste input rate to comply with the fermenter 'recipe'. This controls the C/N ratio and the input rate of feedstock in order to manage biogas yield. Only Senior employees are able to control the feed input rate. The amount of feed from each feedstock source is determined in line with the loading rate calculations. These seek to maintain optimal conditions in the digester. The plant is able to recirculate material between digesters and from the secondary digesters back into the primary digesters. This helps the operators to blend fresh feedstock with existing substrates to optimise the digestion process.

Substrate is mixed in the digesters by rotating paddles, with recirculation cycles and gas bubble generation also providing a mixing effect. Mixing ensures the best distribution of feedstock within the digester. This prevents the formation of localised volatile fatty acids (VFA). The production of VFA can cause bubbling within the digesters and make conditions unstable,

subsequently causing a sudden and uncontrolled load of partially acidified material when the areas of low mixing become homogenised.

Biological desulphurisation means the removal of sulphur from biogas through microbial fixation. It occurs within the primary and secondary digesters and digestate storage tanks. A small amount of pure oxygen is fed into the primary and secondary digesters to facilitate microbiological oxidation. The biological desulphurisation will continue in the digestate storage tanks. As well as causing odour, elevated hydrogen sulphide levels can also cause damage to boilers. Achieving an optimal reduction in the concentrations of hydrogen sulphide (H₂S) in the biogas is of particular importance for this reason.

Biological desulphurisation occurs naturally when thiobacilli provide a microaerophilic surface on the digestate where sulphur can form by reacting with the oxygen. This fixes the sulphur from the hydrogen sulphide in the gas and remains in the digestate as S-fertiliser.

Depending on the conditions, including temperature, reaction time, the volume and location of oxygen added, the hydrogen sulphide concentration of the biogas can be reduced by up to 95%, less than 50 ppm. For the reaction to be carried out effectively, stoichiometric volumes of oxygen should be added to the biogas to balance the concentration of oxygen with hydrogen sulphide. This would be a concentration of no more than 1.0% oxygen in biogas, for typical hydrogen sulphide concentrations.

The digester tanks are stirred and heated for not less than 57 days. Green waste, slurry and food wastes can be fed as available and glycerol is fed continuously under controlled conditions. The temperatures of the digesters are maintained at around 40°C and designed to exclude air. This allows anaerobic digestion of the feedstock when a range of micro-organisms digest the waste, releasing a methane-rich gas (biogas) and producing a nutrient rich material (digestate).

Biogas is collected from the primary digesters, which is distributed to onsite CHP engines or to the gas grid via collection pipework. The substrate flows from the primary to the secondary digester where it continues to be processed and gas is collected until the substrate has reached a total residence time of no less than 57 days. The remaining substrate is pumped from the secondary digester into the subsequent pasteurisation phase. The entire digestion process is enclosed, with no release point to the atmosphere, meaning no emissions should be released during this process.

DIGESTION				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Poor digestion resulting in odour.	Process monitoring.	OLR (4.5 – 6.5 kg VS/M3/Day) Temperature (38.5 °C - 42°C) FOS / TAC ratio (0.3 – 0.55) pH (7.8-8.1)	The entire digestion process is enclosed. Balancing and feedstock control is carried out to maintain the feedstock quality added to the digester. The SCADA system is programmed by Duranta's operatives to manage the 'recipe' for the different summer and winter balanced loads.	SCADA

DIGESTION				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
		Ammonia (c.4,500 mg/l) Dry solids (4.5-6%) ORP/REDOX (<-350)	The SCADA systems controls are utilised to keep the fermentation conditions in the digester optimal in order to efficiently treat waste, producing a consistent supply of high-quality biogas. The digestate is regularly sampled and tested. The process is observed daily to ensure it is operating at optimal performance and maintaining optimal conditions. The concentration of air in the biogas is monitored frequently. The sulphur/air ratio is reviewed weekly, or more frequently as required, to determine the optimum rate of sulphur fixation from biological desulphurisation in the tanks.	
Gas engines and flare fails resulting in bio-gas venting through over pressure valves at top of digester.	Maintenance inspections	N/A	Maintenance schedule of engines and flare as per manufacturers guidelines, investigation of all alarms on gas engines and flare and follow up repair. Over pressure alarms are categorised as Level 1. Minimise gas production rate by reducing feed rates if any equipment is unavailable.	Maintenance Schedule
Leaks from tanks.	Maintenance inspections	N/A	Inspection and maintenance of tanks and membrane roofs consisting of regular testing of tanks, particularly around break in points and membrane / tank seals, for biogas leaks.	Maintenance Schedule

4.5 Pasteurisation

The material is then transferred to one of the four pasteurisation tanks, designed to meet the PAS110 standard and ABP regulations by achieving a minimum of 70°C for 1 hour and produce digestate with a particle size of less than 8mm.

Feed into the tanks is controlled by the SCADA system, the substrate passes through a 12mm chopper pump and is periodically subject to sieve tests. On passing through the chopper pump, the material enters one of the four pasteurisation tanks that retain the digestate for a minimum of 1 hour at 70°C, this must be confirmed before the pasteurisation can be considered complete. The temperature is monitored by three probes, which are calibrated annually.

The pasteurisers are heated by the onsite CHP engines. The plant has four CHP engines and the digestion plant only requires one engine to operate. This provides an adequate level of redundancy if an engine fails.

The pasteuriser tanks work on a positive release system and the material will not be released into the final digestion storage stage until such time that it has met the residence time and temperature criteria. In the event that a tank perpetually misses the required standard (e.g. due to an equipment fault), then Duranta have the option to evacuate digestate from the affected pasteuriser to enable it to be recirculated through the system or disposed of.

PASTEURISATION				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Odour from incomplete pasteurisation process.	Process monitoring.	70°C for 1 hour. <12mm.	The SCADA system is utilised to keep the conditions in the pasteuriser optimal in order to efficiently treat waste and produce a consistent supply of high-quality digestate which is regularly sampled to ensure all standards are maintained. The pasteurisation process is fully enclosed, with no emission release from this process stage. Prior to pasteurisation, material passes through a 12mm Vogelsang chopper pump with integral stone trap before subsequently passing through an 8mm Vogelsang chopper pump to ensure material is optimal size for full sanitisation.	SCADA Daily Check Sheet
Leaks from tanks.	Maintenance inspections.	N/A	Inspection and maintenance of tanks and roofs consisting of regular inspections, particularly around break in points and tank seals, looking for biogas leaks.	Maintenance Schedule

4.6 Digestate Storage

Following completion of pasteurisation, digestate is stored in one of two storage tanks prior to its removal offsite for application to agricultural land. One tank has an 8,150m³ storage capacity, and the other has a 6,709m³ storage capacity. The digestate is pumped through a fully sealed system directly into the storage tanks as spare capacity allows. Both digestate storage tanks are equipped with pressurised membrane roofs, enabling pressure changes due to fluctuations in the biogas volume.

The biogas in the digestate tanks also benefits from biological desulphurisation when in contact with the digestate, this reduces the odour generated from hydrogen sulphide.

DIGESTATE STORAGE				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Odour concentration inside digestate storage tanks.	Process monitoring	N/A	The digestate storage tanks are sealed and has a membrane roof to allow for fluctuations in the volume of biogas. The concentration of oxygen in the biogas is monitored frequently. The sulphur/oxygen ratio is recorded every hour and a half and monitored frequently to determine the optimum rate of sulphur fixation from biological desulphurisation in the tanks.	SCADA
Leaks from tank.	Maintenance inspections.	N/A	Inspection and maintenance of the tank and membrane roof consisting of regular testing of the tank, particularly around break in points and membrane / tank seals, for biogas leaks.	Maintenance Schedule.

4.7 Digestate Loading

When digestate is ready to be removed from site for application to agricultural land, the digestate is removed by vehicular tanker. The tankers connect to the digestate storage tanks via a flexible hose which is fitted with a snap link to guard against breakages and reduce the likelihood of significant spills and/or odour emissions.

Duranta undertake testing of batches of the digestate prior to it being removed from the site, this ensure that it meets PAS110 standard.

DIGESTATE LOADING				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Displaced air from tanker during loading.	N/A	N/A	Odour abatement from tanker. Filters have routine change out schedules. A digestate offtake carbon vessel designed for this purpose is used.	Dispatch records.

4.8 Biogas Generation

Biogas produced by the process is collected via pipework which is attached to each primary and secondary digester tank. The biogas then flows to the onsite gas cooling system where it is conditioned and then boosted before being sent to the CHP engines where it is combusted to produce renewable power and heat for various uses around the plant. Biogas is also upgraded to biomethane and injected into the gas transmission grid via either the Air Liquide plant on site, or a second grid entry unit connected to the site's second biogas upgrading facility.

4.9 CHP Engine Exhaust and Flare 1

The exhaust stack from the CHP engine is 28m high, this provides adequate dispersion for any odours that could be present in the exhaust fumes. If CHPs are offline or there is another failure

on the plant affecting the process and the biogas pressure increases, the gas flare will automatically burn the excess gas until a point when the pressure drops below a set level. The gas flare is intended to be a last resort and is designed to protect the plant rather than to run regularly.

Gas cleaning to remove sulphur and condensate takes place upstream of the engines and flare. Gas is compressed in one of three gas compressors (two in use & one on standby). A chiller and filter system cleans the gas by removing, water, condensate and other contaminants.

The four GE Jenbacher CHP engines (three 1.487MWe engines and one x 637kWe) on site have a total generating capacity of 5.098MWe. The parasitic load is between 8% and 10% of electrical output only (maximum 0.50MWe). The engines are operated and maintained as per the manufacturer's guidelines. Maintenance schedule of engines as per manufacturers guidelines, investigation of all alarms on gas engines and follow up repair. Monitoring of biogas composition is undertaken via the site's SCADA system and a separate handheld monitor.

CHP & FLARE 1				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Combustion gases causing odour.	Process monitoring.	N/A.	Gas cleaning to remove sulphur and condensate prior to combustion.	SCADA.
Breakdown of CHP causing flaring.	Maintenance.	N/A.	Inspection and maintenance of CHP engines as per manufacturers recommendations.	Maintenance Schedule.

4.10 Second Biogas Upgrading Facility and Flare 2

The site is equipped with a second biogas upgrading facility (Biogas Upgrading Plant 2) and grid entry unit, located near the northern boundary of the site. The site's second gas flare is capable of burning both biogas and biomethane and is deployed in instances where excess gas is produced.

BIOGAS UPGRADING PLANT 2 & FLARE 2				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Emissions to atmosphere of gases from biogas upgrading process	Process monitoring.	N/A.	Gases removed and vented to atmosphere during the biogas upgrading process.	SCADA.
Breakdown/unusual operation of biogas upgrading unit leading to inefficient treatment of biogas.	Process monitoring and maintenance.	N/A.	Inbuilt inline sensors, monitoring devices and shut off valves. Leak Detection and Repair (LDAR) system in place. Regular sniff test monitoring by site operatives as part of site checks	Maintenance Schedule. LDAR System Records. Site Inspection Records.

BIOGAS UPGRADING PLANT 2 & FLARE 2				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Loss of containment of propane or gas odorant.	Maintenance and process monitoring	N/A.	Inspection and maintenance of propane and/or gas odorant containment systems. Emergency procedure in place for dealing with leaks/spillages from odorant containment.	SCADA Maintenance Schedule and Emergency Procedures.

4.11 Site Infrastructure

The anaerobic digestion facility has infrastructure to control emissions from site at various stages of the process, namely surface water management, air from reception hall and process units.

4.11.1 Odour Abatement Systems

The facility is equipped with a number of odour abatement technologies to limit odour generation and the subsequent impact of odour in the surrounding area. Abatement included at the site is can be summarised as follows, but is discussed in greater detail in section 5.0 below:

- Biofilter which channels emissions from the reception hall and reception tanks.
- Digestate offtake carbon filter.
- A carbon filter vessel serving the external ABP reception tank.
- Gas cleaning system for CHP engines.
- CO₂ vent to atmosphere for Biogas Upgrading Plant 2.

Site Infrastructure => Abatement System				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Biofilter not in optimal moisture content.	Air humidity within plenum chamber.	>45% <65%	Air entering the biofilter is constantly measured for humidity to ensure that the correct moisture content is delivered to the biofilter. This ensures it is kept consistently within operation critical limits and is backed up with regular visual inspections of the media for clefts, cracks and lumps to ensure humidity critical limits are still appropriate. In case of overly dry filter material, longer spraying of the filter layer from the top with sprinkler system is implemented.	Process Computer Records.

Site Infrastructure => Abatement System				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Biofilter not in optimal temperature range for performance.	Temperature Monitoring.	>22°C for more than 48hrs <operating temperature	Elevated temperature readings indicate that biodegradation of biofilter media is occurring. Should temperature become elevated above critical limits, water will be added to the biofilter media. The media will also be inspected and replaced if required, as soon as reasonably practicable.	Biofilter Daily Check Sheet.
Biofilter degraded closing structure preventing airflow through biofilter.	Back pressure at inlet to biofilter.	>10 mbar	Should backpressures be elevated above critical limits then the biofilter media will be inspected and replaced as appropriate with clean media as soon as practicably possible.	Biofilter Daily Check Sheet.
Growth of plants on biofilter leading to inefficient use of the biofilter.	Daily inspection for weed growth on biofilter.	Weeds present.	If weeds are present, they have to be removed manually with the entire root.	Biofilter Daily Check Sheet.
Digestate offtake carbon filter not working correctly.	Odour level checks.	Detection of odour around the vessel.	Stop digestate collections and empty old carbon media from vessel, replace with fresh carbon stored on site and recommission.	Odour Check Sheet.
Slurry tank carbon filter vessel	Odour checks with VOC detector.	Rising trend of detectible VOC's from outlet.	Stop slurry tank deliveries and empty old carbon media from vessel, replace with fresh carbon stored on site and recommission.	Odour Check Sheet.
Gas cleaning system for CHP.	Monitoring via SCADA system.	Rising sulphur ppm's on the clean side of the carbon filters.	Arrange for replacement of carbon media within both vessels by an external contractor. Vessels refreshed one at a time so at no point will there be no filtration.	Daily via SCADA.
CO ₂ vent for biogas upgrading	Odour level checks	Emission of gases deemed to be odorous through the CO ₂ vent.	Valve shut off to prevent further release of odour. Inline sensors and monitoring devices provide real-time data on the effectiveness of venting systems.	Daily via SCADA.

4.11.2 Performance Monitoring

The performance of the odour abatement systems employed on the site shall be monitored as per the schedule listed in the table below.

Location	Test Frequency	Test Type	Comments
Biofilter	Annually (unless off site odours are detected)	Olfactometric testing	Input sample point reference xxxx. Exit sample point reference xxxx. Calculation of abatement performance.
	Daily	Site sensory check	Noted on Site Inspection Records daily.
	Weekly	Moisture check of biofilter media	Noted on Site Inspection Records daily.
	Monthly	pH check of leachate	Noted on Site Inspection Records daily.
BE8 Carbon filter vessel	Daily	Site sensory check	Noted on Site Inspection Records daily.
Gas cleaning carbon pack	Continuous monitoring via SCADA	Gas analysis	H ₂ S levels in the biogas will indicate the performance of the carbon pack.
Biogas upgrade plant 1	Daily	Site sensory check	Noted on Site Inspection Records daily.
Biomethane injection plant 1	Daily	Site sensory check	Noted on Site Inspection Records daily.
Biogas upgrade plant 2	Daily	Site sensory check	Noted on Site Inspection Records daily.
Biomethane injection plant 2	Daily	Site sensory check	Noted on Site Inspection Records daily.

4.11.3 Integral Drainage System

The site has been built with an engineered fall which ensures that all surface water falling on the site will be directed to the South of site. There is a sump at the Southern corner which captures all surface water. The sump is fitted with 1 standard pump to remove water from the sump under normal conditions, and three large contingency pumps which have been installed to deal with situations such as an excessive rainfall event, or a tank breach. From this sump, water is pumped to the surface water storage tank (8,000m³) in the northern portion of the site. When the operator wishes to discharge water from the water storage tank due to the water reaching a certain level, they will conduct a Dissolved Oxygen test, record the results and then discharge into the sewer if it is within tolerance.

Surface water arising in the extended site area is collected in a new surface water attenuation tank. The collected water is then pumped into the existing surface water drainage system and managed in accordance with the process described above.

Duranta's sewage requirements are managed via a septic tank which is pumped into a collection tank at set intervals and then discharges into the sewer system. When required the septic tank is cleaned out by a licensed contractor to ensure functionality is maintained. In case of small-scale leaks (e.g. from a pump, a separate contained drainage system is in place around the main pump room and tanker connection points. Any liquid captured within this system is directed to the external ABP reception tank where it can be pumped back into the process.

Site Infrastructure => <u>Drainage System</u>				
Potential Odour Issue	Monitoring	Critical Limits	Process Controls	Records
Blocking of drains leading to pooling of leachate on concrete surfacing.	Visual Assessment.	Particulate blockages.	Daily site inspections are made to ensure that no drains are blocked by loose material. Where identified, material is swept up immediately and re-processed as soon as practicably possible.	Daily Check Sheet.

4.12 Process Conditions

Process conditions shall be continuously monitored. Key process indicators have been identified and the process conditions shall be maintained to meet these indicators. The conditions of the process are monitored by the SCADA system, linked to Process Logic Controllers (PLC) as necessary. Where applicable, aspects of operation are automated, to reduce the risk of breakdowns or process upsets caused by human error.

In the event that an alarm is raised, the operator will take the necessary action defined by the operating procedures to return the process back to the correct conditions. See Accident Management Plan for a summary of these procedures (DUR-C01).

4.13 Site Management System

The Duranta Teesside Management System includes details of maintenance and housekeeping schedules. Housekeeping and cleaning schedules ensure that organic material does not adhere or aggregate in any areas of the site which would produce an odour. The Management System includes within it the maintenance and inspection schedules for the odour abatement systems installed around site.

4.14 General Control Measures

To effectively control odours, emphasis is placed on using well designed systems to prevent initial odour production before resorting to technology to remove the odour. Process-based controls are usually cheaper and more effective than secondary abatement technology.

The plant was designed based on a similar existing AD plant in Europe. The plant is operated according to the manufacturer's instructions, including the frequency of maintenance. Deviations from the manufacture's recommendations can only be approved by the Operations and Maintenance Manager after a review has taken place.

Duranta shall ensure that there is the required number of qualified staff on site prior to the waste acceptance and rejection procedures. Personnel shall ensure that the site has capacity to store and treat any incoming waste. Personnel shall ensure that the site will not exceed Permit conditions when accepting any incoming wastes.

Operators will be trained to a high standard to ensure that the process is managed effectively to prevent and reduce odours and to avoid the risk of odour becoming a significant nuisance.

Equipment and operations shall be reviewed annually or more frequently if appropriate to identify any issues with odour management and to determine if any aspects of the plant or operation could be improved to further reduce odour.

4.15 Active Odour Management

The effectiveness of the measures outlined in this OMP are monitored using subjective odour monitoring in the form of sniff testing. The Operations and Maintenance Manager will ensure that daily sniff tests are carried out around the site to establish whether any odours are discernible. Locations for testing are stated on the odour report form. The results of the sniff testing are recorded in the daily check sheets and records are kept for inspection.

The checks above are made in line with on-site olfactory monitoring with reference to the protocol in Appendix 1 of the H4 Technical Guidance Note, with the Daily Check Sheet being completed to record results. The odour assessor may not be subject to significant waste treatment odour in the 30 minutes prior to the assessment. This is to ensure that the assessor is not suffering from odour fatigue and will be sensitive to waste odours. An appropriate time to do this may therefore be at the start of the day.

Persons carrying out odour monitoring will be trained in this procedure.

All site personnel will be responsible for reporting any odour problems immediately to the Operations and Maintenance Manager or the next level of management if the Operations and Maintenance Manager is not available as per section 8.4.3.

The Operations and Maintenance Manager will be informed immediately of any findings of odour attributed to the site and will authorise remedial measures to be taken.

Any odours found to be present onsite will be recorded and their source investigated. Steps will be taken to mitigate the sources of odours using the strategies to control odour as outlined above. This internal monitoring procedure, including a survey of odour reports will be re-assessed on a yearly basis, unless the number of odour incidents warrants additional reviews.

4.16 Passive Odour Management

The site will be kept clean and tidy in all areas. Site cleanliness activities will be undertaken daily and recorded on the Daily Check Sheet. Cleanliness activities include the following:

- Daily offtake of digestate via tanker
- Removal of all wind-blown litter are interior perimeter walls/underneath pipework daily.
- Regular inspection of the site's drainage system on a daily basis to ensure its efficient operation at all times, and,
- Regular offtake of spent carbon filter media.

In the unlikely event that a spillage occurs it is cleaned up immediately and recorded in the Daily Check Sheet. Through undertaking recognised best practice, any opportunities for odour generation from the site will be minimised.

4.17 Housekeeping

The Duranta Internal Management System includes details of maintenance and housekeeping schedules. Housekeeping and cleaning schedules ensure that organic material does not adhere or aggregate in any areas of the site which would then produce an odour. For example, the reception building shall be cleaned in line with the cleaning schedule to prevent odour and/or attraction of pests. The Management System includes within it the maintenance and inspection schedules for the negative aeration system, biofilter and other abatement systems.

4.18 Contingency Planning

In the event that odour is proven to be from the site and found to be causing a problem, as determined by the investigation of off-site complaints or during routine on-site monitoring, action will be taken to determine the source and the following courses of action will be taken.

It is deemed unlikely that the proposed wastes will be malodorous to such a degree that any particular waste cannot be accepted. However, if a particularly malodorous waste stream arrives on site, it will be quarantined and sent for off-site disposal as soon as practical and in any case no longer than 24 hours. The acceptance of the specific waste type will be put on hold pending further investigations.

5.0 EVAPORATION

Evaporation from waste processing activities is unlikely to be significant given any liquids are fully enclosed throughout the system, and the material that is not always enclosed is solid e.g. green waste and not stored for long periods of time. The system is regularly investigated to ensure no leaks are present which could lead to excess evaporation.

The site drainage system will transfer any surface water to the attenuation tank and sump and subsequent water storage tank for removal from site. Both the water attenuation tank and the water storage tank are enclosed so the risk of evaporation is seen to be minimal.

6.0 CONTAINMENT AND ABATEMENT

The system is sealed as much as practicable. The only points in the system open to the environment and not entirely sealed are the waste inputs and material outputs. These points are only open to the environment for the minimum time required for offloading and loading. Plant and equipment are enclosed and fitted with odour abatement systems as far as possible.

6.1 Air Transfer

The Reception Building is managed by operators to ensure that the roller shutter door and pedestrian access doors are only open only when necessary and are not left open after access has been made. This ensures that the reception building is enclosed as much as possible to limit the escape of malodours. Upon delivery, the doors will open to allow the delivery vehicles access to the reception facility, the doors will then be closed during offloading of waste materials.

The air in the Reception Building is extracted by an air handling ventilation system. This air is treated and can then be released with minimal odour. The air extraction rate is variable up to 3 air changes per hour. The air passes through a biofilter containing woodchip and volcanic rock in separate chambers.

At the slurry tank, vehicle tankers use their on-board pumps to discharge waste. The system used for the offloading process is fully enclosed from the tanker to the storage silos. The slurry silo also receives leachate via a pit situated underground next to the solid feeding system. The pit captures any spillage from the filling station which is then pumped into the slurry tank.

On site odour abatement systems should operate continuously except for maintenance and/or breakdown. If any part of the odour abatement systems fails or displays poor performance, no deliveries will be taken until the system returned to full working order and to designed performance levels.

6.2 Biofilter

The Biofilter is comprised of an 80m³ system with three separate chambers for air to pass through. Two of the chambers incorporate treated woodchip and the third contains volcanic rock media to filter odorous air. The filter media provides a long residence time to remove particulates, droplets, potentially odorous compounds and helps to break down substances biologically that may have otherwise produced potentially odorous releases.

The Biofilter shall be inspected weekly, or more frequently as required, to:

- Prevent breakthrough or tracking in the media;
- Ensure material is properly conditioned (correct moisture content) and,
- Prevent loss of degradation of filter media.

Enzymes are periodically added to the biofilter media to assist with the breakdown of potentially odorous releases.

6.3 Carbon Filters

Adsorption is a heterogeneous reaction in which gas molecules are retained on a solid surface which prefers specific compounds to others, they are therefore able to remove specific compounds from the gas stream.

Granular activated carbon (GAC) is the most common adsorbent with a wide efficiency range and not restricted to polar or non-polar compounds and can be impregnated with oxidants such as potassium permanganate or with sulphur compounds, thereby improving retention of heavy metals.

Carbon filters are installed to treat the air from the slurry tank, the gas prior to the CHP engines and the road tanker barrel pressure vent when loading at the digestate offtake point, treating any potential odours. The filters are maintained following manufacturer's guidance and continuous monitoring occurs to determine the performance of the carbon filters.

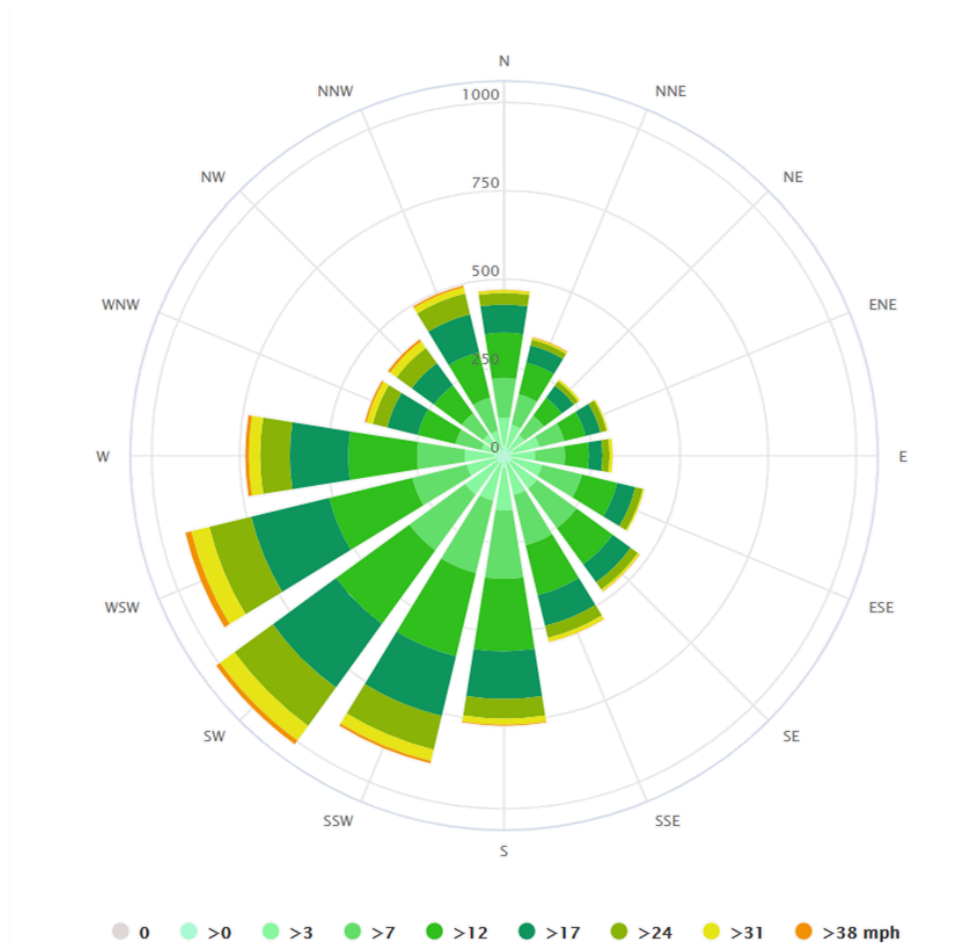
6.4 CO₂ vent for Biogas Upgrading Plant 2

Odour attenuation is achieved through the treatment of biogas in the biogas upgrading unit, to remove Hydrogen Sulphide and other VOCs prior to emission to atmosphere. Controls for gas release out of the CO₂ vent are inbuilt into the upgrading unit through inline sensors, monitoring devices and shut off valves. Sniff test monitoring and LDAR will provide additional checks to ensure optimal performance at all times.

7.0 DISPERSION

The following section identifies the prevailing weather conditions onsite, particularly the wind strength and direction, in order to predict the path of the likely aerial dispersion of odours generated onsite.

The wind data for Middlesbrough has been collated over the last 30 years (Meteoblue weather data). The data is illustrated in Figure 2, showing the prevailing wind direction is towards the south west.



Site operatives utilise an online weather report and a weather station installed on site for recording weather conditions as required on monitoring forms. The weather information will identify at least wind strength and direction, temperature and atmospheric pressure.

8.0 SENSITIVE RECEPTORS

There are potential sensitive receptors within 250 metres of the facility. The site is located within Riverside Park Industrial Estate, Middlesbrough. The site is surrounded by industrial and commercial buildings, there are also potential residential sensitive receptors, (>550m). The closest known residential building is approximately 860m South of the centre of the Duranta site, on Beaufort Street. There is a Site of Special Scientific (SSSI) Interest 555m from the site, the River Tees. The Duranta Site is located within a bend of the River Tees so the river is to the west, north and east of the site. Table 3 details the sensitive receptors within 250 metres of the site.

Table 3 - Distance to Nearest Identified Sensitive Receptors

Reference	Receptor	Distance
1	Harwood Court Depot	100m (NE)
2	Cobra Middlesbrough/ Middlesbrough Goods Yard	135m(SE)
3	Oak Road Motor Factors	205m (SE)
4	Unknown industrial use	55m (SW)
5	Unknown warehouses	90m (NW)
6	Galliford Ty Street Lighting	200m (SE)
7	Tees Riverside Intermodal Park	50m (N)
8	AV Dawson	185m (N)
9	NPSM	165m (N)
10	Hanson Cement	250m (SW)
11	Parson & Crosland	135m (SW)



Figure 3 - Map of sensitive receptors within ~250m from site.

8.1 Dispersal Control

There are a number of sensitive receptors within close proximity of the site, the closest being <100m away. The sensitive receptors surround the site, however most receptors within 500m of the site are also industrial sites. Given the dedicated odour controls and operational procedures, no additional restrictions will be implemented based upon wind direction and/or strength. Should a revision of the OMP identify that this should be implemented than an investigation into appropriate controls will be made and documented.

8.2 Community Engagement

Duranta strive to educate the local community through the use of site tours both for schools and local resident groups. The Environment Agency are advised of any operation being undertaken that may temporarily increase odour generation.

If an action is being considered that may cause temporary odour, outside of the normal operational procedures identified previously, then before such action is taken the Operations and Maintenance Manager will be informed. The EA and neighbours who may be affected will be contacted to advise them of the operation being undertaken and notified that any increase in odour will be of a temporary nature.

The site shall provide, where required, a phone number that will be used as an appropriate route for complaints to be received and recorded. All complaints will be recorded and actioned in accordance with the complaints procedure (section 8.4).

All complaints are recorded and actioned in accordance to the complaints procedure. Feedback is given to any complainants on the findings of odour investigations when/if they are known. A summary is provided of any remedial measures taken to rectify odour problems and ensure that the problem has been suitably resolved.

8.3 Responsibilities

The overall responsibility for the site shall remain with the Company's Managing Director. Day to day operational responsibility for the site, implementing this Odour Management Plan and ensuring that training in odour assessment is provided to staff carrying out the assessments is maintained by the site's competent persons or COTC holders (Certificate of Technical Competence holders), in this case the Operations and Maintenance Manager. The Operations and Maintenance Manager is also responsible for ensuring all staff and (if applicable) Contractors are aware of their obligations under this plan.

In the event of an odour incident, the odour management plan will come into force, following the emergency response which will initially deal with the incident, the causes and consequences of the incident, and then look to mitigate any potential odour issues which may have resulted from the incident.

8.4 Procedures when Odours Arise

There is an external complaints procedure to ensure any odour issues are dealt with quickly and effectively.

8.4.1 External Complaints Procedure

Any complaints relating to the odour of the site will be taken seriously and channelled through a senior member of staff, in this case the Operations and Maintenance Manager. Staff taking note of the complaint will use the appropriate Incident Report Form. Once the complaint is taken, the Operations and Maintenance Manager will investigate the complaint and the site activities and respond to the complainant in writing outlining any findings and actions taken to mitigate the source of odours.

All complaints will be fully investigated within 24 hours of receipt of a complaint during the working week. The follow up actions and any remedial works required will be agreed in an action plan, including timescales, with the EA. The action plan, if required, will be submitted to the EA within 24 hours of the complaint being received. Upon identification of the source of the odour issue, the activity that has been identified as causing the odour release is immediately stopped, whilst the action plan is approved and implemented.

The complaints procedure, including a survey of the complaints made in each year will be assessed by the Operations and Maintenance Manager on an annual basis, unless the number of complaints warrants additional reviews.

8.4.2 Response to Complaints

The receipt of a single odour complaint during normal AD operations is treated as an exceedance of control levels. The primary response will be as detailed in accordance with the site's complaints procedure. An investigation shall be initiated into the cause of the complaint; this will involve as necessary:

- An olfactory survey as outlined below;
- An examination of the site activities at the time of the complaint;
- An examination of the meteorological conditions at the time of the complaint; and
- A review of the effectiveness of operational and odour control procedures.

If the complaint is validated, it will be treated as an exceedance of the control level. The outcome of the investigation will determine the corrective actions to be implemented.

8.4.3 Detection of Distinct Odour during Olfactory Survey

Detection of a "distinct odour" or stronger (3-6 on odour scale,) will initiate a more extensive olfactory survey to determine the extent of the odour plume. The Operations and Maintenance Manager will be notified immediately, and the survey will continue to attempt to determine the scope and extent of the odour plume, as follows:

- A suitable location downwind of the site at which the odour plume is unlikely to extend will be selected for assessment;
- Survey will continue toward the AD facility until an AD associated odour is perceived; and
- Assessment points perpendicular to the plume axis and equidistant from the AD site will then be monitored, subject to access requirements.

An investigation will be initiated into the cause of the odour. This shall involve as necessary:

- A review of the site activities at site and other nearby potential sources at the time of the olfactory survey;
- A review of the meteorological conditions at the time of the olfactory survey; and
- A review of the effectiveness of process operations and odour control procedures.

The investigation will be carried out and an action plan written for dealing with the elevated odour. The action plan will be submitted to the EA for approval prior to implementation within 24 hours of the original odour survey.

8.4.4 Corrective Actions

The outcome of an investigation will determine the corrective actions to be implemented, they will consider, but not be limited to:

- Alteration to waste reception procedures and odour control measures employed;
- Effectiveness of the fan ventilation system
- Review of digestate loading techniques;
- Review of AD process monitoring results;
- Update of OMP if new procedures are created;
- Consider removal from site of material responsible for unacceptable offsite impacts;
- Consider ceasing the reception of further material on site until issue resolved; and
- Activities that are necessary to bring the process back under control shall not be suspended without detailed consideration of risks.

The exact corrective action to be implemented and timescale for implementation will be detailed in an action plan submitted to the EA for approval.

8.4.5 Reporting

Exceedance of the offsite odour control level will be investigated (as described above) and recorded in accordance with current procedures. This includes recording the following:

- Nature of the incident;
- Date of occurrence/s;
- Results of the investigation;
- Details of responses/ action plans implemented; and
- The event will be marked within the site's incident log.

The report will be made available to the Environment Agency upon request.

8.4.6 Review of Control Mechanisms.

A full review of the Odour Management Plan, taking note of all the internal odour report forms and external complaints will be made on a yearly basis, or as necessary after an odour incident in order to assess the site's operational procedure and odour control management plan. Findings from the review will then be incorporated into an updated plan which will replace this document.

9.0 INCIDENTS AND EMERGENCIES

In accordance with the requirements of Environment Agency's Technical Guidance Note H4, types of failure or abnormal events considered to have the potential to result in an odour impact have been considered. These have been identified as abnormal meteorological conditions and failure of aspects of the AD process during any of the process stages previously described. Failure and abnormal event scenarios with response requirements are summarised below. The Operations and Maintenance Manager will be responsible for enacting the emergency responses outlined within this section.

9.1 Machinery Breakdown

The plant has been designed so that short term (hours) equipment failures do not substantially impact on anaerobic digestion or biogas generation. The failure of pumps, motors, valves and pipe blockages, may have a more significant impact on the AD process and the conditions are more likely to run outside the optimum conditions. A breakdown of equipment may result in a delay in processing the material received or the processing of air. The magnitude of impacts will depend on the length of the breakdown, the type and volume of waste received and the prevailing meteorological conditions but, could potentially result in elevated odour concentrations at receptor locations.

Duranta has 3 compressors (2 duty, 1 standby) and 4 gas engines in the CHP Energy Compound, this reduces the likelihood of complete failure as there are backup engines and compressors. If there is a compressor or engine failure, gas may be vented via one of the two gas flares located onsite. During long-term or complete failure, gas may be retained within the accumulator roofs of the post-fermenter and the digestate storage tanks for short periods of time (2-3 hours), after which gas can be flared, venting the gas will only occur as a last resort.

In the event of loss of gas pressure, the gas fired engines will automatically shut down. The gas engines will restart once the pressure has reached the normal minimum of 1mbar (normal operation range: 1-5mbar).

In the event of equipment failure, the operator shall notify the Operations and Maintenance Manager immediately and take the required actions as outlined in the operating procedures to try and rectify the process conditions. If there is an ongoing failure (lasting over 24 hours), action will be taken to slow the AD process by reducing feedstock inputs to limit the biogas generation.

If a leak is detected in the system, the operator shall, where safe, attempt to stem or isolate the leak to limit further damage and reduce the risk of odour emissions. The equipment causing the leak shall then be replaced or repaired. Key equipment is located within a sealed and bunded area to prevent the loss of material and escape of odour due to leaks.

A potential failure would be minimised through routine maintenance of equipment, servicing in accordance with manufacturers guidelines, provision of adequate spares, and a service level agreement to replace plant (or source hire equipment) as required.

9.2 Staff Absence

Short-term staff shortages (such as a few days illness) will not affect the ability of the site to operate effectively as other staff members can be reassigned to critical operations. The magnitude of impacts will depend on the length of the absence, the number of staff absent at any one time and the seniority of the staff member, but could potentially result in elevated

odour concentrations at receptor locations, should process controls not be managed effectively.

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. If widespread illness occurs amongst staff members (such as COVID-19), the delivery of waste to the site will be suspended until sufficient staff are present to operate the site. If prolonged or widespread absence occurs, the operators would contact alternative operators, such as other AD site operators, for emergency assistance.

9.3 Flooding

If the site becomes flooded, this will inhibit effective control over deliveries of feedstock material. The site is located in flood zone one, so the probability of flooding is low. The site ground level was also raised as part of the initial build process further reducing the risk of flooding.

In a flooding situation, no further waste would be able to access the site and priority would be given to ensuring the on-going effective processing of waste. Where waste is saturated with floodwaters, the Operations and Maintenance Manager will make an assessment if the waste can be processed through the facility, or if the waste needs to be disposed of from site to a suitably licensed waste management facility.

9.4 Fire

Fires are possible at the AD site given that gas is generated on site; equally it could be as a result of accident or mechanical failures, arson or lightning strike. With all fires the immediate response shall be the responsibility of the fire brigade and odour would not be the primary concern.

Depending on the severity of the fire, site critical equipment may have been damaged and no further reception or processing of material would be undertaken until agreed with the EA. If equipment will be inoperable for extended periods of time, consideration will be given to the removal of material from site until repairs are effectuated.

9.5 Adverse Meteorological Conditions

The plant is robust and designed to withstand weather, however extreme weather events including extreme temperature, wind, rainfall etc. could affect the operations of the AD plant and therefore the process conditions. The forecasted weather will be reviewed daily to help determine if any action is required to ensure the process remains in operation.

The plant would be able to operate with a degree of flooding, however if serious flooding were to occur, the operational manager will decide whether the AD process must be temporarily slowed or stopped.

9.5.1 Snow/Ice

Sever cold weather may result in disruption to waste deliveries and removal of materials from site. Disruption to deliveries may result in waste delivered to site that has been stored at the point of production for longer than anticipated. Likewise, waste may need to be stored on site

longer than anticipated. Inability to remove waste from site will coincide with inability to deliver waste to site, therefore material quantities on site should remain the same.

9.5.2 Hot Weather

Warmer temperatures have a greater potential to generate odour, therefore an increase in air temperature may result in increased odour resulting from incoming and stored wastes. The majority of the process however is contained, so this risk is seen to be minimal. The air abatement system is connected to a biofilter which will also assist in the processing of odours.

9.6 Site at Full Capacity

At the time of writing, the site is currently operating below the permitted capacity. There is the potential that should new third-party contracts be won for processing wastes, the site will be operating closer to full capacity, which could lead to stretching of the site's resources during busy periods. The site could generate odours during this period if material is not processed as soon as is required within the process controls. The same mitigation measures apply to the overall annual throughput as for individual process stages.

The site will not accept more waste that it can process effectively at any one time and not above the permitted tonnage per annum.

In the event that the site reaches its maximum capacity, the Operations and Maintenance Manager will divert any further incoming waste from the site to neighbouring facilities able to process the same types of waste. This will continue until such a time when the site can resume operations within its normal operating capacity.

9.6.1 Delivery of Large Feedstock Volumes

Reception tanks are sized to cope with the delivery of a large volume of feedstock over a short period of time. Maximum tonnages that can be accepted are defined. In the event of an over-delivery, Duranta retain the right to decline and return the delivery. Delivery vehicles will usually be sealed tankers or covered vehicles, preventing or reducing the likelihood of emission of odour if vehicles are waiting on site to deliver.

9.7 Odour Accident Management Plan

Procedures are in place, as identified in Table 4, below, for the management of odour incidents. The identified incidents, potential for occurrence and anticipated consequences have been discussed. A set of actions to be taken in order of priority is presented and will be carried out by the site operatives and management.

Table 4 - Odour Incident Management Plan

Incident Type	Potential Occurrence	Consequences	Actions
Plant or Equipment failure	Seldom. Stringent preventative maintenance procedures in place	If waste is not processed for a long period, compaction reduces the available oxygen	- Inform management. - Establish time frame for repairs to be undertaken. - Hire or source an alternative piece of equipment.

Incident Type	Potential Occurrence	Consequences	Actions
	to ensure all machinery remains functioning.	which could lead to odours once the machinery is fixed.	• If no replacements are available divert waste to another site. • If diversion is not available cease accepting waste. • Inform the EA if necessary. • Record and review the incident.
Fire - contaminated water and polluting smoke	Extremely rare.	• Potentially polluting liquids flowing onto impermeable surface where they have the potential to generate odours. • Polluting smoke. • Wind dispersal of pollutants.	• Raise alarm on-site. • Ensure personnel evacuated and accounted for from danger area. • Ensure all staff are alerted. • Call fire service and other emergency services as required. • Inform site management. • Inform the EA. • Post member of staff at entrance to site to direct emergency services. • Liaise and follow instructions of emergency team making them aware of any hazards on-site. • Consult site register for COSHH if appropriate. • Prevent fire waters causing pollution on-site. • Excess water should be removed from site to prevent odours. • Record and review incident.



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