Goddards Green STC
Odour Management Plan
790101_ERA_OdourMP_GOD

December 2024
V5

from Southern Water

Contents

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1. Odour Management Plan

1.1. Introduction

The Odour Management Plan (OMP) for Goddards Green Sludge Treatment Centre (STC) ('the Site') has been developed with the assistance of Mott MacDonald on behalf of Southern Water Services ('Southern Water' or 'the Operator'). The OMP is the responsibility of Southern Water Services as the OMP may assume a legal status if it forms part of the planning conditions or other legal agreements with local authorities or other third parties.

The OMP has been designed to be a live working document that forms part of the operational management system of the Site. It is a mitigation and control measure document with which operations shall comply. It demonstrates how odours shall be managed and controlled to prevent odour impacts from activities during normal operation and during abnormal events.

This OMP has been produced in accordance with the Environment Agency's H4 Odour Management guidance[1], Best Available Techniques (BAT) Reference Document for Waste Treatment[2] and Appropriate measures for the biological treatment of waste[3].

1.2. Objectives

The OMP identifies potential odour emissions from site operations and identifies procedures to manage, control and minimise odour impacts. The plan provides information about the measures currently implemented to control odour emissions from the Site. It provides sufficient detail to allow operators and maintenance teams to understand the operational conditions.

It is intended to be used as a reference document by operational staff on a day-today basis. The OMP includes the following:

- A description of the Site and catchment, including potential sources of odour on the Site, and location of sensitive receptors
- The Site's individual process operation descriptions in order to minimise, manage and control odour;
- Characterisation of odours at different points in the treatment process and assessment of risk, particularly during abnormal operating conditions
- Southern Water Operation and Management (O&M) procedures for the Site, including housekeeping measures to minimise odour generation and release
- The mitigation procedures which should be implemented when foreseeable situations, that may compromise the ability to prevent and minimise odorous releases, occur. These can include both breakdowns and external conditions such as extreme weather
- An odour risk assessment identifying any odorous or potentially odorous areas of the works and immediate and longer-term actions required to eliminate odour complaints
- Containment, enclosure, ventilation, abatement of odours and emission standards
- Monitoring of odorous emissions and action plans for investigation, remedial measures and procedural changes in the event of abnormal emissions
- Management of the sludge reception, dewatering and treatment processes
- Odour control and management procedures during emergencies and maintenance
- Routine care and maintenance of critical equipment (extraction and odour abatement plant)

[1] Environment Agency (2011), Environmental permitting: H4 odour management. Available online at: https://www.gov.uk/government/publications/environmental-permitting-h4-odour-management

[2] Joint Research Centre (2018) Best Available Techniques (BAT) Reference Document for Waste Treatment. Available online at: https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/JRC113018_WT_Bref.pdf

[3] Environment Agency (2020) Appropriate measures for the biological treatment of waste- Consultation draft July 2020. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/898956/Appropriate_measures_for_the_biological_treatment_of_waste_-_consultation_document.pdf

- Monitoring, recording and reporting arrangements
- The management and operator training requirements and records with respect to odour
- Staffing, responsibilities, training and procedures
- Communication strategy and complaint management/resolution procedures
- OMP updating, review and development procedures
- An action procedure for complaints

The primary responsibility for implementation of the OMP lies with the operational site management. Other business functions support the implementation of the OMP across their areas of responsibility.

The OMP outlines the potential odour sources and the risks to receptors. It outlines the measures Southern Water will employ on a daily basis and how Southern Water will respond to prevent or minimise odour releases and impacts. The routine assessment of odour and the monitoring and maintenance of plant and equipment at the Site will be carried out according to the schedules given in the Operation & Maintenance (O&M) manual and Environmental Management System (EMS) to ensure that performance is optimised.

The OMP will be reviewed, and amended where necessary, following changes in infrastructure or changes in operation that have an impact on odour at the Site. Otherwise the OMP will be reviewed annually as a minimum, or as requested by the Environment Agency. The OMP is incorporated into the Site's EMS.

1.3. Site Location

Goddards Green Wastewater Works (WTW) and Sludge Treatment Centre (STC) is situated approximately 1.75 km north west of Burgess Hill town, West Sussex, just off Cuckfield Road. The WTW site was built in 1992, with the addition of the STC in 2002.

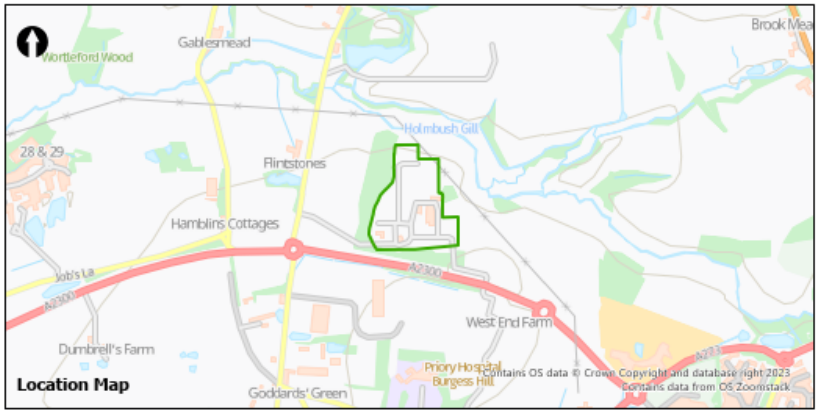
Site address: Cuckfield Road, Goddards Green, West Sussex, RH17 5AL

National grid reference: TQ 28947 20659

The Site location and layout are shown in Figure 1.

Figure 1: Location and layout of the Site

Emissions Ref	Emissions Points	Assets Ref	Assets	X	Y
		1	Centrifuges	528952	120778
A02	CHP Exhaust Stack	2	CHP	529015	120647
A03	Flare	3	Flare	528950	120640
A04	Generator Exhaust	4	Generator	528987	120753
A05	OCU Stack 1	5	OCU 1	529011	120692
A06	OCU Stack 2	6	OCU 2	528936	120602
A07	OCU Stack 3	7	OCU 3	528932	120656
A08	Whessoe Valve x2	8	Post Digestion Storage Tank 1	528977	120673
A09	Whessoe Valve x2	9	Post Digestion Storage Tank 2	528988	120672
A10	Whessoe Valve x2	10	Primary Digester 1	528975	120659
A11	Whessoe Valve x2	11	Primary Digester 2	528993	120659
A12	Whessoe Valve x2	12	Gas Bag	528965	120642
A14	Boiler Exhaust Stack	14	Boiler	529014	120678
A15	THP Vessels	15	THP Vessels	528966	120739
		16	Polymer Dosing Storage	528981	120715
		17	Liquor Treatment Plant	528818	120663
		18	Sludge Strain Press	528933	120685
		19	Drum Thickeners	528990	120715
		20	Centrifuge Building	528995	120716
		21	Cake Reception	528944	120682
		22	Post Screening Storage Tank 1	528976	120689
		23	Post Screening Storage Tank 2	528991	120689
		24	Sludge Reception Tank	528988	120608
		25	Thickened Sludge Storage Tank	529012	120716
		26	Cake barn	528955	120794
		27	Liquor Storage Tank	528824	120691
		28	Cake Strain Press	528957	120688
		29	Auxiliary Sludge Storage Tank 1	528855	120722
		30	Auxiliary Sludge Storage Tank 2	528855	120693
		31	Auxiliary Sludge Reception	528870	120682
		32	Cake Blending Tank	528947	120670
		33	Cess Reception	529008	120580
		34	THP Silo	528958	120727
		35	Poly Storage and Dosing	528963	120763
W1	Inlet Works			528969	120586



1.4. Best Available Techniques

This document reflects the existing arrangement at site and any commitments Southern Water has already made during the ongoing application process. It is acknowledged that it does not fully meet BAT in some instances. Changes to site will be undertaken and completed to meet BAT, where applicable. The changes required will be submitted to the Environment Agency, in plans to be submitted as part of Improvement Conditions within the permit, for their agreement and Southern Water's subsequent implementation.

As the changes are implemented the documentation will be updated to reflect the changes made to meet BAT.

The OMP addresses the following BAT:

- BAT 1: Environmental Management System to include the Odour Management Plan
- BAT 10: periodically monitor odour emissions
    - Section 5 addresses monitoring
- BAT 12: Implement and regularly review an odour management plan, as part of the environmental management system, including protocols for:
    - Actions and timelines (addressed in Section 4.2 and 5)
    - Conducting monitoring (Section 5)
    - Response to identified odour incidents (Section 7.4 and Appendix G)
    - Odour prevention and reduction (Section 4, 5 and 6)
- BAT 13: Reducing odour emissions through the use of techniques: addressed in Section 4
- BAT 14: Reducing diffuse emissions to air, addressed in Section 3.2
- BAT 33: Reduce odour emissions through pre-acceptance, acceptance and sorting the waste addressed in 790101_MSD_WasteAcceptance_GOD November 2024.
- BAT 34: reduce channelled emissions, addressed in Section 4.1.
- BAT 53: Reducing emissions of hydrochloric acid (HCl), ammonia (NH_3) and organic compounds to air in Section 4.1.

This OMP is applicable to the STC operations only and any mention to the wider WTW is for context only.

2. Site Operation

2.1. Overview of Site operations

The WTW is operated under the Urban Wastewater Treatment (England and Wales) Regulations 1994 and has a standalone Water Discharge Activity Environmental Permit, this will remain an independent permitted activity. The STC operation is a non-hazardous waste activity which is currently carried out under registered S1, S2 and U6 Exemptions. The site also holds two environmental permits: EPR/WP3695HW is a bespoke waste permit for a biological treatment facility (A23), and; EPR/JP3137QB for a CHP MCP/SG permit. The application is to consolidate the permits above and upgrade to an installation permit.

The waste activity comprises imports, physio-chemical, anaerobic digestion (AD) treatment and the storage of waste, all for recovery purposes. The STC handles waste derived from the wastewater treatment process, either indigenously produced on-site or imported from other Southern Water owned assets. The site currently receives sludge cake and cess and waste imports and will accept trade waste in the future following inclusion in the permit variation.

The primary permitted installation activity will be the AD treatment facility. The AD facility will treat indigenously produced and imported sludges. Permitted Directly Associated Activities will be the import of waste from other WTW assets; the physio-chemical treatment of imported and indigenously produced sludges; the storage of indigenously produced sludges, imported sludges and the sludge cake from the AD facility; the storage of biogas derived from the AD treatment of waste and the combustion of biogas in an on-site Combined Heat and Power plant (CHP). In the event the CHP cannot run in an emergency or due to operational issues, biogas will be combusted via an on-site flare stack and/or back-up boiler system.

2.2. Summary of STC components

Currently the Site accepts cess and both imported and indigenous sludge and cake waste derived from the wastewater treatment process. On average the Site accepts 44 tankers containing sludge, cess, septic, and chemical toilet waste. This consists of approximately 21 tankers per day of liquid sludge imports, and an average of 23 tankers of imported cess, septic and chemical toilet waste. All imported liquid waste and sludges are transported in enclosed tankers and liquid sludge is unloaded via a hose.

Below is a brief summary of the components for the Site. The Site is a sludge treatment centre which has both liquid sludge and sludge cake reception facilities.

2.2.1. Sludge treatment at the STC

Reception and Screening of Indigenous an Imported Sludge and Sludge Cake

On average the Site accepts 44 tankers containing sludge, cess, septic, and chemical toilet waste. This consists of approximately 21 tankers per day of liquid sludge imports arriving at the Site, and an average of 23 tankers of imported cess, septic and chemical toilet waste per day is accepted at the Site.

Indigenous and imported liquid sludge are screened by two strain presses and then thickened by two duty / standby drum thickeners. Imported sludge cake is blended with indigenous liquid sludge and then screened in two strain presses (separate).

Sludge Storage

Blended and thickened sludge is mixed and stored in one thickened sludge storage tank.

Digested sludge is stored in one digested sludge storage tank.

Dewatered digested cake is stored on site in storage bays before being recycled to farmland.

The site hosts a strategic liquid waste storage facility which is used to take unscheduled emergency sludge imports. This facility consists of two sludge storage tanks with a combined capacity of 5,000 m^3.

Thickening of Liquid Sludges

Sludge thickening is undertaken to increase the solids content of the sludge. This is achieved by means of mechanical equipment that is housed within a building to contain odorous air for treatment.

Liquor from the thickening process is returned to the WTW for further treatment via the liquor treatment plant.

Indigenous and imported liquid sludge are thickened by two duty / standby drum thickeners. This increases the dry solid content (%DS) from 3% DS to 7.5-8.5% DS. Following blending with imported liquid sludge, blended and thickened sludge is mixed and stored in one thickened sludge storage tank before being fed to the digesters.

Thermal Hydrolysis Plant (THP)

A Thermal Hydrolysis Process (THP) plant provides a new pre-digestion process. Sludge is continuously fed from the Pre-THP Silo into the THP pulper section which homogenises and pre-heats the sludge to a temperature close to 100°C, using steam recovered from the flash tank. From the pulper, the warm sludge is fed continuously to the reactors, in a sequential process that ensures sealed batches of sludge in each reactor. Once a reactor fills up, sludge flows to the next available one. When the reactor is full and sealed, steam is pumped to raise the temperature to 160 to 180°C at a pressure of about 6 bars. The thermal hydrolysis process is typically set at 20 to 30 minutes for each batch, to ensure pathogen kill. The system is sealed except for emergency vents. The THP feed silo is connected to the OCU. THP vessels are fitted with a set-pressure/rated burst disc, short pipe and subsequent pressure relief valve (PRV). The pipe section is fitted with a pressure sensor.

If the burst disc is breached the pressure sensor will identify the issue, record as alarm on SCADA and automatically commence a safe shut down. Depending on the cause the PRV may operate to mitigate the overpressure risk. The release occurrence and duration would be identifiable from SCADA data."

From the reactor, the now sterilised and hydrolysed sludge is passed to the flash tank, which operates at atmospheric pressure. The sudden pressure drop leads to substantial cell destruction for the organic matter in the sewage sludge. The steam generated by the pressure release is returned to the pulper to preheat the incoming sludge. Leaving the flash tank, the sludge is cooled to the typical temperature for anaerobic digestion, by passing through a heat exchanger or cooler. Then it is fed to the primary digesters. The THP plant will comprise one cambi B2-4 stream. The main process vessels will be one pulper, four B2 reactors and one flash tank. There will also be one process gas skid. Cold final effluent that has been filtered and UV disinfected will be added as dilution water to the hydrolysed sludge at the digester feed pumps. The percentage of dilution water in the diluted hydrolysed sludge is a parameter that can be selected by the operator. The THP unit is designed to treat an average daily load of 16 tons DS/day at an average throughput of 97 m^3/day at 16.5%DS.

A new dual fuel composite steam boiler has been installed as part of the new THP plant process. This boiler is capable of operating at a maximum pressure of 12 bar. To reduce the amount of supplementary fuel required for steam generation, waste heat will be recovered from the CHP engine exhaust gases. The steam boiler primarily runs on the biogas produced at the Site, with the option to operate on diesel if required. The boiler has a waste heat section through which the hot exhaust gases from the CHP engine can be passed. A bypass arrangement has been provided on the CHP exhaust gas line to allow the exhaust gas to bypass the steam boiler and to be

discharged directly to the new exhaust stack. The control of this bypass is automatic so that CHP exhaust gas only bypasses the boiler when the boiler is at its maximum operating pressure.

Digesters

There are two conventional mesospheric anaerobic digesters operating at 35 ºC where temperature is maintained by heat exchangers. SIx enzyme hydrolysis reactors are available for advanced anaerobic digestion, but they are not currently operated. Biogas produced by the digesters are used by CHP for site operations, such as generating heat for temperature control of the digestion process or electricity for site operations.

The AD process provides a controlled environment where micro-organisms (including bacteria and fungi) can grow, multiply and break-down organic material, releasing water, carbon dioxide and methane (biogas). Gas production, gas pressure and digester temperature are monitored and logged on the SCADA system. The produced gas is stored in one biogas holder, which is a double skinned, expandable, hemispherical container. A biogas flare is provided for periods when, for example, the CHP is unavailable during maintenance or downtime, to control and manage excess gas during these periods.

In instances where the gas pressure is too high the pressure relief valve system de-pressurises the system. These pressure relief valves are located at the connection point with the biogas distribution system pipework at the top of each digester. Opening of the pressure relief valves is an emergency response of the system to maintain safety and would be rare, short-lived events. Pressure levels are monitored in the gas system and linked to the SCADA system. This is provided with an alarm which can alert operators to increased pressure. The performance of the digesters is monitored daily, through the sampling of inlet and outlet sludge quality.

Combined Heat and Power Unit (CHP)

A CHP plant is installed at the Site, designed to use biogas. The biogas produced in the digestion process is fed to the CHP unit (1.79 MWth) to generate electricity and heat. The electricity is used to partially power the Site and heat is to be recovered and used to heat the digesters. There is also a back-up flare for use when the CHP engine is on downtime for maintenance.

Post Digestion

Digested sludge is stored in two digested sludge storage tank before being dewatered by two duty, standby centrifuges.

Dewatering

Dewatering takes place in two centrifuges (one standby, one duty). Dewatering further reduces the volume of sludge by reducing the water content from around 96% to 75%. Cake is stored in one large cake bay in the Dutch Barn before being transported off site for recycling to agriculture.

Liquor from the dewatering plant is returned to the WTW for further treatment.

The centrifuges are maintained as part of the framework maintenance contract which also provides an emergency response.

Cake storage

Cake is moved straight from the centrifuge building following drying via a conveyor system. Cake is stored in one large cake bay in the Dutch Barn before being transported off site for recycling to agriculture.

Odour control equipment

Many of the facilities and processes on the Site are enclosed, with the exception of the liquor treatment plant. All sludge treatment processes are covered or enclosed.

The Site has three odour control units (OCU) serving the STC assets area and sludge dewatering building. OCU1 and OCU 3 are biofilters, with pumice media, followed by activated carbon filters. The

OCU 2 is a carbon filter only. Odours are drawn from covered process tanks and buildings to the odour control units where odorous chemicals are removed by biological actions and absorption.

The sludge and cake holding bays are equipped with a sprayed odour suppressant system, which can be used during cake movement. A mobile sprayed odour suppressant unit is also provided which can be utilised at different locations.

The flow rates and assets served, for the OCUs are:
OCU 1 – Installed 2012. Approx total air flow is 1,281m3/hr – centrifuges and drum thickeners in centrifuge building and thickened sludge tank.

OCU 2 – Installed 2012. Approx total air flow is 5,356m^3/h - cess reception.

OCU 3 – Installed 2020. Approx total air flow is 14,318m^3/hr - THP silo, auxiliary. sludge storage tanks, imported cake and sludge reception, cake blending tank, THP centrifuges and raw liquor tank.

Filtered odour streams are discharged into the environment through OCU stack as shown in Figure 1 and are monitored hourly to ensure the absence of odorous compounds.

Liquor Treatment Plant

The liquor treatment plant (LTP) is a biological process in the form of Cyclic Activated Sludge System (CASS). This treats liquors received from the STC. The CASS LTP has a maximum throughput of 1200m^3/day (≈1,200 tonnes/day) and consists of three storage volumes, as follows.

- Liquor treatment plant is a tank with capacity of 2500m^3. This consists of four aeration blowers (operating on duty/assist/assist/standby) connected to diffusers in the bottom of the tank. This tank is uncovered and is being reviewed for the technical feasibility of covering it.
- Liquor storage tank is formed of two concentric tanks operating independently. The centre tank being a raw liquor buffer tank with a capacity of 1342m^3. This is covered and is connected to an OCU 3. The uncovered outer tank is the treated liquor buffer storage with a capacity of 1284m^3. The total tank volume is 2626m^3.

Combined liquors (from drum thickeners, strain-presses and sludge cake bays) are received into the raw liquor buffer tank, transferred through the liquor treatment plant, and back to the treated liquor buffer storage area.

The treated liquor is discharged into the main inlet flume (oxidation ditch distribution chamber) in the WtW and continues through the treatment process.

The LTP operates on a cycle of six hours of air blowing, 1 hour for settling and 1 hour for transfer. The SAS from LTP is pumped to the post screened storage tank, thus remaining with STC boundary.

Other relevant STC components

- Sludge reception and cake reception (covered)
- Sludge strainpress
- Cake strainpress
- Storage tanks:
  - 2 No. Post Screening Storage Tanks PSST) (500m^3 each) (covered)
  - 2 No. Post Digestion Storage Tanks (PDST) (312m^3 each) (covered)
  - 2 No. Auxiliary Sludge Storage Tanks (ASST) (2,500m^3 each) (covered)
  - 1 No. Thickened Sludge Storage Tank (TSST) (400m^3) (covered)
  - 1 No. Cake blending tank (57m^3) (covered)
  - 1 No. Sludge reception tank (98m^3) (covered)

  - 1 No. Liquor Storage Tank (2,626m^3) - raw liquor tank (centre tank) covered; treated liquor tank (outside perimeter) open
- 1 No. Biogas fuelled CHP (1.79 MWth)
- 1 No. Back-up diesel generator (0.64 MWth)
- 1 No. Biogas burner (flare)
- 3 No. Odour Control Units serve the STC area
- 2 No. Primary Digesters (1932m^3 each) (covered)
- 1 No. Gas Bag (920m^3)
- 1 No. Liquor Treatment Plant (2,500m^3) (open)
- 1 No. Cake bay (stored in Dutch barn 994m^3) (covered)
- 2 No. Drum Thickeners (duty and assist) in centrifuge building (covered)
- 2 No. Centrifuges (duty and standby) in centrifuge building (covered)
- 1 No. Thermal Hydrolysis Plant (THP):
  - 1 No. THP Pulper (4m^3) (covered)
  - 4 No. THP Reactors (2m^3 each) (covered)
  - 1No. THP Flash tank (4m^3) (covered)
- 1 No. THP Feed silo (130m^3) (covered)
- 2 No. Centrifuges (post THP) (covered)
- 1 No. THP Steam boiler (1.11 MWth when operating on biogas)

The following are outputs from the process:

- Screenings and grit – deposited into skips before being removed off-site.
- Biogas – stored in an existing gas holder, then either
  - burnt in the CHP to generate electricity for use on-site,
  - flared in the waste biogas burner.
- Cake – stored in cake bay (in a Dutch Barn) prior to being shipped off site for recycling to agriculture (soil conditioner).

A schematic for the odour control units can be found in Appendix B.

3. Potential Odour Sources

3.1. Overview of the mechanisms for odour generation

The generation of odour from the processing of sewage is primarily associated with the release of odorous Volatile Organic Compounds (VOCs) that are generated as a result of the anaerobic breakdown of organic matter by micro-organisms.

Since the main source of odour and VOCs is the solid organic matter, the most intense and offensive odours tend to be generated from the operations involving the handling of sludge i.e. the processes applied to dewater, treat and store raw sludge. These processes are generally considered to present the greatest risk of odour impact off-site unless adequate controls are put in place. Depending on the quality of the sewage presented to the works, aspects of the treatment process involved in the handling of raw sewage (e.g. preliminary and primary treatment stages) may also contribute to offensive odours.

Odours generated from the sewage treatment processes downstream of the primary sludge removal stage (e.g. the secondary treatment processes and final settlement) present a significantly reduced risk of odour impact. This is due to the fact that the majority of odorous biogenic material has been removed from the flow at this point, and the treatment processes applied to remove any remaining contaminants in the sewage are aerobic. Anaerobic conditions inhibit the formation of the majority of the reduced sulphur compounds which are responsible for offensive sewage odours.

The rate of odour release from sewage and sludge sources is primarily dependent on the temperature of the material, and the surface area exposed to the atmosphere. As a result, odorous emissions from sewage treatment operations tend to be highest during the summer months. Furthermore, activities that lead to increases in the surface area of odorous material exposed to the atmosphere (e.g. due to turbulence generated by sewage handling processes and agitation of sludge) will inevitably lead to an increase in the magnitude of odour released.

Southern Water acknowledges that high levels of odour arising from wastewater and sludge treatment are not acceptable and that reasonable and practicable measures must be taken to minimise any nuisance caused to the general public. Southern Water does not operate under a single defined odour exposure standard. Each site is considered individually taking into account the relevant legislation and the local authority's conditions. Site specific factors such as site history with regard to odour complaints, potential future encroachment by residential or business developments, and the presence of particularly odour sensitive receptors within the vicinity of the Site are also taken into consideration.

3.2. Potential odour sources

Table 1 identifies the plant, equipment and activities which have the potential to generate odours under normal operational conditions. Odour sources under emergencies and abnormal operating conditions are addressed in section 4.3.3 Abnormal conditions.

Wastes accepted to the STC, under the Environmental Permit, are listed in Appendix C.

Due to the nature of the site activities, the hedonic tone of odours is neutral at best, whereas most odours generated on site will have a negative hedonic score (therefore deemed offensive). As the local population has already become sensitised to this, it is prudent to reduce the benchmark of the rating associated with sludge treatment. The hedonic score of the material will improve through the sludge treatment process as organic material is digested.

Table 1: Identified odour sources

Process or activity	Plant or equipment (and odour monitoring location)	Potential source of odour	Odour controls in place	Potential for odour emissions during normal conditions
Sludge reception	Sludge reception tank TQ 28986 20608	Liquid sludge	Imported liquid sludge is delivered to the Site by tanker and stored in a sludge reception tank. The reception tank is enclosed. Hoses are in place in case of spills during tanker unloading. Maximum storage capacity: 98m^3 Waste retention time: One day Open/covered: Covered	Low
	Sludge reception TQ 28941 20681	Sludge cake	Sludge cake is imported in sealed or covered containers. Shutters are kept closed on the building unless a vehicle is moving through them. Hose wash facilities are available at waste receptions. Open/covered: Covered	Low
Sludge Treatment	Anaerobic digesters TQ 28974 20659, TQ 28991 20659	Biogas	Digesters are covered, and the process is closely monitored and regularly maintained. Planned preventative maintenance undertaken on equipment Maximum storage capacity: 1932m^3 each Waste retention time: Average 22.5 days in primary digesters and 1 day in secondary digester. Open/covered: Covered	Low
	Anaerobic digesters pressure release valve TQ 28974 20659, TQ 28991 20659	Biogas	Opening of the pressure relief valves (whessoe valves) is rare and events are recorded on the SCADA system.	Low
	Sludge storage tanks TQ 28987 20608	Liquid sludge	All sludge storage tanks are covered and enclosed air is extracted to the central OCU. The process is monitored and regularly maintained. **PSST:** Maximum storage: 500m^3 each Waste retention time: 2 days Open/covered: Covered **PDST:** Max storage: 384m^3 each Waste retention time: One day Open/covered: Covered	Low

			TSST: Maximum storage 400m^3 Waste retention time: turn every 6-8 hours Open/covered: Covered **Cake blending tank:** Maximum storage: 57m^3 Open/covered: Covered	
	Centrifuge building TQ 28993 20717	Sludge cake	Centrifuges are enclosed in the centrifuge building and air is extracted to the central odour control plant. Small amount of gas released from sludge at the centrate discharge point. Open/covered: Covered	Low
	Odour control units OCU 1 TQ 29011 20692 OCU 2 TQ 28936 20602 OCU 3 TQ 28932 20656	Untreated air	There are three OCU at the Site to treat air and remove odorous compounds. These are process monitored and planned preventative maintenance is regularly undertaken on equipment	Low
	Cake bay (stored in Dutch Barn) TQ 28955 20794	Sludge cake	Cake is currently stored in one large cake bay in the new Dutch barn. Waste retention time: 4 weeks Maximum storage: 994m^3 Open/covered: Covered	Medium
	THP TQ 28990 20744	Liquid sludge	The THP is an enclosed system with regular monitoring and is therefore unlikely to generate odour. THP pulper – 4m^3 THP 4eactors (x 4) 2m^3 each THP flash tank – 4m^3 THP feed silo – 130m^3 Maximum storage: 272m^3 Open/covered: Covered	Low
Sludge Treatment	THP Pressure relief valves TQ 28966 20739	Biogas	Each THP vessel (of which there are 6 in total) is fitted with a set-pressure/rated burst disc, short pipe and subsequent pressure relief valve (PRV). The pipe section is fitted with a pressure sensor. If the burst disc is breached the pressure sensor will identify the issue, record as alarm on SCADA and automatically commence a safe shut down. Depending on the cause the PRV may operate to mitigate the overpressure risk. The release occurrence and duration would be identifiable from SCADA data. As all the THP tanks are close together one emission point has been provided to cover any of the six PRVs.	Low

Liquor treatment plant	LTP TQ 28818 20663	Process liquors	The LTP treats liquors produced from the STC process prior to discharging to the head of work at the adjacent Goddard's Green WtW Maximum storage: 2,500m^3 Open/covered: open	Low
Liquor storage tanks	LTP TQ 28824 20691	Process liquors	Maximum storage: Total tank volume 2,626m^3 Waste retention time: ranges from few hours to a few months Raw liquor tank (centre tank). Maximum storage: 1342m^3. Open/covered: Covered; Treated liquor tank Maximum storage: 1284m^3. Treated (outside perimeter) open	Low Low
Biogas combustion	Gas bag holder TQ 28965 20641	Biogas	This is a sealed system Maximum storage: 920m^3	Very low
	Combined Heat and Power (CHP) unit TQ 29018 20648	Biogas	Planned preventative maintenance undertaken on equipment. If CHP unit is down, gas is burnt in flare	Low
	Flare TQ 28950 20640	Biogas	Planned preventative maintenance undertaken on equipment	Low
Cake export	Cake export TQ 28972 20725	Sludge cake	Lorries/trailers are covered before leaving or sealed skips are used. Covers only removed when inside building and loading of cake is taking place. Odour suppressants used during cake movement.	Medium

3.3. Odour impact

3.3.1. Adjoining land use

The Site is situated approximately 1.75 kilometres north west of Burgess Hill town, West Sussex, just off the Cuckfield Road. The Site is bordered by agricultural and rural land use to the east, south and west. Approximately 260m to the west of the Site is the Flintstones Residential estate, and there are several places of work to the south and south east of the Site, including warehouses and a farm.

3.3.2. Sensitive receptors

Receptors sensitive to odour include users of the adjacent land, which may vary in their sensitivity to odour. The level of sensitivity will be defined using the Institute of Air Quality Management guidance[4].

- High sensitivity receptors e.g. residential dwellings, hospitals, schools/education and tourist/cultural.
  - users can reasonably expect enjoyment of a high level of amenity; and
  - people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.
- Medium sensitivity receptor e.g. places of work, commercial/retail premises and playing/recreation fields.
  - users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or
  - people wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.
- Low sensitivity receptor e.g. industrial use, farms, footpaths and roads.
  - the enjoyment of amenity would not reasonably be expected; or
  - there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.

The magnitude of risk relates to[5]:

- Frequency: How often an individual is exposed to odour
- Intensity: The individual's perception of the strength of the odour
- Duration: The overall duration that individuals are exposed to an odour over time
- Odour unpleasantness: Odour unpleasantness describes the character of an odour as it relates to the 'hedonic tone' (which may be pleasant, neutral or unpleasant) at a given odour concentration/ intensity. This can be measured in the laboratory as the hedonic tone, and when measured by the standard method and expressed on a standard nine-point scale it is termed the hedonic score.
- Location/Receptor sensitivity: The type of land use and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor. The 'Location' factor can be considered to encompass the receptor characteristics, receptor sensitivity, and socio-economic factors.

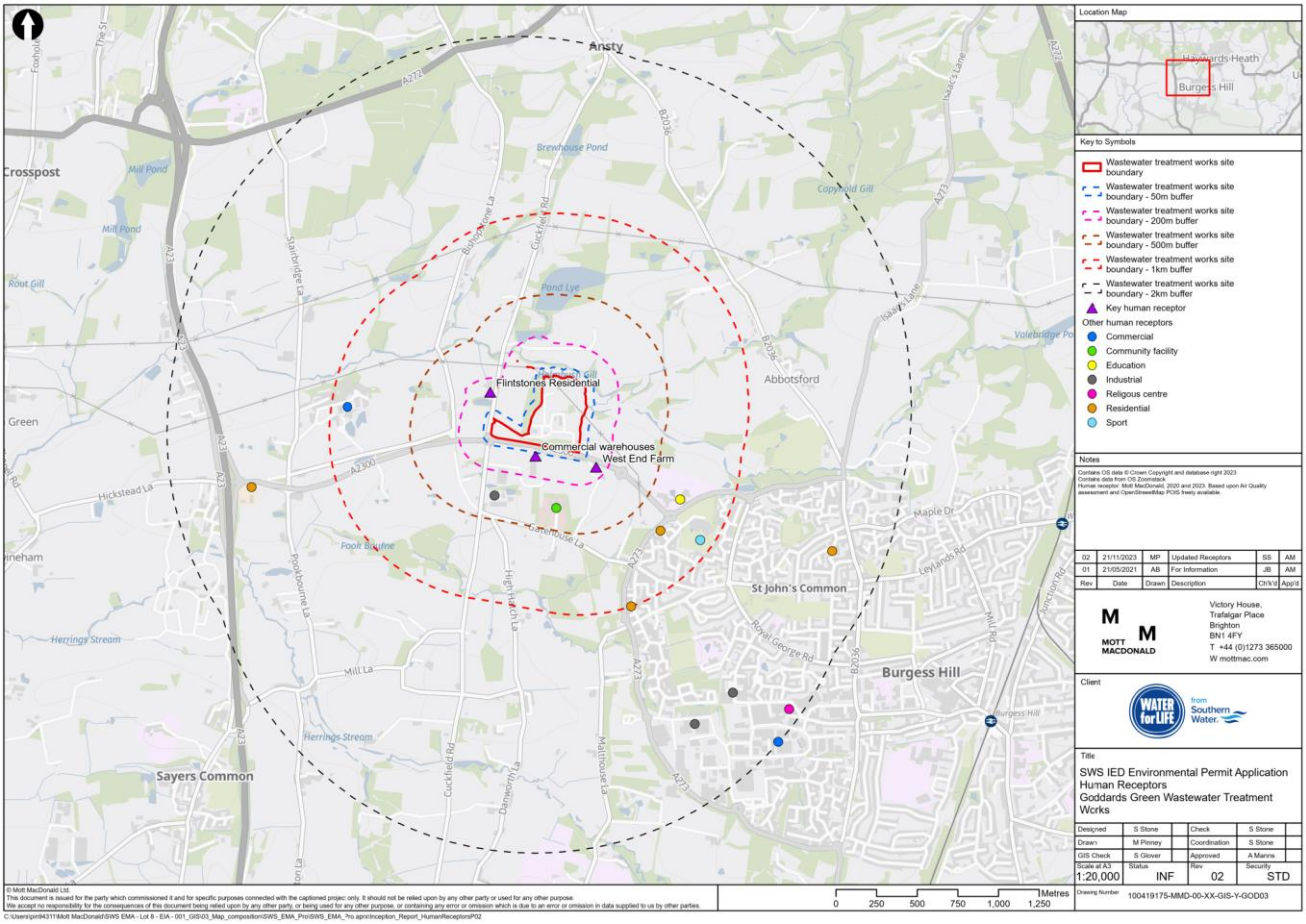
There are a number of sensitive receptors within 500m of the potential emission sources at Goddards Green WTW and STC. There are in total 5 buildings within a 325m – 400m radius of the site, and additionally one building 500m from the treatment works.

Figure 2 identifies the sensitive receptors within 2km of the Site. Table 2 identifies the sensitive receptors within 500m of the Site.

[4] Institute of Air Quality Management (2018) Guidance on the assessment of odour for planning V1.1. Available online at: https://iaqm.co.uk/text/guidance/odour-guidance-2014.pdf

[5] Institute of Air Quality Management (2018) Guidance on the assessment of odour for planning V1.1. Available online at: https://iaqm.co.uk/text/guidance/odour-guidance-2014.pdf

Figure 2: Sensitive receptors within 2km of the Site



Source: Mott MacDonald (2023)

Table 2: Receptors within 500m of potential emission sources at the Site

Receptor	Nearest potential emission source to receptor	Process	Distance (m) from nearest potential emission source (b)	Direction of receptor from closest emission source
Commercial premises south of the Site	Cess reception area	Cess/sludge/cake reception and distribution	230	South west
	Sludge reception tank	**Cess/sludge/cake reception and distribution**	**220**	**South west**
	Cake reception	Cess/sludge/cake reception and distribution	270	South west
	OCU for cake reception	Cess/sludge/cake reception and distribution	230	South west
	Auxiliary sludge storage tank	Sludge treatment	220	South
	Anaerobic digesters	Sludge treatment	240	South west
	PDSTs	Sludge treatment	300	South west
	Centrifuges	Sludge treatment	320	South west

Table 2: Receptors within 500m of potential emission sources at the Site

Receptor	Nearest potential emission source to receptor	Process	Distance (m) from nearest potential emission source (b)	Direction of receptor from closest emission source
	TSST	Sludge treatment	330	South west
	Thermal hydrolysis plant	Sludge treatment	320	South west
	Dutch Barn (with cake bay)	Sludge treatment	**350**	South west
	OCU for sludge treatment	Sludge treatment	350	South west
	Liquor balance tank	Sludge treatment	230	South
	Liquor treatment plant	**Sludge treatment**	**200**	**South**
	Gas bag	**Biogas combustion**	**230**	**South west**
	CHP unit	Biogas combustion	280	South west
	Flare	**Biogas combustion**	**230**	**South west**

Note: (a) Distance from source to receptor is rounded to the nearest 5m

(b) Value in **bold** represents the nearest potential emission source for each process which is closest to a sensitive receptor.

The bioaerosol risk assessment for the Site (Document reference: 790101_ERA_BioaRA_GOD March 2024) addressed the probability of exposure and consequence of the hazards to determine the overall magnitude of the risk to sensitive receptors within 250 metres. A Source-Pathway-Receptor model has been used to help assess the probability of exposure associated with different processes at the Site.

The assessment concluded that the overall magnitude of the risk associated with bioaerosols emissions from the Site (including to human health) is considered to be 'very low' to 'low'. This is primarily due to the 'wet' nature of several processes undertaken at the Site and the control measures in place at the Site which are considered to be effective at reducing and containing emissions of bioaerosols, inhibiting the pathway between source and receptor. Concentrations of bioaerosols decline rapidly within the first 100m from a source and generally decrease to background concentrations within 250m.

3.4. Odour modelling

The effectiveness of the pathway for odour impacts associated with the Goddards Green WTW has been assessed using wind data and the locations of the nearest sensitive receptors relative to the Site. Modelled wind data for the years 2019-2022 were derived for the Site from an atmospheric hindcast model (Vortex).

The nearest medium sensitivity receptors to the site were a group of industrial receptors located off Cuckfield Road which are approximately 200m to the south, 330m to the southwest, and 440m to the west of the site. During 2019-2022, the mentioned receptors were downwind from the site approximately 13% (located 200m to the south), 10% (located 330m to the southwest), and 10% (located 440m to the west) of the time, respectively. Based on the distance between these receptors and the Site and the frequencies of winds to disperse odours towards these receptors, the pathway for odour impacts from the Site to the industrial and residential receptors are considered to be slightly effective to moderately effective. Therefore, the potential for odour impacts from the Site cannot be scoped out on the basis of this simple assessment.

Odour modelling has recently been commissioned for this Site and modelling has been undertaken prior to the application for a bespoke installation permit, with consideration to the installation of the new THP. The assessment was undertaken by Stantec in June 2019. The report drew the following conclusions:

- Southern Water has made a commitment to meet 1.5 ouE/m^3 at Goddards Green WwTW site boundary.
- When the existing operation was modelled with average measured odour emission rates, the contour plot indicates that the 1.5 ouE/m^3 contour will exceed the site boundary on all sides with the greatest odour impact to the north-east and south-west of the site boundary. The baseline model has included individual source groups to determine the main sources of odour impact and these are inlet works, primary treatment, cake storage bays, liquid sludge reception tank and cess reception tank. Thus, to reduce the off-site odour impact from the Site and to aim to achieve 1.5 ouE/m^3, odour mitigation measures will have to be implemented addressing these key areas as a minimum.
- The library values included in the models for the fresh and aged/stored THP sludge cake are lower than the digested sludge cake emissions currently observed on site. Based on experience with emissions from THP sludge cake, it was found that the emissions increase over time. So, whilst fresh THP sludge cake has a very low odour emission rate (3.0 ouE/m^2/s), over a two-week period this will increase the longer it is stored (up to 10.9 ouE/m^2/s) and re-handled. Therefore the duration and volume of stored THP sludge must be as low as practicable to reduce off-site odour impact.

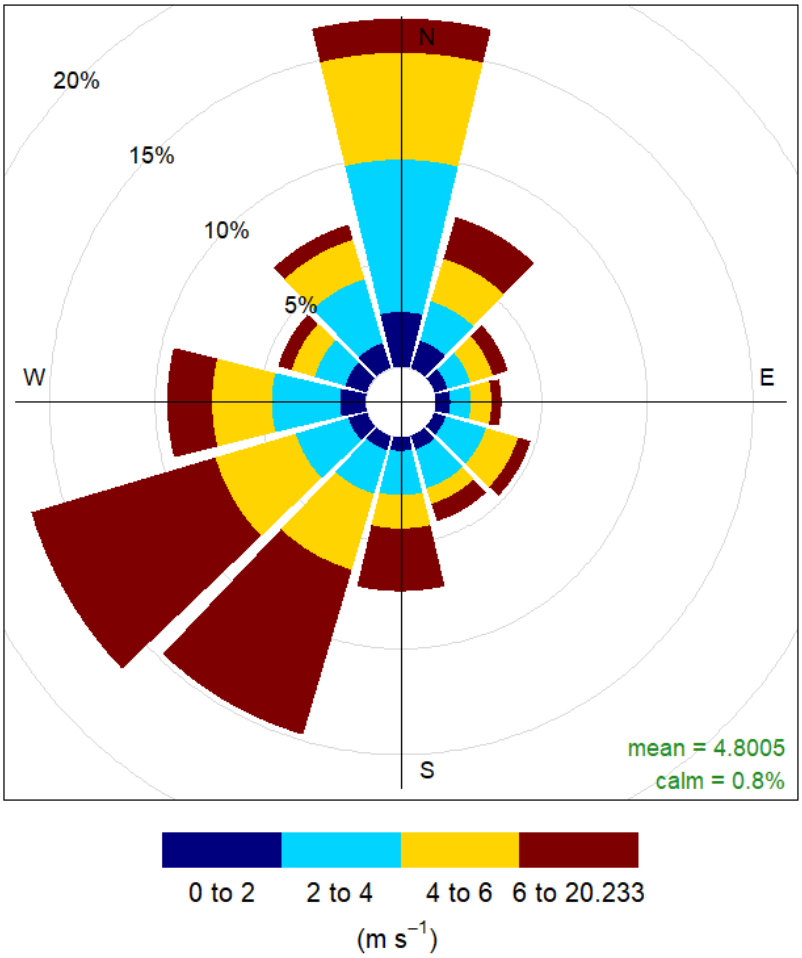
The modelling assessment has been considered within the OMP.

Wind rose and information generated for the bio-aerosol risk assessment have been used to determine the direction of any potential odours released from the Site. The 2019-2023 wind rose for the nearest meteorological site, Shoreham Airport (located approximately 17.3km south west of the Site), is shown in Figure 3. This monitoring site experiences strong prevailing winds from the south west, with frequent mild winds from the north. However, this meteorological site is located within a wide valley by the coast which channels winds from the north, resulting in the frequent mild northerly winds. The Site is in a more sheltered location from winds from the north as to the north of the Site are a crest of hills within the South Downs National Park. Therefore, an atmospheric hindcast model (Vortex) has also been used to assess the wind conditions at the Site.

The Vortex model uses historic ERA5 data from the European Centre for Medium-Range Weather Forecasts (ECMWF) and works by combining past meteorological data with current weather models. This allows meteorological parameters, such as wind speed and direction, to be predicted at any location for any time period from the past 40 years, accounting for some localised effects. The data from this model is a popular dataset for climate modellers and is used by the World Meteorological Organization for their annual State of the Climate report.

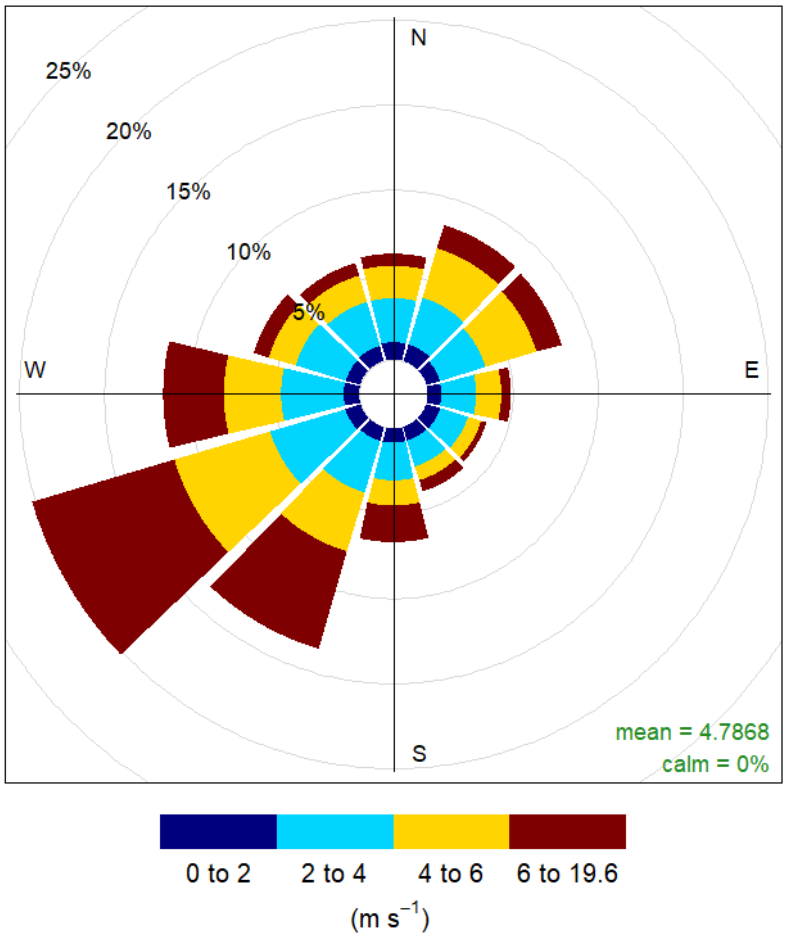
Figure 4 presents the wind rose generated for the Site from the Vortex model for the period from 2019-2023. The wind rose demonstrates that historically this location experiences strong prevailing winds from the south west, with occasional gusts from the north east. This suggests that sensitive receptors located to the north east of the Site would be at the greatest risk from bioaerosol emissions from the Site as they would be downwind of the prevailing wind direction. Overall, the two datasets show general agreement with the modelled data indicating the predominant wind originating from a south westerly direction.

Figure 3: Average wind rose for Middle Wallop meteorological site, 2019 – 2023



Source: NOAA Integrated Surface Database (ISD) (2023)

Figure 4: Average wind rose for the Site from the Vortex model, 2019-2023



Source: NOAA ISD (2023)

4. Odour Management and Control

4.1. Odour control system

Most sources of odour identified at the Site have been either covered or are enclosed within buildings.

Th Site has three OCUs serving the STC area and sludge dewatering building. Two OCUs are biofilters followed by activated carbon filters. One is an activated carbon filter only. Odours are drawn from covered process tanks and buildings to the odour control units where odorous chemicals are removed by biological actions and absorption.

The key parameters are described in Table 3.

Table 3: Odour Control Unit details

Specification	OCU 1	OCU 2	OCU 3
Assets	Centrifuge building and thickened sludge tank	Cess reception	THP silo, THP silo, auxiliary. sludge storage tanks, imported cake and sludge reception, cake blending tank, THP centrifuges and raw liquor tank
Model type	Biological filters and activated carbon filters	Activated carbon filters	Biological filters and activated carbon filters
Stack height	15m	Approx 10m	14.9m
Total Flow m^3/hr	1281m^3/hr	14,318m^3/h	5,356m^3/h

The Site also has automated Hydrogen Sulphide monitors that detect failures of the odour control system and alarm at high level. This then raises a job for the Operators to investigate the alarm and rectify the fault.

In-line with BAT 34 and 53, the Site utilises a biological filters and activated carbon filters to treat and reduce channelled emissions to air on two of the OCUs. Details of the monitoring carried out on the OCU is outlined within this section and in Section 5.

The OCUs are monitored through SCADA 24/7, with duty operator instructed to investigate any alarms raised immediately. Trigger level information is not available. This will form part of the monitoring and reporting plan and include timescales for implementation of work required to remediate any identified gaps.

Leak detection by means of a methane gas analyser is installed on biogas holder/s to ensure any leaks from the inner bag are detected. Any leaks detected on the biogas system would always be fixed immediately by Southern Water due to the process safety risk posed by biogas.

The removal of biosolids off-site will be undertaken as soon a practically possible whilst considering prevailing weather conditions.

A process flow diagram showing which assets are covered by the OCU can be found in Appendix B.

Odour control checklists can be found in Appendix D.

4.2. Odour control in normal and abnormal conditions

All operating practices must be compliant with the Sites O&M manuals, Southern Water company practices and management systems and the OMP. Routine and non-routine activities are reviewed for their impact upon the potential for odour generation in line with Southern Water's EMS.

In order to achieve overall odour containment and thus to minimise unplanned releases of odour to atmosphere, it is essential that:

- The integrity of all covers over process units is maintained continuously, other than during periods of essential maintenance.
- All doors in buildings ventilated to the odour control system remain closed except when access is required and that the integrity of the buildings fabric is ensured.
- If an alarm is generated within a building monitoring H2S levels, all doors in buildings ventilated to the odour control system remain closed until alarm ceases following the treatment and extraction of odour.
- Imports of pre-digested cake are to be offloaded within buildings with closed doors and Odour Control Unit extraction operating.
- Any imports to the head of works to be undertaken as quickly as possible to limit odour emissions. Additional imports to head of works are on an emergency basis, for example if a pumping station goes down or there is a burst rising main, the waste would be transferred via tanker to the head of works and only from assets that would already discharge to the Site (indigenous).

Where routine, planned and emergency maintenance of plant items has to be carried out and there is a high risk of odour being released to atmosphere in quantities sufficient to result in detection off-site, a detailed risk assessment of the activity is conducted, as part of which issues of odour generation, release and control are considered. Where the risk of an off-site odour event occurring is judged to be high, the Southern Water Customer Services call centre will be informed, together with the Environment Agency.

4.2.1. Normal conditions

There will be regular occasions throughout the year when routine, planned and reactive maintenance are carried out in order to ensure continued optimum operation of wastewater treatment and sludge recycling. Routine and planned maintenance tasks are divided into different classifications according to the level of complexity, speciality and frequency. The classifications are:

- Routine Operations: the daily and weekly routine operations are scheduled regionally through weekly and quarterly programmes of work. Site operators are responsible for carrying out the tasks and the Field Performance Manager (FPM) for checking completion and quality.
- Planned Maintenance (Ellipse): the programmes for planned maintenance are generated regionally. Jobs are sent direct to qualified mechanical or electrical technicians via electronic communication. Start and completion of tasks, including work done, are logged direct to Ellipse, which produces records of plant performance. Site and regional mechanical and electrical staff, in conjunction with specialist contractors, are responsible for carrying out the tasks and the FPM for checking completion and quality.
- Contractor Maintenance (CM): the programmes for planned maintenance of some categories of specialist equipment (centrifuges, odour control equipment, odour control monitoring equipment, etc.) are generated regionally. Paper records of work carried out, completion and approval are kept on-site and by the Supply Agreement Leader.
- Local Plant Monitoring (LPS): Specific monitoring (for example, hydrogen sulphide at some sites) is carried out by online instrumentation. Information is recorded on SCADA. The plant records (daily plant spreadsheet) are created by site operators and process scientists. Site operations staff are responsible for carrying out the tasks and FPMs for checking completion and quality.
- Contractors Records (CR): Records of sludge deliveries are recorded in real time on-site via an electronic logging system and reported monthly. Records are available via online database.
- Material Delivery and Removal: Records of sludge deliveries are recorded electronically in real time. Chemical delivery records are maintained on site logs. Bulk chemical deliveries and consumption are also recorded on SCADA in real time.

Minor repairs and routine maintenance works are carried out continuously throughout the year during the working day, avoiding evenings and weekends, except in emergencies. Where possible, more major maintenance tasks are carried out in a planned manner according to priority and resources. Odour sensitive major maintenance tasks will be aimed to be undertaken during the winter period (between October and April), where appropriate. The emphasis in planning this maintenance is to minimise the time required to carry out the work, ensuring as far as possible, that odours are contained or abated during the work and to deploy alternative odour suppression systems, if required.

Where a maintenance operation is likely to release quantities of odour likely to be detectable off-site, the relevant authorities and the Southern Water Regional Call Centre would be informed in advance.

The OCU maintenance report can be referred to for more detailed actions required on site (Appendix E).

Table 4 highlights the typical maintenance activities for the wastewater and sludge treatment processes.

Table 4: Typical maintenance for wastewater and sludge treatment activities

Process	Period	Typical Maintenance activities
Preliminary treatment	Daily	Checks on plant and equipment as per operating plan
	2-3 times/week	Removal of grit/screening skips
	Weekly	Operational checks on screens, compactors and associated equipment as per operating plan
	Monthly	Checks by mechanical/electrical (M&E) engineers as per regional maintenance schedules.
	Annually	Maintenance of plant and equipment
Primary Treatment	Annually	Drain-down of and repairs to the tanks
Secondary Treatment	Daily	SCADA and Visual checks by operations personnel, checks of dissolved oxygen and bubble pattern along with daily sampling.
	Weekly	Clean and check dissolved oxygen probes.
	Dictated by operational performance	Drain and clean lane, replace failed diffuser membranes.
Sludge Import	Ad-hoc	Regular checks on deliveries and operation of exhaust extraction and ventilation, removal of skips from sludge and cess screens.
	Weekly	Routine checks on equipment. Tasks carried out and records maintained under the Site operating and monitoring plan. Inlet gas temperature, gas flow rate, pressure differential, inlet gas moisture content, and leak detection.
	Monthly	Checks by M&E. Tasks carried out and records maintained under regional maintenance schedules.
Sludge Storage	Daily	Monitoring of levels. Tasks carried out and records maintained under the Site operating and monitoring plan.
	Weekly	Visual inspection of plant & equipment. Tasks carried out and records maintained under the Site operating and monitoring plan.

Process	Period	Typical Maintenance activities
	Dictated by operational performance	As required drain down and clean tank, inspect structure. Tasks carried out and records maintained under regional maintenance schedules.
Sludge Thickening	Daily	Routine daily checks.
	Weekly	Routine weekly checks and maintenance including cleaning.
	Six monthly	Checked/Serviced every six months by appointed service provider.
	Annually	Checks by M&E as per regional maintenance schedules.
Digester and degassing tanks	Daily	Feed Volume, Temperature, Dry solids Test, and Visual Inspections (levels and Equipment) monitoring.
	Monthly	Checks of pressure relief valves and plant. Routine maintenance of systems.
	Annually	Checks and service of gas systems.
Centrifuge	Daily	Centrifuge check routine as advised by supplier.
	Weekly	Centrifuge check routine as advised by supplier.
	Monthly	Checked in line with routine service agreement by appointed service provider.
	Six monthly	Checked/Serviced every six months by appointed service provider.
Odour control units	Daily	Routine daily checks
	Monthly	Inspection and maintenance routines in accordance with both the frequency and task specified in the regional maintenance schedules.
	Annually	Annual service by the Odour control service provider in line with contracted maintenance requirements

Diffuse emissions from open storage areas are minimised by:

- Reducing movement of cake across the site, cake is only moved when required.
- Limiting, or ceasing, the volume of cake to be dropped during windy weather, to ensure cake lands within the bay walls and limit transport of VOCs and bioaerosols.
- Ensuring the bays receiving cake from the conveyor belt remains sheltered.
- Minimising the volume of sludge cake being stored to eliminate the risk of cake overspilling.
- The sludge cake not being handled once in the cake bay (unless liming is required, however this requires minimal handling) until it is being removed from site.
- All sludge cake being exported is transported in covered lorries

To minimise odour nuisance, it is important to ensure that the Site is operating as designed. Covers and hatches are replaced to maintain the integrity of enclosures provided to collect odorous air.

4.2.2. Odour risk assessment

Unless it is in an emergency situation, an odour risk assessment will be undertaken before carrying out maintenance tasks with high odour risk and high odour sensitivity. Examples of such activities are:

- Shutdown of odour control systems for an extended period for maintenance;
- Non-routine draining down of large open process tanks with potential to generate odour;

- Lifting of odour control covers, opening of hatches or keeping doors of odour-controlled building open for an extended period;
- Commissioning of new odour sensitive processes or equipment where odour risk may not be adequately mitigated; and
- Significant flow diversion outside odour-controlled processes for an extended period

A flowchart to identify when an activity requires a separate odour risk assessment is provided in Appendix F.

An odour risk assessment matrix will be used to determine the odour risk for planned and unplanned maintenance work commonly performed. Where an unusual activity not contained in the matrix is planned, a site-specific risk assessment will be carried out according to a standard procedure. The matrix also includes foreseeable situations for emergency breakdown and situations arising as a result of dealing with an emergency where the ability to improve control of or minimise odorous release is compromised. The advice given by the odour risk assessment matrix will be followed, as appropriate, taking into account site conditions.

Table 5 provides an example of a risk assessment for routine maintenance operations. The risk assessments are reviewed and updated at least annually. The key contact group (the Environment Agency and Southern Water Customer Services) will be informed for high risk activities, in relation to odour, at least 3 days before work is due to commence.

Southern Water's Regional Control Centre (RCC) will be informed in advance of the nature and duration of maintenance work and measures to be undertaken when a significant odour risk is identified from the Odour Risk Assessment.

Table 5: Example of risk assessment for routine maintenance operations

Event	Implications	Odour Risk (High, Medium, Low)	Proactive Actions	Responsive Actions
Maintenance of processes within STC	Opening of hatches, and exposure of process units to building.	Low	Processes contained within the STC which itself is odour controlled.	Minimise number of hatches open at any one time.
Maintenance on sludge treatment process (not biogas system)	Potential for odour release if any sludge exposed to atmosphere.	High	Divert or minimise sludge throughput in process area.	Carry out during winter months where possible, if required during summer use portable odour reduction sprays.
Maintenance of odour control system	Reduced capacity for period of maintenance risk of odour release if input peaks received	Medium	Control processes to minimise risk of high peaks of H_2S reaching odour control unit.	Carry out during winter months where possible, if required during summer assess need to use portable odour reduction sprays. Or use of temporary plant to maintain function. Reduce or replan site import schedule.

4.2.3. Abnormal conditions

Unanticipated breakdowns of equipment may occur which require unplanned and emergency maintenance. During periods of abnormal conditions, the normal odour standard and emission standards may not be able to be fully complied with, and/or there may be fugitive emissions of odour from parts of the Site where there are normally none. An exemption may be required for these operations, but mitigation ought to be documented in an odour risk assessment.

In the event of plant failures or emergency situations, this would raise an alarm on the Site's SCADA or telemetry systems, which will be reacted to by on-site or regional control room operators and FPM.

Depending upon the nature of the fault or emergency, a mechanical or electrical technician, both of whom are on-call 24-hours, would be contacted and will attend the Site as soon as practicable if required. Where the on-call technicians are already engaged upon other response work, there is the facility to access staff from other Southern Water geographic divisions, coordinated by the FPM. All faults, breakdowns and emergencies are logged electronically together with records of the action taken and the solutions reached.

If any waste arrives on-site that fails to provide correctly completed paperwork this is immediately reported to the Industrial Waste Services Team, who will decide if it can be accepted or rejected, as per Southern Water's Quarantine procedure.

Cake leaving Site is quarantined in any of the following circumstances:

- Hazard Analysis Critical Control Point (HACCP) critical limit breach
- Maximum Acceptable Concentration (MAC) sample failure
- Measured cake DS% on-site has dropped below 20% (the 20% has to be confirmed by second sample)

If any of these take place, then material will need to be quarantined in line with the Biosolids Assurance Scheme procedures.

If quarantining is required, then the quarantined digested material is placed in an empty bay on site. If a storage bay is not available, then the Biosolids Compliance Team should be contacted to arrange alternative storage.

When the breach is HACCP or MAC failure related, the cake will be held at the quarantine location

until compliant results are received from the laboratory provider. After bacti compliance is confirmed the relevant stakeholders will be notified by a certificate of compliance that cake from the site in

question can be recycled to land.

When the breach is related to DS% content of the cake being below 20% then the affected cake will be held in quarantine until alternative treatment or disposal can be arranged by Southern Water.

If, on sampling and testing, waste does not meet the specific pH limits in the Environmental Permit, then further advice is sought from the Industrial Waste Services Team, who will decide if it can be accepted or rejected. If rejected, then the Waste Rejection and Incident Note is completed, and the load is turned away.

Table 6 provides an example of a risk assessment for abnormal and emergency operations, which is reviewed and updated as required. The key contact group (the Environment Agency and Southern Water Customer Services) is informed, for high-risk activities, relating to odour, as soon as event occurs.

Table 6: Risk Assessment for Emergencies and Abnormal Operating Conditions

Event	Potential source of odour	Potential impacts	Odour risk	Measures to prevent or minimise risk	Actions to be taken
Breach of odour-controlled area (loss of untreated air to atmosphere)	Untreated air	Effectiveness of foul air extraction system compromised, risk of odour release until repairs completed	Medium	Minimise odour generating activities in area	Temporary containment pending full repair Ensure any interconnecting doors etc secure Minimise odour generating activities in area Assess odour impact with local survey, use portable odour reduction sprays if requirement identified
Breach of odour-controlled area sludge containing structure (loss of liquid sludge to environment)	spilt sludge	Effectiveness of foul air extract system compromised, risk of odour release until repairs completed, risk of odour from spilt sludge	High	Review sludge handling operations divert or minimise for duration of breach	Minimise area exposed to atmosphere and surround with portable odour sprays as appropriate
Breach of biogas system/ loss of biogas containment	Leaks from membrane	Uncontrolled release of biogas, risk of odour release until repairs completed Double membrane system with gas pressure between the membranes regulated and monitored. Methane detectors operated with alarms to alert operators of any leakage.	High	Minimise activities for duration of containment loss	Minimise sludge processing, divert to controlled release point via the combined vacuum and pressure release valve Surround with portable odour sprays as appropriate Diversion of biogas to CHP plant or Gas Burner Inspection maintenance and repairs as appropriate Record details and actions taken in site diary Report to the Environment Agency Emergency response from gas maintenance contractor

Event	Potential source of odour	Potential impacts	Odour risk	Measures to prevent or minimise risk	Actions to be taken
Failure of odour control plant	Untreated air	High risk of release of abnormal operational odours direct to atmosphere until repaired	High	Regular monitoring of equipment performance. Duty standby functionality. Standby capacity in the media beds. Emergency call to odour maintenance contractor. Control processes to minimise risk of high peaks of H2S reaching odour control unit.	Assess need to use portable odour reduction sprays Investigate and repair
Spillage of sludge on site	Liquid sludge	High risk of odour until cleaned up. Low volume spillage likely to go directly to drain which returns to the WTW for treatment.	High	Regular site inspections and monitoring the system through SCADA to detect any spills. Priority to clean up as and when detected. Pipe work and tanks undergo regular inspections. Planned maintenance on equipment	Stop source of spill and immediately wash down area Repair or bypass if possible. If incident prolonged use portable odour sprays until cleared. Record spillage and actions taken in site diary
Failure of sludge thickeners	Sewage sludge	Thickeners are enclosed and air extracted to OCU	Medium	Sludge dosed with polymer as required	
High pressure conditions in digesters	Release from Pressure Relief Valve	Biogas would be vented at high pressure to aid dispersion	Medium	Gas pressure is regulated and monitored	Diversion of biogas to Gas Burner Record details and actions taken in site diary
High pressure conditions in biogas holder	Release from Pressure Relief Valve	Biogas would be vented at high pressure to aid dispersion	Medium	Gas pressure is regulated and monitored.	Diversion of biogas to Gas Burner Record details and actions taken in site diary
Sludge reception unit roller shutter door failure	Release from behind the	Effectiveness of odour control measures	Medium	Minimise sludge reception activities until	Record details and actions taken in site diary

Event	Potential source of odour	Potential impacts	Odour risk	Measures to prevent or minimise risk	Actions to be taken
	shutter door in sludge reception	compromised, risk of odour release until repairs completed		repairs have been completed	
Failure of treatment process	Release from untreated sludge	Risk of odour from incomplete biological treatment until plant recovery achieved	Medium	Process monitoring and having closed covers. Immediate involvement of process support team to identify cause of process failure and aid recovery	Assess need to use temporary plants (including portable odour sprays spread around process units) Reduce imports of sludge as required
Prolonged hot and dry period	High strength / septic sludge	Potential for septicity to develop throughout the works. Issues with temperature sensitive components	High	Increased monitoring. Planned maintenance on equipment	Record details and actions taken in site diary
Very high rainfall	Flooding causing failure of odour control equipment	Flooding on site causing failure of equipment	Low	Increased monitoring. Installing new equipment above water levels, if known to be an issue on site Planned maintenance on equipment	Check the performance of the OCU and repair as required (check performance of sludge pumping stations, clearance of road drainage may be required following flooding)

5. Monitoring

5.1. Routine monitoring

As part of the general operation of the Site, control room operators monitor the SCADA outputs on a routine basis in order to ensure that individual process units on and off the Site are performing within specification. In the event of an out-of-specification plant item or an alarm being initiated, appropriate remedial actions would be instigated, and this is dealt with in subsequent sub-sections.

In the event of an out-of-specification plant item is operating beyond normal operating ranges, the process parameters are outside optimum or any other alarm being initiated, appropriate remedial actions would be instigated. Operatives will follow the Awareness Raising Instruction in Appendix A, and further measures are dealt with in subsequent sub-sections.

Any odour detected on-site during normal operation will be rectified using measures described in Table 7 to implement actions and prevention protocol. Routine sniff tests at the potential odour sources listed in Table 1 are in place to proactively mitigate odour reaching and exceeding the site boundary. If detected, investigation into odour source is undertaken and contingency measures listed in Table 7 are implemented.

Site personnel periodically assess the performance of odour containment and extraction systems utilising specialist equipment (such as but not limited to Optical Gas Imaging) to compare actual vs. designed air changes per hour, or to identify leakage points on systems. Any issues identified will be addressed and then a re-assessment performed to confirm issue resolution.

5.1.1. General duties

Operators shall carry out routine duties according to the relevant operational and maintenance schedules and procedures to ensure effective operation of plants. Specific tasks include:

- Perform daily, weekly and monthly maintenance tasks as scheduled;
- Make regular observation of critical processes and equipment including odour sensitive and odour control systems;
- Carry out routine performance tests and recording;
- Order and take deliveries of chemicals and other consumables; and
- Report performance issues or equipment problems promptly to Process Scientists, Mechanical & Electrical (M&E) technicians, Instrumentation, Control & Automation (ICA) technicians or Specialist Contractors as appropriate.

5.1.2. Duties for odour control

Operators shall carry out the following tasks:

- Undertake and record any inspections in the site diary, along with any actions undertaken.
- Investigate odour complaints following the Complaints Procedure as shown in Appendix G.
- Record actions taken in respect of odour investigations.
- Conduct twice daily sniff tests.
- Record and report incidents that caused significant odorous emission, and follow the Awareness Raising Instruction in Appendix A.
- Produce other records as required by the OMP.
- Undertake the Site odour monitoring and controls listed in Table 7.

Drivers delivering odours loads shall carry out the following tasks:

- Ensure loads are sealed and covered when arriving the Site and approaching the sludge reception.
- Covers to only be removed within the sludge reception building with the doors closed.
- Follow the spillage management procedures set out in section 5.1.6 if odour materials are spilled.
- Any wastes that are not authorised to be accepted must not enter the Site (as referred to in the Duty of Care).

Table 7: Site odour monitoring and detection processes

Potential Odour Source	Routine Actions Required	Risk pre-control measures	Monitoring Frequency	Attention Level	Action level	Preventative Action	Risk post-control measures
STW Inlet & pumping station	Check condition of sewage entering works for unusual odours	Low	Daily	Noticeable odour from sewage	Noticeable odour from sewage Follow the Awareness Raising Instruction, Appendix A.	Take sample and get analysed for BOD, COD etc. Check consented discharges	Low
Raw sludge reception	Avoid excessive turbulence (open tanks) Ensure doors are closed before discharging or unloading Connect foul air exhaust to hose before loading Ensure vehicles cleaned after loading/unloading. Hose down any spillage after each load/unload Clean contaminated wheels before leaving Site. Doors closed after unloading/discharging	Medium	Daily	Noticeable odour in tanker unloading area	Follow the Awareness Raising Instruction, Appendix A.	Check containment, hoses connected to exhaust. Follow the Awareness Raising Instruction, Appendix A.	Low
Transportation	Ensure only sealed or covered skips/trailers used. No removal of covers whilst parked waiting to load/unload Monitor odours during cake loading	Medium	Every week day	Noticeable odour from vehicle	Follow the Awareness Raising Instruction, Appendix A.	If necessary, implement special odour mitigation measures to reduce the risk of odour nuisance. Make contractor aware of requirements in OMP	Low
Sludge holding tanks	Minimising retention time Monitor odour levels around tank	Medium	Daily	Noticeable odour from tank	Noticeable odour from tank	Increase sludge treatment rate to reduce retention Hose spillage's	Low

Potential Odour Source	Routine Actions Required	Risk pre-control measures	Monitoring Frequency	Attention Level	Action level	Preventative Action	Risk post-control measures
					Follow the Awareness Raising Instruction, Appendix A.	Increase de-sludge ops up stream Run odour masking system (Short term)	
Sludge thickening/ blending	Minimise retention prior to thickening, dewatering or digestion; Discharge sludges and liquors, including imported sludges, to covered tanks, with displaced air passed through an Odour Control Units; Prevention of sludge accumulation in off-line tanks; and Proactive identification of potential problems and tankering of sludges to other sites with odour abatement.	Medium	Daily	Increased odours from area	Noticeable odour from area and/or complaint received Follow the Awareness Raising Instruction, Appendix A.	Quality checks Undertake process in an enclosed building with appropriate odour abatement tankering of sludges to other sites without odour abatement	Low
Secondary Digesters	Check for strong and uncharacteristic odours	Low	Daily	Investigate unusual odours	Investigate and report strong/unusual odours to FPM and Scientist Follow the Awareness Raising Instruction, Appendix A.	Regular checks and investigative action	Low
Centrifuge	Check for strong and uncharacteristic odours	Low	Daily	Investigate unusual odours	Investigate and report strong/unusual	Regular checks and investigative action	Low

Potential Odour Source	Routine Actions Required	Risk pre-control measures	Monitoring Frequency	Attention Level	Action level	Preventative Action	Risk post-control measures
					odours to FPM and Scientist Follow the Awareness Raising Instruction, Appendix A.		
	Check polymer dosing	Low	Daily	Polymer dosing rates exceeds set limits	Polymer dosing exceeds upper or lower threshold limits Follow the Awareness Raising Instruction, Appendix A.	Take remedial action to return polymer dosing to correct rate	Low
Gas flare stacks	Complete biogas combustion should give clean emissions with blue or non-visible flame	Low	Daily	Occasional orange flame or black smoke visible	Constant orange flame or black smoke visible Follow the Awareness Raising Instruction, Appendix A.	Routine contractor checks or maintenance to clean nozzles of carbon build-up	Low
Whessoe valves on digesters	Check they are clear from foam residue	Low	Daily		Not seating correctly Follow the Awareness Raising Instruction, Appendix A..	Engage service contractor to resolve any problems	Very low
OCU	Check pH Check media condition	Medium	Daily	pH<8.9, ORP<750	pH >3 Sudden drop in performance Follow the Awareness Raising	Ensure media is damp Change media as per schedule	Low

Potential Odour Source	Routine Actions Required	Risk pre-control measures	Monitoring Frequency	Attention Level	Action level	Preventative Action	Risk post-control measures
					Instruction, Appendix A.		
Whole STC site	Doors to operational buildings will remain closed and hatches will be latch closed.	Medium	Daily	Increased odours	Follow the Awareness Raising Instruction, Appendix A.	Doors and hatches will only be opened for minimum periods while access is required for planned operational and maintenance activities.	Low

5.1.3. Visual and olfactory inspections

There will be a daily walkover survey incorporating a “sniff-test”. Sniff testing will be undertaken at the operational area boundary, starting at an upwind location. Where possible, the sniff testing will be carried out by a person who is not accustomed to the odour generated by on site activities i.e. a person who has recently entered the Site boundary such as a person working at the beginning of their shift.

During each walkover, the person undertaking the “sniff-test” must stand nearby to each potential source of odour identified in Table 1 and at least one location for the north, south, east and west of the site boundary (as close to the perimeter as practicable) and note on a map the location of the perimeter checks. Checks in each location should be undertaken for at least 20 seconds and the monitoring form completed, see Appendix H.

During this walkover, over a period of approximately 30 minutes, perceptive “sniff-testing” of the ambient atmosphere is conducted and observations are recorded on a daily check sheet. If odour is likely to exceed the site boundary and, therefore, has potential to cause a complaint, the procedure in Appendix A will be followed.

The results of the sniff test will be recorded in the site diary or an appropriate form, which will be sent to customers services and the management team. Sniff testing is designed to detect any abnormal plant odour emissions. In addition, it is important to document any potential contribution from other off-site sources of potential odour nuisance located outside of the Site boundary.

In addition to Olfactory monitoring, all regular visitors to the Site are contacted to ask them to remain alert to potential odour issues at the Site. A notice specifying this has also been added to the Site Notice Board. In the event that visitors detect significant odours at the site they are required to contact the Site Manager or the Waste Management Team. Upon receipt of this information, the issue will be added to Southern Water’s Environmental Audit System and actions allocated to address the issue within suitable timescales. This exercise, a requirement of the Environmental Permit for the site, not only allows for the early detection of a problem if one should occur, but additionally gives an indication as to the effectiveness of any odour control measures implemented at the site.

In the event that abnormal plant odour is detected, the source of the odour will be investigated, as appropriate, and remedial action taken, as necessary, following measures addressed in the OMP. The approximate extent of the downwind odour will be established to determine whether this reaches the downwind post and rail fence boundary. During maintenance and/or emergency conditions which are likely to result in release of odours, the frequency of “sniff-testing” will be increased to twice daily, or more frequently as appropriate.

Actions for remediation will be assigned by the FPM following the issue of an odour record. Once actions are completed, additional sniff tests at least once a day for minimum three days at the source of the odour will be carried out to determine whether further actions are required. Whereby odour is no longer detected the record will be closed. If odour remains the OMP and maintenance records will be reviewed to determine alternative actions to be taken, this process will continue until the odour issue is no longer on-going.

5.1.4. House keeping

Good housekeeping improves efficiency, creates a pleasant environment to work within and makes the Site less likely to cause odour nuisance. Operators have a responsibility to keep sites clean and tidy. The “Top 10 Tips to Minimise Odour Impact” will be communicated to the Site.

- Ensure that your odour control plants are fully operational and maintained
- Keep all doors and hatches latch closed at all times to contain odour
- Clean up debris / spillages as soon as practicable
- Monitor sludge levels within Primary Treatment to avoid septicity

- Hose down and clean process tanks / channels after draining
- Monitor digesters / Whessoe valves and gas flares
- Report any odour activity caused by Contractors to your Senior Manager
- Where possible, don't undertake odour sensitive work if it cannot be completed before or continued during the weekend
- Follow business procedures and respond to all odour complaints
- If you See it, Smell it, do something about it (Don't ignore it)

Additional reminder signs will be displayed in prominent positions at the Site where open-doors, covers and skips present an odour risk and include:

- Keep all doors shut
- Keep all covers / lids latch closed
- Clean up spills immediately using disinfectant if required
- Monitor odour control systems
- All rubbish / waste to be disposed of immediately to relevant skip

5.1.5. Meteorological observations

Southern Water will record daily in the site diary the following meteorological data:

- Air temperature
- Relative Humidity
- Wind Direction
- Wind Speed
- Rainfall

Meteorological data will be reviewed in advance of activities that may present an odour concern, such non-routine activities such as emptying of sludge cake, to consider suitable measure to limit odour. For example, time such activities when wind speed is low (if possible).

Meteorological data will also be available to complete odour records to establish potential trends. Wind direction, wind speed and temperature will be sourced online from the Met Office or onsite weather station, if available.

5.1.6. Spillage management

All staff on-site have a responsibility to maintain good housekeeping and clear spillages at the earliest opportunity to prevent odour. If a spillage occurs from a process, operators will carry out clean up as soon as possible (using disinfectant, where necessary). If a spillage is caused by a lorry or tanker, the driver is responsible to clean up before leaving the Site. If a lorry or tanker left a spillage behind, operators will log and report any incident observed. The driver or company involved will be asked to return to the Site immediately to clean up. Significant spillage incidents will be recorded in the site diary.

Key areas at risk from spillage (and the control measures):

Sludge reception area

- Tanker drivers are responsible for cleaning up spillages after every load. A hose is supplied.

Cake bay area

- Drivers are responsible for cleaning up spillages after every load.

Inlet works

- Spillages around the inlet area must be cleaned up immediately.

Digester

- Anti-foam used to suppress foaming of sludge within the digester or dewatering process.

Entire site

- Routine site inspections by FPM and site manager – a minimum of once per month.

5.1.7. Accident management

The Site operates under a site-specific Accident Management Plan, and associated Site Emergency Incident Plan, to prevent and manage environmental related accidents. The site-specific AMP (790101_MSD_AMP_GOD November 2024) includes a description of nominated key personnel and their responsibilities, emergency response procedures, contact details of internal contacts (Works Manager, Team Leader, Process Technician, Regional Control staff and key H&S staff), national and regional (where appropriate) contact details of emergency services and environmental regulators.

The AMP is distributed to key staff, to supervise the implementation of the Plan, and shared with external contacts (emergency services and the Environment Agency). The AMP is accompanied by a site plan that identifies the locations of designated storage areas (e.g. for chemicals, flammable compounds, bottled gas etc), spill kits, firefighting equipment, site entrances and access routes, gas bags and gas pipeline routes, gas isolation valves, major electrical equipment and possible isolation points, and other significant plant items.

The key procedures relating to environmental accident and incident management are set out in Southern Water's ISO14001 accredited EMS.

The relevant procedures in the EMS relating to environmental accident and incident management includes:

- EMS234 – Chemical and oil storage
- EMS240 – Nuisance management
- EMS260 – Pollution prevention
- EMS275 – Emissions to air
- EMS308 – Site housekeeping checklist
- EMS340 – Nuisance management procedure
- EMS341 – Air quality/odour management procedure
- EMS360 – Pollution prevention procedure
- EMS363 – Procedure for managing oil spills on sites
- EMS364 – Lime spill management
- EMS381 – Operational waste procedure
- EMS388 – Waste permit breaches and near miss reporting procedure

5.2. Monitoring of the odour abatement system

Table 8 identifies the parameters and monitoring requirements in relation to the odour control system that needs to be undertaken at the Site.

Table 8: Parameters and monitoring requirements in relation to the odour control system to be undertaken at the Site

Emission point type	Parameter	Monitoring frequency	Monitoring standard or method
Channelled emissions to air (from OCUs)	Hydrogen chloride	Once every 6 months	Southern Water are to initially undertake characterisation of emissions from the odour control units, in line with BAT 3, to demonstrate if TVOC and HCI are present in the waste gas stream. If TVOC and HCI are identified as relevant in the waste gas streams Southern Water will monitor these emissions in line with BAT requirements and the Environmental Permit.
	TVOC	Once every 6 months	
	Ammonia	Once every 6 months	As per design and manufacturer's specifications or otherwise as specified in the Environmental Permit
	H_2S		Maintenance undertaken by service provider or otherwise as specified in the Environmental Permit
	Efficiency checks	Annual	Annual maintenance undertaken by service provider, or otherwise as specified in the Environmental Permit
	Gas stream flow	Continuous	As per design and manufacturer's specifications and SCADA, or otherwise as specified in the Environmental Permit
	Overall operation, including air circulation	Daily	Visual assessment or otherwise as specified in the Environmental Permit

Monthly service visits for the OCU's are undertaken by ERG. A service visit report is issued after each visit which identifies priority actions required, other faults and comments as well as condition monitoring and observations. A copy of an example site visit report for October 2023 is presented in Appendix E.

6. Training

6.1. Staff training

Southern Water provides a comprehensive programme of Health and Safety and operational awareness training which is carried out for new starters and as an ongoing programme of refresher courses.

All new starters receive a comprehensive programme of health and safety training and on-going refresher courses. All staff receive training to cover operations at the Site. On the job training is provided to all staff through a rolling training programme.

Southern Water has developed its own Competency Management System (CMS), which identifies the training required for different roles on site.

Training on the following technical subjects relevant to odour control will be provided to operational staff according to needs and site requirements:

- Wastewater treatment processes.
- Sludge treatment processes.
- Checks for odour control equipment.
- Risk assessment of odour sensitive maintenance activities.
- Deployment of temporary odour control measures, for sites where these are present.
- Site requirements in relation to the Odour Management Plan.

The training needs of each individual are assessed during personal performance appraisal and reviews.

Formalised training for all grades of staff on the Site is undertaken relevant to job role. All staff are made fully aware of the need to be constantly vigilant with regard to site odour control and management procedures.

Records for training received by all staff are held electronically. Records of environmental training are kept in the Southern Water EMS.

Relevant components of the OMP should form part of the induction process for all site staff and contractors, to ensure they are aware of the procedures and responsibilities in relation to odour.

7. Communication

The objective of communication in odour management is to raise the profile and awareness of the importance of odour control and to keep stakeholders informed of odour incidents, and management practices. Appendix A provides an example of an awareness raising instruction.

7.1. Internal communication

Odour control will be regularly included by FPMs as an agenda item for team meetings.

Statistics of odour complaints and progress of actions to address odour issues will be updated monthly and communicated to Wastewater and Network Area Managers and other key personnel with odour management responsibilities.

7.2. External communication

Southern Water is committed to working closely with stakeholders to achieve sustainable reduction of odour nuisance. Southern Water is committed to making available relevant records and information to regulatory and local stakeholders, where appropriate, and communicating and engaging, in advance, with stakeholders where appropriate, any relevant activities that may generate odours.

7.3. Reporting

Southern Water will send all reports and notifications required by the Environmental Permit, or upon request by the Environment Agency, within the given timescales.

7.4. Complaints management and resolution procedure

All customer complaints about odour are entered on the Southern Water Customer Services Management System (CSMS), the details of which are detailed in Appendix G.

8. Reviews and Auditing

8.1. Reviews

8.1.1. Periodic reviews

A review of this OMP will be carried out by the FPM annually, unless agreed otherwise, and in accordance with the Environment Agency's H4 guidance (or current existing guidance should this change).

8.1.2. Ad-hoc reviews

Ad hoc reviews will occur when any significant changes in operational practice are made and on completion of any significant capital scheme which could impact the OMP.

8.2. Auditing

The regulatory authorities, where required, will be provided with reasonable access, in order to audit the implementation of the OMP upon request.

8.3. Records

The following records will be maintained:

- Record of complaints are stored on CSMS.
- Reports of investigations are held electronically.
- Odour issues which require a capital scheme to be raised to resolve them.

A. Awareness Raising Instruction

Activities that may result in an odour nuisance

All Process Operations staff must ensure that if a failure of plant, equipment or a system occurs, which may lead to complaints from customers, that the RCC/Customer Services are informed in a timely manner.

Listed below (but not limited to) are some examples of the type of incident that are to be reported.

- Odour control plant failure
- Spillage of wastewater/sewage
- Spillage of sludge or sludge cake
- Failure of chemical dosing systems
- Odour monitoring equipment failure
- STC flare stack ignition failure

If the Operational Control Centre or Customer Services are made aware of the problem, it means that they give a more constructive response to the person making the enquiry/complaint.

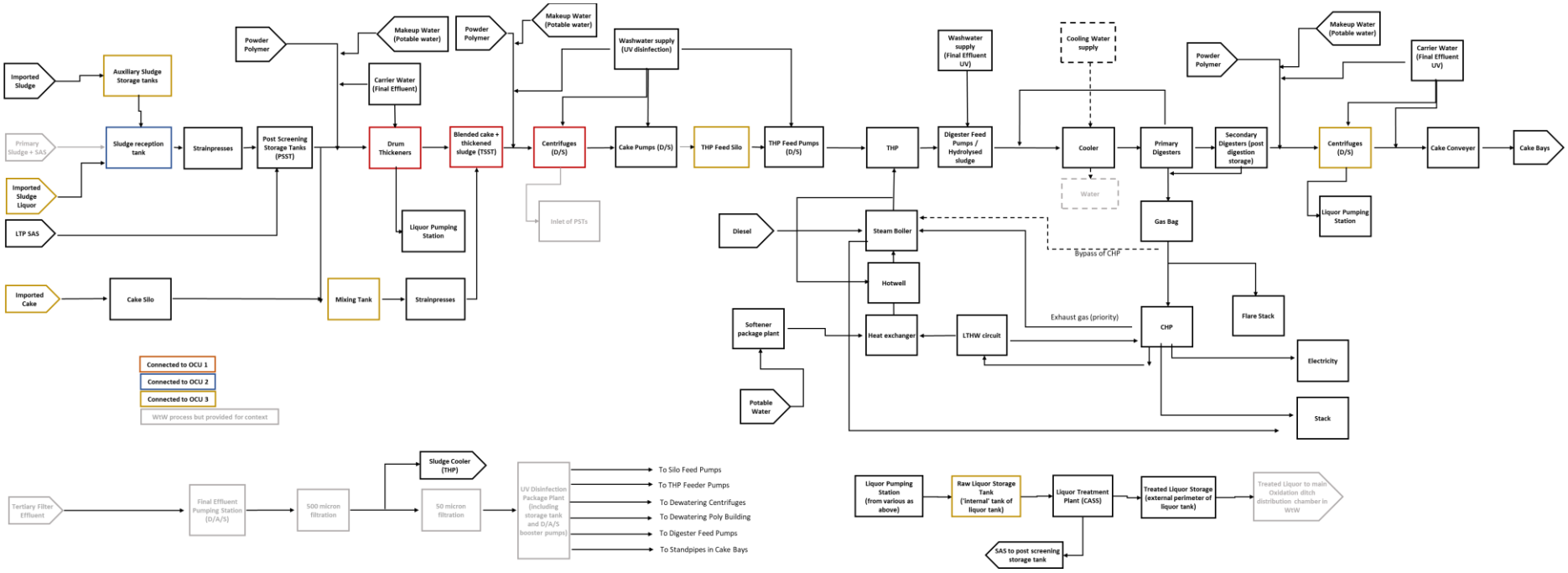
Please contact the OCC and request information is passed to the Customer Contact Team and added to the Operational Business Report.

Every effort must be made to carry out the above request, a short phone call to share information with colleagues dealing directly with the Customer will greatly help them deliver a more valid and informed response.

Be proactive, not reactive!

B. Odour Schematic

Source: 790101_MSD_Schematics_GOD November 2024



C. Waste Codes

As per Environmental Permit EPR/WP3695HW for waste to be accepted to the Site.
It is requested that the annual quantity of indigenous sludge and liquid sludge imports to be accepted is 328,233 wet tonnes.

D. Odour checklist

This is a generic checklist applicable to all sites and aspects that are not applicable to a particular site should be ignored.

Area of works	Potential issue		Follow up action
Odour management plan (OMP)	Is the Site operated according to the OMP?	YES / NO	Make changes to site operation to minimise odour production and release
Site - general	Are all covers in place?	YES / NO	Put back covers and close hatches as required
	Are all access hatches closed?	YES / NO	
Inlet works	Is the crude sewage black and/ or smelly?	YES / NO	Check incoming sewage for septicity (in communication with Operations Support Team)
			Check for potential septic discharges
Screening	Are there any spilled screenings?	YES / NO	Clean up spills
	Are the compacted screenings clean	YES / NO	Optimise operation of screenings hand ling equipment
Grit removal	Is there any spilled grit?	YES / NO	Clean up spills
	Is the grit clean	YES / NO	Optimise operation of grit handling equipment
Screening and Grit Skips	Do the screening skips smell?	YES / NO	Check that screenings are clean and free from organic material;
	Do the grit skips smell?	YES / NO	Check that grit is clean and free from organic material; optimise grit cleaning system if needed
	Are the screenings skips too full?	YES / NO	Empty skip(s)
	Are the grit skips too full?	YES / NO	Empty skips as needed
Storm tanks	Have the storm tanks been left full following a storm?	YES / NO	Empty and clean out tanks as needed
	Is there any sludge left in the bottom of the tanks?	YES / NO	
Primary tanks	Are the tanks black and / or smelly?	YES / NO	Check inlet for septicity
	Are the tanks gassing?	YES / NO	Check levels of sludge in the tank and increase de-sludge rate if needed.
	Is there excess scum on the surface	YES / NO	Remove excess scum
Biological filtration	Are the aeration vents blocked?	YES / NO	Unblock aeration vents

Area of works	Potential issue		Follow up action
	Is there any ponding?	YES / NO	Consider increasing flushing rate and/ or forking media
Activated sludge	Do the dissolved oxygen levels in the aeration lanes match the setpoint(s) ?	YES / NO	Adjust dissolved oxygen levels as requ ired
	Do the MLSS fall within the timelines for the Site?	YES / NO	Increase / decrease RAS rate as needed
Final settlement tanks	Are the tanks black and/or smelly	YES / NO	Check inlet of tanks for septicity
	Are the tanks gassing?	YES / NO	Check levels of sludge in the tank and increase de-sludge rate if needed
	Is there excess scum on the surface	YES / NO	Remove excess scum
Tertiary treatment	Any there any site-specific issues?	YES / NO	Investigate and rectify
Sludge treatment	Are there any sludge spills?	YES / NO	Clean up spills
Imports and Exports	Does the tanker filling and emptying process cause significant release of odour?	YES / NO	Investigate whether the process can be modified to reduce odour emissions
			Consider changing timing of tanker operations to reduce nuisance potential
Sludge Thickening and Storage	Are all covers in place?	YES / NO	Put back covers and close hatches as required
	Are all access hatches closed?	YES / NO	
	Are the doors to sludge treatment buildings / sludge cake stores kept closed?	YES / NO	Close doors as required
Anaerobic Digestion	Is all excess gas flared?	YES / NO	Contact contractor to investigate
	Is flare stack ignition immediate and reliable?	YES / NO	
	Are the Whessoe valves / pressure relief valves operating prematurely?	YES / NO	
	Are the seals on the condensate trap s intact?	YES / NO	
Odour abatement	Is there any detectable odour downwind of the stack?	YES / NO	Check OCU using additional checklist
	Is the fan(s) working?	YES / NO	Arrange for fan to be repaired
General	Are there any outstanding actions fro m a previous investigation?	YES / NO	Complete actions

E. ERG Odour Control Unit Service Report

ERG (Air Pollution Control) Ltd
Bridge House Environmental Centre, Five Oaks Road,
Slinfold, Horsham, West Sussex, RH13 0QW, UK
tel: +44 1403 292000 e-mail:maintenance@ergapc.co.uk web:www.ergapc.co.uk

Visit

Service Visit Report – October 2023

Project name	Southern Water Maintenance	Project number	AM7143

Visited	Goddards Green	**Report By**	[redacted]
Company	Southern Water	**Tel**	
Contacts	[redacted]	**Mobile No**	
		Date	25/10/2023
		Copy To	
		Reviewed by	HMcW 10/11/2023
Purpose of Visit	**Maintenance and Inspection of OCU 2 (Carbon Filter)**		

1. Actions required:

1.1. On this visit, as previous in April 2023, the differential pressure across the carbon filter is very high, and airflow vey low suggesting that the carbon has become blocked and will need replacing. **ERG have quoted for media change.**

2. Other faults and actions required:

2.1. None

3. Other comments:

3.1. On arrival fan 2 duty, fan 1 standby selected. Both operating in AUTO. Both tested, run okay.

4. Condition monitoring:

Condition monitoring	units	Oct 23	April 23	Nov 22	May 22	Design
Airflow volume rate at Ø440mm OCU inlet	m^3/h	1,504	1,279	2,644	1,433	TBC
Carbon filter diff. pressure	KPa	1.57	1.61	1.44	0.42	TBC
Calculated OCU H_2S reduction efficiency	%	No load	No load	No load	No Load	TBC

Carbon filter inlet (Ø440mm): Pressure = 1.59 kPa
Velocity = 2.75 m/s
Calculated volume flow = 1,279.1 m^3/h
H_2S = <0.1ppm (Gastec 4LL)

Carbon filter outlet: Pressure = 0.012 kPa
Carbon filter calculated ΔP = 1.57 kPa
H_2S = <0.1ppm (Gastec 4LL)
H_2S reduction efficiency = No load

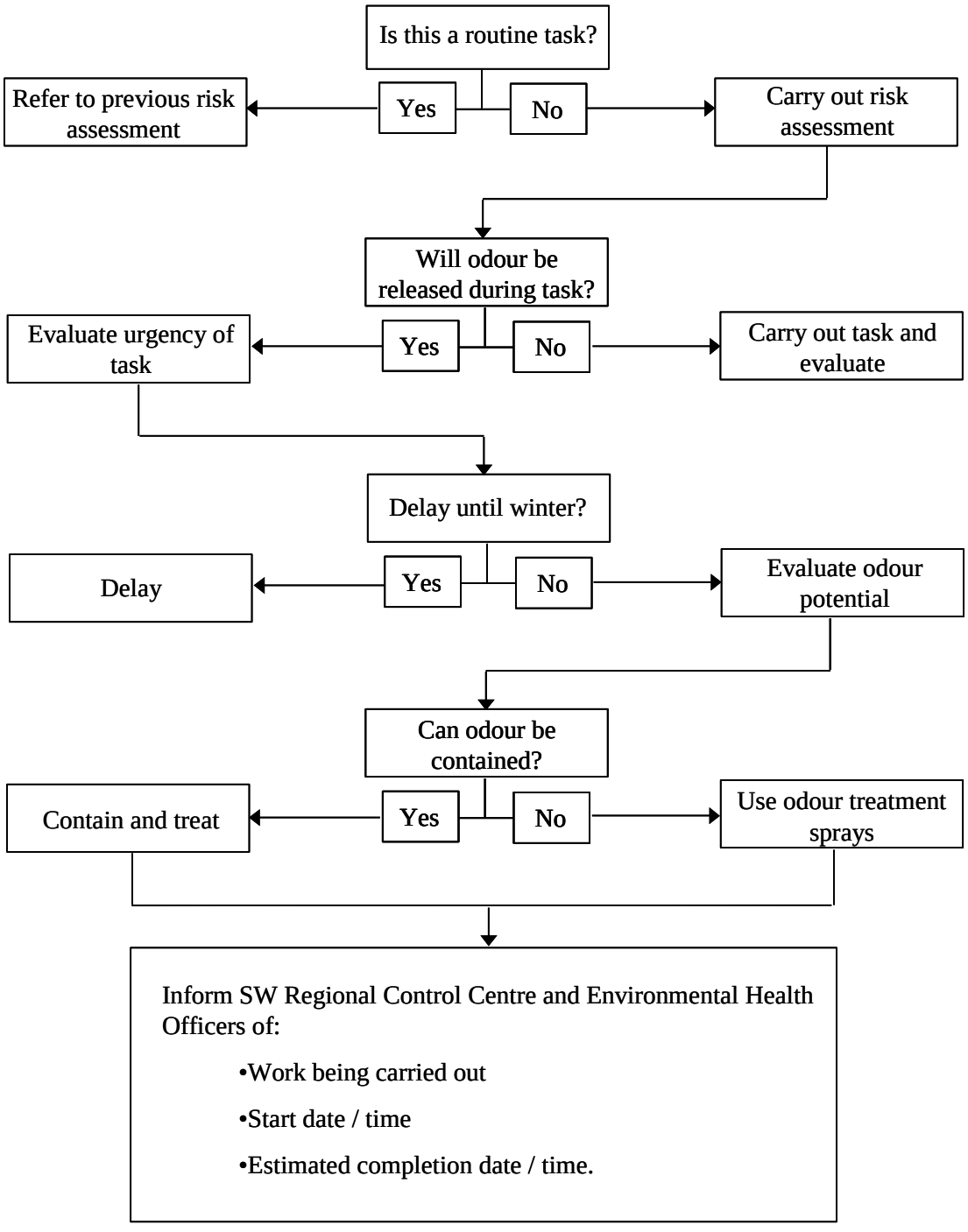
- Fan 1 run hours = 44,991 hrs @ 9.6A (last visit 44,339 hrs)
- Fan 2 run hours = 43,522 hrs @ 9.9A (last visit 41,646 hrs)

- Carbon filter ΔP gauge = 100 mmWG
- H_2S inlet monitor = 0.1 ppm @ 11.00
- H_2S tape monitor = 0 ppb.

Observations

- Belt size: SPA1800 / 2 per motor / 2 motors on unit

F. Risk Assessment Flowchart



G. Complaints Management

G.1 Management of odour complaints

G.1.1 System overview

Southern Water operates an integrated process to receive and record odour complaints by members of the public. It is designed to ensure complaints are dealt with promptly and consistently and a comprehensive record is kept. The following system ensures that these objectives are achieved:

- A unique and recognised point of contact for members of public and Southern Water staff to report odour incidents and issues
- A straightforward process for operational staff to investigate and mitigate odour issues after a complaint is received.
- A recognised point to provide feedback to customers
- A mechanism to review recent odour complaints and actions
- A database to capture trends and potentially serious problems to guide future improvement

The following sections describe how odour complaints are received and handled. This procedure may be augmented by local arrangement to provide a tailored service to meet local council requirements.

G.1.2 Receipt of odour complaints

The Customer Services is the first point of contact for members of the public to report odour incidents during normal working hours.

The Regional Control Centre can deal with odour complaints out of hours.

When a member of the public phones in to report odour from a Southern Water site, relevant information will be taken from the caller, including name, phone number, address, time, duration, the characteristics of the odour experienced and whether the customer would like to receive a feedback by phone. Each call is assigned a unique CSMS number. The information is entered into the CSMS Database under a designated sort code.

Verification of the complaint is made through identification of the caller's property and the Southern Water site in question on electronic GIS maps. Following verification, a CSMS summary sheet is generated and transmitted immediately to the relevant FPM or the Regional Controller.

Where odour complaints are received directly by other Southern Water staff, the receiver of the call will contact Customer Services to log the call on behalf of the caller. The caller will be provided with the telephone number for Customer Service for future use.

All CSMS records of odour complaints are stored in the Corporate Information System to ensure transparency, visibility and consistency of the information.

G.1.3 Follow up actions

Initial action by Field Performance Manager

The FPM or Regional Controller upon receiving a CSMS summary of odour complaint will investigate the issue as soon as practicable. Based on the sensitivity of the Site, the investigation may range from remotely checking the Site alarms to the assignment of an operator to conduct a site investigation. Site investigation will be guided by and recorded on a site odour incident form if available or on a generic Odour Risk Checklist. Where possible, actions will be undertaken by the operator to improve control of odour emission. Following the investigation, the FPM or the investigator

will forward the findings to the Customer Liaison Officer during normal working hours at other times. If required in the site specific OMP, FPM will also produce reports to the regulator within an agreed time period.

Feedback to the customer from Customer Liaison Officer

Unless the customer had indicated that they would not wish to receive a feedback, a feedback will be provided at the earliest opportunity by the Customer Liaison Officer. The Customer Liaison Officer will then close the CSMS call.

Action by Process Scientist

If requested by a FPM, a process scientist will carry out a further investigation where a site has received reoccurring odour complaints. Process scientists will advise FPMs of available options to mitigate odour, e.g., re-adjusting sludge disposal activities or process parameters. Process scientists will provide technical support if such measures are adopted. Process scientists will produce a written report for each investigation and follow up any further actions.

Action by Southern Water Managers

Managers will carry out regular reviews of odour complaints to all Southern Water sites and inform relevant FPMs where a trend is developing. Southern Water Managers will deploy additional monitoring resources where necessary to support the resolution of significant odour issues.

H. Odour Monitoring Form

Date:	
Name:	**Visitor or staff:**

Intensity
0 – No odour
1 – Very faint odour
2 – Faint odour
3 – Distinct odour
4 – Strong odour
5 – Very strong odour
6 – Extremely strong odour

Receptor Sensitivity
Low (e.g. footpath, road)
Medium (e.g. Industrial or place of work)
High (e.g. housing)

Location	**Time**	**Weather conditions (dry, rain, snow etc)**	**Temperature (very warm, mild)** *Use degrees when known*	**Wind strength (light, strong)** *Use Beaufort scale if known*	**Wind direction (e.g. SE)**	**Intensity** *(See above)*	**Duration**	**Constant or intermittent in this period or persistence**	**Receptor sensitivity** *(See above)*	**Is source evident?**	**Any other comments or observations**