

Budds Farm STC

Odour Management Plan

790101_ERA_OdourMP_BUD

January 2025

V4



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1. Odour Management Plan

1.1. Introduction

The Odour Management Plan (OMP) for Budds Farm Wastewater Treatment Works (WTW) and 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 that operations shall comply with. It demonstrates how odours shall be managed and controlled to prevent odour impacts from activities during normal operation and during abnormal events.

The OMP has been produced in accordance with the Environment Agency's H4 Odour Management guidance¹, Best Available Techniques (BAT) Reference Document for Waste Treatment² and Appropriate measures for the biological treatment of waste³.

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-to-day 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

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 (2024) Biological waste treatment: appropriate measures for permitted facilities Available online at: <https://www.gov.uk/guidance/biological-waste-treatment-appropriate-measures-for-permitted-facilities/1-when-appropriate-measures-apply>

- 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)
- 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

The Site is located on an industrial estate and is bordered by Storehouse Lake to the south and west and screened in all directions by trees. The site was built in 1953 and serves a population of approximately 380,419 from the two sub-catchments of Portsmouth and Havant.

Site address: Southmoor Lane, Havant, Hampshire, PO9 1JW.

National grid reference: SU 70722 05539

The Site layout and location plan is shown in document reference 790101_MSD_SiteLayoutPlan_BUD January 2025.

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: Control of odour emissions through pre-acceptance, acceptance and sorting the waste addressed in document reference 790101_WasteAcceptance_BUD January 2025
- BAT 34: Reduce channelled emissions, addressed in Section 4.1.
- BAT 53: Reducing emissions of hydrochloric acid (HCl), ammonia (NH₃) 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 Regulations (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, D5, S2 and U6 exemptions. The site also holds two environmental permits: EPR/AP3392HG for a biological treatment facility (A23) which incorporates T21 exemption at greater volumes for accepted wastes; and EPR/ZP3235XJ for a Tranche B specified generator and an existing Combined Heat and Power (CHP) unit (excluded generator) utilising biogas to generate electricity.

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. It also receives sludge cake and tankered wastes derived from the wastewater treatment process.

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.

Acceptance of liquid sludge waste (digestate) at post digestion, for dewatering.

Post digested liquid sludge (digestate) from other Southern Water sites enters at the post digestion tanks, for dewatering at the centrifuges. The process aligns with the above description of the anaerobic digestion from the post digestion tanks onwards.

2.2. Summary of the STC components

Currently the Site accepts indigenous sludge and imported sludge cake derived from the wastewater treatment process. On average, per day the Site accepts 21 tankers containing sludge, cess, septic, and chemical toilet waste. This consists of approximately nine tankers per day of liquid sludge imports, and an average of 12 tankers of imported cess, septic and chemical toilet waste. All imported liquid waste and sludges are transported in enclosed tankers. The site also accepts tankered trade waste.

Below is a brief summary of the components for the Site. A process flow diagram can be found in Appendix B.

2.2.1. Sludge treatment at the STC

The sludge treatment centre (STC) at Budds Farm treats imported and indigenous liquid sludge and imported sludge cake.

STC Building

All activities concerned with the reception of imported sludge are housed within the STC building from which air is extracted to the odour control system to prevent the uncontrolled release of odours and bioaerosols and reduce the likelihood of exposure of receptors to these. Similarly, each vehicle

delivery bay associated with the process inputs and waste arisings are enclosed units within the building, from which the air is extracted to the central odour control unit.

Reception and Screening of Indigenous and Imported Sludge and Imported Sludge Cake

On average the Site accepts 21 tankers containing sludge, cess, septic, and chemical toilet waste. This consists of approximately nine tankers per day of liquid sludge imports arriving at the Site, and an average of 12 tankers of imported cess, septic and chemical toilet waste per day is accepted at the Site. All imported liquid waste and sludges are transported in enclosed tankers. The site also accepts tankered trade waste.

Imported raw sludge cake is discharged into the raw cake reception point and then blended with surplus activated sludge (SAS) from the 2 No. SAS tanks (979m³ each) before being pumped to the 2 No. thickened sludge storage tanks (866m³ each).

The fraction of SAS not blended with imported raw cake is thickened by 5 No. drum thickeners before being stored in the 2 No. thickened sludge storage tanks (866m³ each).

Imported liquid sludge is received in 1 No. sludge reception tank (142m³). Indigenous sludge is transferred to 2 No sludge holding tanks (156m³ each). It then joins the imported liquid sludge as it is pumped through 2 No. strain presses and stored in 2 No. screened sludge storage tanks (135m³ each).

Deliveries of sludge cake and liquid sludge occur at any time in the week (24 hours a day, seven days a week).

Sludge cake and liquid sludge is imported from other sites, indigenous sludge is from Havant, and other catchments in emergency conditions. Sewage reaches the Site through a network of gravity sewers.

Sludge Storage

Sludge is stored in various cylindrical storage tanks.

Imported liquid sludge is received in 1 No. sludge reception tank (142m³). It is then pumped through 2 No. strain presses and stored in 2 No. screened sludge storage tanks (135m³ each).

Indigenous sludge is transferred to 2 No sludge holding tanks (156m³ each). It then joins the imported liquid sludge as it is pumped through 2 No. strain presses and stored in 2 No. screened sludge storage tanks (135m³ each).

All storage tanks are enclosed and connected to the OCU or biogas system. The sludge storage tanks are mixed using enclosed macerator pumps located outside the digesters. Therefore, there are no mechanical parts inside the tanks requiring access at regular intervals for maintenance purposes. Routine maintenance of the tanks and external mixing pumps would be subject to the Site odour risk assessment.

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.

Indigenous sludge and imported liquid sludge is thickened in 2 No. drum thickeners, before passing to 2 No. thickened sludge storage tanks (866m³ each), and fed to the anaerobic digesters. After digestion it is stored in 2 No. post digestion storage tanks (866m³ each).

Digesters

There are 5 No. anaerobic digesters (2750m³ each) operating between 33 to 38°C. The temperature is automatically maintained by heat exchangers. All tanks capable of producing biogas are sealed and connected to the biogas system. Biogas produced from these tanks are stored within 1 No. biogas holder (2100m³) before being combusted at high temperatures within 2 No. CHPs (1 No. 5.04MWth and 1 No. 2.59MWth) where it is used to generate heat (i.e. to control the temperature of the digestion process) and electricity for the Site. Excess gas is burned in the 1 No. flare stack.

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 1 No. biogas holder (2100m³), 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. Alarms and ameliorative actions are noted in the Site log. The performance of the digesters is monitored daily, through the sampling of inlet and outlet sludge quality.

Combined Heat and Power Unit (CHP)

2 No. CHP engines (1 No. 5.04MWth and 1 No. 2.59MWth) are installed at the Site, designed to use biogas. The biogas produced in the digestion process is fed to the CHP unit and standby boiler (powered by biogas and natural gas) 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. 3 No. dual fuel standby boilers are available when the CHPs are offline (although 1 No. boiler is currently out of service).

Post Digestion

Digested sludge is stored in 2 No. post digestion sludge tanks (866m³ each) prior to being dewatered by 3 No. centrifuges.

Dewatering

Digested sludge is dewatered by 3 No. centrifuges. Lime is injected to digested sludge during dewatering which enables digested sludge cake to be disposed to farmland directly from 1 No. cake storage silo (220m³).

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

SAS and raw sludge thickener filtrate, centrate from the dewatering centrifuges and biogas condensates all gravitates to the liquor sump. The sludge liquor is then routed to the Havant PST flow distribution chamber.

Cake storage

Imported sludge cake is first discharged into 1 No. cake silo (220m³), where it is stored until it is unloaded into trucks and transported offsite for use on agricultural land. The cake silo fills in approximately six hours; a maximum of eight lorries per day remove the treated cake. There is a small alternative cake bay available on-site for use in emergencies.

Odour control equipment

All tanks and key equipment are covered or enclosed and connected to either the biogas system or OCU.

Odour from the main sludge treatment building, containing the sludge cake reception and primary sludge treatment processes is controlled via 1 No. Odour Control Unit (OCU), a chemical scrubber system with total flow rate of 53,100 m³/hour (there is no carbon filter). Treated odour streams are discharged into the environment through OCU stack and are monitored hourly to ensure the absence of odorous compounds.

A Cobra Odourmaster Mobile unit is retained on site for emergency or unexpected odour and/or dust emissions, this unit sprays a fine mist which suppresses odour and dust.

Foul air enters the towers and passes through a column of plastic media to enable mass transfer of odorous compounds to the liquid phase. A liquid containing chemicals (sodium hypochlorate) is circulated through the column to destroy odorous compounds and turns them into odourless and soluble salts, which are then returned to the wastewater treatment system. Chemical dosing is controlled by a redox and pH system, in order to maintain optimum conditions for the chemical reaction caustic is added to the towers and controlled by pH probes.

Treated air is dispersed via a 14m stack to the atmosphere, process parameters including pH, chlorine concentration, redox value and chemical tank levels are continuously monitored and trended on the Supervisory Control and Data Acquisition (SCADA) system.

Chemical dosing for the odour control stack is set by a set of duty standby dosing pumps, in the case of a duty pump failure an alarm is raised on SCADA and the standby pump automatically takes over and the emergency protocols would be undertaken to rectify the fault as soon as possible.

Relevant STC components

- 5 No. Anaerobic digesters (2,750m³ each) (covered)
- 2 No. Strainpresses (covered)
- 2 No. sludge holding tanks (156m³ each) (covered)
- 2 No. screened sludge storage tanks (135m³ each) (covered)
- 2 No. thickened sludge storage tanks (TSST) (866m³ each) (covered)
- 2 No. post digestion storage tanks (PDST) (866m³ each) (covered)
- 2 No. surplus activated sludge (SAS) holding tanks (979m³ each) (covered)
- Reception areas:
 - 3 No. Tankered waste reception areas (for cess, chemical toilet and tankered trade waste)
 - Tankered waste reception area 2 also includes 1 No. tankered trade waste reception tank (1032m³)
 - 1 No. Cake waste reception area (covered)
 - 1 No. Sludge reception area including 1 No sludge reception tank (142m³) (covered)
- 1 No. Cake silo (220m³) (covered)
- 1 No. Alternative cake bay (40 tonnes) (covered)
- 7 No. Drum thickeners (covered)
- 3 No. Dual fuel boilers (biogas/natural) (2.81MWth each)
- 2 No. CHP units (1 No. 5.04MWth and 1 No. 2.59MWth)

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- 1 No. Biogas burner (flare stack)
- 1 No. Gas bag holder (2,100m³)
- 1 No. OCU (wet chemical scrubber system – no carbon filter)
- 3 No. Centrifuges (covered)
- 1 No. Liming tank (21m³) (covered)
- 2 No. Alternative sludge holding tanks (784m³ each) (covered)

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, whereby 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 area incl Sludge reception tank SU 70742 05489	Liquid sludge	Imported liquid sludge is delivered to the Site by tanker and stored in a sludge reception tank. The reception tank and import area is enclosed. Hoses are in place in case of spills during tanker unloading. Maximum storage capacity: 142m ³ Retention time: N/A Open/covered: Covered	Low
Raw cake reception	Cake reception area SU 70749 05495	Sludge cake	Sludge cake is imported in covered roro bins or tipper lorries and is discharged into the feed hopper which is enclosed within the main process building from which air is extracted to the OCU. Shutters are kept closed on the building unless a vehicle is moving through them. Sludge cake is processed immediately. Hose wash facilities are used at waste receptions. Maximum storage capacity: 70m ³ Retention time: N/A Open/covered: Covered	Low
Sludge treatment	Anaerobic digesters (incl PRVs) x 5 1 - SU 70665 05566 2 - SU 70693 05567 3 - SU 70665 05547 4 - SU 70693 05546 5 - SU 70656 05586	Biogas	Digesters are covered, and the process is closely monitored and regularly maintained. Planned preventative maintenance undertaken on equipment Opening of the pressure relief valves (whessoe valves) is rare and events are recorded on the SCADA system. Digesters are connected to the biogas system. Maximum storage: 13,750m ³ (2,750m ³ each) Waste retention time: Average 17.4 days Open/covered: Covered	Low
	SAS tank x 2 1 – SU 70728 05563 2 – SU 70728 25547	Liquid sludge	All sludge storage tanks are covered and enclosed air is extracted to the OCU. Maximum storage capacity: 1958m (979m ³ each) Retention time: 6-8hrs Open/covered: Covered	Low
	Thickened sludge storage tank x 2 1 – SU 70713 05563 2 – SU 70714 05547	Liquid sludge	All sludge storage tanks are covered and enclosed air is extracted to the OCU. Maximum storage capacity: 1732m ³ (866m ³ each) Retention time: 3 days Open/covered: Covered	Low
	Post digestion storage tank x 2	Liquid sludge	All sludge storage tanks are covered and enclosed air is extracted to the central OCU.	Low

1 – SU 70648 05563 2 – SU 70647 05547		The process is monitored and regularly maintained. These include: Maximum storage capacity: 1732m ³ (866m ³ each) Retention time: 1 day Open/covered: Covered	
Sludge holding tank x 2 1 – SU 70742 05566 2 – SU 70754 05566	Liquid sludge	All sludge storage tanks are covered and enclosed air is extracted to the OCU. Maximum storage capacity: 312m ³ (156m ³ each) Retention time: 6-8hrs Open/covered: Covered	Low
Screened sludge storage tank x 2 1 – SU 70737 05534 2 – SU 70747 05533	Liquid sludge	All sludge storage tanks are covered and enclosed air is extracted to the OCU. Maximum storage capacity: 270m ³ (135m ³ each) Retention time: 6-8hrs Open/covered: Covered	Low
Alternative sludge storage tank x 2 1 – SU 70746 05435 2 – SU 70772 05435	Liquid sludge	Holding tank to store and feed additional sludge into the process. All sludge storage tanks are covered and extracted to OCU. Maximum storage capacity: 1568m ³ (784m ³ each) Retention time: N/A Open/covered: Covered	Low
Centrifuges x 3 SU 70706 05497	Sludge cake	Centrifuges are enclosed in the a building and air is extracted to the central odour control plant. Small amount of gas released from sludge at the centrate discharge point, this is collected through extraction to the central OCU. Maximum storage capacity: N/A Retention time: N/A Open/covered: Covered	Low
Odour control unit SU 70752 05601	Untreated air	There is on stationary Odour control unit and one mobile Odour control unit at the Site to treat air and remove odorous compounds. These are process monitored and planned preventative maintenance is regularly undertaken on equipment	Low
Liming tank SU 70640 05573	Sludge cake	Lime is injected to digested sludge during dewatering and placed into the cake silo, an enclosed process. Maximum storage capacity: 21m ³ Retention time: N/A Open/covered: Covered and separately banded.	Low
Cake silo and bay	Sludge cake	Cake is stored in a silo which is enclosed, cake is moved around the site via up to eight	Medium

	SU 70693 05483 SU 70709 05492		20t tippers daily. There is also an alternative cake bay on-site. Cake silo Maximum storage capacity: 220m ³ Retention time: 6hrs Open/covered: Covered Alternative cake bay Maximum storage capacity: 40 tonnes Retention time: 6hrs (emergency use) Open/covered: Covered	
Biogas combustion	Gas bag holder SU 70648 05507	Biogas	This is a sealed system Maximum storage: 2,100m ³	Very low
	Combined Heat and Power (CHP) units x 2 1 - SU 70661 05528 2 - SU 70640 05530	Biogas	Planned preventative maintenance undertaken on equipment. If CHP unit is down, gas is burnt in flare	Low
	Boilers x 3 SU 70693 05524	Biogas	Planned preventative maintenance undertaken on equipment. 3 x dual fuel standby boilers sharing same stack.	Low
	Flare SU 70620 05529	Biogas	Planned preventative maintenance undertaken on equipment	Low
Cake export	Cake export (Lorries/trailer routes)	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. The dry vapour odour control unit is run near the silo during the loading of lorries. Cake is exported to farms which occurs outside.	Medium

3.3. Odour impact

3.3.1. Adjoining land use

The Site is located on an industrial estate with industrial facilities located to the north and west of the Site. Havant household waste recycling centre is located approximately 450m northwest of the Site. Further north is a residential area, approximately 650m from the Site. The southeast and northwest sides are surrounded by Langstone Harbour (a SSSI) where Storehouse Lake is situated south of the Site.

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 guidance⁴.

- High sensitivity receptors e.g. residential dwellings, hospitals, schools/education and tourist/cultural.

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>

- 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.

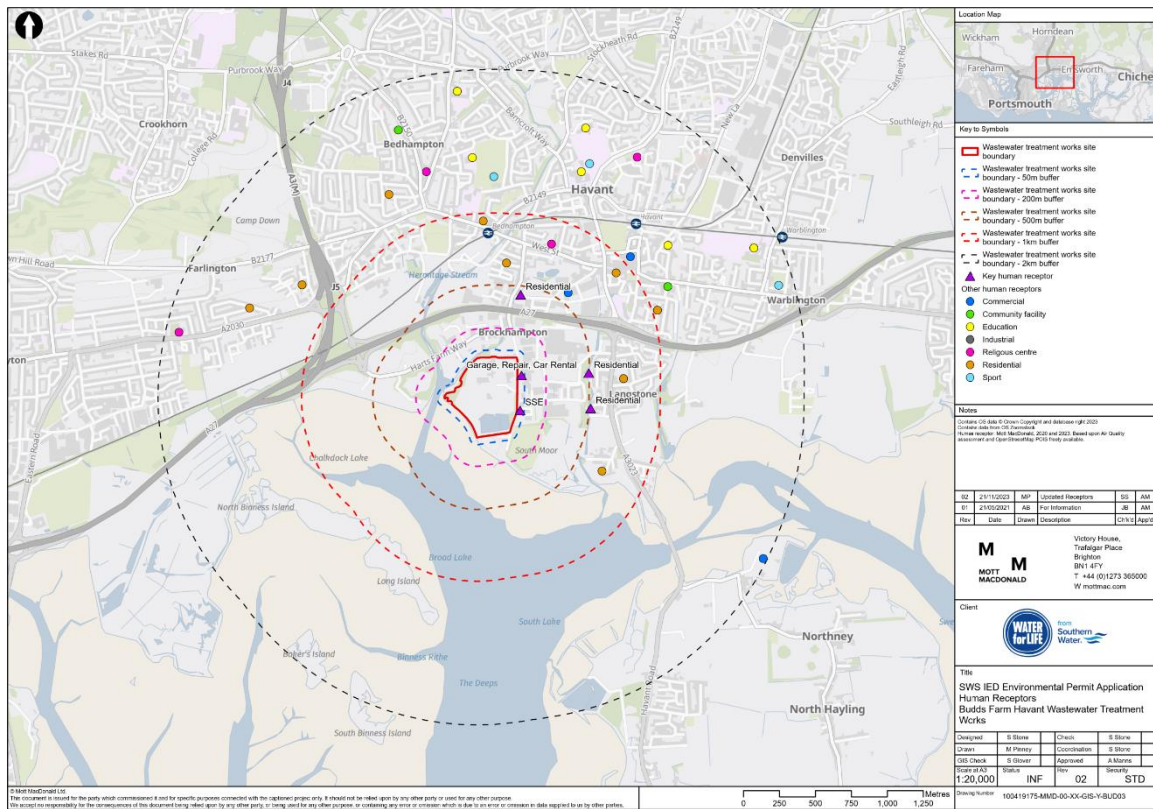
The magnitude of risk relates to⁴:

- 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 250m of the potential emission sources at Budds Farm STC. As demonstrated in Figure 1 the receptor closest to a potential emission source are industrial facilities north of the Site, which is located approximately 40m northeast of the WTW reception site.

Figure 1 identifies the sensitive receptors within 2km of the Site and Table 2 identifies the sensitive receptors within 500m of the Site.

Figure 1: 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 (a)	Direction of receptor from closest emission source
Industrial facilities east of the Site	Sludge reception	Cake reception and sludge treatment	245	East
	Primary sludge treatment building ⁵	Cake reception and sludge treatment	230	East
	TW reception	Cake reception and sludge treatment	75	East
	Anaerobic digesters	Sludge treatment	285	East
	Post digestion sludge storage tanks	Sludge treatment	335	East

⁵ Primary sludge building contains the cake reception areas, cake blending tank, sludge reception, drum thickeners and centrifuges.

Receptor	Nearest potential emission source to receptor	Process	Distance (m) from nearest potential emission source ^(a)	Direction of receptor from closest emission source
	SAS & TSST tanks	Sludge treatment	250	East
	Digested sludge cake silo	Sludge treatment	295	East
	Biogas holder	Biogas combustion	340	East
	CHP	Biogas combustion	310	East
	Flare	Biogas combustion	365	East
	Boilers	Biogas combustion	270	East
Industrial facilities north of the Site	Sludge reception	Cake reception and sludge treatment	195	North
	Primary sludge treatment building⁴	Cake reception and sludge treatment	170	Northeast
	TW reception	Cake reception and sludge treatment	20	Northeast
	Anaerobic digesters	Sludge treatment	130	Northeast
	Post digestion sludge storage tanks	Sludge treatment	165	Northeast
	SAS & TSST tanks	Sludge treatment	120	North
	Digested sludge cake silo	Sludge treatment	210	North
	Biogas holder	Biogas combustion	205	Northeast
	CHP	Biogas combustion	180	Northeast
	Flare	Biogas combustion	215	Northeast
	Boilers	Biogas combustion	160	Northeast
Industrial facilities northwest of the Site	Sludge reception	Cake reception and sludge treatment	255	Northwest
	Primary sludge treatment building	Cake reception	185	Northwest

Receptor	Nearest potential emission source to receptor	Process	Distance (m) from nearest potential emission source ^(a)	Direction of receptor from closest emission source
		and sludge treatment		
	TW reception	Cake reception and sludge treatment	155	Northwest
	Anaerobic digesters	Sludge treatment	120	Northwest
	Post digestion sludge storage tanks	Sludge treatment	130	Northwest
	SAS & TSST tanks	Sludge treatment	185	Northwest
	Digested sludge cake silo	Sludge treatment	225	Northwest
	Biogas holder	Biogas combustion	175	Northwest
	CHP	Biogas combustion	150	Northwest
	Flare	Biogas combustion	150	Northwest
	Boilers	Biogas combustion	200	Northwest
Residential properties northeast of the Site	Sludge reception	Cake reception and sludge treatment	420	Northeast
	Primary sludge treatment building	Cake reception and sludge treatment	420	Northeast
	TW reception	Cake reception and sludge treatment	305	Northeast
	Anaerobic digesters	Sludge treatment	400	Northeast
	Post digestion sludge storage tanks	Sludge treatment	440	Northeast
	SAS & TSST tanks	Sludge treatment	375	Northeast
	Digested sludge cake silo	Sludge treatment	460	Northeast
	Biogas holder	Biogas combustion	475	Northeast
CHP	Biogas combustion	445	Northeast	

Receptor	Nearest potential emission source to receptor	Process	Distance (m) from nearest potential emission source ^(a)	Direction of receptor from closest emission source
	Flare	Biogas combustion	490	Northeast
	Boilers	Biogas combustion	415	Northeast

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_BUD February 2024) addressed the probability of exposure and consequence of the hazards to determine the overall magnitude of the risk to sensitive receptors within 500 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 'low' to 'medium'. 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 Budds Farm Wastewater Treatment Works 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 include two areas of industrial receptors at Southmoor Lane which is approximately 80m to the east and 20m to the north, and one area of industrial receptor located off Southmoor Lane is approximately 250m to the northeast. During 2019-2022, the mentioned receptors were downwind from the site approximately 58% (approximately 80m to the east), 43% (approximately 20m to the north) and 35% (approximately 250m to the northeast) 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 residential and industrial receptors are considered to be highly effective to moderately effective. Therefore, the potential for odour impacts from the Site cannot be scoped out on the basis of this simple assessment.

No specific odour modelling has been commissioned for this site and modelling has not been undertaken prior to the application for a bespoke installation permit because the OMP consolidates existing odour control measures and will form part of the Operational Techniques. The Site does not meet the criteria for the listed suggestions for odour modelling according to the Environment Agency H4 guidance:

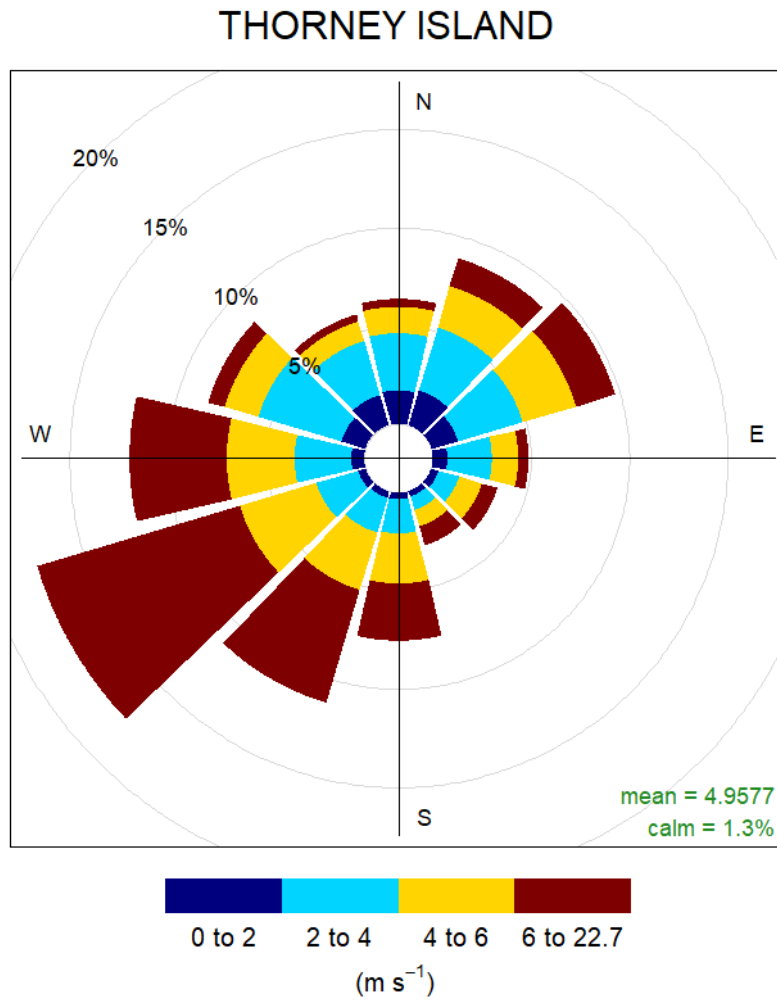
- to predict the impact of a new proposal: The Site is an existing site and structural changes are not proposed as part of the variation application. The sources of odour and their controls are already known;

- to assist in the investigation of the cause of odour complaints: The Site has received four odour complaints in the past five years;
- compare the cost effectiveness of odour mitigation options: Southern Water are not seeking at the time of the Bespoke Installation Permit application to implement additional odour mitigation measures that require capital investment;
- work out emission limits for point source emissions: The Site presents a low to medium odour risk to sensitive receptors and an Odour Control System is in operation, which will be compliant with design standards or as specified in the Environmental Permit, see Section 5.7;
- indicate how much improvement is needed or size abatement equipment: improvements to odour control is implemented through the OMP as management measures that do not require capital investment. The Site has received a relatively low number of odour complaints in the past five years, which suggests capital investment and improvement on existing abatement equipment is not necessary at present; and,
- calculate a suitable chimney height to provide an acceptable exposure at receptors: the chimney heights are fixed structures, since the Site is low to medium risk of odour it is not justified to alter existing odour control structures.

The 2019-2022 wind rose for the meteorological site at Thorney Island, the nearest representative meteorological site to the Site, is shown in Figure 2. This monitoring site is considered representative of Site conditions due to its similar topography and surrounding land uses

Figure 33 presents the wind rose generated for the Site from the Vortex model for the period from 2019-2022. The wind rose demonstrates that historically, this location experiences strong prevailing winds from the southwest. Overall, the two datasets show general agreement with both the monitored and modelled data indicating the prevailing winds originate from the southwest. Therefore, sensitive receptors located to the northeast of the Site would be at the greatest risk from bioaerosol emissions from the Site.

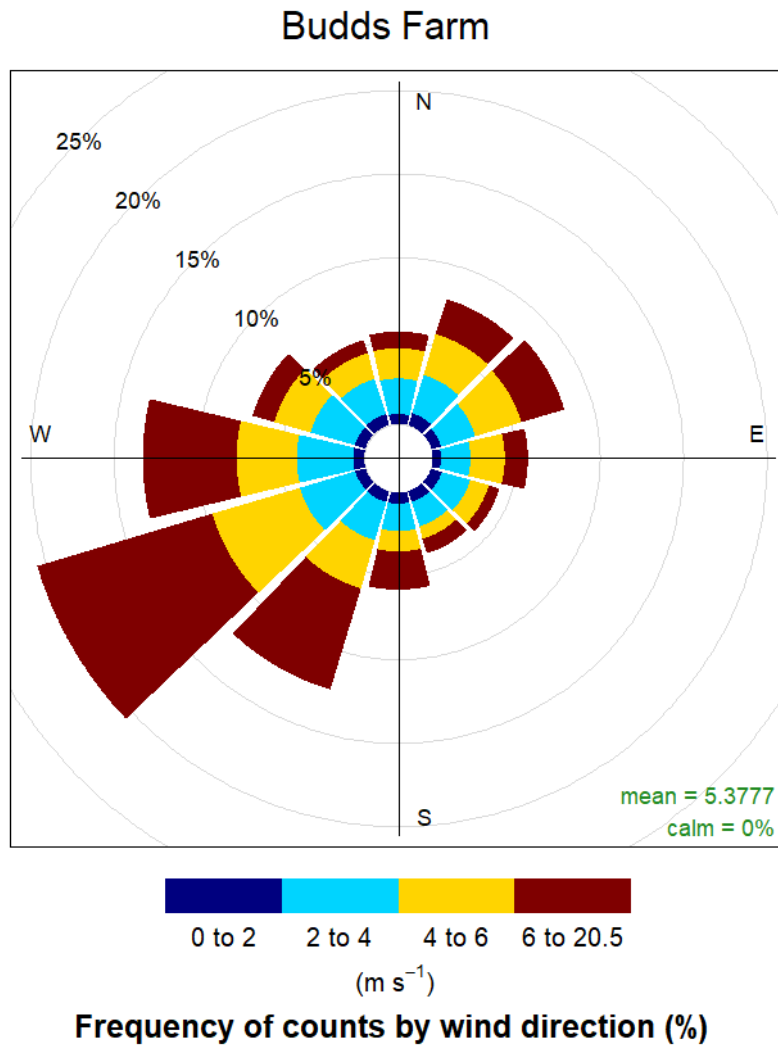
Figure 2: Average wind rose for Thorney Island meteorological site, 2019 – 2022



Frequency of counts by wind direction (%)

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

Figure 3: 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

To contain emissions of bioaerosols, all sludge treatment processes on the Site are contained or covered. The sludge thickening and blending activities are contained in the odour-controlled primary sludge treatment building to prevent the uncontrolled release of bioaerosols and reduce the likelihood of exposure of receptors to bioaerosols.

There is one OCU on the Site which connects to the main sludge treatment building, containing the sludge cake reception and primary sludge treatment processes. This unit contains one wet chemical scrubber system. After treatment, air is released to the atmosphere. A dry vapour system is used around the cake silo to mask odours during unloading. The key parameters are described in Table 3.

Table 3: Odour Control Unit details

Specification	Description
Model type	Single stage, dual tower wet chemical scrubber system – no carbon filter
Installed by	Parsons Engineering
Stack height	14
Odour removal efficiency	>99%
Total Flow m ³ /hr	53,100
Refurbishment of scrubbing liquid	Every 10 hours
Makeup/blowdown rates	400l/h for Acid Scrubber 500l/h for Alkali Scrubber

A Cobra Odourmaster Mobile unit is retained on site for emergency or unexpected odour and/or dust problems; this unit sprays a fine mist which suppresses odour and dust.

In-line with BAT 34 and 53, the Site utilises wet chemical scrubber system to treat and reduce channelled emissions to air, however, it does not pass through a carbon filter before emitted through the stack. Details of the monitoring carried out on the OCU is outlined within this section and in Section 5. Treated air from the OCU is then released to the atmosphere.

The OCU is 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 as 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.

An example 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.

Process	Period	Typical Maintenance activities
	Monthly	Checks by M&E. Tasks carried out and records maintained under regional maintenance schedules. Inlet gas temperature, gas flow rate, pressure differential, inlet gas moisture content, and leak detection.
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.
	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/Service 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/Service 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. Pressure, flow rate for both gas and liquid, the pH/ OPR of Scrubbing liquid is checked during a monthly service
	Annually	Annual service by the Odour control service provider in line with contracted maintenance requirements, including the cleaning of the nozzle of the liquid feeding system and checking of the gas pipes of the scrubber.

Diffuse emissions from open storage areas, including the alternative cake bay (asset ref 18 in **Error! Reference source not found.**), are minimised by:

- Reducing movement of cake across the site, cake is only moved when required;
- Limiting the drop height of cake
- 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 optimisation of the digestion process to limit the bioaerosol potential of post-digested sludge.

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 requirements 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 ₂ S 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

There will also be unanticipated breakdowns of equipment 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. Exemption would be required for these operations.

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 SWS.

If waste does not meet the specific pH limits, on sampling and testing, 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 extract 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

Budds Farm STC
Odour Management Plan

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 sludges 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 an out-of-specification plant item is operating beyond normal operating ranges, the process parameters are outside optimum, or on 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. Temporary use of odour suppression system (spray) is available to be operated while contingency measures are being prepared.

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 weekly 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 odorous 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
STC 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 discharge	Low
Raw sludge reception	Avoid excessive turbulence (open tanks) 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	Every site visit		Follow the Awareness Raising Instruction, Appendix A.	Check containment hoses are connected to exhaust	Low
Transportation	Ensure only sealed or covered skips/trailers used. No removal of covers whilst parked waiting to load/unload	Medium	Every weekday	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

Budds Farm STC
Odour Management Plan

Potential Odour Source	Routine Actions Required	Risk pre-control measures	Monitoring Frequency	Attention Level	Action level	Preventative Action	Risk post-control measures
	Monitor odours during cake loading						
Sludge holding tanks	Minimising retention time Monitor odour levels around tank	Medium	Daily	Noticeable odour from tank	Noticeable odour from tank Follow the Awareness Raising Instruction, Appendix A.	Increase sludge treatment rate to reduce retention Hose spillage's Increase de-sludge ops up stream Run odour masking system (Short term)	Low
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 is undertaken in an enclosed building with appropriate odour abatement tinkering 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	Regular checks and investigative action	Low

Budds Farm STC
Odour Management Plan

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.		
Centrifuge	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
	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
Skip conveyer feed gates	Visual check to ensure skips not over filling	Low	Daily		Follow the Awareness Raising Instruction, Appendix A.	Engage M&E to rectify if malfunctioning	Low

Budds Farm STC
Odour Management Plan

Potential Odour Source	Routine Actions Required	Risk pre-control measures	Monitoring Frequency	Attention Level	Action level	Preventative Action	Risk post-control measures
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	Low
OCU	Check pH Check media condition	Medium	Daily	pH>8, ORP<750	pH >3 Sudden drop in performance Follow the Awareness Raising Instruction, Appendix A.	Ensure media is damp Change media as per schedule	Low
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 or 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 permitter 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, 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 and a copy sent to Customer Services. If odour is likely to exceed the site boundary and, therefore, has potential to cause a complaint, the procedure in Appendix F 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 Customer 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 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
- Wind Direction
- Wind Speed

Meteorological data will be reviewed in advance of activities that may present an odour concern (i.e. non-routine activities such as emptying of sludge cake) to consider suitable measures to limit odour. For example, to 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.

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_BUD February 2024) includes emergency response procedures, 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
- EMS387 – Procedure for the acceptance of tankered commercial waste
- 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 OCU)	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 HCl are present in the waste gas stream.
	TVOC		If TVOC and HCl are identified as relevant in the waste gas streams Southern Water will monitor these emissions in line with BAT requirements and the Environmental Permit.
	Ammonia	Once every 6 months	As per design and manufacturer's specifications or otherwise as specified in the Environmental Permit
	H ₂ S		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. An example copy of a site visit report (November 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.

8.2. 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.

8.3. 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.

8.4. 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

This OMP will be reviewed 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 Regional Control Centre (RCC)/ Customer Services are informed in a timely manner by the waste duty manager.

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

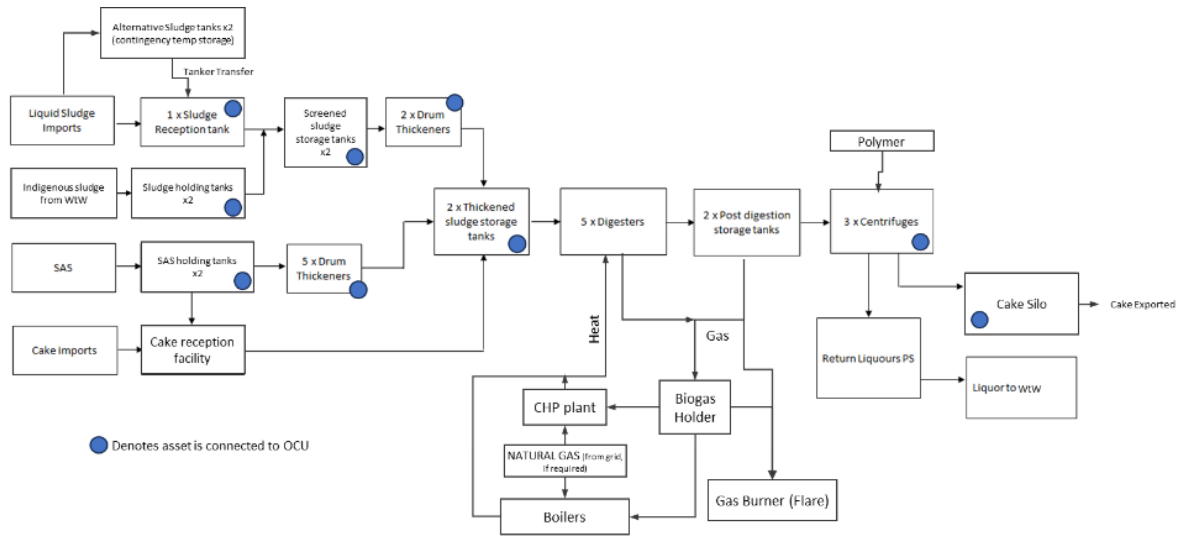
If the Operational Control Centre or Customer Services are made aware of the problem, it means that they give a more constructive response to the person making the enquiry/complaint.

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



C. Waste Codes

As per Environmental Permit EPR/AP3392HG 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 1,150,000 wet tonnes.

It is requested that the annual quantity of imported digested sludge for dewatering to be accepted is 1,000 wet tonnes.

It is intended that the annual quantity of tankered waste imports (including trade waste and domestic waste) to be accepted will be 339,202 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 handling 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 required
	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 traps 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 from a previous investigation?	YES / NO	Complete actions

E. ERG Odour Control Unit Service Report



ERG (Air Pollution Control) Ltd

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Horsham, West Sussex, RH13 0QW, UK Tel: +44 1403 292 000
e-mail: maintenance@ergapc.co.uk web: www.ergapc.co.uk

Visit

Service Visit Report: 10 of 12 – November 2023

Project name	Southern Water Maintenance	Project number	AM7143
Visited	Budds Farm	Report By	
Company	Southern Water	Tel	
Contacts		Mobile No	
		Date	09/11/2023
		Reviewed By	TJS
		Copy To	HMcW, RW, MB, TJS, GL
Purpose of Visit	Monthly Service Visit of 2-Stage Chemical Scrubber OCU		

1. Actions required:

- 1.1. Fan 1 still off and isolated. ERG issued quotation for Replacement Fan (AM7112 KDqt-01) in October 2022 – requoted April 2023.
- 1.2. **Alkaline Scrubber** – The alkaline scrubber hypo dosing still hasn't been reinstated after a P1 attended early July (hypo syphoning into the scrubber). And Caustic dosing is off as the pumps trip after 5min operation. ERG suggested the hypo bulk storage tank should be cleaned to remove contamination. Stuart Burstow has requested that ERG offer a quotation to install a strainer on the inlet side of the hypo tank to catch/identify any contamination before it reaches the tank. ERG are assessing the feasibility of this suggestion.
- 1.3. Water softening unit alarming LOW on SCADA. It has been reported from previous visits that the unit is intermittently producing hard water. This visit it was tested **HARD**. Site needs Kinetico to service the unit. – ERG Issued quotation for water softener service 8th August. The unit is producing hard water and it hasn't used salt for ages. Service engineer from Kinetico is required urgently.

2. Other faults and actions required:

- 2.1. The caustic dosing controls not operating in AUTO. The pumps need to be selected at the panel, setting one or the other in duty. Caustic dosing pump #1 keeps tripping and going to pump #2. Caustic dosing pump #2 has no power, ERG checked MCC but found on problem, further investigation required. **This is a design issue – new controller panel same as hypo dosing is required. Requires further electrical investigation.**
- 2.2. From June/2022 service visit, when checking the dosing pumps before isolating them, found hypo and acid dosing pumps still running even with low-low alarm while chemical tanks empty, which is critical. This requires further investigation and repair as the pumps should be inhibited at if low-low level reached. **ICA to investigate.**
- 2.5. DP indicator for acid tower is faulty. **Magnehelic needs replacing.**
- 2.6. Please see item 6 for historical faults.

3. Other comments:

N/A.

4. Condition monitoring:

Process	Units	Nov	Oct	Sep	Aug	Design
Operational Fan on arrival	Tag/N ^o	2	2	2	2	
*Airflow in 1300mm Ø Duct	m/s	5.0	6.4	6.4	4.2	10.4
*Air Volume	m ³ /h	23,982	18,103	18,103	20,058	50,000
Inlet Pressure 1 st stage acid scrubber	kPa	1.43	1.53	1.53	1.55	
Inlet Pressure 2 nd stage alkali scrubber	kPa	1.63	1.85	1.82	1.95	
Outlet Pressure 2 nd stage alkali scrubber	kPa	3.66	3.75	3.72	3.9	
Acid scrubber pressure drop	kPa	0.20	0.32	0.29	0.4	1.0
Alkali scrubber pressure drop	kPa	2.03	1.9	1.89	1.95	1.0
H ₂ S inlet 1 st stage acid scrubber	ppm	<0.1	<0.1	2.5	<0.1	
H ₂ S outlet 2 ^{sd} stage Alkaline scrubber	ppm	<0.1	<0.1	<0.1	<0.1	
Calculated OCU H ₂ S reduction efficiency	%	No load	No load	99.8	No load	99
H ₂ S inlet monitor reading @ (time)						
H ₂ S outlet monitor reading @ (time)	PPB	FAULT30	FAULT 30	FAULT 30	0	

Mechanical	Running	Available	Isolated off	Back Turning	Noisy Vibration	Leakages	No flow Low flow
Fan F01			X				
Fan F02	X						
Recirc pump (acid) RP01	X						
Recirc pump (acid) RP02		X					
Recirc pump (alkali) RP03		X					
Recirc pump (alkali) RP04	X						
Acid dosing pump DP01		X					
Acid dosing pump DP02	X						
Caustic dosing pump DP03			X				
Caustic dosing pump DP04			X				
Hypo dosing pump DP05			X				
Hypo dosing pump DP06			X				
Materials	Low/ Empty	Isolated off	Liquor in bund	leakages	Softener Low salt	Hard	No flow Low flow
Acid Storage							
Alkali storage							
Hypochlorite storage							
Make up water system					Full	X	

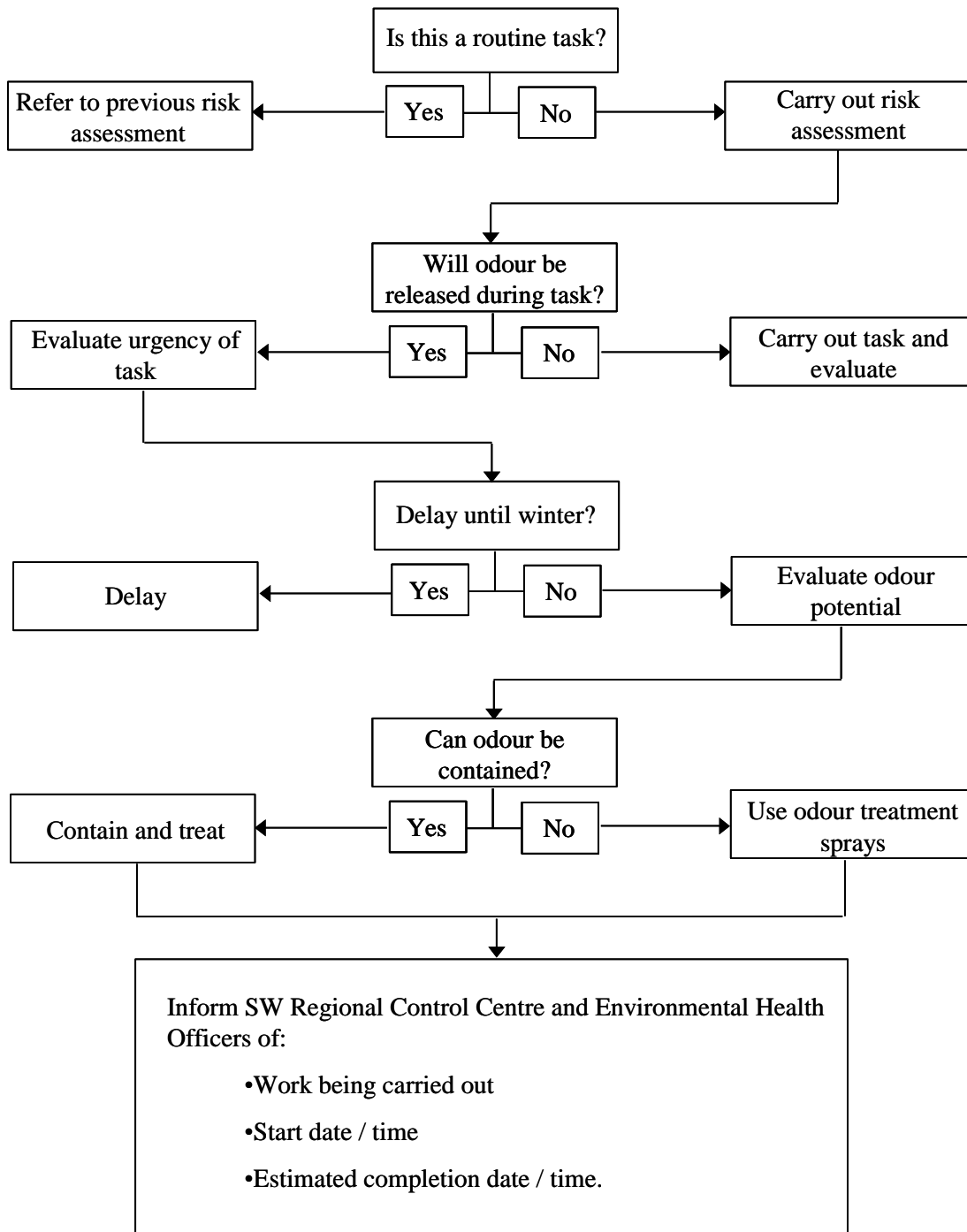
*Note: Low flow on system is expected at around 6.5m/s as venturi not operational and some ductwork partially isolated.

5. Observations & other information

- The Venturi is no longer running. Reason for reduced flow through system
- S1 Make up water: 400 L/h
- S2 make up water: 500 L/h

6. HISTORICAL FAULTS	DIAGNOSED
<p>6.1. SCADA There have been several instances of incorrect alarms on SCADA, where the actual condition is ok, it is not clear where/how the discrepancies are being generated. For example, Extraction Fan 2 was showing “failed”, i.e., “stopped” when the fan was running in hand as normal. Hypo bund level alarm was high, this has been reported previously, with no chemical present. ICA required to investigate further.</p>	Jan.2018
<p>6.3. Scrubber 2 recirculation pump 3. The pressure gauge for this pump has lost most of its fluid and may fail. The gauge (0-6bar / 0-86 PSI Prochem Services) ERG can quote to replace the gauge.</p>	Aug.2019
<p>6.4. SCADA. Salt level switch is u/s and incorrectly alarming on SCADA “LS17 low”. Requires replacement.</p>	Jan.2018
<p>6.5. Hypo Bund. The pulsation dampers drain into the hypo bund. When the dampers are drained, it contaminates the bund. SWS operators have been made aware of this in case the leaked chemical is mistaken as a pipework leak. SWS should consider using a large IBC type container, or modifying the pipework, to route back to the tank or similar.</p>	Aug.2019

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 from Southern Water staff the Site's duty manager / the RCC should be contacted in a timely manner.

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 feedback, 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 SWS 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.

