Ashford STC

Odour Management Plan

790101_ERA_OdourMP_ASH

December 2024

V5

from Southern Water

Contents

Issue and Revision Record

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1. Odour Management Plan

1.1. Introduction

The Odour Management Plan (OMP) for Ashford 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 produced to support Southern Water's application to vary permit EPR/BP3296SB to incorporate anaerobic digestion to meet the Industrial Emissions Directive (IED) and consolidate EPR/KP3736GS for the CHP system. There are no new proposed works to be undertaken on the Site in respect of this permit application, therefore, the activities on-site are not anticipated to increase the off-site impact or result in adverse impact upon nearby sensitive receptors or the amenity of the area surrounding the Site. Southern Water are in discussions with the Environment Agency and addressing proposals in principle with regards to on-going odour complaints as part of the agreed action plan.

The OMP is a live working document that forms part of the operational management system of the Site. It will be updated accordingly as and when improvements are agreed and implemented. It is a mitigation and control measure document with which Operations shall comply. It demonstrates how odours shall be managed and controlled to prevent odour impacts from activities during normal operation and during abnormal events.

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

1.2. Objectives

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

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

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

[3] Environment Agency (2020) Appropriate measures for the biological treatment of waste- Consultation draft July 2020 Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/898966/Appropriate_measures_for_the_biological_treatment_of_waste_-_consultation_document.pdf

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

1.3. Site location

The Site is located to the northeast of the town of Ashford, at Bybrook. The Ashford catchment serves the town of Ashford and surrounding villages with a population equivalent of approximately 116,000.

Site address: Kinneys Lane, Off Canterbury Road, Bybrook, Ashford, TN24 9QB

National grid reference: TR 02107 43407.

The Site layout and location plan is shown is shown in document reference 790101_MSD_SiteLayoutPlan_ASH December 2024.

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 F)
    - 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_MSD_WasteAcceptance_ASH December 2024
- BAT 34: Reducing channelled emissions, addressed in Section 4.1.
- BAT 53: Reducing emission of hydrochloric acid (HCl), ammonia (NH_3) and organic compounds to air in Section 4.1.

The OMP is applicable to the STC operations only and any mention of 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 a registered waste permit, with the CHP activities under a separate permit.

The waste activity comprises imports, physio-chemical, anaerobic digestion (AD) treatment and the storage.

of waste, all for recovery purposes. The STC handles waste derived from the wastewater treatment process, either indigenously produced on-site or imported from other Southern Water owned assets.

The 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 onsite 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.

In 2010 a further stage of treatment, thermal drying, was added to treat all of the sludge and produce a product that is capable of meeting the enhanced treated standard as defined in current regulations. However, the drying plant has subsequently been decommissioned and mothballed.

2.2. Summary of the STC components

Currently Ashford WTW & STC accepts indigenous sludge, imported liquid sludge, imported cake and domestic waste. On average the site accepts 50 tankers per day containing sludge, cess, septic and chemical toilet waste. This consists of approximately 22 tankers per day of liquid sludge imports arriving at the site. Up to 28 tankers of imported cess, septic and chemical toilet waste per day is accepted at the site. The site does not accept tankered trade waste from either SWS derived waste or third-party producers.

All waste is delivered to the Site in enclosed and sealed tankers.

Below is a brief summary of the components for the Site.

2.2.1. Sludge treatment at the STC

The Site contains a STC which has both liquid sludge and sludge cake reception facilities.

Reception and Screening of Imported Liquid Sludge, Cake and Cess

Liquid sludge imports are received onsite via tankers at the liquid sludge reception. On average the site accepts 50 tankers per day containing sludge, cess, septic and chemical toilet waste. This consists of approximately 22 tankers per day of liquid sludge imports arriving at the site. Up to 28 tankers of imported cess, septic and chemical toilet waste per day is accepted at the site. The site does not accept tankered trade waste, both SWS derived waste and third-party producers, per day. The tankers are sealed to prevent any escape of malodours.

Liquid sludge is transferred from tankers into one of three sludge reception tank (100m^3 each). All of the tanks are covered and extracted to the OCU to ensure capture of odorous air for treatment. A traffic light system in place for use by tankers, which ensures odorous air is not vented to atmosphere but instead discharged into the covered system. A delay in the closing of the discharge valve has been input to allow the tankers to fully de-pressurised before they can disconnect. All the time the valve is open a red light is shown. When the valve is shut a green light is shown. Tankers are only permitted to connect/disconnect when the green light is shown.

Sludge cake is imported to be treated at the Site from nearby WTWs. Cake arrives on-site via Roll On, Roll Off (RO-RO) sealed skips where it is unloaded into a sludge cake reception tank. The cake reception is enclosed within a building maintained under negative pressure and air is extracted from under the covers and treated by the odour control plant.

Delivery vehicles discharge liquid sludge into liquid sludge reception facilities prior to screening and thickening with indigenous sludge.

Southern Water also operates a Closed Doors and Hatches Policy (Appendix I).

Sludge Storage

Sludge is stored in various cylindrical concrete and glass reinforced plastic (GRP) storage tanks.

Combined imported and indigenous sludge is first stored in the sludge reception tanks (100m^3 each), generally only one is used. Combined sludges are pumped through 2 No. strain presses for screening before being discharged into two post-screened sludge tanks (PSST) (1,300m^3 each) before being thickened. Sludge from the PSST is either thickened using 2 No. gravity belt thickeners or used in blending of imported sludge cake, in 1 No cake blending tank (50m^3) to achieve a consistent 7% dry solids. Thickened sludge is then stored in two thickened sludge storage tanks (TSST) (420m^3 and 1,500 m^3) before being pumped to 4 No anaerobic digesters (total volume of 10,100m^3). After the digestion process, digested sludge is stored in two post-digested sludge tanks (PDST) (766m^3 each). All of the pre-digestion tanks are enclosed to capture odorous air for treatment. Air is extracted from each tank to the central odour control system. Routine maintenance of these tanks 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 the heat exchanger building.

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

The sludge is thickened in 1 No. gravity belt thickener operating and poly-electrolyte is added to facilitate this process. Thickened sludge is stored in 2 No. PDSTs before being fed to 4 No. anaerobic digesters.

Blending of sludges

Imported sludge cake is received from Broomfield Bank (population equivalent of 100,000) and Weatherlees Hill A&B (a combined population equivalence of 200,000) into what is referred to as Weatherlees cake sludge reception. Sludge cake is tipped into a hopper, from where it is manipulated using conveyors and augers to blend with liquid to achieve a blended sludge to 7% dry solids and stored in two post thickened sludge storage tanks.

An alternative sludge reception at Ashford, referred to as Broomfield bank reception, is occasionally used to blend sludge when there is maintenance undertaken at the Weatherlees reception or loads are brought in from other sites.

Anaerobic Digesters

Thickened sludge is fed into four sealed, conventional mesophilic anaerobic digesters (total volume of 10,100m^3), where it stays for at least 17.4 days at a temperature of 33-38^{o}C. 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 anaerobic digester temperature are monitored and logged on the SCADA system. The produced gas is stored in one biogas holder, which is a double skinned, expandable, hemispherical container. A biogas flare is provided for periods when, for example, the CHP is unavailable during maintenance or downtime, to control and manage excess gas during these periods.

In instances where the gas pressure is too high, the pressure relief valve system de-pressurises the system. These pressure relief valves are located at the connection point with the biogas distribution system pipework at the top of each anaerobic 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 action are noted in the site log. The performance of the anaerobic digesters is monitored daily, through the sampling of inlet and outlet sludge quality.

Combined Heat and Power (CHP)

A CHP plant is installed at the Site, designed to use biogas. The biogas produced in the digestion process is fed to the CHP unit (5.04MWth) to generate electricity and heat, and 2 No. standby boilers (1.16MWth and 0.94MWth rating). The electricity is used to partially power the site and heat is recovered and used to heat the anaerobic digesters. There is also a back-up flare for use when the CHP engine is on downtime for maintenance.

Post Digestion

Digested sludge is stored in 2 No. post digestion sludge tanks to allow the material to cool down, prior to being fed into a dewatering plant employing two centrifuges. These tanks are required to provide buffer storage between the continuous digestion process and the dewatering processes which will run intermittently. The two GRP coated steel tanks are covered but partially open to the atmosphere. The odour emissions from these tanks were connected to the gas system in the second half of 2022. Analysis of the residual biogas potential and gas produced by these tanks is small in comparison to the total gas make (estimated less than 5%).

Dewatering

After anaerobic digestion, further preparation is necessary to ensure the sludge cake complies with the ‘conventional or enhanced treatment’ status before it can be recycled in accordance with the ‘biosolids assurance scheme’. This involves mop up of residual pathogens with low dose of lime as well as dewatering. Lime treatment is undertaken to increase solids content and kills pathogens. Lime can react with some odorous volatile compounds such as ammonia. The addition of lime generates heat that also promote the evaporation of odorous compounds, lime treatment can cause fugitive emission of odours.

Dewatering takes place in 2 No. centrifuges (operating duty / standby) which separate the solid material from the bulk of the water to form a ‘cake’ that typically contains 24 to 28% of solids. The centrifuges are located within a steel frame and profiled steel sheet clad building (formally known as the ‘Dryer Building’). Air from

within the building is extracted to an odour control unit (OCU). The building also has a separate ventilation system. The water removed during this process is returned to the WTW for treatment via the liquor treatment plant. Dewatered digested cake is stored in the cake storage bays 1-6, before being transported off-site for storage prior to spreading onto land.

A liquor pumping station has been installed to pump liquors from the dewatering processes to the sludge liquor treatment plant. The pumping station is fitted with airtight covers, and it is connected to the odour control plant.

The sludge liquor treatment plant is an AMTREAT® plant comprising hot and cold liquor balancing tanks, anoxic tanks, aeration tanks and settlement tanks, all constructed of GRP steel panels with GRP roofs on concrete bases, together with chemical storage facilities, a kiosk housing blower and a motor control centre. All of the tanks, except for the settlement tanks, are covered and air is extracted to an OCU. Treated liquor is returned to the PST distribution chamber.

Cake storage

Dewatered sludge is loaded into trailers at a large bay in the north of the Site (Bay 10). Six cake bays are also located in the south-east of the site. All cake is produced within the centrifuge building adjacent to Bay 10, it is loaded into trailers by means of mechanical conveyor and then transported and stored in Bays 1 to 6 as part of normal operation. These cake bays are open to the air.

When liming (liquid lime) is undertaken, the cake is stored for a maximum of 2 to 3 days on-site (on weekends), otherwise it is removed as soon as possible from site. Unlimed cake is separated from limed cake and stored in Cake Bays 1 to 6 for a minimum 41 days (to enable pathogen reduction) prior to being transported offsite. Bays 1-6 are a further distance from the Little Burton receptors than Bay 10.

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

Odour control equipment

Odorous air is extracted by one set of two duty standby fans and is treated by 1 No. wet chemical scrubber system. The scrubber has a retention time of greater than three seconds and the total design odour removal efficiency of greater than 99%.

The first stage of scrubbing involves a venturi spray tower. Its primary function is to prevent foam aerosol carryover and to provide some gaseous scrubbing of hydrogen sulphide (H_2S). It is designed to remove H_2S by the sulphur precipitation route using a weak bleach dose. The bleach comes from the stage 2 blow down, and a mechanically proportioned dose of neat hypochlorite solution, as a constant background dose. The sulphur deposition can only occur, if the H_2S levels are high enough to promote the reaction route (which they generally are not), and keep the pH below 8. This route is preferred, as it uses approximately 50% of the chemical required to oxidise the H_2S to sulphuric acid.

The gas then enters the second stage, which is a conventional packed tower utilising both hypochlorite and sodium hydroxide to remove the residual H_2S from the air stream. The Stage 2 scrubber has associated pH and oxidation reduction potential (ORP) control (redox probes) to accurately dose the required amounts of sodium hydroxide and hypochlorite respectively. The cleaned gas passes through the demister and to a stack with an H_2S analyser.

The plant can be operated in automatic or manual mode.

The main OCU controls odour from the STC tanks and process areas including: cake reception building, cake reception process plant, sludge reception building, cake blending tank, strain press skips, thickened sludge storage tanks (both), sludge thickener building, sludge reception tank, sludge pumping station, post screened storage tanks, liquor balancing tank, anoxic tanks (both) and the LTP reactors (both).

The treated air is discharged via an 18m high stack. The OCU is a chemical (wet) scrubber, installed in 2010. The OCU has a total throughput of 44,000m3/hr. The concentration of hydrogen sulphide in the stack is monitored continuously using a Draeger ChemLogic 1 instrument provided by Pollution Monitoring.

For context in relation to the cess reception point, there is a dedicated OCU, which is a biofilter (pumice media) with carbon scrubber. This OCU has a throughput of 120m3/hr.

Other odour mitigation measures implemented on-site include the use of two cobra (wet system) mist spray suppressors at WTW storm tanks, around cake bays 4 to 6 and at the northern border near Cake Bay 10, and a cobra (dry vapour) at Cake Bay 10.

Other relevant STC components

- 3 No. Sludge reception tanks (100m^3 each) (covered)
- 2 No. Sludge strain presses (enclosed)
- 1 No. Cake blending tank (50m^3) (covered)
- 2 No. Gravity belt thickener (enclosed)
- 2 No. Post screened sludge tanks (1,300m^3 each) (covered)
- 1 No. Thickened sludge storage tank (420m^3) (covered)
- 1 No. Thickened sludge storge tank (1500m^3) (covered)
- 4 No. Anaerobic digesters (two 1,550m^3, one 2,800m^3 and one 4,119m^3) (covered)
- 2 No. Post-digested sludge tanks (766m^3 each) (covered)
- 1 No. Liming plant (covered)
- 1 No Dewatering plant (enclosed)
  - 2 No. centrifuges (1 duty, 1 standby)
- 1 No. Liquor balance tank
- 7 No. Cake bays (total 5,557m^3) (open)
- 2 No. Anoxic tanks (140m^3 each) (covered)
- 2 No. AMTREAT® Reactors (1275m^3 each) (covered)
- 2 No. Final settlement tanks (230m^3) (not covered)
- 1 No. CHP unit (5.04MWth)

- 2 No. Standby boilers
  - Boiler 1: 800 kW (0.94MWth) dual fuel (biogas/gas oil) boiler
  - Boiler 2: 925 kW (1.16MWth) dual fuel (biogas/gas oil) boiler
- 1 No. Gas bag holder (2,200m^3)
- 1 No. Biogas burner (flare)
- Odour control unit (OCU) No. – wet chemical scrubber serving the main STC processes

The following are outputs from the process:

- Cake (dewatered post digestion sludge) - stored in cake bays before being shipped for use as a fertiliser;
- Bio-gas - stored in an existing 2,200m^3 gas holder, then either:
  - Burnt in the CHP or back-up boilers to generate electricity for use on-site of export to the Grid;
  - Flared in the waste biogas burner.
- Grit and screenings (small amount) – deposited in skips before being taken off-site.

The site has three standby generators providing back up power supply to essential elements of the wastewater treatment process only. There are no generators serving the STC.

A schematic for the odour control units can be found in Appendix B **Error! Reference source not found.**.

3. Potential Odour Sources

3.1. Overview of the mechanisms for odour generation

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

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

Odours generated from the sewage treatment processes downstream of the primary sludge removal stage (e.g. the secondary treatment processes and final settlement) present a significantly reduced risk of odour impact. This is due to the fact that the majority of odorous biogenic material has been removed from the flow

at this point, and the treatment processes applied to remove any remaining contaminants in the sewage are aerobic. Anaerobic conditions inhibit the formation of the majority of the reduced sulphur compounds which are responsible for offensive sewage odours.

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

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

3.2. Potential odour sources

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

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

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

sludge treatment. The hedonic score of the material will improve through the sludge treatment process as organic material is digested.

Table 1: Identified odour sources

Process or activity	Plant or equipment	Potential source of odour	Odour controls in place	Potential for odour emissions during normal conditions
Sludge reception	Cake reception TR 02076 43446 (Broomfield) TR 02037 43364 (Weatherlees)	Sludge cake	The existing cake reception area is in a building to capture odours. Air is extracted from inside the building to the odour control plant. The procedures and control system will normally ensure that the doors are closed while sludge discharge is in progress. The (Weatherlees and Broomfield) sludge cake reception silo has an airlock arrangement to minimise release of odour. The building has doors and the silo has a lid. The vehicles will reverse into the building and the building door will close before the silo lid opens. After tipping the sludge into the silo, the silo lid closes before the building door can open. During this operation air is extracted at a high rate from the building to OCU. The only open sludge surface is within the silo. Process is completed as rapidly as possible. **Maximum storage capacity**: N/A **Waste retention time**: N/A **Open/covered**: Covered	Low
	Cake blending tank TR 02089 43428	Liquid sludge and cake	Imported sludge cake is then blended with the screened sludge in 1 No. cake blending tank. **Maximum storage capacity**: 50m^3 **Waste retention time**: N/A **Open/covered**: Covered	

Process or activity	Plant or equipment	Potential source of odour	Odour controls in place	Potential for odour emissions during normal conditions
	Sludge reception tanks Tank 1 - TR 02074 43397 Tank 2 – TR 02079 43404 Tank 3 - TR 02084 43411	Liquid sludge	Imported liquid sludge is delivered to the Site by tanker and stored in a sludge reception tank (100m^3 volume). Sludge pumped from tanker directly into covered sludge reception tank (100m^3). The reception area is not enclosed. Unloading is completed as rapidly as safely possible. Venting of odorous air is controlled by adherence to the traffic light system. **Maximum storage capacity**: 300m^3 **Waste retention time**: One day **Open/covered**: Covered	Low
	Strain press	Sewage sludge	Strainpress covered and odour controlled, process monitored and regularly maintained. **Maximum storage capacity**: N/A **Waste retention time**: N/A **Open/covered**: Covered	Low
	Anaerobic digesters pressure release valve Tank 1 - TR 02163 43350 Tank 2 - TR 02129 43344 Tank 3 - TR 02146 43332 Tank 4 - TR 02137 43368	Biogas	Anaerobic digesters (two 1,550m^3, one 2,800m^3 and one 4,119m^3) covered, process monitored and regularly maintained. Planned preventative maintenance undertaken on equipment **Maximum storage**: 10,100m^3 **Waste retention time**: 17.4days **Open/covered**: Covered	Low
	Dewatering and thickening plant Dewatering building - TR 02050 43470 GBT 1 – TR 02131 43411 GBT 2 – TR 02132 43407	Liquid sludge	Dewatering and thickening activities (including centrifuges and GBTs) are covered, enclosed and odour controlled, process monitored and regularly maintained. These activites are located within a steel frame and profiled steel sheet clad buildings. Air from within specified process areas are extracted to OCU. **Maximum storage capacity**: N/A **Waste retention time**: N/A **Open/covered**: Covered	Low

Process or activity	Plant or equipment	Potential source of odour	Odour controls in place	Potential for odour emissions during normal conditions
	Liquor treatment plant Balance tank – TR 01987 43373 Anoxic tank 1 – TR 01976 143350 Anoxic tank 2 – TR 01962 43367 Reactor 1 – TR 01965 43340 Reactor2 – TR 01951 43359 FST 1 – TR 01937 43364 FST 2 – TR 01969 43327	Liquid sludge	The sludge liquor treatment plant is an AMTREAT® plant. Consisting of 1 No liquor balance tank, 2 No. anoxic tanks, 2 No. reactors, 2 No final settlement tanks Tanks are all constructed of GRP coated steel panels with GRP roofs on concrete bases, together with chemical storage facilities, a kiosk housing blower and a motor control centre. All of the tanks, except for the settlement tanks, are covered and air is extracted to OCU. **Maximum storage capacity**: 6,090m^3 **Waste retention time**: N/A **Open/covered**: Covered except the final settlement tanks	Low
	Post screened sludge storage tanks Tank 1 - TR 02107 43465 Tank 2 -TR 02121 43457	Sewage sludge	Post screened sludge tanks are covered and odour controlled, process monitored and regularly maintained. **Maximum storage capacity**: 2,600m^3 **Waste retention time**: 2 days **Open/covered**: Covered	Low
	Thickened sludge storage tanks Tank 1 – TR 02156 43396 Tank 2 – TR 02021 43399	Sewage sludge	Thickened sludge storage tanks are covered and odour controlled, process monitored and regularly maintained. Thickened sludge storage tanks are constructed of glass coated steel walls on a concrete base and have a GRP roof. Air is extracted from the tank to the odour control plant. **Maximum storage**: 1,920m^3 **Waste retention time**: 6-8hrs **Open/covered**: Covered	

Process or activity	Plant or equipment	Potential source of odour	Odour controls in place	Potential for odour emissions during normal conditions
	Post digested sludge tanks Tank 1 – TR 02147 143436 Tank 2 – TR 02161 43426	Sewage sludge	Two GRP coated steel tanks, (766m^3 each) which are covered but partially open to the atmosphere. The odour emissions from these tanks are greatly reduced by the fact that the sludge is digested and has had ferric sulphate addition. Work to connect these tanks to gas system is due to be completed in 2022.Sludge is processed immediately on arrival. Risk assessment and odour plans put in place before cleaning any tank. **Maximum storage**: 1,532m^3 **Waste retention time**: 1 day **Open/covered**: Covered	Medium
	Odour control unit TR 02055 43375	Untreated air	Odour control unit treats air to remove odorous compounds including Sulphides and mercaptans. It is process monitored and planned preventative maintenance is regularly undertaken on equipment. **Maximum storage capacity**: N/A **Waste retention time**: N/A **Open/covered**: Covered tanks	Low
	Liming TR 02156 43396	Sludge cake	Liquid liming is currently undertaken on a continuous basis. Cake is stored as far as reasonably practicable from the most sensitive receptors, storage onsite is limited and minimised. **Maximum storage capacity**: N/A **Waste retention time**: N/A **Open/covered**: Covered tanks	Medium
	Cake bays Bays 1-6 TR 02388 43179 Bay 10 - TR 02021 43482	Sludge cake	While uncovered, cake is moved to the receiving bay at the end of the treatment process so odour emissions are minimised. No disturbance of cake while in bays (5,560m^3 total volume) except for removal. Bays 1 – 6 are furthest from receptors. **Maximum storage**: 5557m^3 **Waste retention time**: 60 days **Open/covered**: open	Medium
Biogas combustion	Gas holder TR 02186 43371	Biogas	The gas holder (2,200m^3) is in a sealed system. **Maximum storage**: 2,200m^3 **Waste retention time**: N/A **Open/covered**: Covered	Low

Process or activity	Plant or equipment	Potential source of odour	Odour controls in place	Potential for odour emissions during normal conditions
	CHP unit TR 02145 43393	Biogas	Planned preventative maintenance undertaken on equipment. If CHP unit is down, gas is burnt in flare. **Maximum storage capacity**: N/A **Waste retention time**: N/A **Open/covered**: N/A	Low
	Boilers TR 02126 43408	Biogas	Planned preventative maintenance undertaken on equipment. **Maximum storage capacity**: N/A **Waste retention time**: N/A **Open/covered**: Covered	Low
	Flare TR 02187 43445	Biogas	Planned preventative maintenance undertaken on equipment. **Maximum storage capacity**: N/A **Waste retention time**: N/A **Open/covered**: N/A	Low
Cake export	Cake export TR 02380 43280	Sludge cake	Lorries/trailers are covered before leaving or sealed skips are used.	Low

**OCU potential impact is noted as low based on H_2S and design performance standard, To be reviewed under IED. It should be noted spot sampling by Ricardo AEA ltd. noted no ammonia detected into or out of OCU.

3.3. Odour impact

3.3.1. Adjoining land use

There is a public cycle way and footpath which runs along the bank of the Great Stour river, which is within

250m of the North and West Site boundary. There is only one road access route into the Site via Kinneys Lane, which intercepts the public footpath at the bridge which crosses over the Great Stour river. This is the closest public access route to the Site.

The Southern boundary is adjacent to the M20 motorway, which joins to the M25 and therefore is major transport link to the Channel Tunnel and Dover ports.

3.3.2. Sensitive receptors

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

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

The magnitude of risk relates to[4]:

- Frequency: How often an individual is exposed to odour

[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

- 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 two areas of sensitive receptors found within 500m of potential odour emission sources at the Site which are identified in Table 2. For each area of sensitive receptors, the distance and direction from each potential odour emission source to a sensitive receptor within the area has been identified. Where multiple assets exist for the same process, such as anaerobic digesters or settlement tanks, only the closest asset has been presented.

As demonstrated in Figure 2, the majority of receptors are found to the south (upwind) of a potential emission source; the receptor closest to a potential emission source is a warehouse, which is located approximately 80m south of the biological filters. No sensitive receptors are found within 250m of a potential emission source downwind of the prevailing wind direction, with the exception of the Ashford Rugby club. Use of the Rugby club by its nature typically coincides with a cooler months and therefore likely lower risk time of year. Rugby typically takes place away from the busiest time of the week in terms of vehicle movements / deliveries.

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

Figure 2: Sensitive receptors within 2km of the Site

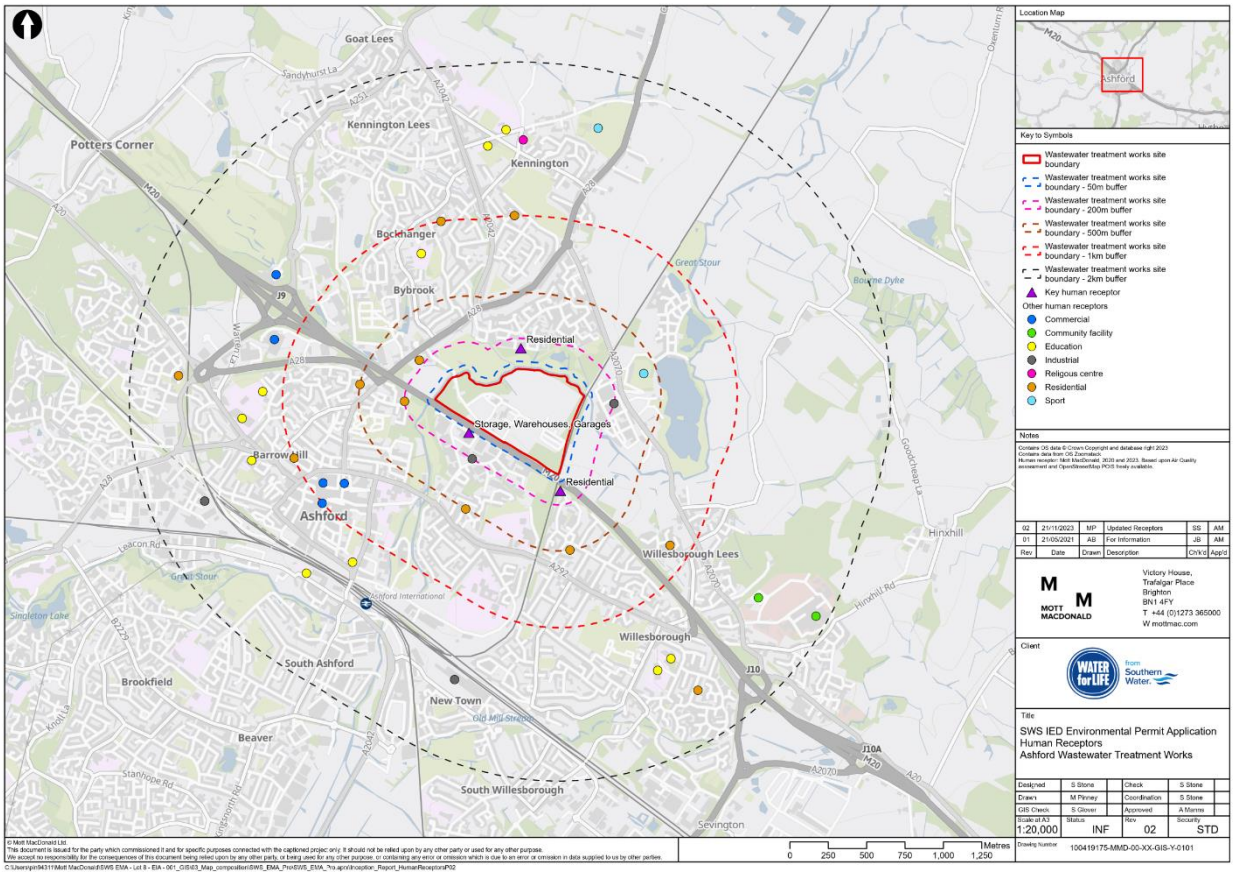


Table 2: Receptors within 500m of potential emission sources at the Site

Receptor	Nearest potential emission source to receptor	Process	Distance (m) from nearest potential emission source	Direction of receptor from closest emission source
Industrial estate south of the Site (place of work)	Cake reception	Sludge reception and distribution	**170**	South
	Tanker sludge unloading	Sludge reception and distribution	205	South
	Sludge treatment building	Sludge treatment	255	South
	Strainpress	Sludge treatment	260	South
	Anaerobic digesters	Sludge treatment	200	South
	Dewatering plant	Sludge treatment	250	South
	Liquor treatment	Sludge treatment	**110**	South
	Emergency liquor tank	Sludge treatment	290	South
	Sludge storage tank (b)	Sludge treatment	190	South

Receptor	Nearest potential emission source to receptor	Process	Distance (m) from nearest potential emission source	Direction of receptor from closest emission source
	PDSTs	Sludge treatment	290	South
	Odour control unit	Sludge treatment	190	South
	Cake bays	Sludge treatment	260	South
	Cake bays	Sludge treatment	210	South west
	Gas holder	Biogas combustion	**255**	South
	CHPs/boilers	Biogas combustion	**255**	South
	Flare	Biogas combustion	330	South
Residential property south east of the Site	Cake bays	Sludge treatment	**230**	South

Note: (a) Distance from source to receptor is rounded to the nearest 5m
(b) Sludge storage tank includes sludge reception tanks, sludge blending tanks, thickened sludge storage tanks and post screened sludge tanks
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_ASH December 2023) addressed the probability of exposure and consequence of the hazards to determine the overall magnitude of the risk to sensitive receptors within 250 metres. A Source-Pathway-Receptor model has been used to help assess the probability of exposure associated with different processes at the Site.

The assessment concluded that the overall magnitude of the risk associated with bioaerosols emissions from the Site (including to human health) is considered to be 'very low' to 'medium'. Concentrations of bioaerosols decline rapidly within the first 100m from a source and generally decrease to background concentrations within 250 metres[5,6]. Operation of the Site is therefore unlikely to lead to significant impacts at nearby sensitive receptors from bioaerosol emissions. This is in part because the majority of sensitive receptors are located more than 100m or 250m for a potential bioaerosol source, including Little Burton.

3.4. Odour modelling

The effectiveness of the pathway for odour impacts associated with the Ashford Sludge Treatment Centre has been assessed using wind data and the locations of the nearest sensitive receptors relative to the Site.

Modelled wind data for the years 2018-2022 were derived for the site from an atmospheric hindcast model (Vortex).

The nearest high-sensitivity receptors are located at residential properties approximately 230m and 290m south of the Site. The nearest medium-sensitivity receptors to the Site are industrial receptors located approximately 80m to south of the Site.

Historically, the Site has received a large number of odour complaints; 58 were recorded in 2018 and 66 in 2019. In 2020 the Site recorded an unusually high number of odour complaints with an annual total of 123, averaging about 10 odour complaints a month throughout the year. This spike in complaints was likely to have been caused by a hot spring and summer in which the majority of the local residential population were at home for extended periods, including midweek days, due to the Coronavirus pandemic.

In 2020, a scheme was approved to install covers on tanks and extract the gas to the OCU. According to the FPM, with the improvement works on site, the number of odour complaints recorded reduced to 25 in 2021, seven in 2022 and zero in 2023.

Odour modelling was conducted for this site by Ricardo AEA Ltd. In January 2021. Ricardo AEA was specifically engaged to provide a targeted set of options to reduce odour abatement at the site, the report models impact of a number of scenarios which have fed into an internal Southern Water mechanism known as Risk and Value (R&V), the R&V approach takes a series of options and attempts to rationalise those to be taken forward based on cost, constructability, time, optimising value in terms of benefit delivered and level of risk reduction to site. These have fed into the odour reduction plan with engagement with the relevant regulators and the OMP.

In addition, Olfasense UK Limited (consultancy and laboratory services) in October 2020 undertook an assessment of the of containment and treatment of odour within the two sludge cake buildings. The study observed the routes for the transfer of smoke, and hence odours, to the external atmosphere and thus to the local receptors.

GC-MS analysis of emissions from the OCU identified, exceeded odour threshold value values for Nonanal (2.3 times greater) and Decanal (1.6 times greater) (both are aldehydes), which may be contributors to

odours detected. It is expected that dispersion will certainly reduce concentrations of both of these to below the odour threshold. Leak detection testing of containment at both raw cake reception facilities was carried out. ‘Good level of containment’ was observed because once the ventilation system was reactivated the fugitive emissions ceased to emit from the buildings and following 0.5 hours and 1.0 hours for cake storage building 1 and building 2, respectively, the added smoke was fully removed.

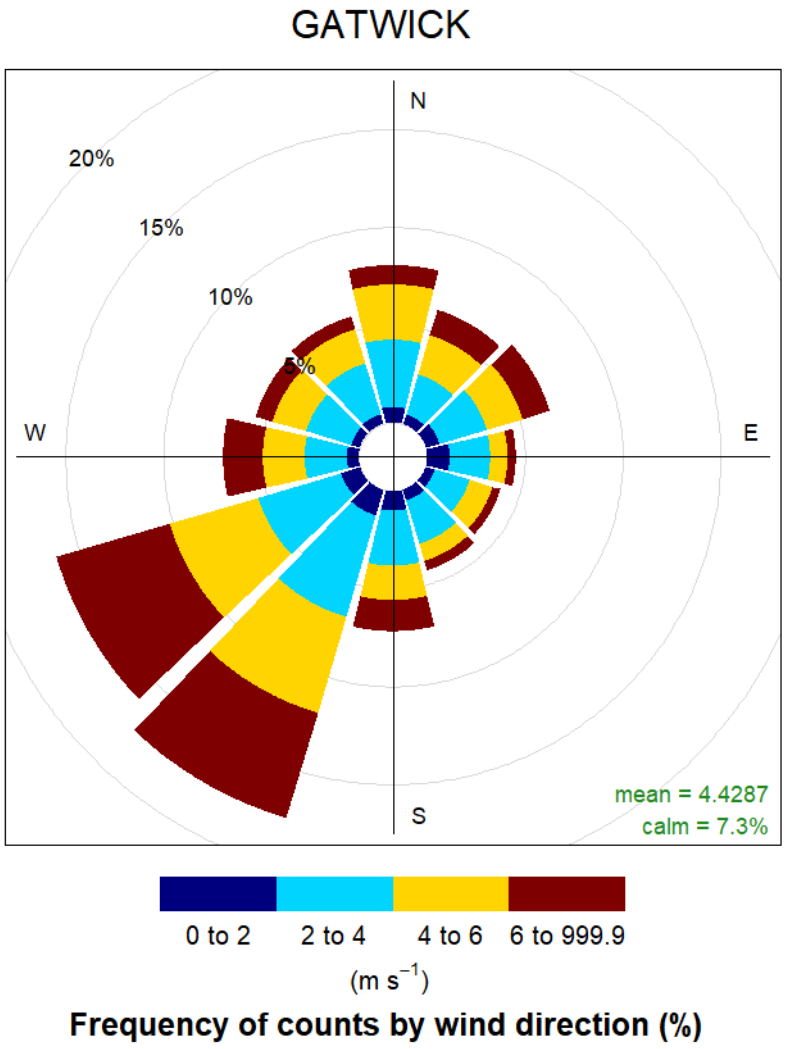
Wind rose and information generated for the bio-aerosol risk assessment have been used to determine the direction of any potential odours released from the Site.

The 2018-2022 wind rose for the meteorological site at Gatwick airport, the nearest representative meteorological site to the Site, is shown in Figure 3. This site is located approximately 74km west of the Site but is considered representative as Gatwick airport is located in a similar, inland environment with a similar elevation to the Site while other meteorological sites closer to the Site are at coastal locations.

The Gatwick airport meteorological site experiences frequent mild and strong winds from the southwest. This suggests that sensitive receptors located to the north east of the Site would be at the greatest risk from odour emissions from the Site as they would be downwind of the prevailing wind direction. Given the distance between Gatwick airport and the Site, an atmospheric hindcast model (Vortex) has also been used to assess the wind conditions at the Site.

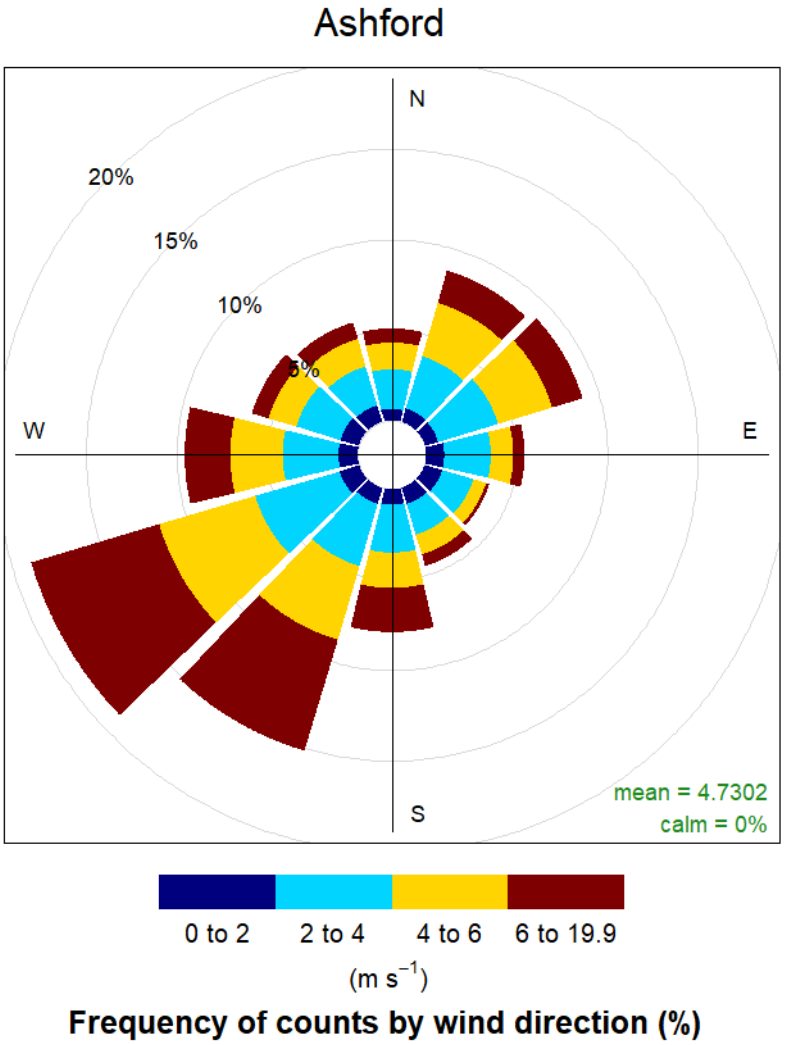
Figure 4 presents the wind rose generated for the Site from the Vortex model for the period from 2018-2022. The wind rose demonstrates that historically, this location experiences strong prevailing winds from the south west. Overall, the two datasets show general agreement with both the monitored and modelled data indicating the prevailing winds originate from the south west. Therefore, sensitive receptors located to the

north east of the Site would be at the greatest risk from odour emissions from the site. This is in agreement with operational experience which suggests that receptors to the north are most effected by odour.
Figure 3: Average wind rose for Gatwick Airport meteorological site, 2018- 2022



Source: NOAA Integrated Surface Database (ISD) (2020)

Figure 4: Average wind rose for the Site from the Vortex model, 2018- 2022



Source: NOAA Integrated Surface Database (ISD) (2020)

4. Odour Management and Control

4.1. Odour control system

The liquor treatment process and all sludge treatment processes are covered and enclosed with the exception of final settlement. All covered processes are extracted the Odour Control Plant OCU1.

The plant has the capacity to treat 44,000 Nm^3/hr of foul air. The treated air is discharged via an 18m high stack. The concentration of hydrogen sulphide in the stack is monitored continuously using a Draeger ChemLogic 1 instrument provided by Pollution Monitoring. Process and air quality monitoring data are monitored by Site personnel regularly throughout the day and are centralised on the SCADA and telemetry system to ensure emissions are free of odorous compounds.

Other odour mitigation measures implemented on-site include the use of 3 No. cobra (wet system) mist spray suppressors at storm tanks, around Cake Bays 4 to 6 and at the northern border near Cake Bay 10, and a cobra (dry vapour) at Cake Bay 10.

Leak detection (methane gas analyser) is also installed on the biogas holder 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 of posed by biogas.

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

The use of odour atomisers during unloading of waste into the system is to be considered. The removal of biosolids off-site will be undertaken as soon a practically possible whilst considering prevailing weather conditions.

Leak detection (methane gas analyser) is also installed on the biogas holder 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 of posed by biogas.

The key parameters of the OCUs are described in Table 3.

Table 3: Odour Control Unit details

Specification	OCU Description
Model type	2-stage Chemical scrubber system
Stack height	18m
Odour removal efficiency	Odour: 60% Hydrogen Sulphide: 93% TVOC: 1%
Total Flow Nm^3/hr	44,000

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 Site's 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, where accepted, are to be offloaded within buildings with closed doors and Odour Control Unit extraction operating.

There is a site-wide "Close Doors & Hatches" policy, which is shown in Appendix I. The policy is regularly communicated to all Site staff.

During the implementation of the Odour Reduction Plan (Appendix H), the odour suppressant sprays remained in use during operational hours. Breakdown of the spray system were resolved promptly to bring back into operation. Following the completion of each item on the Odour Reduction Plan the operational procedures of the spray system is being reviewed, with the aim to reduce the frequency of use of the odour suppression system, where appropriate.

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

4.2.1. Normal conditions

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

- Routine Operations: the daily and weekly routine operations are scheduled regionally through weekly and quarterly programmes of work. Site operators are responsible for carrying out the tasks and the Field Performance Manager (FPM) for checking completion and quality.
- Planned Maintenance (Ellipse): the programmes for planned maintenance are generated regionally. Jobs are sent direct to qualified mechanical or electrical technicians via electronic communication. Start and completion of tasks, including work done, are logged direct to Ellipse, which produces records of plant performance. Site and regional mechanical and electrical staff, in conjunction with specialist contractors, are responsible for carrying out the tasks and the FPM for checking completion and quality.

- Contractor Maintenance (CM): the programmes for planned maintenance of some categories of specialist equipment (centrifuges, odour control equipment, odour control monitoring equipment, etc.) are generated regionally. Paper records of work carried out, completion and approval are kept on-site and by the Supply Agreement Leader.

- Local Plant Monitoring (LPS): Specific monitoring (for example, hydrogen sulphide at some sites) is carried out by online instrumentation. Information is recorded on SCADA. The plant records (daily plant spreadsheet) are created by site operators and process scientists. Site operations staff are responsible for carrying out the tasks and FPMs for checking completion and quality.

- Contractors Records (CR): Records of sludge deliveries are recorded in real time on-site via an electronic logging system and reported monthly. Records are available via online database.

- Material Delivery and Removal: Records of sludge deliveries are recorded electronically in real time. Chemical delivery records are maintained on site logs. Bulk chemical deliveries and consumption are also recorded on SCADA in real time.

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

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

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

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 (optimum feed maintained at 150mg/L) and bubble pattern along with daily sampling.
	Weekly	Clean and check dissolved oxygen probes.

Process	Period	Typical maintenance activities
	Dictated by operational performance	Drain and clean lane, replace failed diffuser membranes. Biological filtration material is cleaned as and when there is build-up of excess levels of growth on the media resulting in ponding / blockages.
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.
	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 screening	Daily	Routine daily checks.
	2-3 times/week	Removal of screening skips
	Weekly	Operational checks on screens as per operating plan
	Monthly	Checks by mechanical/electrical (M&E) engineers as per regional maintenance schedules.
	Annually	Maintenance of plant and equipment
Sludge Thickening	Daily	Routine daily checks.
	Weekly	Routine weekly checks and maintenance including cleaning.
	6 Monthly	Checked/Serviced every six months by appointed service provider
Anaerobic Digester and degassing tanks	Daily	Feed Volume, Temperature, Feed rate, 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	Routine daily quality checks.
	6 Monthly	Checked/Serviced every six months by appointed service provider.
	Daily	Routine daily checks

Process	Period	Typical maintenance activities
Odour control units	Monthly	Inspection and maintenance routines in accordance with both the frequency and task specified in the regional maintenance schedules. (including monitoring of pressure, flow rate for both gas and liquid, the pH/ OPR of scrubbing liquid, inlet gas temperature, pressure differential, inlet gas moisture content, and leak check monitoring)
	Annually	Annual service by the Odour control service provider in line with contracted maintenance requirements, including checks on the gas pipes of the scrubber and cleaning of the nozzle of liquid feeding system and demisters Nozzle of liquid feeding system and demisters cleaned and gas pipes of scrubber checked (unless pressure profile or airflow readings taken at the monthly service visits indicate fouling, the frequency will be increased).

Diffuse emissions from open storage areas are minimised by:

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

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

4.2.2. Odour risk assessment

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

- Shutdown of odour control systems for an extended period for maintenance;
- Non-routine draining down of large open process tanks with potential to generate odour;
- Lifting of odour control covers, opening of hatches or keeping doors of odour-controlled building open for an extended period;
- Commissioning of new odour sensitive processes or equipment where odour risk may not be adequately mitigated; and
- Significant flow diversion outside odour-controlled processes for an extended period

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

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

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

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

Table 5: Example of risk assessment for routine maintenance operations

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

4.2.3. Odour reduction plan

Southern Water has formulated an action plan to minimise odour emissions, which is shown in Appendix C. The plan provides a description of each odour reduction measure planned for specific plant/equipment and provides a breakdown of the timelines for implementation based on the key delivery stages. The rationale for not including certain items is also elucidated upon where appropriate.

Phase 1 and 2 of the transport and storage of digested cake, addressed in the Odour Reduction Plan, has been completed. Following successful trial digested sludge cake storage has been moved from Bay 10 to

Bays 1-6 at the south eastern end of site. The management of digested cake following the trial has, therefore, been incorporated into the OMP, in particular to reduce impact to Little Burton. Liming of cake will be prioritised, where practicable, to limit challenges of storage capacity and risk of re-wetting during the maturation period.

With the odour reduction measures mentioned above as well as improvement works, implemented onsite, the number of odour complaints have reduced significantly from 58 in 2018, and 66 in 2019 and 123 in 2020, to 25 in 2021 and seven in 2022. No odour complaints have been received in 2023..

4.2.4. Abnormal conditions

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

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

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

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

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 on site sampling and testing, 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 are 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)	Split 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	
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 anaerobic 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

Event	Potential source of odour	Potential impacts	Odour risk	Measures to prevent or minimise risk	Actions to be taken
Sludge reception unit roller shutter door failure	Release from behind the shutter door in sludge reception	Effectiveness of odour control measures compromised, risk of odour release until repairs completed	Medium	Minimise sludge reception activities until repairs have been completed	Record details and actions taken in site diary
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	Use available capacity in the short-term. Assess need to use temporary plants (incl. portable odour sprays spread around process unit) 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 Odour Control Unit and repair as required, check performance of sludge pumping stations, clearance of road drainage may be required following flooding

5. Monitoring

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

Any odour detected on-site during normal operation will be rectified using measures described in Table 6 to implement the 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 6 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
- 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 F

- Record actions taken in respect of odour investigations
- Conduct daily sniff tests
- Record and report incidents that caused significant odorous emission, and follow the Awareness Raising Instruction in Appendix A.
- Produce other records as required by the OMP
- Undertake the Site odour monitoring and controls listed in Table 7

Drivers delivering odours loads shall carry out the following tasks:

- Ensure loads are sealed and covered when arriving the Site and approaching the sludge reception.
- Remove covers only once 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.
- Ensure that any wastes that are not authorised to be accepted do 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
Raw sludge reception	Connect foul air exhaust to hose before loading Ensure vehicles cleaned after loading/unloading. Hose down any spillage after each load/unload	Medium	Every site visit	Noticeable odour in tanker unloading area	Increased odour in tanker unloading area. Follow the Awareness Raising Instruction, Appendix A.	Check containment, hoses connected to exhaust	Low
Lime dosing for stabilisation of cake after prolonged rain	Check cake pH is within acceptable limits as per HACCP plan	Low	After prolonged rain	Noticeable odour from sludge / lime	Increased odour from sludge / lime	Check / calibration of pH probes, sampling of digestate to confirm pH and Bacti kill	Low
Transportation	Ensure only sealed or covered skips/trailers used. No removal of covers whilst parked waiting to load/unload Monitor odours during cake loading	Medium	Every weekday	Noticeable odour from vehicle	Follow the Awareness Raising Instruction, Appendix A.	Make contractor aware of requirements in OMP	Low
Sludge holding tanks	Minimising retention time Monitor odour levels around tank	Medium	Every site visit	Noticeable odour from tank	Increased odour from tank Follow the Awareness Raising Instruction, Appendix A. Follow the Awareness Raising Instruction, Appendix A.	Increase sludge treatment rate to reduce retention Hose spillages Increase de-sludge ops up stream Run odour masking system (Short term)	Low

Potential Odour Source	Routine Actions Required	Risk pre-control measures	Monitoring Frequency	Attention Level	Action level	Preventative Action	Risk post-control measures
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 offline tanks; and Proactive identification	Medium	Every site visit	Noticeable odour from area and/or complaint received	Increased odours from area Follow the Awareness Raising Instruction, Appendix A.	Quality checks of process. Undertake process in enclosed building with appropriate odour abatement. Tankering of sludges to other sites without odour abatement.	Low
Secondary Digesters	Check for strong and uncharacteristic odours	Low	Every site visit	Investigate unusual odours	Investigate and report strong/unusual odours to FPM and Scientist Follow the Awareness Raising Instruction, Appendix A.	Regular checks and investigative action	Low
Centrifuge	Check for strong and uncharacteristic odours	Low	Every site visit	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

Potential Odour Source	Routine Actions Required	Risk pre-control measures	Monitoring Frequency	Attention Level	Action level	Preventative Action	Risk post-control measures
Gas Flare Stacks	Complete biogas combustion should give clean emissions with blue or non-visible flame	Low	Weekly	Occasional orange flame or black smoke visible	Constant orange flame or black smoke visible Follow the Awareness Raising Instruction, Appendix A.	Routine contractor checks or maintenance to clean nozzles of carbon build-up	Low
Whessoe valves on anaerobic digesters	Check they are clear from foam residue	Low	Monthly		Not seating correctly Follow the Awareness Raising Instruction, Appendix A.	Engage service contractor to resolve any problems	Very low
OCU	Check pH Check media condition	Medium	Weekly	pH<8.9, ORP <750	p H <8.5, ORP < 700 Sudden drop in performance Follow the Awareness Raising Instruction, Appendix A.	Check chemical dosing Ensure media damp Change media as per schedule	Low
Whole site	Doors to operational buildings will remain closed and hatches will be latch closed.	Medium	Every visit	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” around the relevant process area perimeter, designed to detect any abnormal plant odour emissions. Sniff testing will be undertaken at the operational area boundary, starting at an upwind location. A daily check shall be carried out by the process operator or other member of staff to assess any noticeable odours, wind direction, operational or maintenance activities that could impact odour nuisance. 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 perimeter as practicable) and note on a map the location of the perimeter checks. Checks in each location should be undertaken for at least 20 seconds and the monitoring form completed, see Appendix G.

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 checks sheet and a copy sent to Customer service.

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

As part of the operator carrying out the Daily Report, they shall also observe the Site access road on leaving and arriving for their shift and include in the report any relevant issues observed.

A regular sulphide survey shall be carried out by a member of the Wastewater Support Section using a Jerome odour-monitor on a 25m sampling grid to produce an odour report.

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. Housekeeping

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 anaerobic 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, such non-routine activities such as emptying of sludge tanks, to consider suitable measure to limit odour. For example, time such activities when wind direction is from the north or west.

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 after spillage

Anaerobic Digester

- Anti-foam used to suppress foaming of sludge within the anaerobic 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_ASH December 2023) includes a description of nominated key personnel and their responsibilities, emergency response procedures, contact details of internal contacts (Works Manager, Team Leader, Process Technician, Regional Control staff and key H&S staff), national and regional (where appropriate) contact details of emergency services and environmental regulators.

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

The key procedures relating to environmental accident and incident management are set out in Southern Water's ISO14001 accredited Environmental Management System (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

The following parameters are continuously monitored for the OCU:

- Pressure - by pressure differential switch
- Liquor flow - by magnetic flow sensor
- pH and ORP of the scrubbing liquid

Table 7 identifies the parameters and monitoring requirements in relation to the odour control system that needs to be undertaken at the Site.

Table 7: 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 1)	Hydrogen chloride	Once every 6 months	Southern Water are to initially undertake characterisation of emissions from the odour control units, in line with BAT 3, to demonstrate if TVOC and HCI are present in the waste gas stream. If TVOC and HCI are identified as relevant in the waste gas streams Southern Water will monitor these emissions in line with BAT requirements and the Environmental Permit.
	TVOC	Once every 6 months	
	Ammonia	Once every 6 months	As per design and manufacturer's specifications or otherwise as specified in the Environmental Permit
	H_2S		Maintenance undertaken by service provider, or otherwise as specified in the Environmental Permit
	Efficiency checks	Annual	Annual maintenance undertaken by service provider, or otherwise as specified in the Environmental Permit
	Gas stream flow	Continuous	As per design and manufacturer's specifications and SCADA, or otherwise as specified in the Environmental Permit
	Overall operation, including air circulation	Daily	Visual assessment or otherwise as specified in the Environmental Permit

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

5.2.1. H_2S monitoring

Inlet and outlet H_2S monitors for the main odour control plant monitor the gas concentrations into and out of the main odour control plant, with an inline paper tape sampler. The level of H_2S is displayed locally and at the main control panel. A programmable logic controller (PLC) based logger records the detected values.

Alarms are raised on the SCADA system if any of the fans, pumps or instruments, including the stack discharge H_2S monitors, on the odour control plants fail.

Failure of the odour control plant immediately and automatically raises an alarm at the Regional Control Centre via the telemetry system. Tank liquid levels, flows and H_2S concentrations are also trended on the SCADA system.

Routine maintenance of the H_2S monitors is carried out on a six-monthly basis by an appointed framework contractor.

The monitoring regime for the Site will include continuous H_2S monitoring at the Site odour control unit outlet stack against emission concentration limits, as determined by dispersion modelling and agreed with Kent County Council.

The performance of the odour control system on the Site is monitored continuously by means of a H_2S monitor installed in the outlet discharge stacks from the odour control units. This instrument takes a sample over every 15-minute period and the resultant value is recorded on the Site's SCADA system. Other relevant odour control unit parameters, such as airflow rate, oxidation reduction potential (ORP) and pH are also monitored. The operating pH of the Stage 2 scrubber is 9.2.

The emission limits from the odour control stacks have been established by odour dispersion modelling, which has been used to determine the H_2S concentrations at sensitive receptors outside the site boundary that could arise from the Site odour control emissions under a range of meteorological conditions. The odour control emission limits have been set to a level which the model has determined will result in values below the threshold of 0.6ppb of H_2S as a 98th percentile of hourly averages over a calendar year. Experience has shown that where this standard is complied with the likelihood of odour annoyance is very low.

The absolute emission concentration limit for the OCU1 odour control stack is 220 ppb of H_2S. The odour control plant will normally achieve 99.5% removal of H_2S. This limit will not be exceeded during normal operating conditions. Periods of regular essential maintenance and breakdowns are excluded from coverage by this limit.

A reporting trigger level is currently set at 50 ppb of H_2S (100 OU/m^3), any excursions beyond which will be fully investigated, remedial and future preventative actions instigated and a report sent to the Southern Water Wastewater Area Manager.

For each ad-hoc review of the OMP the trigger level will be assessed to determine whether the level should be amended. The level will be reduced accordingly during on-going odour issues arise from the OCU. When remedial action has successfully been undertaken the level will be increased to no greater than 50 ppb of H_2S (100 OU/m^3). For each amendment to the trigger level Southern Water must instruct the OCU supplier.

If the H_2S level reaches a pre-set alarm concentration, an alarm is automatically relayed to the Site operators so that remedial action can be taken. In the event of one or more readings above this level being detected, an alarm function would be triggered in the Site control room. The initial reaction to this alarm signal from control room staff would be as follows:

- Check all other relevant items of the odour control plant in order to identify possible cause of excursion (for example, dosing pump failure, chemical flow failure, ORP or pH out of range)
- Contact Framework contractor (available on 24-hour basis to give telephone support or attend site) for advice
- Record response to alarm and remedial action taken
- Notify appropriate Southern Water staff members in the event that problem cannot be solved quickly and is likely to persist, requiring service intervention

- Contact Operational Customer Contact Centre to advise of a potential problem leading to possible customer complaints

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.

6.2. Control of contractors

A Work Order system has been introduced by Southern Water for all contractors operating on wastewater treatment sites. All contractors are given comprehensive Health & Safety, environmental and operational requirements briefings prior to being allowed to commence work on any site.

Where the work is likely to involve maintenance on or modifications to a process critical unit, the potential implications are considered in depth and appropriate remedial measures are included in the job specification prior to commencement of work being authorised.

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 D provides an example of an awareness raising instruction.

7.1. Internal communication

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

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

7.2. External communication

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

7.3. Reporting

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

7.4. Complaints management and resolution procedure

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

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 and the H_2S trigger level 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, including implementation of the Odour Reduction Plan (Appendix H).

The H_2S trigger level, as discussed in section 5.2.1, will be amended accordingly to reflect the overall risk of odour. Changes in the trigger level will not be greater than 50ppb.

8.2. Auditing

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

8.3. Records

The following records will be maintained:

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

A. Awareness Raising Instruction

Activities that may result in an odour nuisance

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

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

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

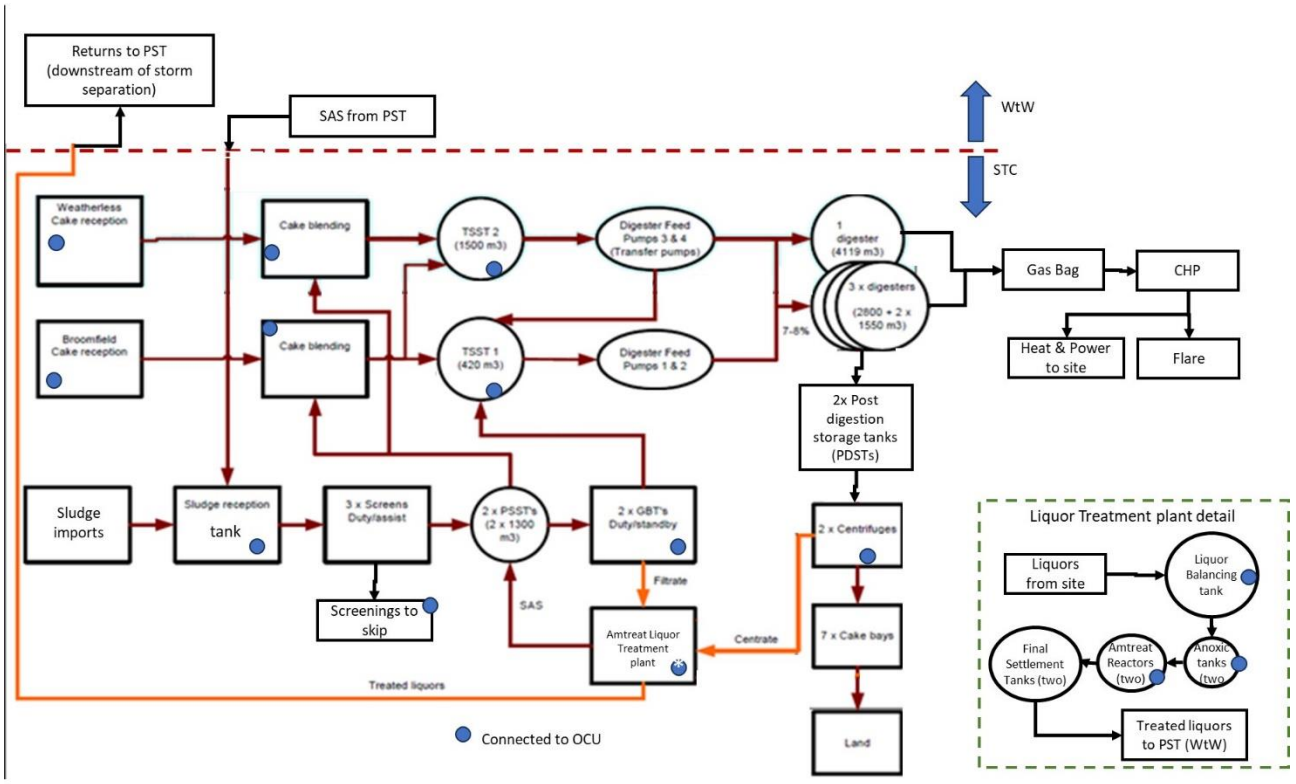
If the RCC or Customer Services are made aware of the problem, it means that they give a more constructive response to the person making the enquiry/complaint.

- In normal working hours, contact Customer Services on 01903 272685
- Outside normal working hours, contact the RCC and request information is added to the 24-hour 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/BP3296SB 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 589,637 wet tonnes.

It is requested that the annual quantity of cess imports to be accepted at the head of the works is 150,000 wet tonnes.

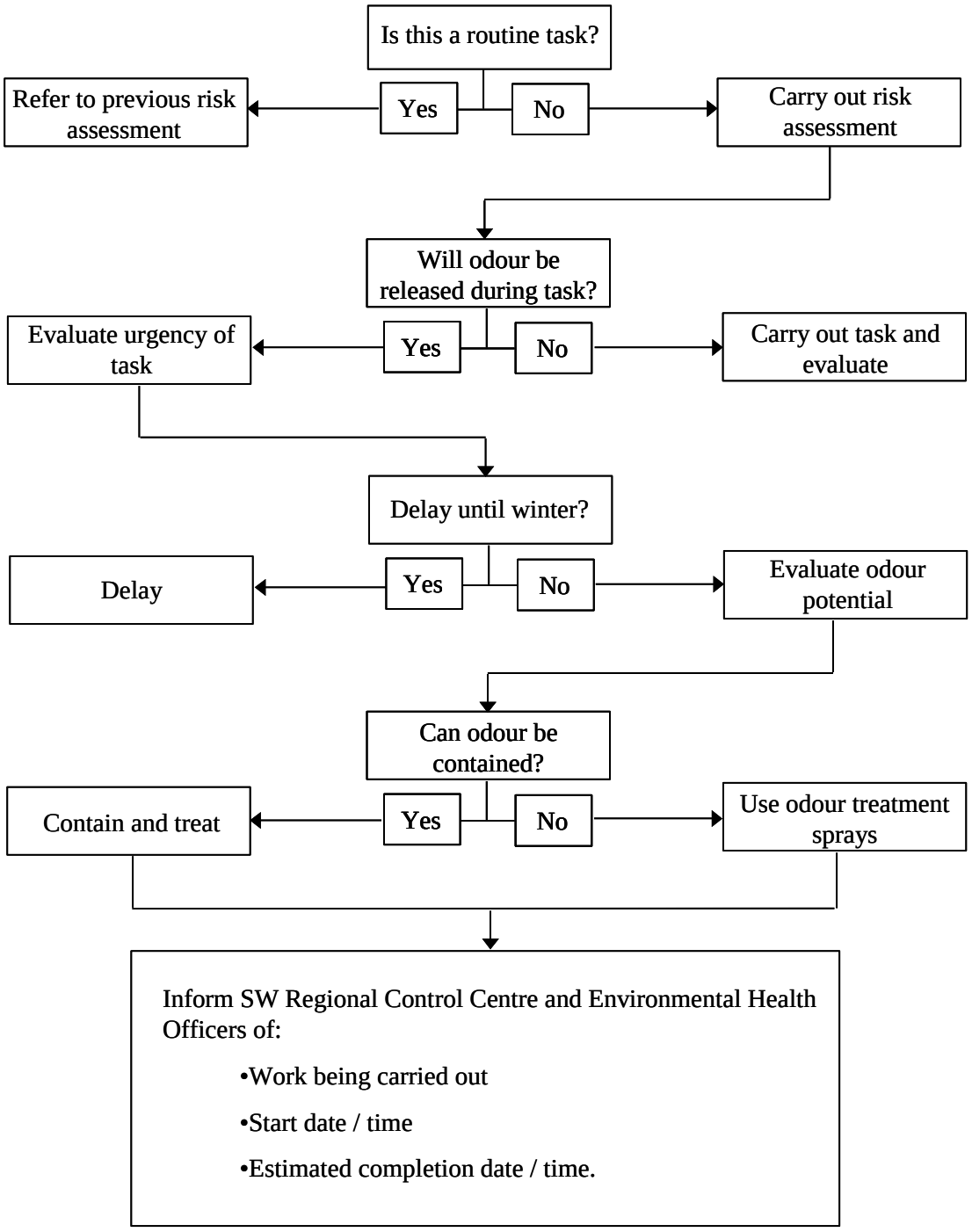
D. Odour Checklist

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

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

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

E. Risk Assessment Flowchart



F. Complaints Management

F.1 Management of odour complaints

F.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.

F.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 feedback by phone. Each call is assigned a unique CSMS number. The information is entered into the CSMS Database under a designated sort code.

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

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

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

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

Action by Southern Water Managers

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

G. Odour Monitoring Form

Date:	
Name:	Visitor or staff:

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

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

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

H. Odour Reduction Plan

Process Area	Total odour emission (OUE/s)	% contribution to odour	Description	Explanation	Start on Site	Completion	Latest Information (June 2022)
Sludge Reception Tanks (3 no.)	42804	37	Cover all tanks and connect to OCU	Replacement of damaged cover on tank 1 and addition of covers on tanks 2 and 3 Odour control to be provided either by existing OCU 1 unit or dedicated unit.	Oct-21	June-22	Completed (connection from Tanks to OCU1)
OCU 1	14456	13	Confirm capacity and performance	1) 1st choice for connection of the sludge reception tanks 2) We have calculated that there is currently some spare capacity on the existing OCU1 and that further volume extraction increases could be gained by uprating the existing fan set. Therefore, this option includes fan modifications to increase current throughput from 47,000 Am3/hr to the design capacity of 52,000 Am3/hr. 3) Potential requirement for the addition of increased odour removal functionality (based upon odour constituent analysis for emissions) to be assessed as part of OCU design phase and included in delivery if required	Oct-21	Mar-22	No modification required for new sludge reception tank connections as Cold Liquors tank connection was removed Ammonia sampling of inlet and outlet of OCU Completed. No ammonia detected

Process Area	Total odour emission (OUE/s)	% contribution to odour	Description	Explanation	Start on Site	Completion	Latest Information (June 2022)
Sludge tanker venting	-	Added post odour modelling	Dedicated OCU connected to tanker / or OCU1	Tanker venting not included in odour reports due to intermittent nature of odour source though tanker venting is thought to have a significant impact on overall odour from the site. This will be included with the covering of the sludge reception tanks.	Oct-21	Mar-22	traffic light system and modified discharge valve operation to alleviate venting to atmosphere.
						June-22	Similar valving/traffic light system in place in Sludge tanker venting area.
2 No. Bybrook Storm Tanks	720	1	Provide storm tank cleaning system	1) Automated storm cleaning system 2) Exploring Xylem Flyjet option; technical feasibility to be confirmed 3) Would shorten delivery timescale 4) Odour benefit expectation higher than that recorded in the odour analysis * if the Flyjet option is not feasible other options will be reviewed	Jun-21	Sep-21	Completed

Process Area	Total odour emission (OUE/s)	% contribution to odour	Description	Explanation	Start on Site	Completion	Latest Information (June 2022)
2 No. Storm Tanks No. 1 – 7	1267	1	Provide storm tank cleaning system	1) Automated storm cleaning system 2) Exploring Xylem Flyjet option; technical feasibility to be confirmed 3) Would shorten delivery timescale 4) Odour benefit expectation higher than that recorded in the odour analysis * if the Flyjet option is not feasible other options will be reviewed	Jun-21	Sep-21	Completed
Cake Bay (Fresh)	6630	6	Recommended short term cake storage & loading solution to reduce ammonia odour impact Phase 1.	Collect limed cake in a trailer, transport & store on cake bays at the bottom of the site, this would require less cake to be stored on site than the non-limed option (Phase 2) and we have enough serviceable cake bays to provide storage and loading requirements. Continue to lime dose cake to normal bacti kill levels but no storage at Cake Bay 10 The storage area is significantly further away from the Little Burton estate This would leave Cake Bay 10 empty of any residual cake other than that being collected reducing the likelihood of impact of odour on the Little Burton Estate.	Jun-21	Aug-21	Completed trial now business as usual

Process Area	Total odour emission (OUE/s)	% contribution to odour	Description	Explanation	Start on Site	Completion	Latest Information (June 2022)
Cake Bay (Fresh) including Tank 4 - Digested Sludge (E-PDST)	10227	9	Options include: 1) Cake bins (RoRo skips) 2) Building over cake bay with odour extraction and optimised lime dosing. 3) Silos 4) Improved sludge process and optimised retention	Assessment of longer-term strategic options in parallel with Phases 1 and 2 above 1) In depth holistic approach required of all possible options 2) Need to explore new solutions on the market 3) Request that time is given to ensure the correct process validation and assurance of solutions	Aug-21	Nov-21	Completed trial now business as usual
PDST Venting	Added post odour modelling	Added post odour modelling	Connect to CHP Gas system	1) Not included in the odour surveys due to its height above ground. * Agreed with the EA/BC to be assessed as part of the IED submissions process - must be addressed by August 22		Oct-22	On-going

Process Area	Total odour emission (OUE/s)	% contribution to odour	Description	Explanation	Start on Site	Completion	Latest Information (June 2022)
Cold Liquors Tank	NA	NA	Repair / replace existing cover and ensure appropriate extraction	Existing cover is damaged resulting in OCU1 capacity reduction	Oct-21	Mar-22	Cold liquors tank decommissioned Complete

I. Closed Door and Hatches Policy

To ensure maximum benefit is obtained from the extensive system of odour abstraction and treatment at the Site, it is essential that wherever possible doors and hatches remain closed or are only opened for the minimum period while access is required for operation and maintenance.

- Keep all doors closed
- Keep all covers/lids closed
- When necessary to remove covers for maintenance, remove the minimum amount for safe working and recover as soon as possible.
- Clean up sludge spills immediately using disinfectant if required
- Monitor odour control system
- All rubbish/waste to be disposed of immediately to relevant skip

J. OCU Maintenance Report

ERG (Air Pollution Control) Ltd
Bridge House Environmental Centre, Five Oaks Road, Slinfold,
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: 11 of 12– November 2023

Project Name	Southern Water Maintenance	Project Number	AM7143

Visited	Ashford	**Report By**	Mahesh Salunke
Company	Southern Water	**Tel**	01403 292000
Contacts	Colin Leavers	**Mobile No**	07387 261520
	Paul Herbert	**Date**	03/11/2023
	Nathan Twine	**Reviewed By:**	TJS
		Copy To:	HMcW, RW, MB, SB, GL, TJS
Purpose of Visit	**Monthly Service Visit of 2 Stage Chemical Scrubber OCU**		

On arrival, the scrubber Stage 2 was working, dosing values were: 9.10 pH / 875 mV

1. Actions Required:

1. **Stage 1 Recirc:** Recirc pumps were OFF at the MCC, resulting no recirculation running. Recirc pump 2 only isolated but not locked and tagged. SW were advised to isolate the pump properly. During the Scrubber Clean in March the demister was identified as being misaligned and covered in algae which can be travelled to extract fan hence the pump has kept OFF. During previous visit Pump 2 was tested and a heavy leak was noted from the discharge flange (200mm diameter, 8 bolt) which was unable to be tightened due to corrosion. *ERG issued quotations in Jan 23 for replacement recirc pumps for stage 2 and March 23 for acid wash and demister clean*.

2. A small leak was noted at the inlet connection to hypo dosing cabinet. As the line is covered with legging, it was not possible to identify where exactly the leak is. Small amount of hypo can be seen underneath the dosing cabinet. To investigate further bund entry is required. SW was made aware of this and requested to monitor it closely. This needs to be investigated and repaired as soon as possible to avoid any major leak. Bund also needs to be cleared as small amount of liquor with hypo was accumulated.

2. Other faults and actions required:

2.1. Extraction fan #1 F16001 was found in SCADA MCC HAND, although the selector switch was in OFF position at MCC panel. SW was made aware of this on this visit. ICA engineers require to investigate the PLC signal a.s.a.p.

2.2. Outlet extraction fans, both flexible ducts have very slight signs of damage. This is not resulting in any odour escape yet, ERG needs to monitor if they get worse.

2.3. Caustic dosing pumps has signs of leaking from the inlet and outlet. **ERG to monitor.** 03/11/2023 Looks very dry an old leak, no fresh caustic leak observed.

2.4. Pressure gauge for stage 2 recirc pumps not showing correct value. The hand valve is too tight for the gauge to be checked manually. Range 0-6bar. **Further investigation required.**

2.5. Hypo level was 35%, but on MCC panel low level alarm was noted. This wasn't the correct alarm and SW was made aware of this. SW ICA to address the issue.

3. **Other comments:**

3.1. Please see item 6 for historical faults.

4. **Condition monitoring:**

Condition monitoring	Unit	Nov	Oct	Sep	Aug	Jul	Design
Velocity at inlet of Stage 1 Ø1280 mm	**m/s**		7.2	8.1	7.8	7.0	
Airflow volume rate at stage 2 inlet	m^3/h		35,519	37,504	36,114	32,784	TBC
ΔP across stage 1 spray tower	kPa		0.23	0.23	0.22	0.25	TBC
ΔP across Stage 2 Alkaline tower	kPa		0.73	0.80	0.68	0.73	TBC
Calculated OCU H_2S reduction efficiency	%		>99	>99	No load	No load	TBC

Observations & other information:

- H_2S inlet monitor, HMI value: 0 ppm @ 09:10 am
- Caustic tank HMI level: 73.3 %
- Hypo tank HMI level: 31.0 %
- Stage 1 recirc flow rate: 0.0 m^3/hr
- Stage 2 recirc flow rate: 158 m^3/hr
- Stage 2 purge liquor flow rate: see item 6.2.
- Stage 2 pH value: 9.10 pH
- Stage 2 ORP value: 875 mV
- H_2S outlet monitor: 4 ppb @ 09:10 am
- Water Softener: Salt tank level good & producing soft water.
- Belts: SPB3750 / 4 belts per motor / 2 motors / 15 spares on site
- HMI login password: 4444

6. HISTORICAL FAULTS	DIAGNOSED
• 6.1. **Stage 2:** Stage 2 recirculation flow sensor FIT161201 is still showing erroneous values, which may generate a low flow alarm & stop recirculation pump. Although System has been running with this issue for a very long time. **ERG has already provided a quotation but can provide new one on request**.	Jun.2018
• 6.2. **Stage 2 purge flow meter:** The purge line from stage 2 has been cleared. The purge flow meter does not register flow at all therefore, the rate cannot be set. This introduces the risk of emptying the sump in stage 2 if set too high. Going back to the ABB visit report no. 447210386 dated 26/10/2018, this unit failed its calibration and requires replacement. **ERG can quote if required.**	May.2019
• 6.3. **Stage 1:** The hypo Dosatron pipework has been cleared and the unit operation checked, but this has not yet been recommissioned. ERG advises against bringing this back on-line, until the unit has been correctly set-up. **If this is not carried out, there is a risk that the hypo bulk storage tank could be emptied. Further attention required**.	Mar.2020
• 6.4. **Stage 1:** Recirc pump P16004 is corroding on the pump flange face & the pump base**. Requires repair and repainting/ replacement.**	May.2019
• 6.5. **Hypo Tank:** Some of the lagging, from the hypo tank to the dosing pump cabinet, is damaged or missing due to leak repairs. **Requires repair.**	Nov.2019