

# Ford STC

# Odour Management Plan

## 790101\_ERA\_OdourMP\_FOR

December 2024

V5

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# 1. Odour Management Plan

## 1.1. Introduction

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

The OMP has been designed to be a live working document that forms part of the operational management system of the Site. It is a mitigation and control measure document 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<sup>1</sup>. Best Available Techniques (BAT) Reference Document for Waste Treatment<sup>2</sup> and Appropriate measures for the biological treatment of waste<sup>3</sup>.

## 1.2. Objectives

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

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

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

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

<sup>2</sup> 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](https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/JRC113018_WT_Bref.pdf)

<sup>3</sup> 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](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)

- Management of the sludge reception, dewatering and treatment processes
- Odour control and management procedures during emergencies and maintenance
- Routine care and maintenance of critical equipment (extraction and odour abatement plant)
- Monitoring, recording and reporting arrangements
- The management and operator training requirements and records with respect to odour
- Staffing, responsibilities, training and procedures
- Communication strategy and complaint management/resolution procedures
- OMP updating, review and development procedures
- An action procedure for complaints.

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

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

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

### 1.3. Site Location

Ford Wastewater Works (WTW) and Sludge Treatment Centre (STC) is located to the west of the hamlet of Ford, approximately 7km northeast of Bognor Regis. Ford WTW and STC serves a catchment with a population equivalent of 138,127.

Site address: Ford Road, Arundel, West Sussex, BN18 0DD

National grid reference: SU 9946 0313

The site location and layout are shown in document reference 790101\_MSD\_SiteLayoutPlan\_FOR September 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 G)
  - Odour prevention and reduction (Section 4, 5 and 6)
- BAT 13: Reducing odour emissions through the use of techniques: addressed in Section 4
- BAT 14: Reducing diffuse emissions to air, addressed in Section 3.2
- BAT 33: Control of odour emissions through pre-acceptance, acceptance and sorting the waste addressed in document reference 790101\_MSD\_DutyofCare\_FOR February 2024
- BAT 34: Reduce channelled emissions, addressed in Section 4.1.
- BAT 53: Reducing emission of hydrochloric acid (HCl), ammonia (NH<sub>3</sub>) and organic compounds to air in Section 4.1.

This 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 registered T21, U6, S1 and S2 exemptions. The site also holds an environmental permit EPR/KP3130KX allowing for the burning of biogas in a sludge dryer from receipt of fuel to emissions of exhaust gas to air and three directly associated activities. The drying plant has been mothballed.

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 on-site Combined Heat and Power plant (CHP). In the event the CHP cannot run (in an emergency or due to operational issues) biogas will be combusted via an on-site flare stack and/or back-up boiler system.

### 2.2. Summary of the STC components

Currently the Site accepts indigenous sludge, imported liquid sludge, imported sludge cake and cess.

On average the Site accepts 11 tankers per day containing liquid sludge imports. 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

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

Imported liquid sludge is screened by two strain presses and then mixed with indigenous sludge in two post screening sludge storage tanks. On average the Site accepts 11 tankers per day containing liquid sludge.

Imported sludge cake is blended with SAS from the enclosed SAS buffer tank.

##### Sludge Storage

Sludge storage is provided between each of the main sludge processing stages by means of cylindrical storage tanks. After screening, indigenous sludge is stored in two post screening sludge storage tanks. Imported liquid sludge is stored in one sludge reception tank. Thickened primary sludge, thickened SAS and blended cake are mixed and stored in one post thickening sludge storage tanks. Digested sludge is stored in one post digestion storage tanks, each 352m<sup>3</sup>.



Air is extracted from each tank to the central odour control system. The sludge storage tanks are mixed using enclosed macerator pumps located outside the digesters. Therefore, there are no mechanical parts inside the tanks requiring access at regular intervals for maintenance purposes. Routine maintenance of the tanks and external mixing pumps would be subject to the Site odour risk assessment. Odour suppressant sprays would be used as necessary during this operation.

### Thickening of Liquid Sludges

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

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

The sludge is thickened by two drum thickeners.

Excess SAS from the blending with sludge cake process is thickened by four drum thickeners.

Polyelectrolyte is added to thicken the mixture. Thickened primary sludge, thickened SAS and blended cake are mixed and stored in one post thickening sludge storage tank, which is then fed to anaerobic digesters.

### Digesters

There are three primary anaerobic digestors operating at a temperature of 36°C. Thickened sludge remains in the digester for at least 12 days.

Biogas from the process is stored in an on-site gas holder, some of the biogas is used to maintain the temperature of the anaerobic digestion process, the remainder is fed to the CHP plant where it is used to generate heat and electricity for the Site.

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

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

### Combined Heat and Power Unit (CHP)

A CHP plant is installed at the Site, designed to use biogas. The biogas produced in the digestion process is fed to the CHP unit and two dual fuel boilers (biogas/natural gas) to generate electricity and heat. The electricity is used to partially power the Site and heat is recovered and used to heat the digesters. There is also a back-up flare for use when the CHP engine is on downtime for maintenance. There is also one generator (diesel) on-site.

## Post Digestion

Digested sludge is stored in two post digestion sludge tanks prior to being dewatered by two centrifuges.

## Dewatering

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

Centrifuges are operated on a duty/standby system (one duty, one standby) to ensure that processing continues during periods of maintenance and repair. The centrifuges are housed within the STC building, which is connected to odour control. The centrifuges are maintained as part of the framework maintenance contract which also provides an emergency response.

## Cake storage

Dewatered digested sludge cake is stored in the form of a cake in 100m<sup>3</sup> enclosed silo. The silo is emptied on Saturdays, filling approximately three 20 tonne tippers. There is also an emergency cake bay on Site, which holds two 16ft ro-ro skips.

## Odour control equipment

Odour is controlled via two Odour Control Units (OCU). The site has a single stage dual-tower wet chemical scrubber, using alkaline scrubbing liquor to treat odorous air. The site also has a dedicated granular activated carbon (GAC) unit for the sludge. Filtered odour streams are discharged into the environment through OCU stack as shown by A09 in Figure 1 and are monitored hourly to ensure the absence of odorous compounds.

The wet chemical scrubber OCU treats odorous air extracted from the PSTs, inlet works, sludge reception, lime silo and centrifuges. Air flows upwards through a tower containing plastic rings (to improve air-water contact). An aqueous solution of sodium hypochlorite in sodium hydroxide (caustic soda) produces activated hydroxyl radicals, and the odorous chemicals in the air flow are forced into solution in the scrubbing liquid and are then oxidised. The treated air is then discharged to the atmosphere through a 15-metre stack.

The GAC OCU is installed to treat odorous air from the sludge building. Odorous air passes through a layer of chemically impregnated GAC which absorbs odours, the treated air is then discharged via stack. The concentrations of H<sub>2</sub>S in the discharge air are measured using a tape monitor with the results being recorded on SCADA.

Carbon filters are on the CHPs to filter gas prior to use.

A Zellweger Chemkey system monitors the concentration of H<sub>2</sub>S every 15 minutes in the stack and is logged by SCADA. This odour control system operates with a duty standby blowers and recirculation pumps.

There are in total nine H<sub>2</sub>S monitors on Site, one in the main OCU, one near the sludge reception, one near the aeration lanes and six around the perimeter of the Site, as shown in Figure 1.

There is also a single stage wet chemical scrubber OCU, which utilises an alkaline scrubbing liquor to treat odorous air from the dryer building, however, as the dryer has been mothballed it has been assumed that this system is not currently running. If the dryer was to become operational again, these systems would need to be re-implemented.

## Other relevant STC components

- 1 No. Sludge reception tank (100m<sup>3</sup>)
- 3 No. Strain presses
  - 2 No. for screening imported liquid sludge

- 1 No. used for blending, prior to THP
- 2 No. Post Screening Sludge storage tanks (1732m<sup>3</sup> each)
- 6 No. Drum thickeners;
  - 2 No. for post screened sludge
  - 4 No. for excess SAS (surplus activated sludge)
- 1 No. SAS tank
- 1 No. Liquor return tank
- 1 No. Thickened sludge storage tank (700m<sup>3</sup>)
- 3 No. Anaerobic digesters (each 1848m<sup>3</sup>)
- 2 No. Post digestion storage tanks (each 352m<sup>3</sup>)
- 1 No. Lime plant
- 2 No. Centrifuges
- 1 No CHP unit (1.84MWth)
- 1 No. Gasholder (670m<sup>3</sup>)
- 1 No. Biogas burner (flare)
- 1 No. Cake Silo (100m<sup>3</sup>)
- Emergency cake bays (two 16tonne ro-ro skips)
- 2 No. Odour control units (OCU) - 1 No. wet chemical scrubber OCU and 1 No. granular activated carbon (GAC) OCU.
- 2 No. Boiler (biogas and natural gas) (Each 1.2MWth thermal input)

The following are the outputs from the process;

- Biogas stored in an existed gasholder, then either
  - Burnt in the CHP
  - Flared in the waste biogas burner
- Digested sludge cake – recycled for agriculture

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

## 3. Potential Odour Sources

### 3.1. Overview of the mechanisms for odour generation

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

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

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

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

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

### 3.2. Potential odour sources

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

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

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

Table 1: Identified odour sources

| Process or activity | Plant or equipment  | Potential source of odour     | Odour controls in place  | Potential for odour emissions during normal conditions |
|---------------------|---|-------------------------------|--|--|
| Sludge reception    | Sludge reception building<br>SU 99413<br>03107  | Liquor                        | Tankers used to import liquid sludge are sealed. Sludge cake imported in covered skips. Sludge is processed immediately. Doors to the building are closed at all times other than providing access to vehicles. All activities associated with imported sludge are carried out within a building, the sludge building is connected to a GAC OCU. Doors are kept closed during the discharging of the liquid sludge from 4k tankers. Exhaust fumes extracted to separate extraction system. However, doors are left open during the unloading of sludge from 6k tankers due to the length. Process monitored and regularly maintained. Sludge is processed immediately. | Low  |
| Sludge treatment    | Sludge treatment building<br>SU 99398<br>03086  | Sewage sludge                 | Sludge treatment activities are enclosed within the sludge building which is connected to the GAC carbon OCU. Process monitored and regularly maintained, and planned preventative maintenance undertaken on equipment.  | Low  |
|                     | Anaerobic digesters pressure release valve<br>SU 99457<br>03114<br>SU 99473<br>03127<br>SU 99487<br>03134 | Biogas                        | Opening of Whessoe pressure relief valves only in emergencies, and the events would be rare and short lived. Digesters covered and sealed, process monitored and regularly maintained. Planned preventative maintenance undertaken on equipment.<br><br>Maximum storage: 1848m <sup>3</sup> each<br>Retention time: Average 26.6 days  | Low  |
|                     | Sludge storage tanks<br><br>Post screening sludge storage tank:<br>SU 99378<br>03060<br>SU 99385<br>03049 | Sludge cake and liquid sludge | All sludge storage tanks are covered and process monitored and regularly maintained.<br><br>Post screening sludge storage tank:<br>Maximum storage: 1732m <sup>3</sup> each,<br>Retention time: 16 days,<br><br>Post digestion:<br>Maximum storage: 352m <sup>3</sup> each,<br>Retention time: 2 days maximum.   | Low  |

|                   |  |               |  |          |
|-------------------|--|---------------|--|----------|
|                   | <p>Post digestion:<br/>SU 99469<br/>03144<br/>SU 99480<br/>03141</p> <p>Thickened sludge:<br/>SU 99425<br/>03110</p> |               | <p>Thickened sludge:<br/>Maximum storage: 960m<sup>3</sup>,<br/>Retention time: 2 days maximum.</p>  |          |
|                   | <p>Centrifuges<br/><br/>SU 99520<br/>03166</p>   | Sludge cake   | <p>Each centrifuge is enclosed and air is extracted to the wet scrubber OCU. Planned preventative maintenance is regularly undertaken on equipment.</p>  | Low      |
|                   | <p>Odour control unit<br/><br/>SU 99440<br/>03094<br/>SU 99398<br/>03060</p>   | Untreated air | <p>Odour control units treat air to remove odorous compounds. It is process monitored and planned preventative maintenance is regularly undertaken on equipment.</p>   | Low      |
|                   | <p>Cake Storage<br/><br/>SU 99537<br/>03203<br/>SU 99536<br/>03177</p>   | Sludge cake   | <p>Sludge cake is stored in a 100m<sup>3</sup> silo. "Split bag" policy to ensure good housekeeping if product is spilled.</p> <p>Maximum storage: 100m<sup>3</sup>,<br/>Retention time: 4 days maximum.</p> | Low      |
| Biogas combustion | <p>Gas bag holder<br/><br/>SU 99447<br/>0312</p>   | Biogas        | <p>This is a sealed system</p> <p>Maximum storage: 670m<sup>3</sup></p>  | Very Low |
|                   | <p>Combined Heat and Power (CHP) unit<br/><br/>SU 99464<br/>03158</p>  | Biogas        | <p>Planned preventative maintenance is regularly undertaken on equipment. If CHP unit is down, biogas is burnt in flare.</p>   | Low      |
|                   | <p>Boilers</p>   | Biogas        | <p>Planned preventative maintenance is regularly undertaken on equipment.</p>  | Low      |

|             |  |             |  |     |
|-------------|--|-------------|--|-----|
|             | SU 99460<br>03138<br>SU 499465<br>103143 |             |  |     |
|             | Flare<br><br>SU 99452<br>03080           | Biogas      | Planned preventative maintenance is regularly undertaken on equipment. | Low |
| Cake export | Cake export                              | Sludge cake | Cake is removed from site in covered skips                             | Low |

### 3.3. Odour impact

#### 3.3.1. Adjoining land use

The Site lies within a former airfield, Ford Airfield Industrial Estate. The surrounding area is a mix of industrial and agricultural use. To the north of the Site is a waste management centre with agricultural fields elsewhere. To the west and south there is agricultural fields surrounding the Site with areas of residential housing. To the southeast is HMP Ford, a large prison is located, with further agricultural fields surrounding this. Rutfield industrial estate is located 415m south of the Site.

#### 3.3.2. Sensitive receptors

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

- 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<sup>5</sup>:

- Frequency: How often an individual is exposed to odour
- Intensity: The individual's perception of the strength of the odour
- Duration: The overall duration that individuals are exposed to an odour over time

<sup>4</sup> 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>

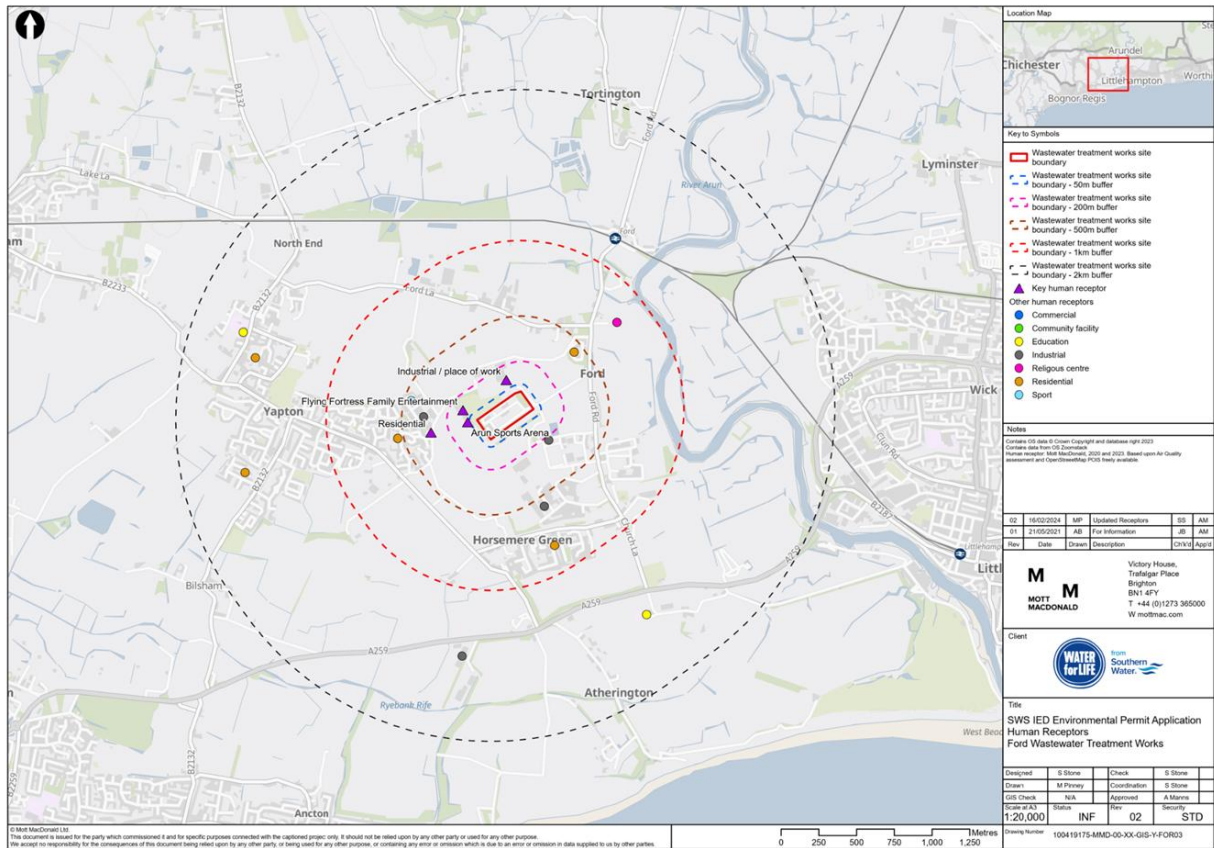
<sup>5</sup> Institute of Air Quality Management (2018) Guidance on the assessment of odour for planning V1.1. Available online at: <https://iaqm.co.uk/text/guidance/odour-guidance-2014.pdf>

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

There are a number of sensitive receptors located within 500m of the potential emission sources at Ford WTW and STC. As demonstrated in Figure 2 the receptor closest to a potential emission source is a sports recreational facility west of the Site, which is located approximately 65m south the three post screening sludge tanks.

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

**Figure 2: Sensitive receptors within 2km of the Site**



Source: Mott MacDonald (2023)



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

| Receptor  | Nearest potential emission source to receptor     | Process           | Distance (m) from nearest potential emission source | Direction of receptor from closest emission source |
|---|---|-------------------|---|--|
| Sports recreational land use north west of the Site | Sludge reception and blending/thickening building | Sludge treatment  | 85  | West   |
|   | Two post screening sludge tanks                   | Sludge treatment  | <b>65</b>   | West   |
|   | Thickened sludge storage tank                     | Sludge treatment  | 135   | South west   |
|   | Two post digestion storage tanks                  | Sludge treatment  | 190   | South west   |
|   | Return liquor pumping station                     | Sludge treatment  | 120   | South west   |
|   | Anaerobic digesters                               | Sludge treatment  | 155   | South west   |
|   | Sludge dryer and centrifuge building              | Sludge treatment  | 215   | South west   |
|   | Cake silo   | Sludge treatment  | 290   | South west   |
|   | Biogas holder                                     | Biogas combustion | 155   | South west   |
|   | CHP   | Biogas combustion | 320   | South west   |
|   | Boilers   | Biogas combustion | 185   | South west   |
|   | Flare   | Biogas combustion | <b>145</b>  | West   |
| Industrial facility north of the Site               | Sludge reception and blending/thickening building | Sludge treatment  | 220   | North  |
|   | Two post screening sludge tanks                   | Sludge treatment  | 260   | North  |
|   | Thickened sludge storage tank                     | Sludge treatment  | 200   | North  |
|   | Two post digestion storage tanks                  | Sludge treatment  | 165   | North  |
|   | Return liquor pumping station                     | Sludge treatment  | 215   | North  |
|   | Anaerobic digesters                               | Sludge treatment  | 190   | North  |
|   | Sludge dryer and centrifuge building              | Sludge treatment  | 150   | North  |
|   | Cake silo   | Sludge treatment  | <b>125</b>  | North  |
|   | Biogas holder                                     | Biogas combustion | 185   | North  |
|   | CHP   | Biogas combustion | <b>155</b>  | North  |
|   | Boilers   | Biogas combustion | <b>170</b>  | North  |
|   | Flare   | Biogas combustion | 235   | North  |

|  |   |                   |            |            |
|--|---|-------------------|------------|------------|
| Industrial facility south east of the Site | Sludge reception and blending/thickening building | Sludge treatment  | 330        | South east |
|  | Two post screening sludge tanks                   | Sludge treatment  | 345        | South east |
|  | Thickened sludge storage tank                     | Sludge treatment  | 330        | South east |
|  | Two post digestion storage tanks                  | Sludge treatment  | 290        | South east |
|  | Return liquor pumping station                     | Sludge treatment  | 335        | South east |
|  | Anaerobic digesters                               | Sludge treatment  | 280        | South east |
|  | Sludge dryer and centrifuge building              | Sludge treatment  | <b>260</b> | South east |
|  | Cake silo   | Sludge treatment  | 285        | South east |
|  | Biogas holder                                     | Biogas combustion | 315        | South east |
|  | CHP   | Biogas combustion | <b>190</b> | South east |
|  | Boilers   | Biogas combustion | 315        | South east |
|  | Flare   | Biogas combustion | 300        | South east |

Note: (a) Distance from source to receptor is rounded to the nearest 5m  
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\_FOR February 2024) addressed the probability of exposure and consequence of the hazards to determine the overall magnitude of the risk to sensitive receptors within 250 metres. A Source-Pathway-Receptor model has been used to help assess the probability of exposure associated with different processes at the Site.

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

### 3.4. Odour modelling

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

The nearest high sensitivity receptors to the site were residential receptors located between Johnston Way and Rollaston Park which is approximately 340m to the southwest; one area of medium sensitivity recreational receptors located off Rollaston Park which is approximately 65m to the west; and one area of industrial receptors located off Rollaston Park which is approximately 130m to the northwest. During 2019-2022, the mentioned receptors were downwind from the site approximately 17% (recreational receptor), 13% (industrial receptor), and 11% (residential receptor) of the time,

respectively. Based on the distance between these receptors and the Site and the frequencies of winds to disperse odours towards these receptors, the pathway for odour impacts from the Site to the residential, recreational, and industrial receptors are considered to be slightly effective to moderately effective. Therefore, the potential for odour impacts from the Site cannot be scoped out on the basis of this simple assessment.

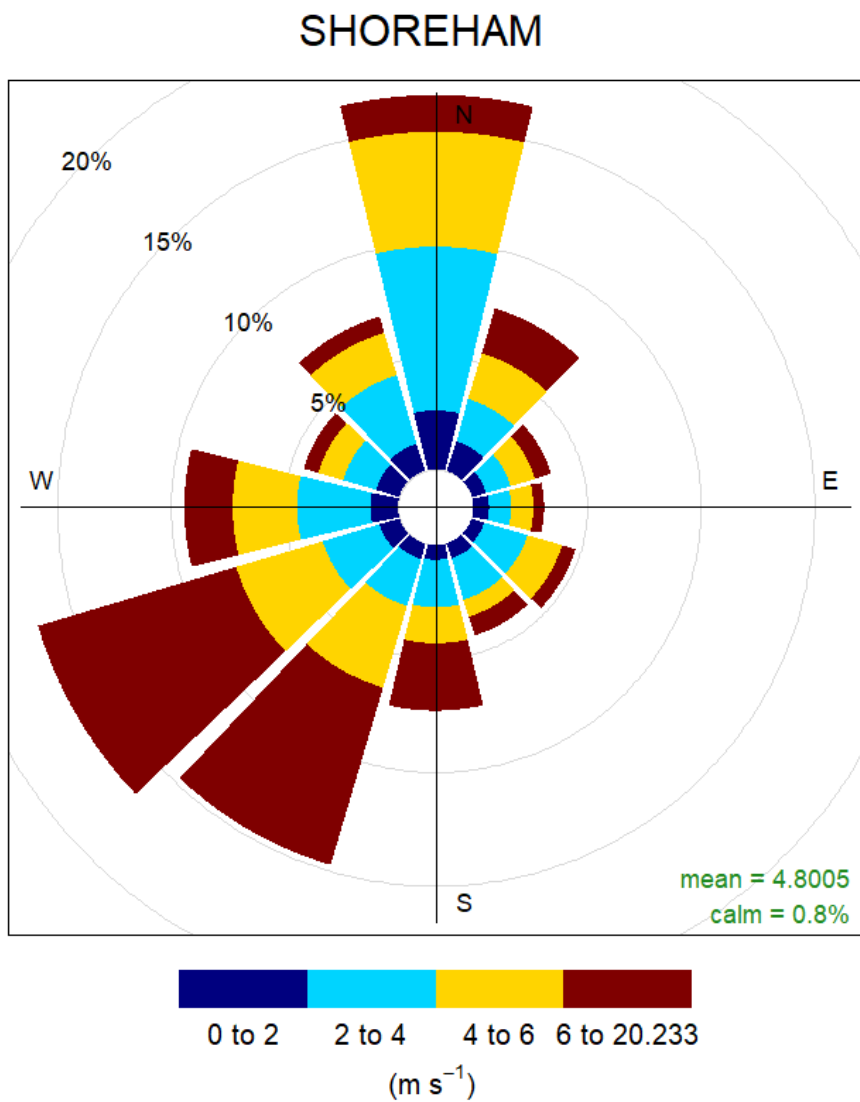
No specific odour modelling has been commissioned for this site and modelling has not been undertaken prior to the application for a bespoke installation permit because the OMP consolidates existing odour control measures and will form part of the Operational Techniques. The Site does not meet the criteria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

- To predict the impact of a new proposal: The Site is an existing site and structural changes are not proposed as part of the variation application. The sources of odour and their controls are already known.
- To assist in the investigation of the cause of odour complaints.
- To compare the cost effectiveness of odour mitigation options: Southern Water is not seeking at the time of the Bespoke Installation Permit application to implement additional odour mitigation measures that require capital investment.
- To work out emission limits for point source emissions: The Site presents a low odour risk to sensitive receptors and an Odour Control System is in operation, which will be compliant with design standards or as specified in the Environmental Permit, see Section 5.7.
- To indicate how much improvement is needed or size abatement equipment: improvements to odour control is implemented through the OMP.  
Three odour complaints have been received from 2018 to 2023.
- To calculate a suitable chimney height to provide an acceptable exposure at receptors: the chimney heights are fixed structures, since the Site is low risk of odour it is not justified to alter existing odour control structures.

The 2019-2022 wind rose for the meteorological site at Shoreham, the nearest representative meteorological site to the Site, is shown in Figure 3. This monitoring site experiences strong prevailing winds from the south west, with frequent mild winds from the north. However, this meteorological site is located within a wide valley which channels winds from the north, resulting in the frequent mild northerly winds. The Site is not located in a valley and has relatively flat surrounding land uses. Therefore, 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 2019-2022. The wind rose demonstrates that historically that this location experiences strong prevailing winds from the south west, with occasional gusts from the north east. This suggests that sensitive receptors located to the north east of the site would be at the greatest risk from bioaerosol emissions from the Site as they would be downwind of the prevailing wind direction.

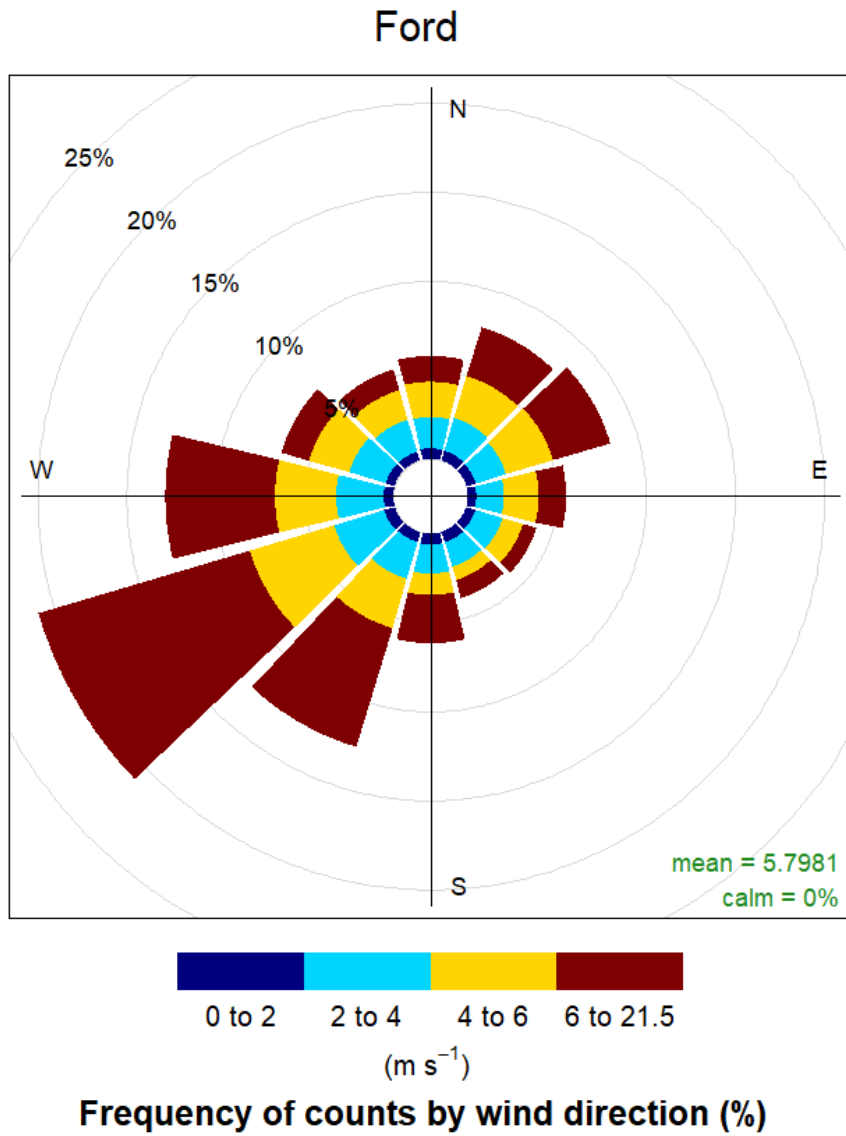
Figure 3: Average wind rose for Shoreham meteorological site, 2019 – 2022



**Frequency of counts by wind direction (%)**

Source: NOAA Integrated Surface Database (ISD) (2024)

Figure 4: Average wind rose for the Site from the Vortex model, 2019-2022



Source: NOAA Integrated Surface Database (ISD) (2024)

## 4. Odour Management and Control

### 4.1. Odour control system

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

There is a wet chemical scrubber odour control unit which extracts air from the PSTs, inlet works, sludge reception, lime silo and centrifuges. A dedicated GAC unit is also installed to treat odorous air from the sludge building.

The dryer building on site is also fitted with a chemical scrubber odour control unit.

Treated air from the OCU's is released to the atmosphere.

Zellweger Chemkey system monitors the concentration of H<sub>2</sub>S in the stacks from the main OCU every 15 minutes and is logged by SCADA. A tape monitor is used to monitor the H<sub>2</sub>S from the stack of the GAC odour unit.

There are a total of nine H<sub>2</sub>S monitors on Site, one in the main OCU, one near the sludge reception, one near the aeration lanes and six around the perimeter of the Site.

Portable odour suppression spray systems are used where necessary to control odours during maintenance.

In-line with BAT 34 and 53, the Site utilises wet chemical scrubber and GAG units to treat and reduce channelled emissions to air. Details of the monitoring carried out on the OCU is outlined within this section and in Section 5.

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

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

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

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

Odour control checklists can be found in Appendix D.

### 4.2. Odour control in normal and abnormal conditions

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

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

- The integrity of all covers over process units is maintained continuously, other than during periods of essential maintenance.

- All doors in buildings ventilated to the odour control system remain closed except when access is required and that the integrity of the buildings fabric is ensured.

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

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

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

An OCU maintenance report example is provided in Appendix E.

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

**Table 4: Typical maintenance for wastewater and sludge treatment activities**

| Process                      | Period                              | Typical maintenance activities   |
|------------------------------|-------------------------------------|--|
| Preliminary treatment        | Daily                               | Checks on plant and equipment as per operating plan  |
|                              | 2-3 times/week                      | Removal of grit/screening skips  |
|                              | Weekly                              | Operational checks on screens, compactors and associated equipment as per operating plan   |
|                              | Monthly                             | Checks by mechanical/electrical (M&E) engineers as per regional maintenance schedules.   |
|                              | Annually                            | Maintenance of plant and equipment   |
| Primary Treatment            | Annually                            | Drain-down of and repairs to the tanks   |
| Secondary Treatment          | Daily                               | SCADA and Visual checks by operations personnel, checks of dissolved oxygen and bubble pattern along with daily sampling.  |
|                              | Weekly                              | Clean and check dissolved oxygen probes.   |
|                              | Dictated by operational performance | Drain and clean lane, replace failed diffuser membranes.   |
| Sludge Import                | Ad-hoc                              | Regular checks on deliveries and operation of exhaust extraction and ventilation, removal of skips from sludge and cess screens.   |
|                              | Weekly                              | Routine checks on equipment. Tasks carried out and records maintained under the Site operating and monitoring plan.  |
|                              | Monthly                             | Checks by M&E. Tasks carried out and records maintained under regional maintenance schedules. Inlet gas temperature, gas flow rate, pressure differential, inlet gas moisture content, and leak detection. |
| Sludge Storage               | Daily                               | Monitoring of levels. Tasks carried out and records maintained under the Site operating and monitoring plan.   |
|                              | Weekly                              | Visual inspection of plant & equipment. Tasks carried out and records maintained under the Site operating and monitoring plan.   |
|                              | Dictated by operational performance | As required drain down and clean tank, inspect structure. Tasks carried out and records maintained under regional maintenance schedules.   |
| Sludge Thickening            | Daily                               | Routine daily checks.  |
|                              | Weekly                              | Routine weekly checks and maintenance including cleaning   |
|                              | Six months                          | Checked/Serviced every six months by appointed service provider  |
|                              | Annually                            | Checks by M&E as per regional maintenance schedules.   |
| Digester and degassing tanks | Daily                               | Feed Volume, Temperature, Dry solids Test, and Visual Inspections (levels and Equipment) monitoring.   |
|                              | Monthly                             | Checks of pressure relief valves and plant. Routine maintenance of systems.  |



| Process             | Period     | Typical maintenance activities  |
|---------------------|------------|---|
|                     | Annually   | Checks and service of gas systems.  |
| Centrifuge          | Daily      | Centrifuge check routine as advised by supplier.  |
|                     | Weekly     | Centrifuge check routine as advised by supplier.  |
|                     | Monthly    | Checked in line with routine service agreement by appointed service provider.   |
|                     | Six months | Checked/Service every six months by appointed service provider.   |
| Odour control units | Daily      | Routine daily checks<br>Scrubbing liquid in OCU refurbished every 10 hours  |
|                     | 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<br>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 not expected as the site has enclosed assets, nonetheless any potential diffuse emissions are minimised by ensuring optimisation of the digestion process to limit the bioaerosol potential of post-digested sludge.

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

#### 4.2.2. Odour risk assessment

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

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

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

An odour risk assessment matrix will be used to determine the odour risk for planned and unplanned maintenance work commonly performed. Where an unusual activity not contained in the matrix is planned, a site-specific risk assessment will be carried out according to a standard procedure. The

matrix also includes foreseeable situations for emergency breakdown and situations arising as a result of dealing with an emergency where the ability to improve control of or minimise odorous release is compromised. The advice given by the odour risk assessment matrix will be followed, as appropriate, taking into account site conditions.

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

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

**Table 5: Example of risk assessment for routine maintenance operations**

| Event   | Implications   | Odour Risk (High, Medium, Low) | Proactive Actions   | Responsive Actions   |
|---|--|--------------------------------|---|--|
| Maintenance of processes within STC                         | Opening of hatches, and exposure of process units to building.                           | Low                            | Processes contained within the STC which itself is odour controlled.                              | Minimise number of hatches open at any one time.   |
| Maintenance on sludge treatment process (not biogas system) | Potential for odour release if any sludge exposed to atmosphere.                         | High                           | Divert or minimise sludge throughput in process area.   | Carry out during winter months where possible, if required during summer use portable odour reduction sprays.  |
| Maintenance of odour control system                         | Reduced capacity for period of maintenance risk of odour release if input peaks received | Medium                         | Control processes to minimise risk of high peaks of H <sub>2</sub> S reaching odour control unit. | Carry out during winter months where possible, if required during summer assess need to use portable odour reduction sprays. Or use of temporary plant to maintain function. Reduce or replan site import schedule |

### 4.2.3. Abnormal conditions

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.

Waste arriving at 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 2nd 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 held at an alternative Southern Water Site located in Lidsey, West Sussex, for 90 days to ensure compliance. If non-complaint material cannot be held at Lidsey WTW then the Biosolids Compliance Team should be contacted to arrange alternative storage.

When the breach is HACCP or MAC failure related, the cake will be held at the quarantine location until compliant results are received from the laboratory provider. After bacti compliance is confirmed the relevant stakeholders will be notified by a certificate of compliance that cake from the site in question can be recycled to land.

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

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

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

**Table 6: Risk Assessment for Emergencies and Abnormal Operating Conditions**

| Event  | Potential source of odour | Potential impacts   | Odour risk | Measures to prevent or minimise risk  | Actions to be taken  |
|--|---------------------------|---|------------|---|--|
| Breach of odour-controlled area (loss of untreated air to atmosphere)                              | Untreated air             | Effectiveness of foul air extraction system compromised, risk of odour release until repairs completed  | Medium     | Minimise odour generating activities in area                                | Temporary containment pending full repair<br>Ensure any interconnecting doors etc secure<br>Minimise odour generating activities in area<br>Assess odour impact with local survey, use portable odour reduction sprays if requirement identified   |
| Breach of odour-controlled area sludge containing structure (loss of liquid sludge to environment) | Spilt sludge              | Effectiveness of foul air extract system compromised, risk of odour release until repairs completed, risk of odour from spilt sludge  | High       | Review sludge handling operations divert or minimise for duration of breach | Minimise area exposed to atmosphere and surround with portable odour sprays as appropriate   |
| Breach of biogas system/ loss of biogas containment  | Leaks from membrane       | Uncontrolled release of biogas, risk of odour release until repairs completed<br>Double membrane system with gas pressure between the membranes regulated and monitored.<br>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<br>Surround with portable odour sprays as appropriate<br>Diversion of biogas to CHP plant or Gas Burner<br>Inspection maintenance and repairs as appropriate<br>Record details and actions taken in site diary<br>Report to the Environment Agency<br>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<br>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<br>Repair or bypass if possible. If incident prolonged use portable odour sprays until cleared.<br>Record spillage and actions taken in site diary |
| Failure of sludge thickeners                      | Sewage sludge                      | Thickeners are enclosed and air extracted to OCU  | Medium     | Sludge dosed with polymer as required   |  |
| High pressure conditions in digesters             | Release from Pressure Relief Valve | Biogas would be vented at high pressure to aid dispersion   | Medium     | Gas pressure is regulated and monitored   | Diversion of biogas to Gas Burner<br>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<br>Record details and actions taken in site diary  |
| Sludge reception unit roller shutter door failure | Release from behind the            | Effectiveness of odour control measures   | Medium     | Minimise sludge reception activities until  | Record details and actions taken in site diary   |

| Event                        | Potential source of odour                           | Potential impacts   | Odour risk | Measures to prevent or minimise risk   | Actions to be taken   |
|------------------------------|---|---|------------|--|---|
|                              | shutter door in sludge reception                    | compromised, risk of odour release until repairs completed  |            | repairs have been completed  |   |
| Failure of treatment process | Release from untreated sludge                       | Risk of odour from incomplete biological treatment until plant recovery achieved                      | Medium     | Process monitoring and having closed covers. Immediate involvement of process support team to identify cause of process failure and aid recovery | Assess need to use temporary plants (including portable odour sprays spread around process units)<br>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<br>Planned maintenance on equipment           | Check the performance of the OCU and repair as required (check performance of sludge pumping stations, clearance of road drainage may be required following flooding) |

## 5. Monitoring

### 5.1. Routine monitoring

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

In the event of an out-of-specification plant item is operating beyond normal operating ranges, the process parameters are outside optimum or an 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 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; and
- Report performance issues or equipment problems promptly to Process Scientists, Mechanical & Electrical (M&E) technicians, Instrumentation, Control & Automation (ICA) technicians or Specialist Contractors as appropriate.

#### 5.1.2. Duties for odour control

Operators shall carry out the following tasks:

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



Drivers delivering odours loads shall carry out the following tasks:

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

**Table 7: Site odour monitoring processes**

| Potential Odour Source      | Routine Actions Required   | Risk pre-control measures | Monitoring Frequency | Attention Level                             | Action level  | Preventative Action  | Risk post-control measures |
|-----------------------------|--|---------------------------|----------------------|---|---|--|----------------------------|
| STW Inlet & pumping station | Check condition of sewage entering works for unusual odours  | Low                       | Daily                | Increased Odour from sewage                 | Noticeable odour from sewage                          | Take sample and get analysed for BOD, COD etc.<br>Check consented discharge  | Low                        |
| Raw sludge reception        | Avoid excessive turbulence (open tanks)<br>Ensure doors are closed before discharging or unloading<br>Connect foul air exhaust to hose before loading<br>Ensure vehicles cleaned after loading/unloading.<br>Hose down any spillage after each load/unload<br>Clean contaminated wheels before leaving Site.<br>Doors closed after unloading/discharging | Medium                    | Every site visit     | Investigate unusual and/or excessing odours | Follow the Awareness Raising Instruction, Appendix A. | Stringent loading and unloading procedures. Extracted air from the tanker loading area is treated by odour control unit. If necessary, implement special odour mitigation measures to reduce the risk of odour nuisance. Make contractor aware of requirements in OMP. | Low                        |
| Transportation              | Ensure only sealed or covered skips/trailers used.   | Medium                    | Every week day       | Noticeable odour from vehicle               | Follow the Awareness Raising                          | If necessary, implement special odour mitigation   | Low                        |

| Potential Odour Source      | Routine Actions Required  | Risk pre-control measures | Monitoring Frequency | Attention Level            | Action level  | Preventative Action   | Risk post-control measures |
|-----------------------------|---|---------------------------|----------------------|----------------------------|---|---|----------------------------|
|                             | No removal of covers whilst parked waiting to load/unload<br>Monitor odours during cake loading   |                           |                      |                            | Instruction, Appendix A.  | measures to reduce the risk of odour nuisance.<br>Make contractor aware of requirements in OMP  |                            |
| Sludge holding tanks        | Minimising retention time<br>Monitor odour levels around tank   | Medium                    | Every site visit     | Noticeable odour from tank | Noticeable odour from tank<br><br>Follow the Awareness Raising Instruction, Appendix A.                           | Increase sludge treatment rate to reduce retention<br>Hose spillage's<br>Increase de-sludge ops up stream<br>Run odour masking system (Short term)              | Low                        |
| Sludge thickening/ blending | Minimise retention prior to thickening, dewatering or digestion;<br>Discharge sludges and liquors, including imported sludges, to covered tanks, with displaced air passed through an Odour Control Units;<br>Prevention of sludge accumulation in off-line tanks; and<br>Proactive identification. | Medium                    | Every site visit     | Increased odours from area | Noticeable odour from area and/or complaint received<br><br>Follow the Awareness Raising Instruction, Appendix A. | Quality checks<br>Process is undertaken in an enclosed building with appropriate odour abatement<br>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   | Planned preventative maintenance undertaken on equipment. If  | Low                        |

| Potential Odour Source | Routine Actions Required                               | Risk pre-control measures | Monitoring Frequency | Attention Level                         | Action level   | Preventative Action  | Risk post-control measures |
|------------------------|--|---------------------------|----------------------|---|--|--|----------------------------|
|                        |  |                           |                      |   | odours to FPM and Scientist<br><br>Follow the Awareness Raising Instruction, Appendix A.                                       | necessary, implement special odour mitigation measures to reduce the risk of odour nuisance. |                            |
| Centrifuge             | Check for strong and uncharacteristic odours           | Low                       | Every site visit     | Investigate unusual odours              | Investigate and report strong/unusual odours to FPM and Scientist<br><br>Follow the Awareness Raising Instruction, Appendix A. | Regular checks and investigative action  | Low                        |
|                        | Check polymer dosing                                   | Low                       | Weekly               | Polymer dosing rates exceeds set limits | Polymer dosing exceeds upper or lower threshold limits<br><br>Follow the Awareness Raising Instruction, Appendix A.            | Take remedial action to return polymer dosing to correct rate                                | Low                        |
| Gas Flare Stacks       | Complete biogas combustion should give clean emissions | Low                       | Weekly               | Occasional orange flame or              | Constant orange flame or black smoke visible   | Routine contractor checks or maintenance to clean nozzles of carbon build-up                 | Low                        |

| Potential Odour Source      | Routine Actions Required  | Risk pre-control measures | Monitoring Frequency | Attention Level                              | Action level   | Preventative Action  | Risk post-control measures |
|-----------------------------|---|---------------------------|----------------------|--|--|--|----------------------------|
|                             | with blue or non-visible flame  |                           |                      | black smoke visible                          | Follow the Awareness Raising Instruction, Appendix A.  |  |                            |
| Skip conveyer feed gates    | Visual check to ensure skips not over filling                                       | Low                       | Every visit          |  | Follow the Awareness Raising Instruction, Appendix A.  | Engage M&E to rectify if malfunctioning  | Low                        |
| Whessoe valves on digesters | Check they are clear from foam residue  | Low                       | Monthly              | Investigate unusual odours and gas detection | Not seating correctly<br>Follow the Awareness Raising Instruction, Appendix A.               | Engage service contractor to resolve any problems                                      | Very low                   |
| OCU                         | Check pH<br>Check media condition   | Medium                    | Weekly               | pH<8, ORP <750                               | pH >3<br>Sudden drop in performance<br>Follow the Awareness Raising Instruction, Appendix A. | Ensure media damp<br>Change media as per schedule                                      | Low                        |
| Whole STC site              | Doors to operational buildings will remain closed and hatches will be latch closed. | Medium                    | Daily                | Increased odours                             | Follow the Awareness Raising   | Doors and hatches will only be opened for minimum periods while access is required for | Low                        |

| Potential Odour Source | Routine Actions Required | Risk pre-control measures | Monitoring Frequency | Attention Level | Action level             | Preventative Action                             | Risk post-control measures |
|------------------------|--------------------------|---------------------------|----------------------|-----------------|--------------------------|---|----------------------------|
|                        |                          |                           |                      |                 | Instruction, Appendix A. | planned operational and maintenance activities. |                            |

### 5.1.3. Visual and olfactory inspections

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

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

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

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

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

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

### 5.1.4. House keeping

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

- Ensure that your odour control plants are fully operational and maintained
- Keep all doors and hatches latch closed at all times to contain odour
- Clean up debris / spillages as soon as practicable
- Monitor sludge levels within Primary Treatment to avoid septicity
- Hose down and clean process tanks / channels after draining
- Monitor digesters / Whessoe valves and gas flares
- Report any odour activity caused by Contractors to your Senior Manager
- Where possible, don't undertake odour sensitive work if it cannot be completed before or continued during the weekend

- Follow business procedures and respond to all odour complaints
- If you See it, Smell it, do something about it (Don't Ignore It)

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

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

#### 5.1.5. Meteorological observations

- 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 cake, to consider suitable measure to limit odour. For example, time such activities when wind speed is low (if possible).

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

#### 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.

##### **Digester**

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

##### **Entire site**

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

#### 5.1.7. Accident management



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

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

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

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

- EMS234 – Chemical and oil storage
- EMS240 – Nuisance management
- EMS260 – Pollution prevention
- EMS275 – Emissions to air
- EMS308 – Site housekeeping checklist
- EMS340 – Nuisance management procedure
- EMS341 – Air quality/odour management procedure
- EMS360 – Pollution prevention procedure
- EMS363 – Procedure for managing oil spills on sites
- EMS364 – Lime spill management
- EMS381 – Operational waste procedure
- EMS387 – Procedure for the acceptance of tankered commercial waste
- EMS388 – Waste permit breaches and near miss reporting procedure

## 5.2. Monitoring of the odour abatement system

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

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

| Emission point type                            | Parameter         | Monitoring frequency | Monitoring standard or method  |
|--|-------------------|----------------------|--|
| Channelled emissions to air (scrubbing system) | Hydrogen chloride | Once every 6 months  | As per design and manufacturer's specifications Southern Water are to initially undertake characterisation of emissions from the odour control units, in line with BAT 3, to demonstrate if TVOC and HCl are present in the waste gas stream. If TVOC and HCl are identified as relevant in the waste gas streams Southern Water will monitor these emissions in line with BAT |
|  | TVOC              | Once every 6 months  |  |

|  |  |                     |  |
|--|--|---------------------|--|
|  |  |                     | requirements and the Environmental Permit.   |
|  | Ammonia                                      | Once every 6 months | As per design and manufacturer's specifications  |
|  | H <sub>2</sub> S                             |                     | Maintenance undertaken by service provider, or otherwise as specified in the Environmental Permit                |
|  | Efficiency checks                            | Annual              | Maintenance undertaken by service provider, or otherwise as specified in the Environmental Permit                |
|  | Gas stream flow                              | Continuous          | As per design and manufacturer's specifications and SCADA, or otherwise as specified in the Environmental Permit |
|  | Overall operation, including air circulation | Daily               | Visual assessment or otherwise as specified in the Environmental Permit  |

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

## 6. Training

### 6.1. Staff training

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

All new starters receive a comprehensive programme of health and safety training and on-going refresher courses. All staff receive training to cover operations at the Site. On the job training is provided to all staff through a rolling training programme. Southern Water has developed its own Competency Management System (CMS), which identifies the training required for different roles on site.

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

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

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

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

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

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

## 7. Communication

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

### 7.1. Internal communication

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

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

### 7.2. External communication

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

### 7.3. Reporting

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

### 7.4. Complaints management and resolution procedure

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

## 8. Reviews and Auditing

### 8.1. Reviews

#### 8.1.1. Periodic reviews

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

#### 8.1.2. Ad-hoc reviews

This OMP will be reviewed when any significant changes in operational practice are made and on completion of any significant capital scheme which could impact the OMP.

### 8.2. Auditing

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

### 8.3. Records

The following records will be maintained:

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

## A. Awareness Raising Instruction

### Activities that may result in an odour nuisance

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

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

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

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

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

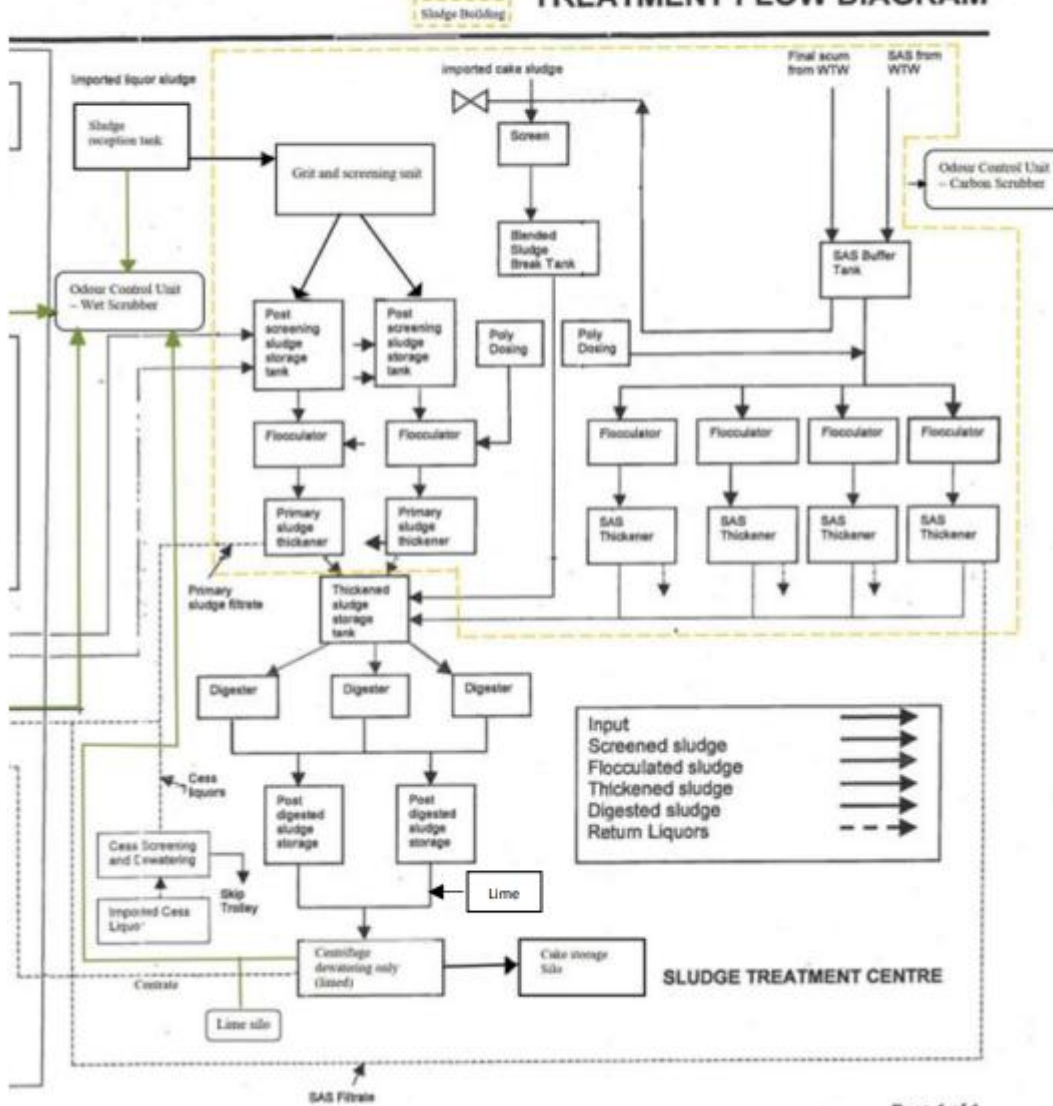
Every effort must be made to carry out the above request, a short phone call to share information with colleagues dealing directly with the Customer will greatly help them deliver a more valid and informed response.

**Be proactive, not reactive!**

## B. Odour Schematic



### PART 4.5 TREATMENT FLOW DIAGRAM



## C. Waste Codes

### C.1 Wastes featuring in the permit

As per Environmental Permit EPR/KP3130KX for waste to be accepted to the Site.



## D. Odour checklist

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

| Area of works               | Potential issue   |          | Follow up action  |
|-----------------------------|---|----------|---|
| Odour management plan (OMP) | Is the Site operated according to the OMP?                                  | YES / NO | Make changes to site operation to minimise odour production and release             |
| Site - general              | Are all covers in place?  | YES / NO | Put back covers and close hatches as required                                       |
|                             | Are all access hatches closed?  | YES / NO |   |
| Inlet works                 | Is the crude sewage black and/ or smelly?                                   | YES / NO | Check incoming sewage for septicity (in communication with Operations Support Team) |
|                             |   |          | Check for potential septic discharges   |
| Screening                   | Are there any spilled screenings?   | YES / NO | Clean up spills   |
|                             | Are the compacted screenings clean  | YES / NO | Optimise operation of screenings handling equipment                                 |
| Storm tanks                 | Have the storm tanks been left full following a storm?                      | YES / NO | Empty and clean out tanks as needed   |
|                             | Is there any sludge left in the bottom of the tanks?                        | YES / NO |   |
| Primary tanks               | Are the tanks black and / or smelly?  | YES / NO | Check inlet for septicity   |
|                             | Are the tanks gassing?  | YES / NO | Check levels of sludge in the tank and increase de-sludge rate if needed.           |
|                             | Is there excess scum on the surface   | YES / NO | Remove excess scum  |
| Biological filtration       | Are the aeration vents blocked?   | YES / NO | Unblock aeration vents  |
|                             | Is there any ponding?   | YES / NO | Consider increasing flushing rate and/ or forking media                             |
| Activated sludge            | Do the dissolved oxygen levels in the aeration lanes match the setpoint(s)? | YES / NO | Adjust dissolved oxygen levels as required  |
|                             | Do the MLSS fall within the timelines for the Site?                         | YES / NO | Increase / decrease RAS rate as needed  |
| Final settlement tanks      | Are the tanks black and/or smelly   | YES / NO | Check inlet of tanks for septicity  |
|                             | Are the tanks gassing?  | YES / NO | Check levels of sludge in the tank and increase de-sludge rate if needed            |
|                             | Is there excess scum on the surface   | YES / NO | Remove excess scum  |
| Tertiary treatment          | Any there any site-specific issues?   | YES / NO | Investigate and rectify   |

| Area of works                 | Potential issue  |          | Follow up action   |
|-------------------------------|--|----------|--|
| Sludge treatment              | Are there any sludge spills?   | YES / NO | Clean up spills  |
| Imports and Exports           | Does the tanker filling and emptying process cause significant release of odour? | YES / NO | Investigate whether the process can be modified to reduce odour emissions  |
|                               |  |          | Consider changing timing of tanker operations to reduce nuisance potential |
| Sludge Thickening and Storage | Are all covers in place?   | YES / NO | Put back covers and close hatches as required                              |
|                               | Are all access hatches closed?   | YES / NO |  |
|                               | Are the doors to sludge treatment buildings / sludge cake stores kept closed?    | YES / NO | Close doors as required  |
| Anaerobic Digestion           | Is all excess gas flared?  | YES / NO | Contact contractor to investigate  |
|                               | Is flare stack ignition immediate and reliable?                                  | YES / NO |  |
|                               | Are the Whessoe valves / pressure relief valves operating prematurely?           | YES / NO |  |
|                               | Are the seals on the condensate traps intact?                                    | YES / NO |  |
| Odour abatement               | Is there any detectable odour downwind of the stack?                             | YES / NO | Check OCU using additional checklist                                       |
|                               | Is the fan(s) working?   | YES / NO | Arrange for fan to be repaired   |
| General                       | Are there any outstanding actions from a previous investigation?                 | YES / NO | Complete actions   |

## E. OCU Maintenance report



### ERG (Air Pollution Control) Ltd

Bridge House Environmental Centre, Five Oaks Road,  
Slinfold, Horsham, West Sussex, RH13 0QW, UK  
tel: 01403 292000 e-mail: [maintenance@ergapc.co.uk](mailto:maintenance@ergapc.co.uk) web: [www.ergapc.co.uk](http://www.ergapc.co.uk)

Visit

### Service Visit Report: SV11 of 12 – November 2023

|                         |   |                       |                           |
|-------------------------|---|-----------------------|---------------------------|
| <b>Project Name</b>     | Southern Water Maintenance                    | <b>Project Number</b> | AM7143                    |
| <b>Visited</b>          | Ford  | <b>Report By</b>      |                           |
| <b>Company</b>          | Southern Water                                | <b>Tel</b>            |                           |
| <b>Contacts</b>         | Christopher Highman                           | <b>Mobile No</b>      |                           |
|                         | Nathan Twine                                  | <b>Date</b>           | 06/11/2023                |
|                         |   | <b>Reviewed By:</b>   | TJS                       |
|                         |   | <b>Copy To:</b>       | HMcW, RW, MB, SB, GL, TJS |
| <b>Purpose of Visit</b> | Monthly Service Visit of 2 Chemical Scrubbers |                       |                           |

#### 1. ACTIONS REQUIRED:

- 1.1. Scrubber 1 sump level indicator was discoloured and indicated the growth of algae, this may have occurred due to scrubber being stopped for very long time (with ref 3.1 it was running in HAND only) and without any chemical dosing. SW was made aware of this. Small amount of chemical dosing was introduced in manual mode during this visit.
- 1.2. System 2 sample line inlet pipe weld has failed near the cabinet entrance during earlier service visit, spraying liquor around the unit. **ERG shut off dosing to System 2.**
- 1.3. System 1 Hypo pump auto changeover is not taking place. **Need ICA to investigate. Checked the HMI and it seems that the PLC keeps selecting Hypo dosing pump A and it doesn't want to change over even though the HMI is showing it has changed to pump B. Further investigation is required by an ICA engineer.**
- 1.4. Both the secondary tanks (caustic and hypo) have been deemed beyond repair as the tank welds have failed in several areas. **ERG have quoted for replacements and are awaiting instruction from SW to proceed.**
- 1.5. H<sub>2</sub>S outlet monitor has been on fault and powered off for a long period of time and requires repair/replacement.
- 1.6. System 2 Previously reported on November.22 visit, extract fan F3115A was on duty and with excessive noise and vibration. It requires further assessment for the root cause however very likely need new bearings and fan balancing.
- 1.7. At the caustic dosing cabinet, the amount of chemical present from leaks is becoming dangerous to service. **Cleaning of dosing cabinets is required ASAP. H&S ISSUE.**
- 1.8. Scrubber S2 extraction fans differential pressure switch support has fallen due to excessive corrosion and instrument is hanging by the tubes on ductwork. This requires urgent attention as it can stop S2 operation completely.

- 1.9. Scrubber S1 recirculation pump MC3116B is leaking badly from the inlet flanges and requires dismantling for inspection/repair. However, the hand valve cannot isolate the inlet fully and still leaks. The pump has been isolated and locked off, S1 requires shut down to empty the sump and replace the hand valve first, then inspect/repair the leak at pump inlet. Dimensions and a sketch of the valve and photos were sent to ERG office for quoting the repair.
- 1.10. All of fan belts cover are distorted, have missing bolts and allow water ingress causing corrosion / damages. Also a H&S issue some have big gaps through the cover. Fan bases are all corroded, with the worst being on S2 fans, this is beyond repair and will require replacement.

## 2. Other Faults and Action required:

- 2.1 Water softener salt tank was empty on arrival, and it was producing hard water. Kinetico attended the site this visit, November 23, and serviced the water softener ensuring it produces soft water again. It is crucial that SW site operators monitor the salt level on the brine tank daily and correct as necessary.

## 3 Other comments:

- 3.1 Hypo dosing cabinet. Found a very bad leak for system 1 hypo dosing pump B outlet hand valve. Repaired and checked for leak. All O.k.
- 3.2 Please note: Left both scrubbers running with the recirc pumps in manual mode. Due to the H<sub>2</sub>S load.

## 4. Condition monitoring:

| Process  | Units              | Nov    | Oct    | Sep    | Aug     | Jul     | Design |
|--|--------------------|--------|--------|--------|---------|---------|--------|
| Operational S1 Fan at the departure              | Tag/N <sup>o</sup> | F3111B | F311B  | F3111B | F3111B  | F3111A  |        |
| Operational S2 fan at the departure              | Tag/N <sup>o</sup> | F3115B | F3115B | F3115B | F3115A  | F3115A  |        |
| Airflow in Ø 720mm duct S1 inlet                 | m/s                | 9.45   | 9.53   | 9.09   | 7.8     | 7.37    |        |
| Air volume S1 inlet                              | m <sup>3</sup> /h  | 13,844 | 13,968 | 13,327 | 11,427  | 10,804  |        |
| Air flow in Ø720mm duct S2 inlet                 | m/s                | 5.05   | 4.81   | 5.21   | 6.0     | 3.92    |        |
| Air volume S2 inlet                              | m <sup>3</sup> /h  | 7,398  | 7,054  | 7,628  | 8,790   | 5,747   |        |
|  |                    |        |        |        |         |         |        |
| Inlet Pressure at S1 scrubber                    | kPa                | 1.1    | 1.18   | 1.10   | 1.0     | 0.95    |        |
| Outlet Pressure at S1 scrubber                   | kPa                | 0.06   | 0.05   | 0.06   | 0.01    | 0.01    |        |
| Inlet Pressure at S2 scrubber                    | kPa                | 1.87   | 1.81   | 1.85   | 2.2     | 2.86    |        |
| Outlet pressure at S2 scrubber                   | kPa                | 0.11   | 0.03   | 0.10   | 0.01    | 0.02    |        |
| S1 scrubber pressure drop                        | kPa                | 1.07   | 1.13   | 1.04   | 0.99    | 0.94    |        |
| S2 scrubber pressure drop                        | KPa                | 1.79   | 1.78   | 1.75   | 2.19    | 2.84    |        |
|  |                    |        |        |        |         |         |        |
| H <sub>2</sub> S inlet S1 (Gastec)               | ppm                | 5      | 8      | 2      | <0.1    | <0.1    |        |
| H <sub>2</sub> S outlet S1 (Gastec)              | ppm                | 2.5    | 2      | <0.1   | <0.1    | <0.1    |        |
| H <sub>2</sub> S inlet S2 (Gastec)               | ppm                | 10     | 18     | 10     | <0.1    | <0.1    |        |
| H <sub>2</sub> S outlet S2 (Gastec)              | ppm                | 5      | 9      | 7      | <0.1    | <0.1    |        |
| S1 H <sub>2</sub> S reduction efficiency         | %                  | 50     | 75     | 98.99  | No Load | No load | 99     |
| S2 H <sub>2</sub> S reduction efficiency         | %                  | 50     | 50     | 30.0   | No Load | No load | 99     |
| H <sub>2</sub> S outlet monitor reading @ (time) | PPB                | Faulty | Faulty | Faulty | Faulty  | Faulty  |        |

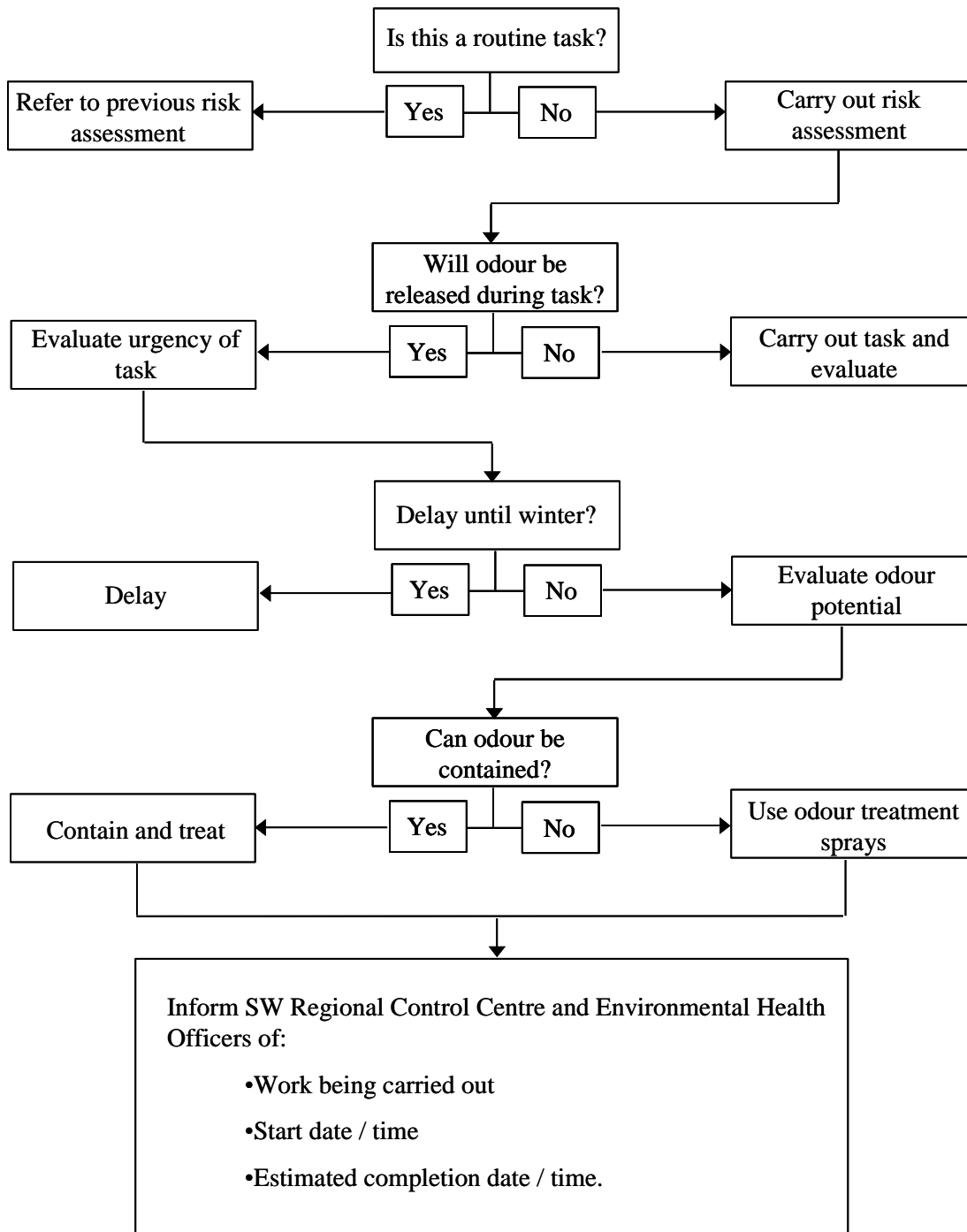
| <b>Mechanical</b>        | Running   | Available    | Unavailable | Isolated off   | Back Turning | Noisy Vibration   | Leakages | No flow Low flow |
|--------------------------|-----------|--------------|-------------|----------------|--------------|-------------------|----------|------------------|
| S1 Fan F3111A            |           | X            |             |                |              |                   |          |                  |
| S1 Fan F3111B            | X         |              |             |                |              |                   |          |                  |
| S2 Fan F3115A            |           | X            |             |                |              | X                 |          |                  |
| S2 Fan F3115B            | X         |              |             |                |              | X                 |          |                  |
| S1 Recirc pump M3116A    | IN HAND   |              |             |                |              |                   |          |                  |
| S1 Recirc pump M3116B    |           |              |             | X              |              |                   |          |                  |
| S2 Recirc pump M3112A    | IN HAND   |              |             |                |              |                   |          |                  |
| S2 Recirc pump M3112B    |           |              |             |                |              | X                 |          |                  |
| S1 Caustic Dosing pump A |           | X            |             |                |              |                   | X        |                  |
| S1 Caustic Dosing pump B |           | X            |             |                |              |                   | X        |                  |
| S1 Hypo dosing pump A    |           |              | X           |                |              |                   |          |                  |
| S1 hypo dosing pump B    |           |              | X           |                |              |                   |          |                  |
| S2 caustic dosing pump A |           |              | X           |                |              |                   | X        |                  |
| S2 caustic dosing pump B |           |              | X           |                |              |                   | X        |                  |
| S2 hypo dosing pump A    |           |              | X           |                |              |                   |          |                  |
| S2 hypo dosing pump B    |           | X            |             |                |              |                   |          |                  |
|                          |           |              |             |                |              |                   |          |                  |
| <b>Materials</b>         | Low Empty | Isolated off |             | Liquor in bund | leakages     | Softener Low salt | Hard     | No flow Low flow |
| Alkali storage           |           |              |             | X              |              |                   |          |                  |
| Hypochlorite storage     |           |              |             | X              |              |                   |          |                  |
| Make up water system     |           |              |             |                |              |                   |          |                  |

5. Observations & other information:

- S1 dosing levels – 0 mV / 8.03 pH an issue with hypo dosing pump B an ICA engineer is required.
- S2 dosing levels – 0 mV/ 6.89 pH No chemical dosing due to broken sample line.
- Belt type: SPB2410 (x3 per fan)

| 6. HISTORICAL FAULTS  | DIAGNOSED |
|---|-----------|
| 6.1. Hypo dosing pump 2 (MC3114B) has been previously found tripped at the breaker, this was reset but failed again. The pump tripped again during the visit and was left off. ERG has set the system to pump 1 only. <b>SW need to electrically investigate this as it is a long-standing fault that can cause a system failure.</b> | Jan.2020  |
| 6.2. RECIRCULATION LINES - All the recirculation pressure gauges have failed/reading incorrect values - all in various states. Consideration needs to be given to the method of fitting to the recirculation headers, and the suitability of these gauges. <b>ERG can offer a quotation if required.</b>                              | Jun.2021  |
| 6.3. No1 Scrubber sump overflow outlet pipe partially blocked (before joins common drain)   | Jul.2022  |
| 6.4. MAKE UP WATER LINES - Both make up water rotameters are in very bad condition and the flow is hard to be seen/adjusted. Both should be replaced.   | Mar.2020  |

## F. Risk Assessment Flowchart



## G. Complaints Management

### G.1 Management of odour complaints

#### G.1.1 System overview

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

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

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

#### G.1.2 Receipt of odour complaints

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

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

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

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

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

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

#### G.1.3 Follow up actions

##### Initial action by Field Performance Manager

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

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

#### **Feedback to the customer by Customer Liaison Officer**

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

#### **Action by Process Scientist**

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

#### **Action by Southern Water Managers**

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





