Netheridge Sewage Treatment Works

Odour Management Plan

Revision	Purpose/Description	Originated	Checked	Reviewed	Approved	Date
1	Draft for Issue with Permit Application	Mark McAree	**Kay daily**	**Joanne Chapman**		**11/10/19**

Contents

1) Introduction and scope

The EA's Guidance on how to 'Control and monitor emissions for your environmental permit[1]' requires for activities which are likely to give rise to odour problems, such as anaerobic digestion, an odour management plan (OMP) should be submitted for approval as part of the permitting process. This plan has been prepared based on that guidance, as well as 'H4 – Odour Management' (March 2011); 'How to comply with your environmental permit. Additional guidance for: Anaerobic Digestion' (EA unpublished: Reference LIT 8737 Report version 1.0, November 2013) and 'Best Available Techniques (BAT) Reference Document for Waste Treatment'; specifically BAT 12-14 within that document (EU, 2018).

Therefore, this document will be submitted as part of an environmental permit substantial variation application for those activities within the works which fall within the scope of the Industrial Emissions Directive, as shown in permit EPR/HP3095CT/V005.

Severn Trent Water Limited operates a number of anaerobic digestion facilities for the treatment of sewage sludge and industrial waste waters and sludges which are of a nature and composition making them suitable for anaerobic digestion.

The plant manager will be responsible for implementation of OMP and its regular review. The document will be subject to periodic review and updating as required, based upon operational experience with the plant and external issues such as changes to nearby sensitive receptors.

2) Site Overview

The permitted facility plant is located within Netheridge Sewage Treatment Works (STW) in the south west of Gloucester. The works sits between the River Severn and the Gloucester and Sharpness Canal, with the majority of the town on the opposite bank of the canal.

The site is a full treatment urban waste water treatment works. Aspects of the site also fall within the scope of the Environmental Permitting Regulations 2016 (as amended), specifically those relating to the anaerobic digestion of sewage sludge and imported tanker trade waste. From the digesters, the permit scope also includes the capture, storage and utilisation of biogas, as well as the dewatering and storage of treated sewage sludge.

The facility will process and manage up to 449,500 tonnes of non-hazardous and 50,000 tonnes of hazardous wastes per annum in addition to the indigenous produced sludges, which will exceed 5,000,000 tonnes. The facility will compromise the following elements:

- Enclosed holding/blending tanks (x4);
- Enclosed primary Anaerobic Digesters (x4);
- Open sludge holding tanks (x4);
- 2 x CHP Units with associated ancillary equipment;
- 2 x Auxiliary dual fuel boilers;
- Auxiliary flare;
- Biogas holding and treatment tank;

[1] https://www.gov.uk/guidance/control-and-monitor-emissions-for-your-environmental-permit

- Dewatering plant (centrifuges and associated chemical storage); and
- Treated cake pad

The proposed capacity at the Netheridge STW, will be met primarily from commercial waste sources and smaller sewage works which lack sludge storage and treatment facilities. Domestic imports which will also be accepted fall under the scope of the Urban Waste Water Treatment Directive and therefore, do not fall under the scope of this OMP.

On-site surface water and process water/liquor are either reused within the facility or transferred to the head of the sewage treatment works.

Biogas produced is used on the site in two combined heat and power engines and in two auxiliary dual fuel boilers. Electricity generated at the site is used both within the site and exported to the national grid, depending upon the current electricity spot price and on-site operational requirements.

3) Site surrounding

Netheridge STW is located on the outskirts of southwest Gloucester OS grid reference SO 80891 15805). The overall land holding of Severn Trent at Netheridge extends to 11.6ha, 4.14ha of which is currently permitted. The STW site is bounded on all sides with varying densities of vegetation screening. Beyond the screening, land use is predominately agricultural in nature to the north and west. To the south of the STW is a strategic road network and the suburbs of the city of Gloucester.

Sensitive receptors:

The nearest residential and external commercial receptors: (see a map in the **Appendix 1**)

- R1 Residential property off Rea Lane
- R2 Static caravan off Rea Lane
- R3 Residential property off Rea Lane
- R4 Residential property off Rea Lane
- R5 Residential property off Netheridge Close
- R6 Residential property off Sims Lane
- R7 Residential property off Sims Lane
- R8 Residential property off Goshawk Road
- R9 Residential property off Sims Lane
- R10 Canal barge mooring
- R11 Canal barge mooring
- R12 Canal barge mooring
- R13 Canal barge mooring
- R14 Canal barge mooring
- R15 Public footpath
- R16 South of Riversmead farm
- R17 Industrial receptor south of site
- R18 Owl sanctuary

4) Process Overview

A process flow diagram for the treatment at the site is presented as Figure 1 below. Wastes in liquid or sludge form are delivered to the site by tanker. Waste pre-acceptance and acceptance procedures follow Severn Trent's agreed tanker trade waste methodology. All waste deliveries are pre-booked in to the site and subject to pre-acceptance testing to confirm their suitability for treatment at the site. Upon arrival, waste transfer notes and the tanker clear wash certificate (if appropriate) are checked against the pre-acceptance information. A sample of waste is taken from the tanker sight glass and confirmatory testing carried out prior to offloading. Where loads do not comply with these requirements, they are rejected. If they meet the site's acceptance criteria, imported wastes are discharged into one of two import tanks. One import tank is for low strength wastes and the other import tank is for high strength wastes. Strength refers to the ammonia and chemical oxygen demand (COD) within the waste stream and influences how the waste streams are blended in the blending tank prior to the digesters.

Indigenous sewage sludge is removed from the aerobic process via gravity within the primary settlement tanks then pumped into a holding tank. Imported sludges are then transferred from the import tanks to the holding tank for mixing, and the mixed sludge is transferred to the anaerobic digesters. The holding / mixing tanks are equipped with an odour control unit (OCU).

Pre-mixed wastes are transferred via pipework to one of the four primary anaerobic digesters at the site, each with an operational capacity of circa 2,800 m3. The tanks are constructed of concrete with steel roofs. They have a conical base which extends below ground surface level and the tanks are built up 20-30% around the base. The contents of the anaerobic digesters are mixed through use of sparging from the methane gas compressor, while the contents undergo anaerobic degradation. The anaerobic digestion process gives rise to biogas (largely methane), which rises through the digester for capture and transfer to the adjacent floating roof gas storage tank for utilisation on site. The biogas storage tank, which is constructed from metal and is fitted with a floating roof includes several environmental and safety process controls (including Whessoe type pressure release valves). The gas storage area is classified as a potentially explosive atmosphere, with strict provisions on the control of potential ignition sources.

Due to the generation of biogas, the digester is operated partly full, to give headspace for biogas generation. The top of the digester is fitted with Whessoe type emergency pressure relief valves to prevent excess pressure build up. The digesters are equipped with high level monitors to check levels and anti-foam added as required to the inputs to prevent foaming occurring. In order to operate within the correct temperature range for optimal digestion, each digester is equipped with a heat exchanger. Heat (hot water) is supplied to this system either through transfer of waste heat from the biogas engines on the site, or through use of the supplementary boilers at the site. The tanks are surrounded by sections of concrete hardstanding, with a mix of grass and gravel beyond.

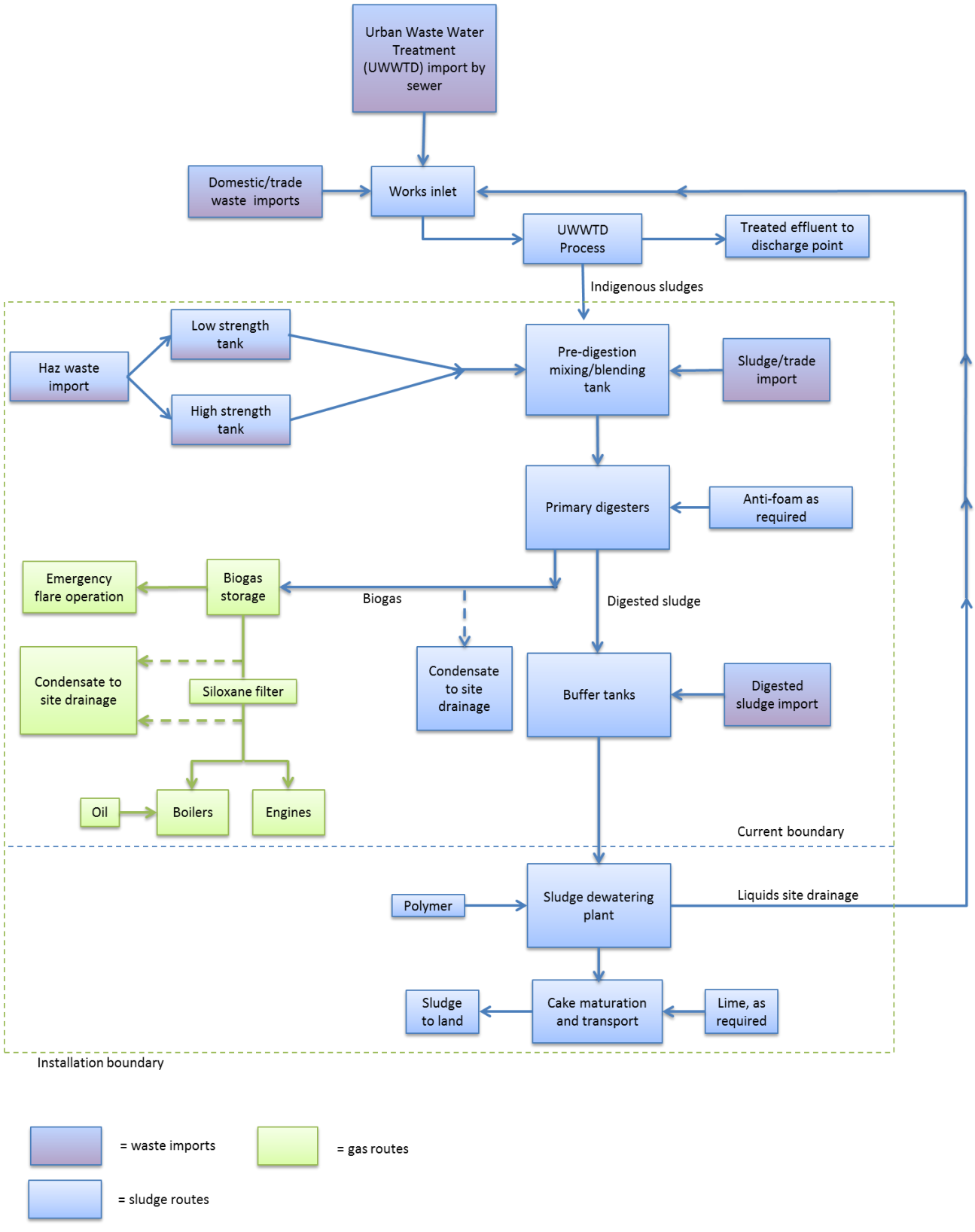
The anaerobic digesters operate as a continuous process with sludge being added and treated sludge extracted. Sludge is retained within the anaerobic digester for approximately 12 days. Sludge extracted from the digesters is then transferred to the buffer tanks, before dewatering occurs by centrifuge.

Fully treated sludge is then transferred for dewatering. Here a polymer-based coagulant is added to the sludge to enable removal of supernatant liquor through centrifugation. The removed supernatant liquor is returned to the head of the works, for treatment through the aerobic treatment route. The produced sludge cake is transferred via conveyors to the adjacent sludge cake pad. The cake pad is engineered hardstanding with segregation provided for differently aged sludge, and drainage provision to capture run-off, which is also returned to the head of the works. Once on the cake pad, sludge cake is analysed to check if it can be landspread in accordance with the requirements of the Sludge (Use in Agriculture) Regulations 1989 (as amended). If the sludge cake is not suitable for application immediately, remedial actions are undertaken to prepare it for reuse. This may be through increased retention time on the pad, mixing with lime, or reprocessing, as required to achieve pathogen kill and other required properties.

The biogas produced in the digesters is wet, and transfer lines are equipped with drainage pots to capture excess water (condensate). These are drained to a sealed drainage system with the water returned to the head of the works. The drier biogas is thermally treated on site. Due to levels of siloxanes within the biogas, which can lead to operational issues for gas engines, the biogas is passed through a GAC filter system to remove siloxanes. The removed filtrate is returned to the head of the works for additional treatment. Hydrogen Sulphide (H2S) monitoring is provided, due to the potential for elevated levels to be present in the biogas. Ferrous dosing is available if needed, but levels of H2S present mean it is seldom used. The site has two Jenbacher 316 gas engines for the combustion of biogas and generation of electricity. These engines have a thermal input of 2.09MW per unit. Heat from the combustion process is used to regulate temperature in the anaerobic digesters, with any excess being discharged using air cooled radiators. Due to the limited levels of unused waste heat at the site, there is no potential for additional CHP outlets. Electricity generated at the site is used both within the site and exported to the national grid, depending upon the current electricity spot price and on-site operational requirements.

There are dual fuelled (oil / biogas) boilers on site which are used to regulate the anaerobic digester operational temperature, primarily when the CHPs are not operational. A flare is located at the site for treatment of biogas during periods of excess generation or engine / boiler downtime. Flare stack operation is automated based on gas level. If the gas level is high then the flare will operate, however utilisation of the gas is preferred over flaring.

Figure 1 – Netheridge Process Flow Diagram



5) Hours of operation

As a sewage works, the digesters are operational 24 hours a day through a computer controlled process. There are no permit restrictions on the delivery of waste to the site, it is however anticipated that wastes would be delivered between the following hours.

07:00 to 18:00 Monday to Friday;
07:00 to 16:30 Saturdays; and by exception;
08:00 to 16:30 Sundays and Bank Holidays as required.

6) Daily and Weekly Tonnages

In any working day, it is expected that the facility will process 100 tonnes of non-hazardous and hazardous waste.

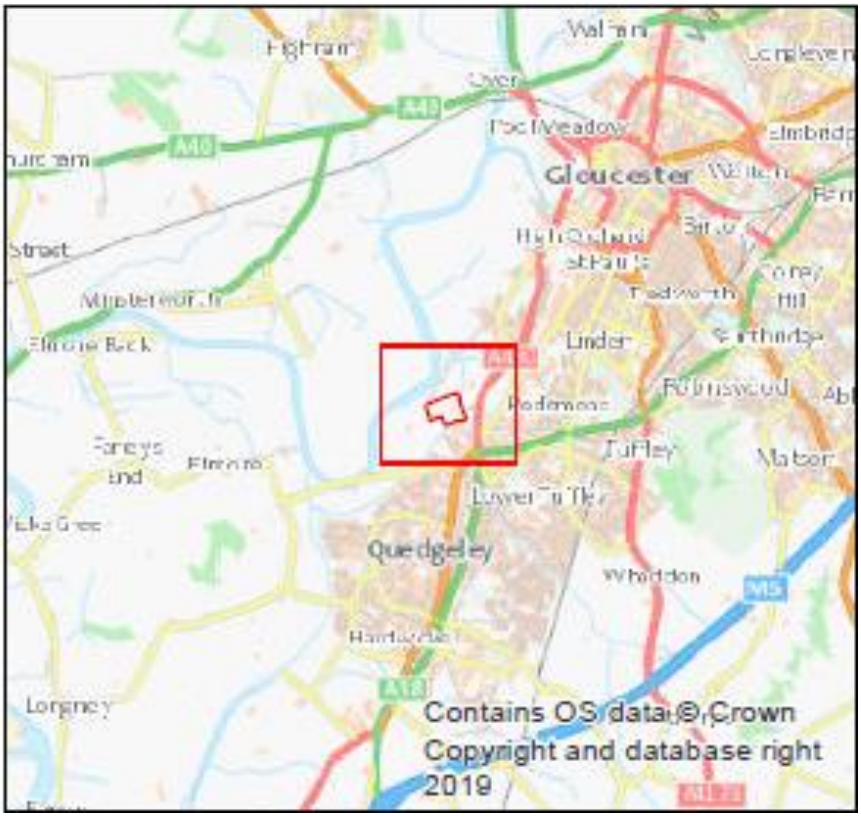
Daily tonnages are carefully planned by staff to ensure that the facility has the appropriate amount of waste to feed the facility and ensure that the site does not receive more waste than it can process.

7) Waste material accepted

Site will accept liquid and sludge waste from commercial sources and small sewage treatment works. For a full list of EWC wastes accepted on site refer to the environmental permit application and when the permit is issued, refer to the permit.

8) Site Location

Figure 2 Site location



9) Available on site capacity

The following capacity is available across the site and is indicative of the total amount of waste that can be retained onsite on any given day.

Table 1 Site capacity details

Waste Infrastructure	Capacity (each) (m3)	Retention Time (approx.)
Holding / blending tanks	Holding tank 800 m3 Import tank 4x 80 m3	<12 hours
Primary Anaerobic Digesters	4x 2800 m3	10-12 days
Sludge holding tanks	8x 1000 m3	0 – 14 days
Cake pad	6600 m3	14 days plus

10) Delivery Vehicles

Wastes in liquid or sludge form are delivered to the site by tanker. Waste pre-acceptance and acceptance procedures follow Severn Trent's agreed tanker trade waste methodology. All waste deliveries are pre-booked in to the site and subject to pre-acceptance testing to confirm their suitability for treatment at the site.

Upon arrival, waste transfer notes and the tanker clear wash certificate (if appropriate) are checked against the pre-acceptance information. A sample of waste is taken from the tanker sight glass and confirmatory testing carried out prior to offloading. Following checking, the tanker is allowed to be discharged. Where loads do not comply with these requirements, they are rejected.

If they meet the site's acceptance criteria, imported wastes are discharged into one of two import tanks.

Vehicles arriving at site that are in poor condition (leaking seals or dirty) such that they may cause odour will be refused re-entry until repairs are made.

All deliveries to the site are by tanker and discharged via a data logger to measure import volumes. This is logged in the site systems along with the origin of the waste, natures and producer. Where deliveries are of commercial wastes or untreated sludges, these are to reception tanks / mixing tanks, prior to transfer to the anaerobic digesters. Once wastes are accepted they cannot be easily separated, and their location onsite will be time dependent following their transfer to the digester.

11) Inventory of Odorous Materials

Waste Sources and Odour Mitigation

The following list provides an inventory of wastes which may give rise to increased odour on site and their mitigation measures following assessment using **FIDOL** (Frequency, Intensity, Duration, Offensiveness, Location and Annoyance Factor).

Table 2 Inventory of Odorous Materials

Material	Suppliers	FIDOL Assessment	Odour Mitigation
Liquid Wastes with low odour potential (delivered in sealed tankers)	Commercial sources, small sewage treatment works	Moderate odour intensity. Mildly unpleasant hedonic tone.	Supplier chemical analysis undertaken prior to receipt. Discharge from tankers into sealed pipework to relevant tanks. This process is supervised by the TCP and highly odorous loads are monitored and logged.
Liquid Wastes with high odour potential (delivered in sealed tankers)	Commercial sources	High odour intensity. Unpleasant hedonic tone. Odour content varies dependant on type.	Only accepted when it can be processed swiftly. Supplier chemical analysis undertaken prior to receipt. Discharge from tankers into sealed pipework to relevant tanks. This process is supervised by the TCP and highly odorous loads are monitored and logged.
Biogas/H2S	Pressure Relief Valves, engine emissions, and Enclosed Flare	Low odour intensity.	Site assets are designed to minimise excess releases. Gas volume is first utilised in specifically sized CHP engines, then stored within the digester roofs and gas holder, or flared, before the need for any raw biogas to be released.
Rainwater Runoff (Leachate)	Runoff from site surfaces	Low odour intensity.	Runoff pumped back in to the site drainage and returned for treatment through UWW route.
Digestate	Final product from process	Low odour intensity. Mildly unpleasant hedonic tone.	Digestate pumped via enclosed pipework for treatment through UWW route.
Sludge Cake	Final product from process	Low odour intensity. Mildly unpleasant hedonic tone.	Runoff from the cake pad pumped back in to the AD system, in sealed pipework, when required.

The list may not incorporate all wastes accepted throughout the operational life and will updated as part of the annual review. Where a contractor wishes to deliver a waste type that has not been previously processed or understood, Severn Trent will either undertake detailed chemical analysis of a sample of the waste prior to acceptance or require a sample.

Rejection of Malodorous Loads

Due to the enclosed nature of the entire AD process, the waste is able to be managed appropriately without giving significant rise to odour. However, there may be occasions where the site is not in a position to receive the waste. Should this be the case, the malodorous load would be rejected.

Rejection of Contaminated Loads

No containerised wastes are accepted at the site, only bulk tankered materials. Only wastes of the types and in Group A, Group B or Group C as listed in the permit are accepted on site. Waste pre-acceptance and acceptance procedures follow Severn Trent's agreed tanker trade waste methodology.

Due to a lack of sampling gantry, sampling occurs from the sight glass and must be witnessed by a technically competent member of site staff. No prior visual inspections are carried out of loads, due to the nature of the wastes being imported. Where loads are visually contaminated they are rejected at this point.

Given the nature of the wastes accepted and sources, the potential for a contaminated load to arrive at the site is very limited.

Waste Rejection Procedure

Where waste is deemed to contain a level of contamination greater than that set out above or is considered to be a malodorous load, the Trade Waste Technician will consider the rejection procedure option.

Should a load be considered unacceptable, the Trade Waste Technicians will quarantine that load in a separate area of the reception roadway. The relevant haulier or waste supplier will be contacted and the reason behind the rejection will be conveyed to them. They will then be requested to remove the load from site, if deemed too malodorous to discharge.

This rejection process is part of our standard operational procedures TTWSS005.1 (Receiving and Accepting Trade Waste Loads on Site) and addresses:

1. Arrival of Waste Stream
2. Bookings Check
3. Duty of Care paperwork
4. Sampling and Testing
5. Acceptance and Rejection
6. Receipting

12)Training

The Environmental Policy is communicated to all persons doing work under the organisations control. Policies, Standards and procedures around permit compliance and operational controls are available and accessed through an online system.

The company's ISO14001 Environmental Management Systems (EMS) basic level awareness e-learning is assigned to all operational staff. EMS e-Learning Nuisance module includes odour pollution and the Site Permit module includes understanding permits. EMS e-learning is recorded as a skill on SAP.

The company's Competency Management Systems (CMS) under the EU Skills Standard ensures Technically Competent Persons are trained on requirements of Environmental Permits. CMS is recorded as a skill on SAP.

Severn Trent also schedules regular CABWI modules throughout the year. CABWI (Diploma in Water and Wastewater Engineering) can be undertaken by Operators and Managers wishing to upskill across aspects of waste water and includes reference to odour issues and mitigation within the training.

Training is monitored and managed by line managers in the first instance.
Site visitors are inducted and made aware of relevant issues or reporting requirements.

13) General considerations

Prevention of nuisance is preferable to mitigation of its effects so we use a phased approach to dealing with the risk of odours.

Sewage and sludge treatment facilities should be designed with nuisance in mind. Where possible the most odorous activities should be located away from sensitive receptors. Long open channels should be avoided and potentially odorous tanks designed so that they can be covered if required.

On existing sites, the following approach is used to minimise the risk of odour nuisance:
Where possible operational methods should be used first e.g. improving housekeeping or increased maintenance and servicing of assets. Odorous activities such as moving sludge cake should be avoided on days when the prevailing wind is towards sensitive receptors.
The last resort is contain the nuisance e.g. by covering odour sources. If covers are required, then small odorous areas such as desludging and return liquor wells should be addressed first. Ventilation may be required to prevent the build up a corrosive atmosphere. Odour abatement equipment should be sized to cope with any variations in odour levels.

Severn Trent is also committed to the following principles of H4 guidance:

- The integrity of the site infrastructure (including roads, buildings, ducts, pipes, drainage/sewerage, process equipment and controls) will be regularly inspected and maintained as described in an Environmental Permit application.
- A high level of site cleanliness will be maintained. This will be enforced by the site management and regular site checks undertaken.

- Company will engage with the neighbours to minimise their annoyance including responding to their complaints effectively
- The Environment Agency will be notified in the event of odorous releases or other relevant conditions that have actual or potential to lead to pollution. In the event of an olfactory egress, the Environment Agency will be informed using a Schedule 5 Notification Form, located in Schedule 5 of the permit.

14) Odour risk assessment

Table 4 below identifies potential elevated odour sources, method of measurement, anticipated odour levels, likelihood of elevated odour arising from the source prior to controls being implemented, control measures and actions to be undertaken should a problem arise. The anticipated odour level is scored based on the six point scale originally prescribed in VDI 39402 and used as the Environment Agency in the H4 Odour Management Guidance (2011) and IQMA Guidance on the assessment of odour for planning 3 (Version 1.1, July 2018) as an example of how to measure odour intensity. The VDI 3940 odour intensity scale has been provided in Table 3 below.

Table 3 VDI 3940 Odour intensity scale

Odour Strength	Intensity level	Comments
No odour/not perceptible	0	No odour when compared to normal working conditions
Slight/ very weak	1	There is probably some doubt as to whether the odour is actually present
Slight/ weak	2	The odour is present but cannot be described using precise words or terms
Distinct	3	The odour character is barely recognisable
Strong	4	The odour character is easily recognisable
Very strong	5	The odour is offensive. Exposure to this level would be considered undesirable.
Extremely strong	6	The odour is offensive. An instinctive reaction would be to mitigate against further exposure.

[2] VDI 3940: 2006, Determination of Odorants in Ambient Air by Field Inspection, Pub. Verein Deutscher Ingenieure, Dusseldorf.
[3] https://iaqm.co.uk/text/guidance/odour-guidance-2014.pdf

Table 4 odour risk assessment (200m distance from sensitive receptors)

Cause of elevated odour	How the severity is measured	Anticipated odour level	Likelihood (pre controls)	Control measures	Actions if odour starts causing a problem
Receipt and Management of Odorous Materials					
Delivery of waste under normal circumstances	Inspection of waste. Olfactory sniff test assessment.	Odour intensity 2/6 or assessed as likely to cause nuisance. Unknown delivery vehicle, or vehicle not contained.	Low	Follow site procedures for pre-acceptance assessment of waste and quarantine/ rejection of nonconforming loads. Deal with loads promptly after acceptance. As specified in EA-approved Waste Acceptance Procedures for Trade Waste, a full assessment of waste is undertaken before first delivery, including laboratory analysis/sampling. Then, sampling of each load before allowing discharge at site. Delivery in contained vehicles. Scheduling of waste to allow immediate processing. Discharged either directly into the head of works or into holding tanks where it is diluted with other effluent/water. **Note: above mitigating principles apply in almost all delivery circumstances and are therefore not replicated below**.	Consider increasing dilution. Consider reducing volume of effluent within the holding tank.
Delivery of waste with a strong offensive odour.	Inspection of waste. Olfactory sniff test assessment.	Odour intensity 5/6 or assessed as likely to cause nuisance.	Medium	Written agreements and on-going communication with waste supplier.	Consider increasing dilution. Consider reducing volume of effluent within the holding tank.

Cause of elevated odour	How the severity is measured	Anticipated odour level	Likelihood (pre controls)	Control measures	Actions if odour starts causing a problem
Spillage of effluent during offloading	Daily checks. Detected by site staff.	Odour intensity 2/6, or spillage assessed as likely to cause problems.	Low	Drainage system captures and returns for full treatment. Concrete surfaces enable swift and effective clean up Spillage kits kept on site Regular maintenance of values and pumps.	Review of training, equipment, offloading process.
Removal of sludge cake from site under normal conditions	Odour assessment of cake. Visual inspection of collection vehicle.	Odour intensity 2/6, or assessed as likely to cause nuisance. Unknown collection vehicle, or vehicle not contained.	Low	Use competent haulage contractors Driver inductions. Collection in sheeted vehicles. Long digestion time results in low odour product. Minimise agitation of cake during loading.	Schedule loading to avoid sensitive wind directions.
Containment					
Damage to tank roofs	Automated system will alarm when loss of pressure	Smelt outside buildings	medium	Regular inspections to check integrity of digester and gas holder roofs, in line with Gas Holder Regulations. Planned preventative maintenance	In extreme circumstances isolate and pump out digestate into other tanks. Isolate digester Stop feed to digester

Cause of elevated odour	How the severity is measured	Anticipated odour level	Likelihood (pre controls)	Control measures	Actions if odour starts causing a problem
Digester pressure valves activate	Inspection Gas alarms detect pressure loss	Faint smell of biogas	medium	Feed appropriately to maintain safe biogas level	Refit pressure value Isolate digester Stop feed to digester
Valves, pipes or pumps damaged or malfunctioning	Routine checks Detected by site staff	Damaged or malfunctioning.	Low	Selection of correct pipework for pressure and flow loads. Regular checks. Clean any spills promptly. Agreements with suppliers for prompt service.	Reconsider pipe design if repetitive failure Consider temporary reduction in waste deliveries.
Odour Control Unit damaged or malfunctioning	Annual checks Detected by site staff	Odour intensity above 3/6, or assessed as likely to cause nuisance.	Medium	Annual checks undertaken by Air-Water Treatments to assess condition Agreements with suppliers for prompt service. Planned preventative maintenance.	Consider temporary reduction of material processing or stop deliveries of more odourous wastes In extreme circumstances, stop or divert deliveries.
Transport and Dispersion					
Vehicles	Smell	Associated with site	Low	Waste suppliers agreements to co-operate Visual checks Wash down facilities provided Scheduling of waste to allow immediate processing.	Ban suppliers from site who refuse to co-operate with site practices.

Cause of elevated odour	How the severity is measured	Anticipated odour level	Likelihood (pre controls)	Control measures	Actions if odour starts causing a problem
Other					
Processing equipment damaged or malfunctioning	Regular checks. Detected by site staff	Damaged or malfunctioning	Medium	Maintenance issues raised & resolved through site manager OPEX budget. Emergency callout contracts for selected equipment and facilities. Regular checks. Planned preventative maintenance. Physical protection from vehicle collision etc.	Consider temporary reduction of site activities. Risks requiring capital maintenance recorded on Severn Trent Operational Risk Matrix (STORM).
Failure of electricity supply	Lights and equipment not functioning	Odour as a result of failure of air extraction system.	Medium	Reduce site activities where possible.	Arrangements in place to deliver emergency generator.
Human error – staff, managers, visitors	Regular checks Detected by site staff	Damage or malfunction caused.	Medium	Staff training and supervision. Visitor inductions. Regular checks. Clean any spills promptly. Near miss reporting.	Consider temporary reduction of site activities.
Malfunction or damage caused by unauthorised visitors	Regular checks Detected by site staff	Malfunction or damage caused.	Medium	Security measures are in place including perimeter fence with controlled access gates. Establish contact with local Police and Fire Services. Repair damage and clean spills promptly.	Consider reduction in deliveries

Cause of elevated odour	How the severity is measured	Anticipated odour level	Likelihood (pre controls)	Control measures	Actions if odour starts causing a problem
Fire and/or explosion	Detected by systems Detected by site staff	Fire or explosion caused.	Medium	Staff training and supervision. DSEAR zones identified on map. Fire extinguishers placed for quick access and checked regularly. Establish contact with local Fire Service who have undertaken a site specific assessment.	Consider temporary reduction of site activities.
CHP gas engine emissions	Odour detected by site staff.	Odour intensity 3/6, or assessed as likely to cause nuisance.	Low	Scheduled stack emissions testing in accordance with requirements set out in the Environmental Permit. 3rd party MCerts approved contractor monitors the exhaust emission once per year in line with permit requirements. Planned Servicing by STW CHP trained technicians as per manufactures recommendations and after each 1000hr service the emissions are monitored using calibrated handheld Testo unit. If emission are found to be outside of the expected range then they are investigated and rectified by replacement of parts or bringing forward the service interval. Follow supplier recommendations.	Shut down engine and use flare Reduce feedstock to reduce gas production

Cause of elevated odour	How the severity is measured	Anticipated odour level	Likelihood (pre controls)	Control measures	Actions if odour starts causing a problem
Poor housekeeping on site	Daily checks. Detected by site staff.	Odour intensity 3/6, or assessed as likely to cause nuisance.	Low	Daily Inspection Routine. Fly and vermin control. Daily cleaning around site. Pressure washers on site. Spills are cleaned up promptly. Spill training is undertaken by Wholesale Ops and spill kits/hoses are readily available.	Deep clean areas that identified as causing odour

15) Monitoring Plan

Some of the monitoring methods that we use are as follows:

- All Tanker trade waste is booked in to the site to enable the Site Manager and Operatives to understand the daily and weekly expected tonnages and potential gas production.
- Sniff testing in response to concerns or complaints or when a potential risk of odour pollution is suspected. Members of staff from the offices/other areas of the Business (who are less sensitised to sewage treatment odours) will be requested to attend site.
- Monitoring the process controls of the Anaerobic Digestion and Urban Waste Water process
- Scheduled emissions monitoring by a specialist contractor (Air-Water Treatments)
- Dynamic monitoring of odour is undertaken on site, using odour management tasks.

Control measures identified in the Odour Risk Assessment to be enacted if required.

Odour pollution Management Information (MI) is analysed and evaluated to enable reporting of trends to those with responsibility and authority to initiate appropriate action.

Records of the information received from this monitoring will be kept, and acted promptly on any findings that suggest there is a potential risk of odour pollution. Further investigation can be carried out via gas bag testing, or GCMS if required. A specialist contractor would be hired to undertake this work.

16) Responding to Odour Concerns and Complaints

Severn Trent Water takes any incidents, non-compliances and environmental complaints very seriously and have procedures in place to record and investigate these. Incidents are managed through standard procedures which ensure that all incidents are logged and that necessary preventative and/or corrective actions are taken.

Complaints are managed by Customer Services, where all complaints are logged on the Complaints Records Online Storage System (CROSS). Site Managers are responsible for ensuring that action is taken and for liaising with the relevant regulatory bodies (where appropriate). They ensure that any complaint is investigated and, if found to be justified, that work is undertaken to resolve the issue. They also provide an appropriate response to the complainant in a timely manner detailing the reason behind the issue and the actions taken to resolve the matter.

Information regarding complaints is recorded to allow determination of an appropriate response (corrective action) and to determine what measures need to be taken in the future to prevent its reoccurrence (preventive action).

The EMS can review the MI (Management Information) data, which will include odour complaints.

Recurring odours may require investigation by our Process Design Engineering teams (PDE). FIDOL assessments (Frequency, Intensity, Duration, Offensiveness and location) are undertaken to assess whether any changes to the process are required.

Where odour issues are prevalent, we would adopt the stance taken at our Wanlip Sewage Treatment Works during 2017/18. Live odour surveys were set up weekly with the local Council. Severn Trent also engaged with local residents and invited customers to site to investigate the locations on site and potential odour olfactory variances.

Engagement with the Environment Agency for process issues or pollutions that could cause odours, would be through either a Schedule 5/6, or a phone call to the Local Environment Officer.

Appendix 1 Map of the nearest sensitive receptors