

Hayden Sludge Treatment Centre

Odour Management Plan

Revision	Purpose/Description	Originated	Checked	Reviewed	Authorised	Date
1	First Issue	Liz Cherry	Kay Daily	S Whitehouse	J Chapman	Dec 21
2	Updated in response to EA requirements	J Chapman	M McAree	S Whitehouse	J Chapman	Nov 23

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1) Introduction and scope

Odour from the majority of sewage treatment works is regulated by the local authority under statutory nuisance provisions of the Environmental Protection Act 1990.

However, sites that have the capacity to accept over 100 tonnes of imported waste per day for the purposes of anaerobic digestion have been issued with Environmental Permits under the Environmental Permitting (England and Wales) Regulations 2016.

The EA's Guidance '*Biological waste treatment: appropriate measures for permitted facilities*' 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.

Therefore, this document will be submitted as part of the environmental permit compliance for the sludge process at Hayden Sewage Treatment Works which will be operated by Severn Trent Water.

This OMP has been prepared following guidance from the Environment Agency:

- H4 – Odour Management.
- Odour Management Review Checklist.
- Odour Management Plans for Waste Handling Facilities.

The OMP will form part of the ISO 14001 Environmental Management System (EMS). The Bioresources manager will be responsible for implementation of OMP and its regular review. This odour management plan will be reviewed on an annual basis or more often if any of the following occur:

- Validated odour complaints
- Changes to the sewage or sludge treatment process
- Significant development in the local area

2) Site Overview

The site is located in a rural setting on the outskirts of Hayden to the west of Cheltenham. The Hatherley Brook runs to the south of the site across agricultural land.

A plan of the proposed permitted site boundary can be seen in figure 4 (section 8) of this Odour Management Plan.

The approximate site centre is at National Grid Reference (NGR) SO 9069 2302.

Hayden STW treats a population equivalent of approximately 125,000. The current discharge permit (S/20/26207/R) levels (on a 95%ile basis) are 10mg/l BOD, 20mg/l SS, 3mg/l ammonia and 1mg/l P. The final effluent is discharged to the River Chelt.

Figure 1: Site location plan



3) Site surroundings

Hayden STW is located west of Cheltenham. Development in the immediate area has been restricted due to a cordon sanitaire imposed by the local council.

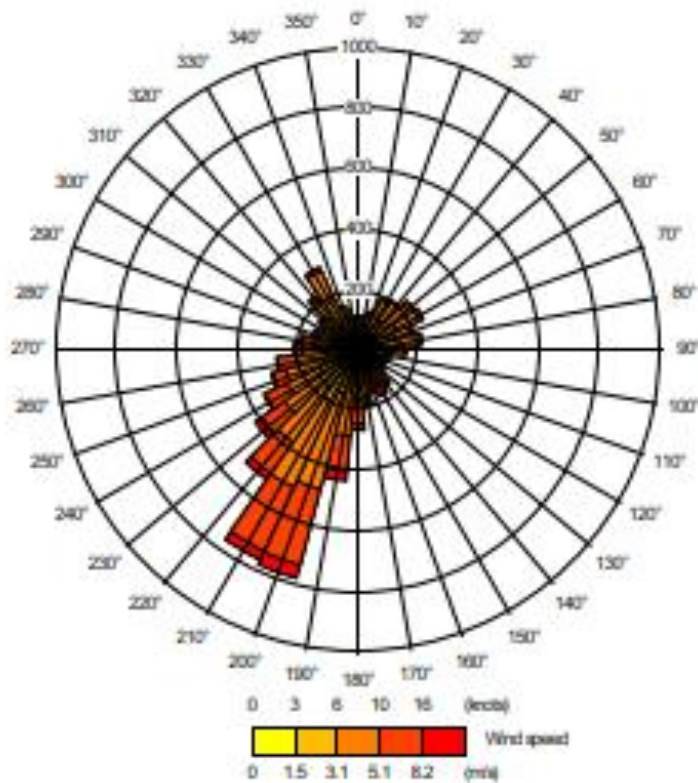
The nearest residential dwellings are on the site access road, approximately 100m from the site boundary. There are a number of public footpaths around the works, including the Cheltenham Circular footpath that runs along the eastern site boundary.

Land to the west of Hayden STW is predominantly rural. The M5 is approximately 1km west of the site. Beyond that are the villages of Staverton, Staverton Bridge and Bamfurlong. Staverton (Gloucestershire) Airport is 2km southwest of Hayden STW.

East of the site, the closest housing is approximately 500m from the site boundary in Cheltenham. There are schools (Pate's Grammar, St Thomas More Primary and All Saints Academy), playing fields and government offices within 1.5km of the site boundary.

Historical prevailing wind data below from the Met Office shows the predominant direction is South-West. This wind rose is for the nearest available site (Birmingham Airport) and has been used in our dispersion modelling. Hayden STW is surrounded by sensitive receptors so the aim is to keep odours to a minimum whatever the wind direction.

Figure 2: Pershore meteorological station 2016 – 2020.



4) Process Overview

A sludge process flow diagram is found in Appendix 1.

Under the Urban Wastewater Treatment Regulations, sewage that has been screened and dewatered is settled in 3 No. circular primary settlement tanks. Settled sewage treated in 4 No. activated sludge lanes (using diffused air) followed by 4 No. FSTs and 6 No. tertiary sand filters. Final effluent is discharged into the River Chelt.

Storm flows are held in 5 No. rectangular storm tanks. These are fitted with tipping buckets to aid cleaning.

Under the installations environmental permit, indigenous primary sludge is screened and then held in a tank before being thickened in 1 No. picket fence thickener. Thickened sludge is transferred to 2 No. pre-digestion blending tanks.

Indigenous SAS is thickened on 3 No. belt thickeners before being transferred to the pre-digestion thickening tanks. Polymer is added to aid the thickening process.

Raw sludge imports are screened and then held in a tank prior to being thickened in 2 No. picket fence thickeners. Thickened sludge is transferred to the sludge import tanks.

Blended sludge is fed to one of 2 No. mesophilic anaerobic digesters. Sludge is held in the digesters for the required time stated on the HACCP plan. Biogas is collected from the digesters, stored in 1 No. gas bag and used in 1 No. CHP engine.

Digested sludge is held in 5 No. pathogen kill tanks prior to being transferred to a single centrifuge via a buffer tank. Digested cake is transferred to cake pads for storage prior to being recycled to agricultural land. Polymer is added to aid the dewatering process and centrate is returned to the head of the works via 2 No. centrate balancing tanks.

The location of these process units on site is shown below:

Figure 3: Hayden STW and STC



5) Hours of operation

Waste is processed through the plant 24 hours a day through a computer controlled process. There are no permitted restrictions on the delivery of tankered waste to the site. Severn Trent will aim to only allow waste via tankers to be accepted between normal working hours to minimise odours. Any tankers received out of hours would be for emergency tankering only.

6) Tonnages

Hayden STW served a population equivalent of 123,864 in 2020/21. The digestion plant has capacity to treat 4,012tds/annum based on its HACCP plan.

7) Waste material accepted

Hayden currently does not accept any tankered trade wastes into the sewage treatment works or the sludge treatment route. Tankered domestic waste and portaloos are accepted into the sewage treatment route. Raw sewage sludge currently is accepted under a T21 waste exemption to the digester route.

For future reference when the plant is permitted under IED, the full list of EWC wastes we are permitted to accept at the site will be found in Schedule 2 of the new permit, and any imported wastes will be accepted under the approved waste acceptance procedures. The new permit will be available to site staff.

Delivery Vehicles

Liquid wastes will be transferred to and from the site in sealed tankers. Solid waste will be removed from site in sheeted Heavy Goods Vehicles (HGV's).

It is the responsibility of the haulier to ensure that the contents of their load are sheeted when removing waste from site as per our agreement with our approved framework contractors. Vehicles arriving at site that are in poor condition (poor sheeting, leaking seals or dirty) such that they may cause odour issues will be refused re-entry until repairs are made.

Liquid wastes will only be accepted or exported in sealed tankers. Tankers can be unloaded using gravity only (no pressure discharge) to reduce potential odour egress.

Exiting cake vehicles are cleaned using the wheel wash before leaving site. It remains the responsibility of the haulier to ensure their vehicle is maintained. All foul water then runs into the site drainage and is directed back to the head of the works for treatment.

Waste imported for dewatering and storage only

Hayden does not generally receive imports of digested sludge though it does have the facility to do so. The site would only receive imports from other sites that were BAS certified.

All of our sludge is treated in accordance with the site HACCP plan & is tested on a regular basis. Liquid digested imports would be discharged into the storage tanks on site and mixed

with the indigenous sludge. Cake is stored on the pad in specific numbered bays and recorded on the site stock sheet. Cake movement on the pad is minimised to reduce odour.

If the imported cake does not meet the requirements for recycling, it will be quarantined on site for further sampling & investigation. Additional treatment may be required or disposal via other non-agricultural routes. Additional treatment may include mixing with lime. If this is required, odour management will be included as part of the RAMS (Risk Assessment / Method Statement) of the relevant contractor.

The “oldest” cake on site will generally be recycled first but this could be impacted by operational requirements or customer preference. For example, treated cake could be delivered directly from under the chute in preference to cake stored in bays which reduces cake movement on site providing operational benefits and reduced carbon emissions.

8) Permitted Area

The proposed installation boundary and air emission points are shown in figure 4. Further details of the potential gas releases from the air emission points are shown in Table 1.

Figure 4: Permitted Area

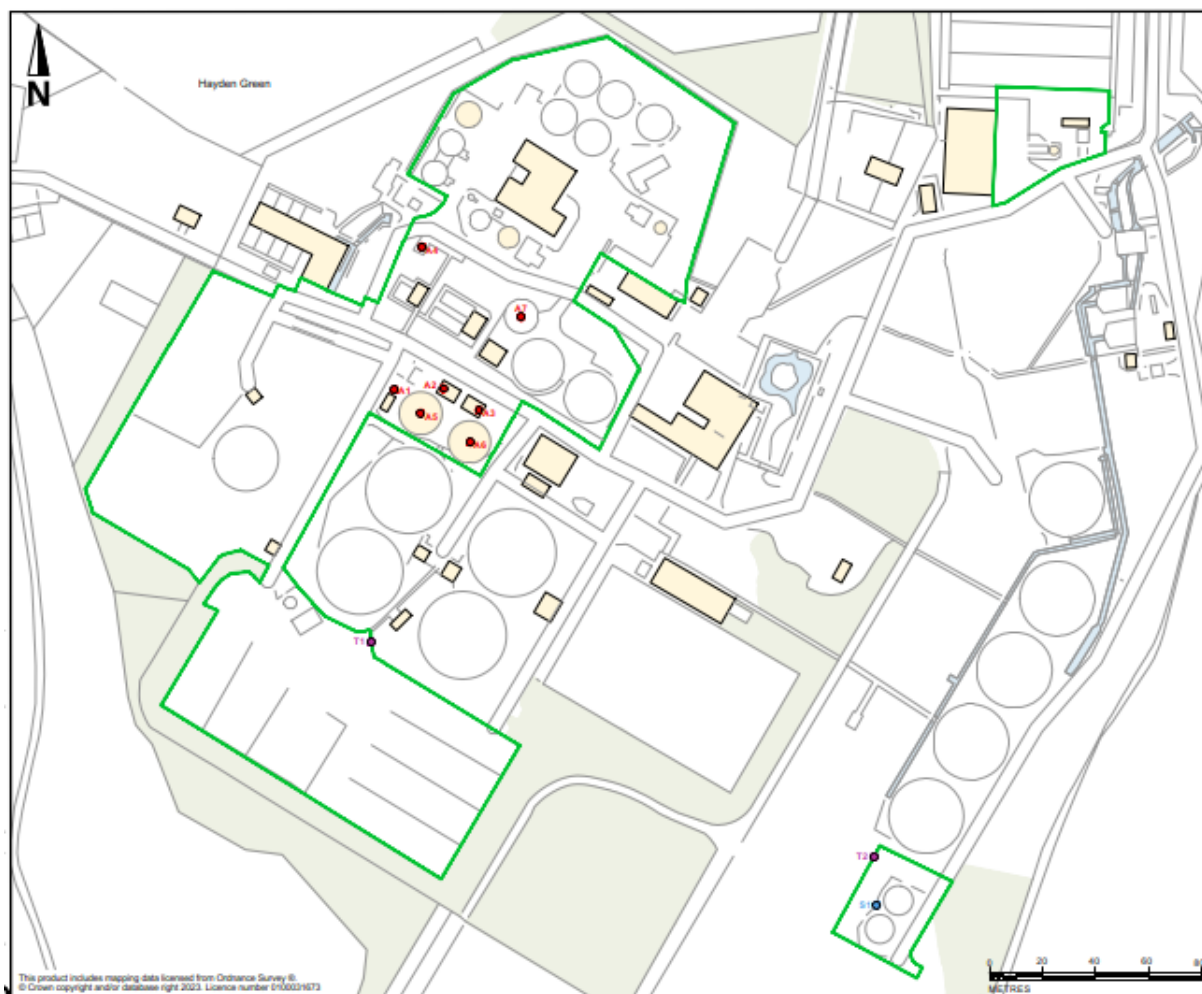


Table 1: Air Emission Points

Emission point + NGRs	Source	Components	Odour Risk
A1 SO 90626 23031	CHP Engine (biogas)	Products from biogas combustion	Low - Combustion plant is regularly maintained and appropriately sized to manage volumes of gas
A2 & A3 SO 90646 23042 SO 90661 23033	Auxiliary Boiler 1 & 2	Products from oil/ gas combustion	Low - Boiler is regularly serviced.
A4 SO 90638 23096	Emergency Flare	Products from biogas combustion	Low - the flare is utilised for the safe disposal of surplus gas in the event of plant breakdown, or a surplus of gas above the level that can be safely stored or utilised. Use of emergency flare is recorded.
A5 & A6 SO 90637 23031 SO 90656 23021	Digester Storage Tanks Pressure relief valves	Biogas (mixture of methane & carbon dioxide)	Low - PRVs are only activated in emergency situations to maintain safety within the biogas system and are re- seated/repared promptly to minimize biogas emissions. PRVs are subject to monitoring via site systems and visual checks by site personnel.
A7 SO 90677 23069	Gas Storage Pressure relief valve	Biogas (mixture of methane & carbon dioxide)	Low - the floating roof gas holder is suitably sized to manage biogas generation.

9) Available onsite 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: Hayden site capacity details

Element	Capacity	Total Capacity
Primary sludge tank	1 x 21m ³	21m ³
Primary Continuous Thickener Tank	1 x 2,071m ³	2,071m ³
Digester Feed Tanks	2 x 2,071m ³	4,142m ³
Imported sludge tank	1 x 51m ³	51m ³
Sludge Import tanks	1 x 2,500m ³ 1 x 2,800m ³	5,300m ³
Digesters	1 x 2,989m ³ 1 x 3,040m ³	6,029m ³
Pathogen kill tanks	5 x 860m ³	4,300m ³
Centrifuge buffer tank	1 x 72m ³	72m ³
Centrate balancing tanks	2 x 500m ³	1,000m ³
Cake pads (assumes cake 1.5m deep)	1 x 7,650m ³	7,650m ³
	Total	25,258m³

10) Our Approach to Odour Nuisance

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:

1. 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.
2. The last resort is to 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.
3. 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.

We assess odour risk using FIDOL (Frequency, Intensity, Duration, Offensiveness, Location) and the source/ pathway receptor model. See Inventory of odorous materials.

Odour risk is assessed if the treatment processes on site are altered, in this case odour control measures are paid for as part of the capital scheme. If the need for odour control is identified under other circumstances, e.g. development close to the site, then the site manager adds the issue to STORM and a capital project is created to install odour control.

Severn Trent Water 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) are regularly inspected and maintained.
- A high level of site cleanliness is maintained and is enforced by the site management.
- Company will engage with the neighbours to minimise their concerns including responding to their complaints effectively.

The Environment Agency will be notified in the event of odorous releases detected outside of the site that are or may be caused by the activities authorised by the environmental permit. 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.

11) 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.

Environmental Management Systems (EMS) basic level awareness e-learning is mandatory 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.

Competency Management Systems (CMS) Technically Competent Persons are trained on requirements of Environmental Permits including nuisances, control measures and Schedule 5 reporting. CMS Technical Competence is recorded as a skill on SAP.

Severn Trent also schedules regular training modules throughout the year. CABWI (Diploma in Water and Wastewater Engineering) can be undertaken by Operators and Managers wishing to upskill across aspects of wastewater 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.

12) 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) assessment and the source/ pathway/ receptor model. The risks in the table are those that occur during normal operation. For exceptional circumstances see Table 5 - Incident/ emergency control measures.

Table 3: Inventory of Odorous Materials

Stage of treatment	Nature of source	Quantities & Retention Time	Odour risk/ mitigation using source/ pathway/ receptor model (Risk assumed during normal operation)
Sewage treatment Inlet works	<ul style="list-style-type: none"> Raw sewage (not part of this permit) Imported tankered domestic waste & thin raw sludges. (EWC 200304) Liquor returns from onsite thickening & dewatering processes. 	<p>Dry weather flow for the site is 35,000m³/d</p> <p>Minimal retention time - inlet works are designed to process flows not store them.</p>	<p>Risk before mitigation - Moderate. Risk after Mitigation - Low</p> <p>Risks (before mitigation) - Liquor returns & imports have moderate FIDOL score. Inlet channels are open</p> <p>Source mitigation - We do not accept odorous wastes (see acceptance criteria). Return liquors are processed as soon as possible after production. Import pipes are extended to reduce splashing. Raw sewage dilutes the other wastes.</p> <p>Pathway/receptor mitigation - Inlet works is located away from residential properties & is screened by trees. The screens are enclosed.</p>
Sludge handling and treatment Raw sludge handling	<ul style="list-style-type: none"> Raw sludge imports from satellite STWs. (EWC 190805) Screenings from raw sludge imports 	<p>Sludge import tanks, digester feed tanks and primary continuous thickener tank. (6,207m³ total capacity)</p> <p>Approx. 3 days retention time to allow process</p>	<p>Risk before mitigation - High. Risk after Mitigation - Low</p> <p>Risks (before mitigation) - raw sludge can have a high FIDOL score.</p> <p>Source mitigation - Import facility is enclosed. Skips emptied regularly via contract with Biffa. Liquors are returned to the head of the works as soon as possible.</p> <p>Pathway/receptor mitigation - Odour is minimised through process control. Imported, primary and pre-digestion blending tanks are covered.</p>

	<ul style="list-style-type: none"> Liquors from the consolidation process 		
Sludge handling and treatment Digester	<ul style="list-style-type: none"> Blended raw sludges (raw sludge imports from satellite STWs. Primary & SAS from onsite sewage treatment). Antifoam may be added. Biogas is produced as part of the digestion process. 	<p>2 x mesophilic anaerobic digesters (6,029 m³ total capacity)</p> <p>Design manual minimum retention time is 12 days. Check HACCP plan on Waterpedia for the latest requirements.</p>	<p>Risk before mitigation - Low. Risk after Mitigation - Low</p> <p>Risks (before mitigation) - digestion takes place in enclosed tanks. Antifoam is not odorous.</p> <p>Source mitigation - Digesters are enclosed tanks. Pressure relief valves (PRVs) are a fail-safe mechanism to prevent an unsafe increase in pressure in the digesters and are designed to only activate in an emergency once all other failsafe routes have been utilised. They are inspected weekly by the operational teams and twice yearly by an external contractor. Our upstream processes ensure that sludges are processed in a timely manner and therefore releases from PRVs are unlikely to cause odour nuisance.</p> <p>Pathway/receptor mitigation - n/a odour controlled at source</p>
Sludge handling and treatment Pathogen kill tanks	Digested sludge from onsite digestion process	<p>5 x path kill tanks (4,300 m³ total capacity)</p> <p>Sludge is held in the tanks as specified in the HACCP plan. Check HACCP plan on Waterpedia for the latest requirements.</p>	<p>Risk before mitigation - Low. Risk after Mitigation - Low</p> <p>Risks (before mitigation) - digested sludge has a low FIDOL score.</p> <p>Source mitigation - Odour is minimised through process control. We optimise digester operation to ensure that digested sludge has a low FIDOL score. Sludge is only kept in the secondary sludge tanks and sludge to land tanks for the time required by the site HACCP plan.</p> <p>Pathway/receptor mitigation - n/a odour controlled at source</p>
Sludge handling and treatment Digested sludge dewatering	<ul style="list-style-type: none"> Digested sludge from onsite digestion process. Polymer is added to aid the dewatering process. Dewatering liquors are produced. 	<p>1 x centrifuge buffer tank, 1 x centrifuge, 2 x centrate balancing tanks (1,072m³ total capacity)</p> <p>Maximum 1 day retention time - time is required to even out the ammonia load to the sewage treatment process.</p>	<p>Risk before mitigation - Moderate. Risk after Mitigation - Low</p> <p>Risks (before mitigation) - digested sludge has a low FIDOL score. Polymer is odourless. Liquors may have a moderate FIDOL score.</p> <p>Source mitigation - The centrifuge is an enclosed unit. Odour from liquors is minimised through process control - they are returned to the head of the works as soon as possible after production.</p> <p>Pathway/receptor mitigation - n/a odour controlled at source</p>

Sludge handling and treatment Cake pads	Dewatered cake from the onsite digestion process	Cake Pads (7,650m3 total capacity if sludge is stored 1.5m deep) The intention is to ensure that cake is not stored on the pad for >12 months	Risk before mitigation - Low. Risk after Mitigation - Low Risks (before mitigation) - digested sludge has a low FIDOL score Source mitigation - Digested cake forms a firm crust after 1 - 2 days, which is essential to ensuring that odours are minimised. Once compliance tests are passed it can be moved offsite to farmers fields for storage Pathway/receptor mitigation - cake is not moved on windy days.
Biogas utilisation CHP engine	Combustion of biogas produced onsite	1 x Jenbacher combined heat and power unit (330 kW)	Risk before mitigation - Low. Risk after Mitigation - Low Risks (before mitigation) - Unburnt gas is released to atmosphere Source mitigation - Engines are specifically sized for the sites operation to minimise the amount of excess gas produced. If there are problems with the CHP engines, sludge imports will cease until the CHPs are back online. This minimises gas production on site Pathway/receptor mitigation - n/a odour controlled at source
Biogas utilisation Flare stack	Combustion of biogas produced onsite		Risk before mitigation - Low. Risk after Mitigation - Low Risks (before mitigation) - Unburnt gas is released to atmosphere Source mitigation - At times when the CHP engines are down, the imports have ceased, and the storage within the digester roofs and gas holder is maximised, the excess gas will be flared. Pathway/receptor mitigation - n/a odour controlled at source

13) Odour Abatement Systems

There are no odour abatement systems installed at Hayden. This is under regular review and should a FIDOL or similar assessment show the need for odour control, then this will be provided using the Bioresources capital maintenance budget.

14) Monitoring Plan

Monitoring is essential to our operational control. These are some of the benefits it provides:

- Assessing the nature and extent of a potential risk of odour pollution
- Investigating sources and pathways
- Measuring releases
- Showing patterns that can be used to plan the timing of operations and predict potential risks of odour pollution
- Aiding management and control of the process, including in exceptional circumstance the diversion of waste to a similar facility

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

- All Tanker waste is booked into the site to enable the Site Manager and Operatives to understand the daily and weekly expected tonnages and potential gas production.
- Monitoring the process controls of the Anaerobic Digestion and Urban Waste Water process. For example digesters are monitored for %DS, feed rate (both recorded on JRP), temperature, pH, VFA, gas quality and H₂S (site manual readings) as part of the “golden measures” programme.
- (if applicable) We have established a time-based media change programme whereby media in our odour control units is replaced every five years in accordance with manufacturers specifications and ME30. We also carry out regular checks to ensure that our odour control equipment continues to be fit for purpose (see Appendix 3 Odour Management Tanks).
- (if applicable) We measure the performance our odour abatement equipment on a regular basis. Tasks are assigned to site operators on the SAP/ Sitemate system (See Appendix 3 Odour Management Tasks).
- We review our OMPs annually. This includes a review of the FIDOL and source/ pathway/ receptor assessment found in Table 2 Inventory of Odorous Materials.
- We have a series of control and reactive measures identified for areas of site that have the potential to be odorous. See Table 5 Incident/ emergency control measures.
- ***As part of the new IED permit, we commit to carrying out a review of our abatement, to determine whether measures have been effective, and (if applicable) to further characterising emissions from the odour control units in line with BAT 3 and 8 to demonstrate that H₂S, NH₃, TVOC and HCl are not present in the waste gas stream. If H₂S, NH₃, TVOC or HCl are found to be present, or any improvements to equipment required, a monitoring and improvement plan will be put in place in agreement with the EA.***

If we were to receive odour complaints or suspected that there was a risk of odour nuisance, then reactive monitoring would be implemented:

- Sniff testing (as described in H4) would be carried out by members of staff from the offices/ other areas of the business (who are less sensitised to sewage treatment odours) in order to pinpoint the source of the odour nuisance. This assessment would focus on the works perimeter as well as the sewage and sludge treatment routes. Sniff testing would include the non-permitted area of site in order to ensure that all potential sources of nuisance are accounted for. Forms for recording observations can be found in the Appendix 4 (Forms).
- Results from the sniff testing assessment would be evaluated and if necessary, further investigation would be carried out via gas bag testing, or GCMS if required. A specialist contractor would be hired to undertake this work.

15) Odour risk assessment

Table 3 Odour risk assessment

Cause of elevated odour	How the severity is measured	Likelihood (pre controls)	Control measures	Reactive Measures/ Actions
Delivery of waste under normal conditions and acceptance of wastes with a strong offensive odour	Inspection, sample and analysis of waste	Low	<ul style="list-style-type: none"> Site procedures for acceptance of waste & quarantine/ rejection of nonconforming loads. Loads are dealt with promptly after acceptance. Delivery in contained vehicles. Scheduling of waste to allow immediate processing. 	Site staff reject odorous loads. Tanker drivers clear up any spills promptly
Removal of sludge cake from site under normal conditions	Odour assessment of cake	Low	<ul style="list-style-type: none"> Use competent haulage contractors Collection in sheeted vehicles. Minimise agitation of cake during loading. 	Consider weather conditions when moving cake.
Damage to tank roofs causing release of odorous gases	Digesters and gas holders are alarmed to indicate loss of pressure	Medium	<ul style="list-style-type: none"> Digesters & gas holders are alarmed to indicate loss of pressure. Digester roofs are routinely inspected & maintained in line with Gas Holder Regs. 	Site manager investigates cause of failure & arranges for maintenance, either by recording the issues on Severn Trent Operational Risk Matrix (STORM) or using the site OPEX budget.
Damage to fabrication of sludge building	Visual inspections	Medium	Regular visual inspections of the sludge building fabrication	Site manager investigates cause of failure & arranges for maintenance, either by recording the issues on Severn Trent Operational Risk Matrix (STORM) or using the site OPEX budget.
Digester pressure valves activate & biogas is released.	Digesters are alarmed to indicate pressure	Medium	<ul style="list-style-type: none"> Digesters are alarmed to indicate pressure Control digester feeds and volumes to maintain safe biogas level 	Site manager investigates the cause of gas release.

Valves, pipes or pumps damaged or malfunctioning	Routine site checks Detected by site staff	Low	<ul style="list-style-type: none"> Regular site checks carried out. Design includes selection of correct pipework for pressure and flow loads Clean any spills promptly. 	Site manager investigates cause of failure & arranges for maintenance, either by recording the issues on Severn Trent Operational Risk Matrix (STORM) or using the site OPEX budget.
Processing equipment damaged or malfunctioning	Regular checks. Detected by site staff	Medium	Regular checks carried out by site staff	Site manager investigates cause of failure & arranges for maintenance, either by recording the issues on Severn Trent Operational Risk Matrix (STORM) or using the site OPEX budget.
Failure of electricity supply resulting in CHP engines flaring/ failing to ignite	CHP engine and flare will fail to work/ ignite	Medium	Dual electricity supply to site.	
Human error – staff, managers, visitors	Regular checks Detected by site staff	Medium	<ul style="list-style-type: none"> Staff training and supervision. Visitor inductions. Regular checks. Clean any spills promptly. Near miss reporting. 	Site staff clean any spills promptly. Near misses are reported on Safety Net.
Malfunction or damage caused by unauthorised visitors	Regular checks Detected by site staff	Medium	<ul style="list-style-type: none"> Security measures are in place including controlled access gates operated in accordance with our Closed gate policy. Perimeter fence and CCTV. 	Report issues on Safety Net
Fire and/or explosion results in sludge spill/ odour release	Detected by systems Detected by site staff	Medium	<ul style="list-style-type: none"> Staff training and supervision. DSEAR zones identified on map and on site. Fire extinguishers placed for quick access and checked regularly. Established contact with local Fire Service who have undertaken a site specific assessment. 	Site manager reports issues on Safety Net & investigates causes. Site staff clean any spills promptly and carry out checks on affected equipment.

CHP gas engine emissions	Odour detected by site staff.	Low	<ul style="list-style-type: none"> Scheduled stack emissions testing in accordance with requirements set out in the Environmental Permit. Serviced by STW CHP trained technicians as per manufactures recommendations and after each 1000hr service the emissions are monitored using calibrated handheld Testo unit. 3rd party MCerts approved contractor monitors the exhaust emission once per year in line with permit requirements. 	If emissions 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.
Poor housekeeping on site	Detected by site staff.	Low	<ul style="list-style-type: none"> Regular checks carried out by site staff who complete the Site Standards Records check list (found on Sharepoint) Spill training is undertaken by Wholesale Ops and spill kits/hoses are readily available 	Site staff ensure spills are cleaned up promptly.

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.

Site Managers are responsible for

- investigating complaints using the reactive monitoring measures described in section 10. The results of their investigations can be recorded on the report form in Appendix 4.
- providing a timely response to the complainant detailing the reason behind the issue and the actions taken to resolve the matter.
- liaising with the relevant regulatory bodies (where appropriate)
- ensuring that work is undertaken to resolve the issue. See section 7 Our Response to Odour Nuisance for more details of possible actions.

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). Please see Appendix 5 for a full version of the Complaints Response SOP.

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

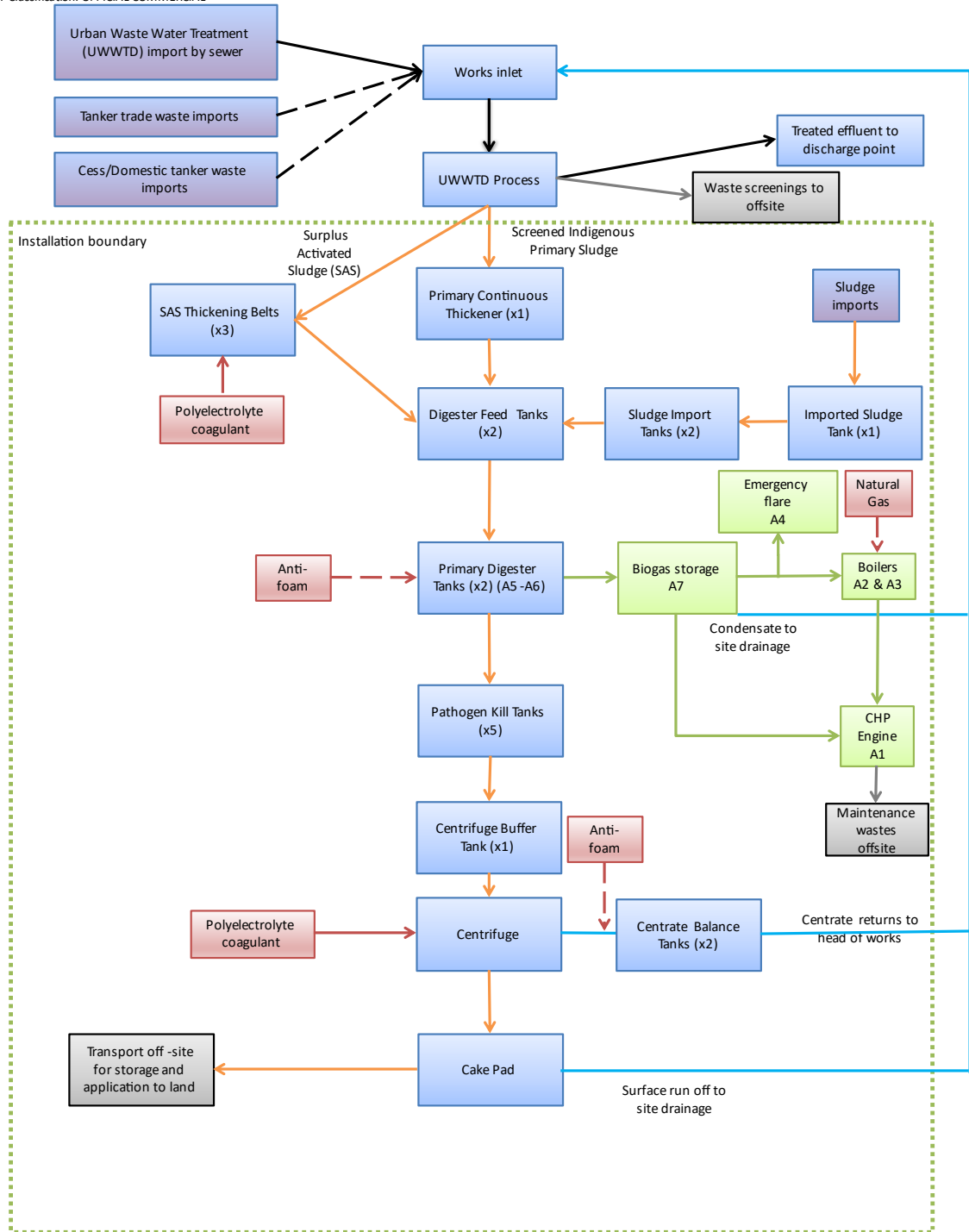
Recurring odours may require investigation by our Process Design Engineering teams (PDE). FIDOL assessments (Frequency, Intensity, Duration, Offensiveness and location) are undertaken to assess whether any changes to the process are required.











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, pollutions that could cause odours or validated odour complaints would be through either a Schedule 5/6, or a phone call to the Local Environment Officer as per the contacts section (Appendix 6).

Appendix 1: Sludge Process Flow Diagram

ST Classification: OFFICIAL COMMERCIAL



- | | | | | | | | |
|---|-----------------|---|-----------------------|---|-----------------------|---|---------------------|
|  | = Waste Imports |  | = Gas Routes |  | = Odour Control Units |  | = waste water flows |
|  | = Sludge Routes |  | = Raw Material Inputs |  | = Solid Waste Routes |  | = sludge flows |
| | | | | | |  | = chemical flows |
| | | | | | |  | = UWWTD water flows |

Appendix 2: Forms
Odour Report Form for Sniff Testing

Odour Report Form for Sniff Testing					Date
Report completed by					
Time of test					
Location of test (area of site)					
Weather conditions (dry, rain, fog, snow etc.)					
Temperature (warm, mild, cold or degrees if known)					
Wind strength & direction					
Odour Intensity (see below)					
Duration of test					
Constant or intermittent odour in this period?					
Describe the smell					
Is the source evident?					
Other comments					

Odour Intensity:

- 0 - no odour
- 1 - very faint odour
- 2 - faint odour
- 3 - distinct odour
- 4 - strong odour
- 5 - very strong odour
- 6 - extremely strong odour

Odour Complaint Investigation Report Form

Odour Complaint Investigation Report Form	
Time and date of complaint	
Name & contact details of complainant	

Date of odour	
Time of odour	
Location of odour	
Weather conditions (dry, rain, fog, snow etc.)	
Temperature (warm, mild, cold or degrees if known)	
Wind strength & direction	
Weather conditions (dry, rain, fog, snow etc.)	
Complainant's description of odour: <ul style="list-style-type: none"> • What does it smell like? • Intensity • Duration (time) • Constant or intermittent? • Other comments? 	
Are there any other complaints in relation to the installation/ location (either historically or at the same time)	
Any other relevant information	
Do you accept that the odour is likely to be from your activities?	
What was happening on site at the time the odour occurred?	
Operating conditions at the time the odour occurred	
Actions taken	
Form completed by	

Odour Intensity:

- | | | |
|----------------------------|----------------------|-----------------------|
| 0 - no odour | 1 - very faint odour | 2 - faint odour |
| 3 - distinct odour | 4 - strong odour | 5 - very strong odour |
| 6 - extremely strong odour | | |

Appendix 3: Standard Operating Procedure for Complaints Responses

Standard Operating Procedure (SOP)

Title	<i>Bioresources - Customer Odour Complaints</i>
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Purpose	To ensure that our neighbours do not suffer from odour nuisance from our sludge treatment centres and to ensure compliance with our environmental permits.
Who	The Bioresources Team Manager has responsibility for implementing this procedure. The procedure must be followed by Technical Operators and Senior Technicians responsible for the day-to-day operation of sludge treatment centres.

Must Have (H&S, Quality, Quantity, Environment, Training, Resources)	
<ul style="list-style-type: none"> • Standard PPE when carrying out site odour assessments • Up to date odour management plan for the site • Access to CROSS complaints database • Weather station should be installed at sludge treatment centres 	
Remember – ‘Stop, Think, Take 20’	

Summary Must Do
<ol style="list-style-type: none"> 1. Ensure that each sludge treatment centre has an up to date Odour Management Plan. 2. Aim to prevent odour nuisance by ensuring good housekeeping and process control. 3. If complaints are received, ensure that the customer is kept informed of the actions that are taken to address their issue.

SOP - Proactive Measures

1. Ensure that the site has an odour management plan (OMP) in place and that this is available to all site staff. The OMP includes an odour risk assessment in the “Inventory of Odorous Materials” table. The OMP should be reviewed annually or more often if any of the following occur:
 - Validated odour complaints
 - Changes to the sewage or sludge treatment process
 - Significant development in the local area
2. We aim to proactively prevent odour nuisance by ensuring good housekeeping and process control. Ensure that Golden Measures are recorded and any issues acted on. Ensure that good housekeeping practices are used - sludge spills should be cleared up as soon as possible.
3. Where odour control units are installed, ensure that regular checks are carried out and the results of these checks are recorded. Details of the required checks are included in the OMP.
4. The steps in the incident/ emergency control table in the OMP can be used to develop a response to any issues that are picked up as part of the regular monitoring.
5. Be aware of weather conditions such as wind direction when carrying out potentially odorous operations such as moving cake.

SOP - Reactive Measures

Complaint received via COSC or direct customer contact

1. Customer complaints can be received via phone, email, letter or social media.
2. If a complaint is received directly by the site, then COSC should be contacted so that the complaint can be recorded centrally.
3. If a complaint is received via COSC, then site staff should contact the customer directly within 24 hours.
4. Customer details should be recorded on the odour complaint investigation report form (found in the appendix of the OMP).
5. Keep the customer informed at all steps of the odour investigation.

Carry out odour investigation

6. Use the odour complaint investigation report form. Record the following information:
 - time & date of odour complaint
 - Weather conditions at time of complaint
 - Operating conditions at the time of the complaint.
7. Walk the sewage and sludge treatment route and carry out a sniff testing assessment. If possible, use office based staff to carry out this assessment (they will not be accustomed to the odours on site). Record details of the assessment on the odour report form for sniff testing (in the appendix of the OMP).
8. If necessary, engage a specialist contractor to carry out further testing using olfactometry.
9. If a persistent odour issue is identified, then further engagement with local residents may be required. The process used at Wanlip STW in 2017/18 could form a basis for actions taken. 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.

10. Inform the EA via a schedule 5 where necessary.
11. Store investigation reports electronically.

Develop a Solution

12. The steps in the incident/ emergency control table in the OMP can be used to develop a response to any issues that are picked up as part of the odour investigation.
13. Where possible operational methods should be used to control odours e.g. improving housekeeping or increased maintenance and servicing of assets.
14. The last resort is to contain the nuisance e.g. covering odour sources. Ventilation may be required to prevent the build up of a corrosive atmosphere under the covers.
15. Update the OMP to reflect the findings of the investigation.
16. Continue to monitor the odours to ensure that the solution is successful.

Appendix 4: Hayden Site Contact Details

Area of Site	Company Responsible	Contact Name	Phone Number
Sludge Screening Rag Skips		REDACTED	
Odour Control Units			
CHP Units			
Trade / Domestic Waste			
Biosolids / Cake pad			
Permit Compliance			
Bioresources Operations			
Production Operations			
Cheltenham Borough Council			
Environment Agency			