

# Newthorpe Sludge Treatment Centre

## Odour Management Plan

Rev	Purpose/Description	Originated	Checked	Reviewed	Authorised	Date
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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 2013.

The EA's Guidance 'Appropriate Measures for the biological waste treatment' requires for activities which are likely to give rise to odour problems, such as anaerobic digestion, an operator shall have and maintain an odour management plan (OMP).

Therefore, this document will be submitted as part of the environmental permit application for the Sludge Process at Newthorpe 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

Newthorpe Sewage Treatment Works is located between Ilkeston and Eastwood in Nottinghamshire. The approximate site centre is at National Grid Reference (NGR) SK 4764 4480.

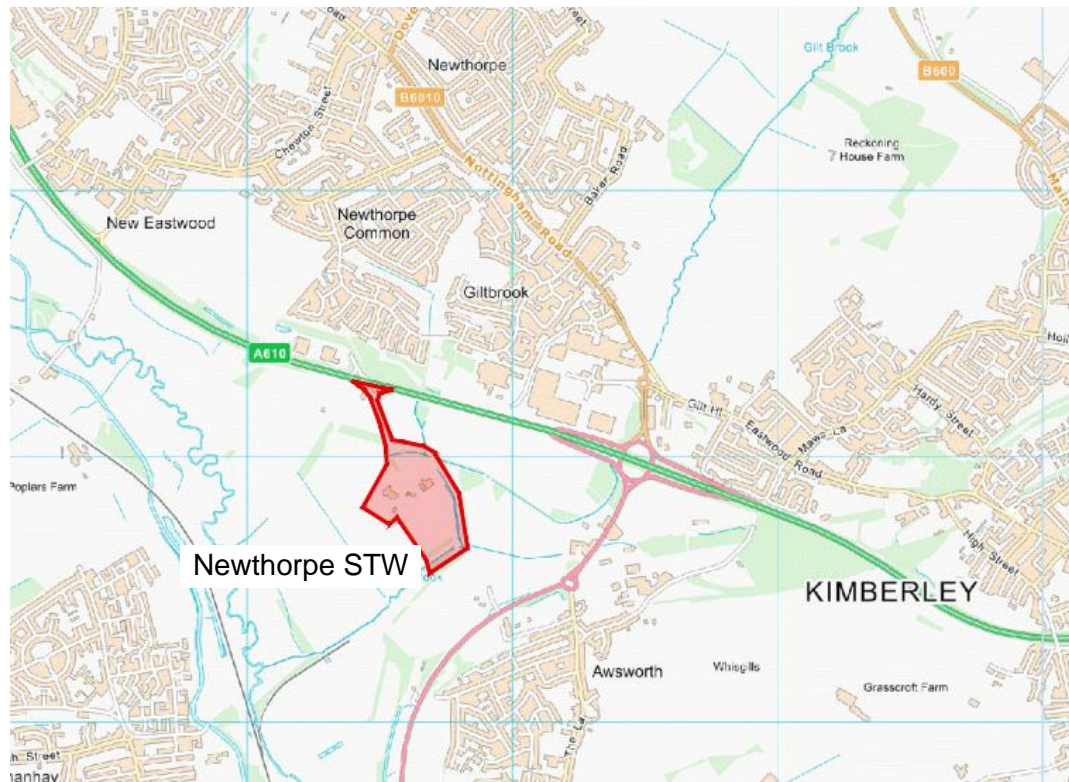
Newthorpe STW treats a population equivalent of approximately 47,000. The STW also treats raw sludge imports from satellite sites in Nottinghamshire.

The site is able to import 375,000 m<sup>3</sup> of non-hazardous waste per annum for treatment. Import of trade waste is not currently permitted on this site.

The current discharge permit (T/61/45995/R) levels on a 95%ile basis are 10mg/l BOD, 20mg/l SS, 3 mg/l ammonia and 2mg/l phosphorus. The phosphorous permit limit is due to

be tightened during AMP 7. This will involve major modifications to the sewage treatment works, including the construction of an activated sludge plant. The final effluent is discharged to the Gilt Brook.

**Figure 1: Site location plan**



### 3) Site surroundings

Newthorpe STW is surrounded on all sides by open fields and is bounded to the east and south by the Gilt Brook, which flows into the River Erewash.

To the north is the A610 and residential areas of Giltbrook and Newthorpe. To the north-west, approx. 450m from the site, is large shopping park consisting of both retail and leisure units. An industrial unit can also be found the west of this retail park.

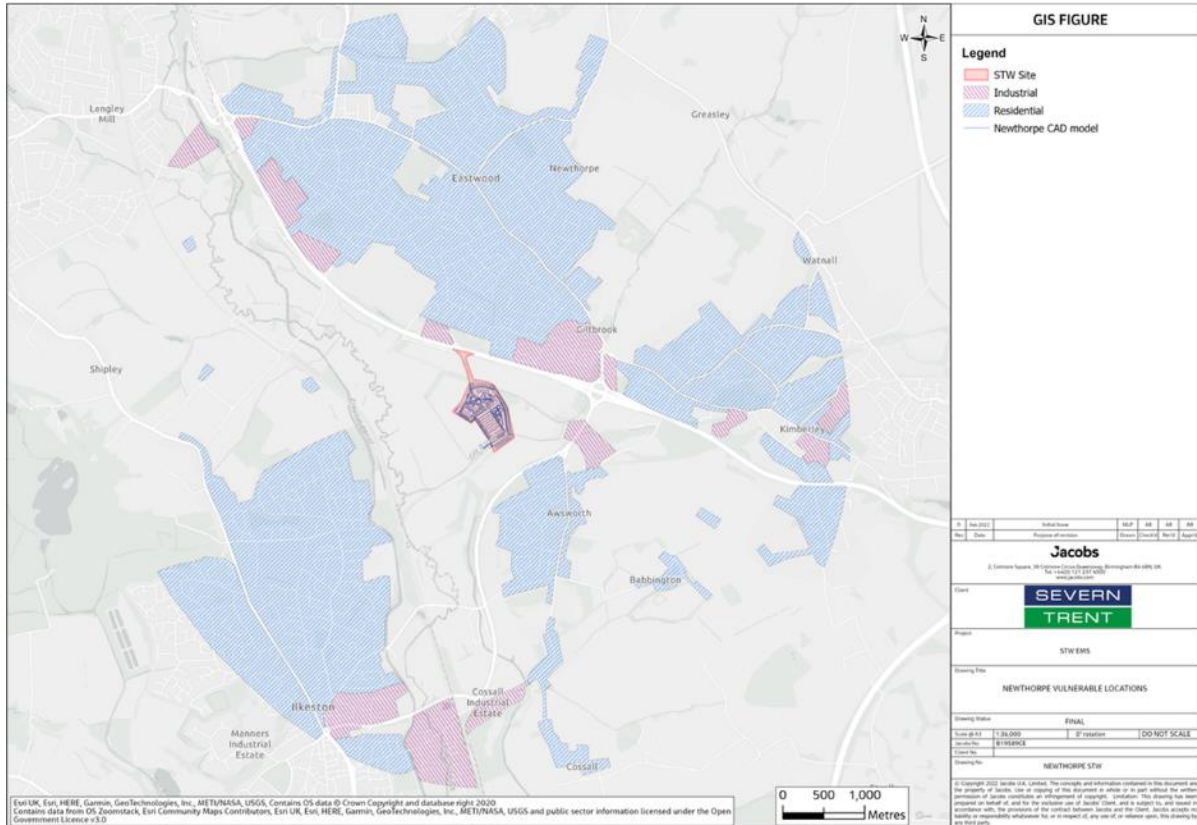
To the west over approx. 400m of fields can be found an industrial stone manufacturing plant and motorhome retailer. Further west is a large industrial unit consisting of vehicle maintenance services, building materials wholesale and storage yard. A hotel can be found approximately 800m to the west of the site beyond this.

To the south, a large car breakers yard is approximately 150m away as well as the village of Awsworth, a mixture of residential dwellings, recreation space and commercial premises, including Awsworth Primary and Nursery School approx. 850m south of the site.

To the east are 750m of fields, the River Erewash and a railway line. Beyond the railway line at a distance of 1 km is the outskirts of the town of Ilkeston. To the north and west are the Tinsley Park Shooting Range, a football pitch and the Notts and Derby Off Road RC race track. Also to the south-west is the Bennerley Viaduct, which has a viewing area for members of the public.

Newthorpe sewage treatment works discharges into the Gilt Brook on the south of the site.

Figure 2: Newthorpe - Sensitive Receptor Locations



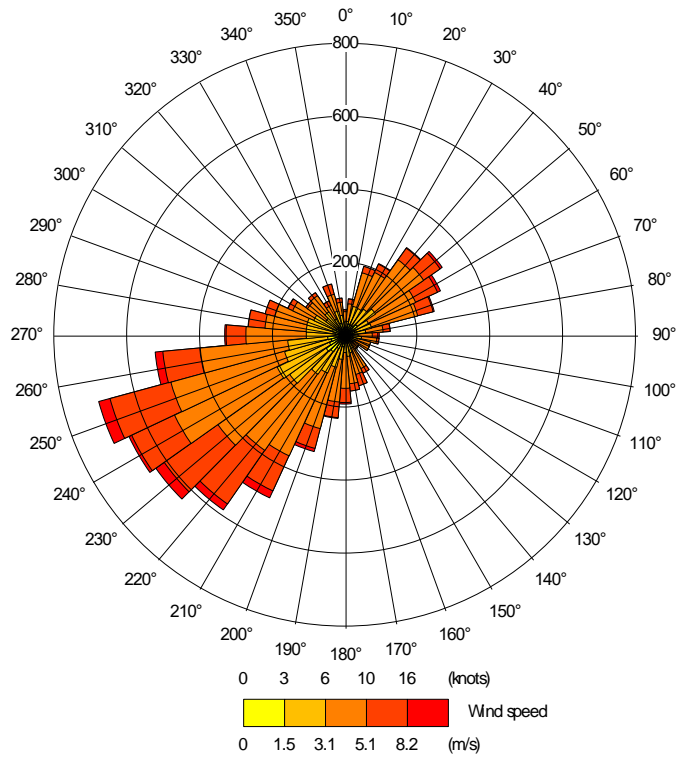
**Sensitive receptors:**

- Residential areas surrounding the sewage treatment works, including schools
- Playing fields and recreation users on the north of the site
- A public footpath follows the east of the permitted site boundary.

The nearest residential receptors are located on Davenport Drive, which can be found north of the site on the far side of the A610 at approximately 270m distance). An industrial unit lies 170m from the site boundary.

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

**Figure 3: Wind rose for Nottingham / Watnall Met Station 2020**

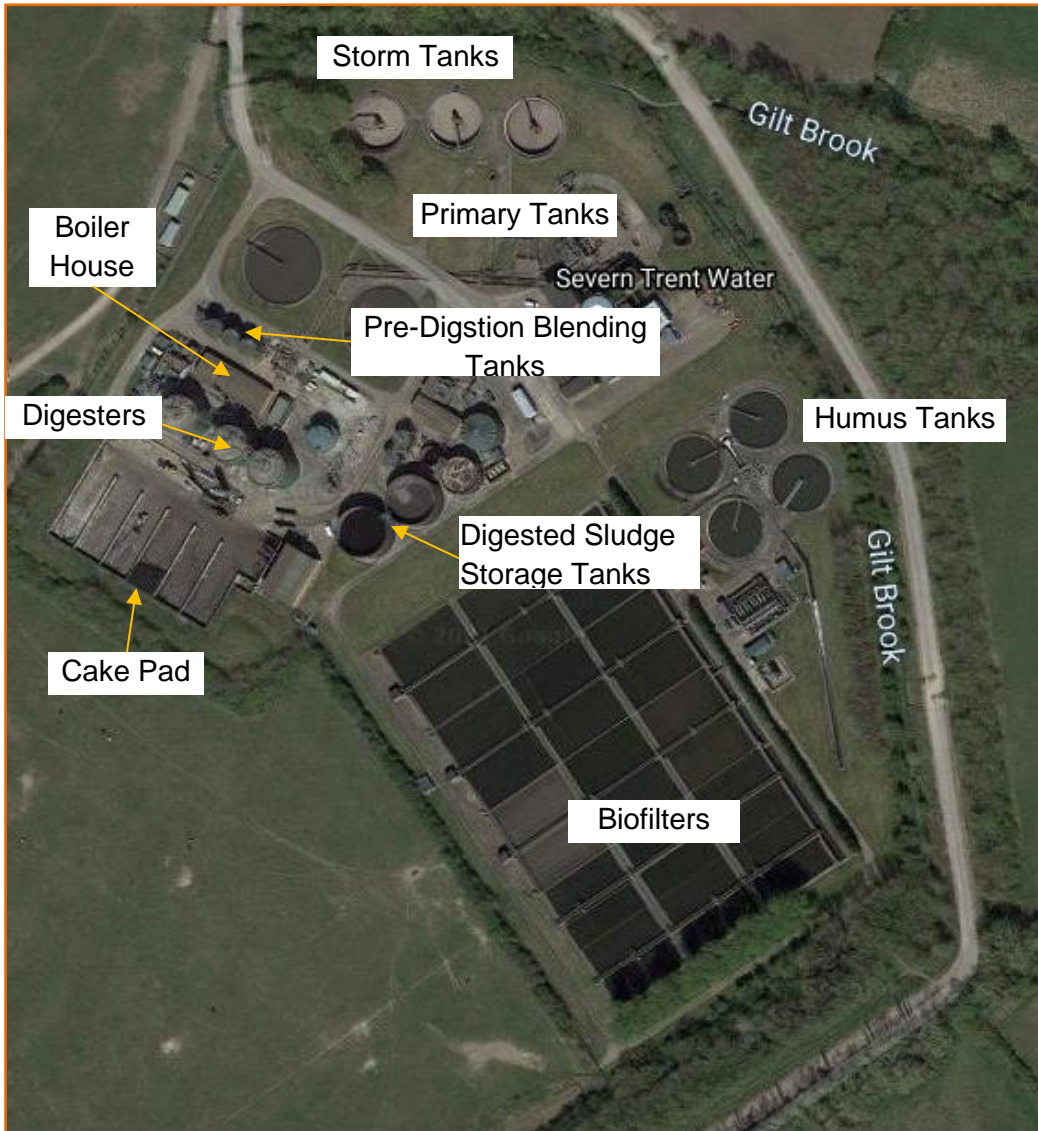


#### 4) Process Overview

A process flow diagram is found in Appendix 1. Figure 4 shows the location of these assets on site:

**Figure 4: Newthorpe STW and STC**





Under the Urban Wastewater Treatment Regulations, sewage that has been screened and dewatered is settled in 2 No. primary settlement tanks. Settled sewage is then treated in 5 No. rectangular biofilters and 4 No. humus tanks. Ferric sulphate is dosed into the biofilters for P removal. Sand filters are used to provide tertiary treatment before the final effluent is discharge into the Gilt Brook.

Under the installations environmental permit, imported raw sludge is screened and then passed to 3 No. pre-digestion blending tanks. Indigenous sludge is co-settled, screened and then thickened in 2 No. picket fence thickeners before being combined with the imports in the pre-digestion blending tanks. The raw sludge route is covered and vented to 3 No. odour control units.

Newthorpe STC has 3 No. digesters. The digesters have a retention time as stipulated in the current site HACCP plan. Biogas is collected from the digesters before being used in a CHP engine.

Digested sludge is stored in 2 No. open topped pathogen kill tanks before being dewatered in 2 No. centrifuges. Polymer is added to facilitate the dewatering process. Digested cake is passed via a conveyor to the day pad and then onto the cake storage pad.

Centrate is stored in a centrate buffer tank before being returned to the head of the treatment works.

## **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**

Newthorpe STW served a population equivalent of 47,386 in 2020/21. The digestion plant has capacity to treat 4,292 tds/annum.

The site is able to import 375,000 m<sup>3</sup> of non-hazardous waste per annum for treatment. Import of trade waste is not currently permitted on this site. Tankered domestic wastes are received under the CWR Reg 3(2) exclusion to the inlet, and prior to the issue of the IED permit, imported UWW sludge was accepted via a T21 waste exemption.

## **7) Waste material accepted**

Severn Trent Water accept tankered domestic waste into the inlet works and raw sewage sludges are accepted into the sludge treatment route. Tankered Trade wastes are not accepted into Newthorpe STW or STC.



## 8) 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.

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.

## 9) Permitted Area

The proposed installation boundary and air emission points are shown in figure 5. Further details of the potential gas releases from the air emission points are shown in Table 1.

Figure 5: Permitted Area



Table 1: Air Emission Points

<b>Emission point</b>	<b>Source</b>	<b>Components</b>	<b>Odour Risk</b>
A1	CHP Engine	Products from biogas combustion	Low - Combustion plant is regularly maintained and appropriately sized to manage volumes of gas
A2	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.
A3a & A3b	Auxiliary Boilers 1 & 2	Products from natural gas/ biogas combustion	Low - Boiler is regularly serviced.
A4 – A7	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.
A9	Biofilter OCU – pre-digestion	Raw sludge odours e.g. H <sub>2</sub> S	Low - the odour control units are subject to regular preventative maintenance. Media is replaced in line with the manufacturers' recommendations
A10	Sludge Import OCU	Raw sludge odours e.g. H <sub>2</sub> S	Low - the odour control units are subject to regular preventative maintenance. Media is replaced in line with the manufacturers' recommendations
A11	Picket Fence Thickeners OCU	Raw sludge odours e.g. H <sub>2</sub> S	Low - the odour control units are subject to regular preventative maintenance. Media is replaced in line with the manufacturers' recommendations
A12	Primary Sludge (Desludge Chambers) OCU	Raw sludge odours e.g. H <sub>2</sub> S	Low - the odour control units are subject to regular preventative maintenance. Media is replaced in line with the manufacturers' recommendations

## 10) 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 2: Newthorpe site capacity details**

	Element	Capacity	Total Capacity
EPR/EP3593VG/V002	Pre-digestion blending tanks	3 x 455m <sup>3</sup>	1,365 m <sup>3</sup>
	Picket fence thickeners	2 x 150m <sup>3</sup>	300 m <sup>3</sup>
	Digesters	3 x 2,400 m <sup>3</sup>	7,200 m <sup>3</sup>
	Digested sludge storage tanks	2 x 2,200 m <sup>3</sup>	4,400 m <sup>3</sup>
	Cake pads	6,440m <sup>3</sup>	6,440m <sup>3</sup>
	<b>Total</b>		<b>19,705 m<sup>3</sup></b>

## 11) 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 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.

## 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.

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.

### 13)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 4 - Incident/ emergency control measures.

**Table 3: Inventory of Odorous Materials**

Stage of treatment	Odour source	Nature of source	Quantities	Odour mitigation
Sewage treatment	Inlet works	Open channels and skips	Dry weather flow for the site is 12,949 m <sup>3</sup> /d  Minimal retention time - inlet works are designed to process flows not store them.	<b>Risk before mitigation - Moderate. Risk after Mitigation - Low</b> <b>Risks (before mitigation)</b> - Liquor returns & imports have moderate FIDOL score. Inlet channels are open <b>Source mitigation</b> - 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. <b>Pathway/receptor mitigation</b> - Inlet works is located away from residential properties & is screened by trees Skips emptied regularly via contract with Biffa.
Sludge handling and treatment	Raw sludge imports	Enclosed system	1 x screen	<b>Risk before mitigation - High. Risk after Mitigation - Low</b> <b>Risks (before mitigation)</b> - raw sludge can have a high FIDOL score. <b>Source mitigation</b> - Import facility is enclosed and connected to a Peacemaker odour control system. Skips emptied regularly via contract with Biffa. Liquors are returned to the head of the works as soon as possible. <b>Pathway/receptor mitigation</b> - n/a odour controlled at source



Sludge handling and treatment	Pre digestion blending tanks	Enclosed tanks	3 x predigestion blending tanks (741 m <sup>3</sup> total capacity)	<b>Risk before mitigation - High. Risk after Mitigation - Low</b> <b>Risks (before mitigation)</b> - raw sludge can have a high FIDOL score <b>Source mitigation</b> – Tanks are covered and connected to a biofilter odour control system. <b>Pathway/receptor mitigation</b> - n/a odour controlled at source
Sludge handling and treatment	Picket fence thickeners	Enclosed tanks	2 x picket fence thickeners (300 m <sup>3</sup> total capacity)  Minimal retention time - belts process sludge rather than storing it.	<b>Risk before mitigation - Low. Risk after Mitigation - Low</b> <b>Risks (before mitigation)</b> - raw SAS has a low FIDOL score. polymer is odourless. <b>Source mitigation</b> - SAS is thickened as soon as possible after production. Polymer is odourless. Thickeners are covered and connected to a Peacemaker odour control system
Sludge handling and treatment	Digesters	Enclosed tanks with pressure relief valves (PRVs)	3 x mesophilic anaerobic digesters (7,200 m <sup>3</sup> total capacity)  Design manual minimum retention time is 12 days. The current site HACCP plan is available on Waterpedia for the latest requirements	<b>Risk before mitigation - Low. Risk after Mitigation - Low</b> <b>Risks (before mitigation)</b> - digestion takes place in enclosed tanks. <b>Source mitigation</b> - 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. <b>Pathway/receptor mitigation</b> - n/a odour controlled at source
Sludge handling and treatment	Digested Sludge Storage tanks	Open tanks	(4,058 m <sup>3</sup> total capacity)  Sludge is held in the tanks as specified in the HACCP plan. The current site HACCP plan is available on Waterpedia for the latest requirements	<b>Risk before mitigation - Low. Risk after Mitigation - Low</b> <b>Risks (before mitigation)</b> - digested sludge has a low FIDOL score <b>Source mitigation</b> - 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 path kill tanks for the time required by the site HACCP plan. <b>Pathway/receptor mitigation</b> - n/a odour controlled at source

Sludge handling and treatment	Dewatering	Enclosed system	2 x centrifuge  Maximum 1 day retention time - time is required to even out the ammonia load to the sewage treatment process.	<b>Risk before mitigation - Moderate. Risk after Mitigation - Low</b> <b>Risks (before mitigation)</b> - digested sludge has a low FIDOL score. Polymer is odourless. Liquors may have a moderate FIDOL score. <b>Source mitigation</b> - The centrifuges are enclosed units. Odour from liquors is minimised through process control - they are returned to the head of the works as soon as possible after production. <b>Pathway/receptor mitigation</b> - n/a odour controlled at source
Sludge handling and treatment	Cake pads	Cake storage on open pad	1 x day pad 6 x cake storage bays (6,480m <sup>3</sup> total capacity if sludge is 1.5 m high)	<b>Risk before mitigation - Low. Risk after Mitigation - Low</b> <b>Risks (before mitigation)</b> - digested sludge has a low FIDOL score <b>Source mitigation</b> - 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 <b>Pathway/receptor mitigation</b> - cake is not moved on windy days.
Biogas utilisation	CHP engines	Engine emission stacks	1 x Jenbacher combined heat & power unit (390kW)	<b>Risk before mitigation - Low. Risk after Mitigation - Low</b> <b>Risks (before mitigation)</b> - Unburnt gas is released to atmosphere <b>Source mitigation</b> - 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 <b>Pathway/receptor mitigation</b> - n/a odour controlled at source
Biogas utilisation	Flare stack			<b>Risk before mitigation - Low. Risk after Mitigation - Low</b> <b>Risks (before mitigation)</b> - Unburnt gas is released to atmosphere <b>Source mitigation</b> - 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. <b>Pathway/receptor mitigation</b> - n/a odour controlled at source

## 14) Odour Abatement Systems

The following odour abatement systems have been installed on the Newthorpe sludge route:

**Table 2: Newthorpe Odour Abatement Systems**

Parameter	Screens and screened imported sludge (A10)	Picket Fence Thickeners (A11)	Desludge chambers (A12)	Pre-digestion blending tanks (A9)
OCU Type	Moderator & P2000 Peacemaker	1 x P500 CIF & 1 x P500 Peacemaker	1 x P500 CIF & 1 x P500 Peacemaker	Biofilter
System details	Fully enclosed system, vents to atmosphere via a single exhaust point	Fully enclosed system, vents to atmosphere via a single exhaust point	Fully enclosed system, vents to atmosphere via a single exhaust point	
Media type	<u>1st Stage:</u> Catalytic iron filter <u>2nd Stage:</u> Pellets impregnated with stabilised chlorine dioxide and absorptive (carbon) media.	<u>1:</u> Catalytic iron filter  <u>2:</u> Pellets impregnated with stabilised chlorine dioxide and absorptive (carbon) media.	<u>1:</u> Catalytic iron filter  <u>2:</u> Pellets impregnated with stabilised chlorine dioxide and absorptive (carbon) media.	
Media Quantity	2,000 kg	500 kg	500 kg	
Media Life (Years)	First Stage C.I.F. 25 years Second Stage Media pro-actively replaced every 5 years. ME30 specifies design life of 5 year minimum	1 C.I.F. 25 years 2 Media pro-actively replaced every 5 years. ME30 specifies design life of 5 year minimum	1 C.I.F. 25 years 2 Media pro-actively replaced every 5 years. ME30 specifies design life of 5 year minimum	
Design Inlet Parameters				
Airflow (m <sup>3</sup> /hr)	200	200	200	
Hydrogen Sulphide	Average 50mg/m <sup>3</sup> , Peak 200mg/m <sup>3</sup> (original design)	Average 20mg/m <sup>3</sup> , Peak 200mg/m <sup>3</sup> (original design)	Average 20mg/m <sup>3</sup> , Peak 200mg/m <sup>3</sup> (original design)	
Stack Outlet Performance				

Odour Conc. (OU <sub>E</sub> /m <sup>3</sup> )	95% reduction (design manual & ME30)	95% reduction (design manual & ME30)	95% reduction (design manual & ME30)	
Hydrogen Sulphide	99% reduction (design manual & ME30)	99% reduction (design manual & ME30)	99% reduction (design manual & ME30)	

Performance checks for the odour control unit are described in section 14) monitoring plan and Appendix 3.

The Severn Trent design standard for odour abatement equipment (ME30) requires 95% total odour reduction and 99% hydrogen sulphide reduction.

### **CIF/ Peacemakers**

The CIF/ Peacemaker system is manufactured by Air-Water Treatments Ltd (AWT). They are fully enclosed units with an exhaust point.

The CIF (catalytic iron filter) is a pre-treatment unit that contains iron media. Peacemakers are a form of dry chemical scrubber that consists of two stages. The first stage consists of pellets impregnated with stabilised chlorine dioxide which oxidise hydrogen sulphide, mercaptans and other odorous compounds. The second polishing stage serves to remove ammonia and other compounds not oxidised by chlorine dioxide. A diagram of the Peacemaker unit is found in Appendix 2.

### **Biofilters**

The biofilter contains a media that supports biomass for odour removal. The media is kept moist using an irrigation system. A diagram of the biofilter is found in Appendix 2.

The following documents are used for the design and operation of the OCU's, which are available upon request:

- ME30 Odour Control Equipment and Building Ventilation (version 4.01) - Design manual ME30 for Odour control is adhered to for all Tier One supply chain partners.
- STW design manual – Sewage Treatment Odour Control (version 1.1)

Site operators carry out regular checks on the odour abatement equipment (see appendix 3 for details). Abatement equipment media is pro-actively replaced on a 5 yearly basis.

## **15)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 trade 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 H<sub>2</sub>S (site manual readings) as part of the “golden measures” programme.
- 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).
- 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 4 Incident/ emergency control measures.
- ***As part of the new IED permit, we commit to carrying out a review of our abatement plants, to determine whether measures have been effective, and to further characterising emissions from the odour control units in line with BAT 3 and 8 to demonstrate that H<sub>2</sub>S, NH<sub>3</sub>, TVOC and HCl are not present in the waste gas stream. If H<sub>2</sub>S, NH<sub>3</sub>, 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.



## 16) 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"> <li>Site procedures for pre-acceptance assessment of waste &amp; quarantine/ rejection of nonconforming loads.</li> <li>Loads are dealt with promptly after acceptance.</li> <li>As specified in EA-approved "Waste Acceptance Procedures for Trade Waste", a full assessment of waste is undertaken before first delivery, including lab analysis/sampling. Then, sampling of each load before allowing discharge at site.</li> <li>Delivery in contained vehicles. Scheduling of waste to allow immediate processing.</li> </ul>	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"> <li>Use competent haulage contractors</li> <li>Collection in sheeted vehicles.</li> <li>Minimise agitation of cake during loading.</li> </ul>	Consider weather conditions when moving cake.
Damage to tank roof causing release of odorous gases	Digesters and gas holders are alarmed to indicate loss of pressure	Medium	<ul style="list-style-type: none"> <li>Digesters &amp; gas holders are alarmed to indicate loss of pressure.</li> <li>Digester roofs are routinely inspected &amp; maintained in line with Gas Holder Regs.</li> </ul>	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 relief valves (PRVs) activate & biogas is released.	Digesters are alarmed to indicate pressure	Medium	<ul style="list-style-type: none"> <li>Digesters are alarmed to indicate pressure</li> <li>Control digester feeds and volumes to maintain safe biogas level</li> </ul>	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"> <li>Regular site checks carried out. Design includes selection of correct pipework for pressure and flow loads.</li> </ul>	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. Site staff ensure that any spills are cleaned promptly.
Odour abatement unit damaged or malfunctioning	Detected by site staff	Medium	<ul style="list-style-type: none"> <li>Regular checks carried out by site staff (Appendix 3). Media pro-actively replaced.</li> </ul>	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. Site staff carry out checks to ensure that the odour control unit is working correctly once repairs are carried out.
Sludge 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 engines and flare will fail to work/ ignite	Medium	<ul style="list-style-type: none"> <li>Dual electricity supply to site.</li> </ul>	
Human error – staff, managers, visitors	Regular checks Detected by site staff	Medium	<ul style="list-style-type: none"> <li>Staff training and supervision. Visitor inductions.</li> </ul>	Site staff clean any spills promptly. Near misses are reported on Safety Net.
Malfunction or damage caused by unauthorised visitors (Vandalism)	Regular checks Detected by site staff	Medium	<ul style="list-style-type: none"> <li>Security measures are in place including controlled access gates operated in accordance with our closed gate policy. Sites have perimeter fences &amp; CCTV.</li> </ul>	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"> <li>• Staff training and supervision.</li> <li>• DSEAR zones identified on map &amp; on site.</li> <li>• Fire extinguishers accessible &amp; checked regularly.</li> </ul> <p>Established contact with local Fire Service who have undertaken a site specific assessment.</p>	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"> <li>• Scheduled stack emissions testing in accordance with requirements set out in the Environmental Permit.</li> <li>• CHPs serviced by STW trained technicians as per manufactures recommendations &amp; after each 1000hr service the emissions are monitored using calibrated handheld Testo unit.</li> </ul> <p>3<sup>rd</sup> party MCerts approved contractor monitors the exhaust emission once per year in line with permit requirements.</p>	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"> <li>• Regular checks carried out by site staff who complete the Site Standards Records check list (found on Sharepoint)</li> </ul> <p>Spill training is undertaken by Wholesale Ops and spill kits/hoses are readily available</p>	Site staff ensure spills are cleaned up promptly.
Flooding from river/ blocked drains results in sludge spills	Detected by site staff.	Low	<ul style="list-style-type: none"> <li>• The general site has wider works designed to minimise risk of localised works flooding due to storm surges.</li> </ul> <p>Site wide drainage system linked to main sewage works, which includes additional capacity in storm tanks within the works to manage additional flows</p>	Site staff follow the site incident response plan & inform relevant authorities Clean up any sludge spills as soon as possible to minimise odour nuisance.
Staff absence	Detected by planning/site staff.	Low	Staff from other sites will cover the work of the absent staff	Ensure site log is up to date so that returning member of staff knows what is going on.

## 17) 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). Customer complaints can be received via phone, email, letter or social media. Customer services operatives follow a script to ensure that standard details are recorded. If a complaint is made directly to the site operators, then they contact Customer Services to ensure that the issues are recorded centrally.

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.

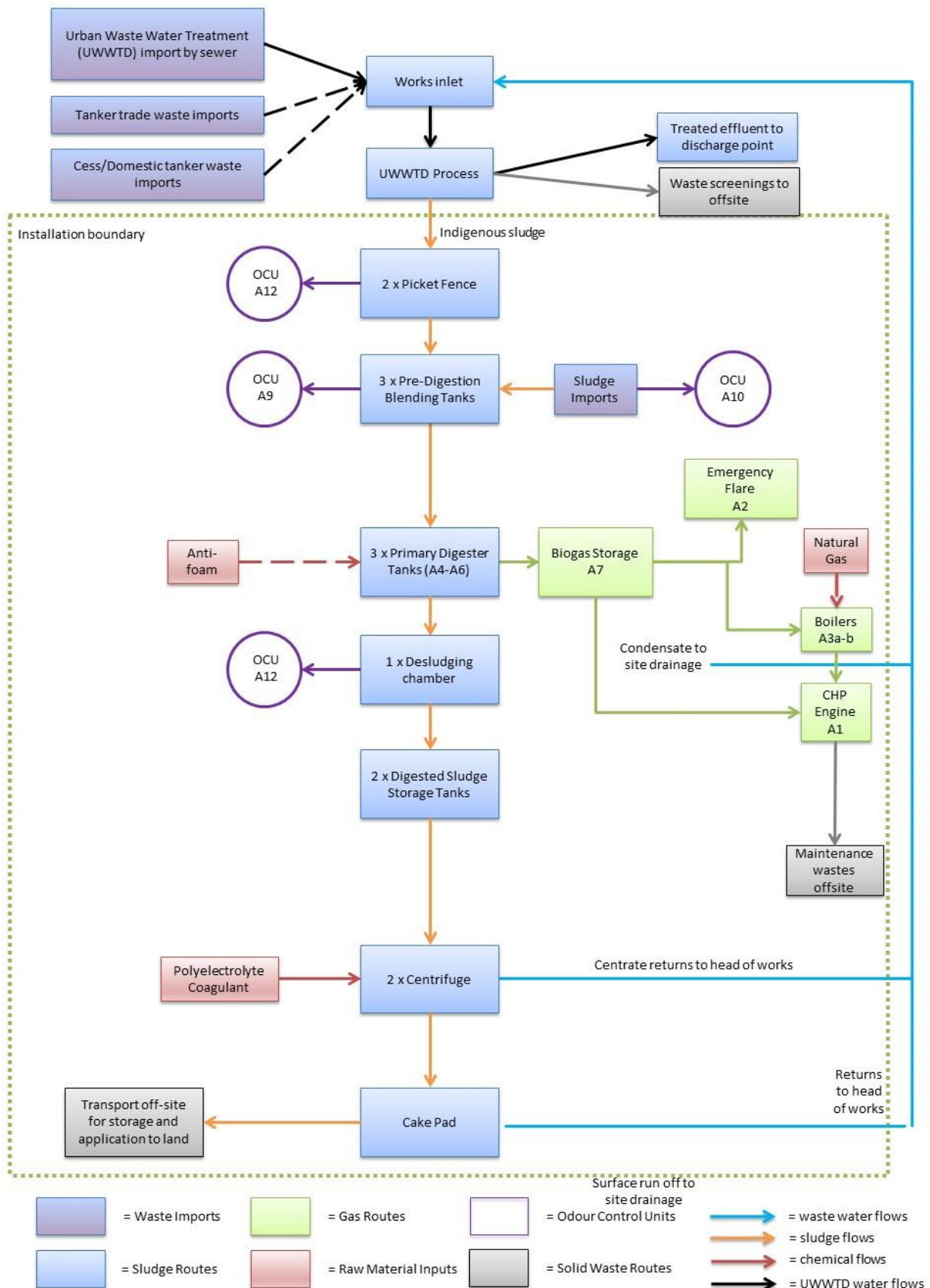
The EMS management review team review the MI (Management Information) data, which will include odour complaints.

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, or a phone call to the Local Environment Officer as per the contacts section (Appendix 6).

## Appendix 1 - Sludge Process Flow Diagram

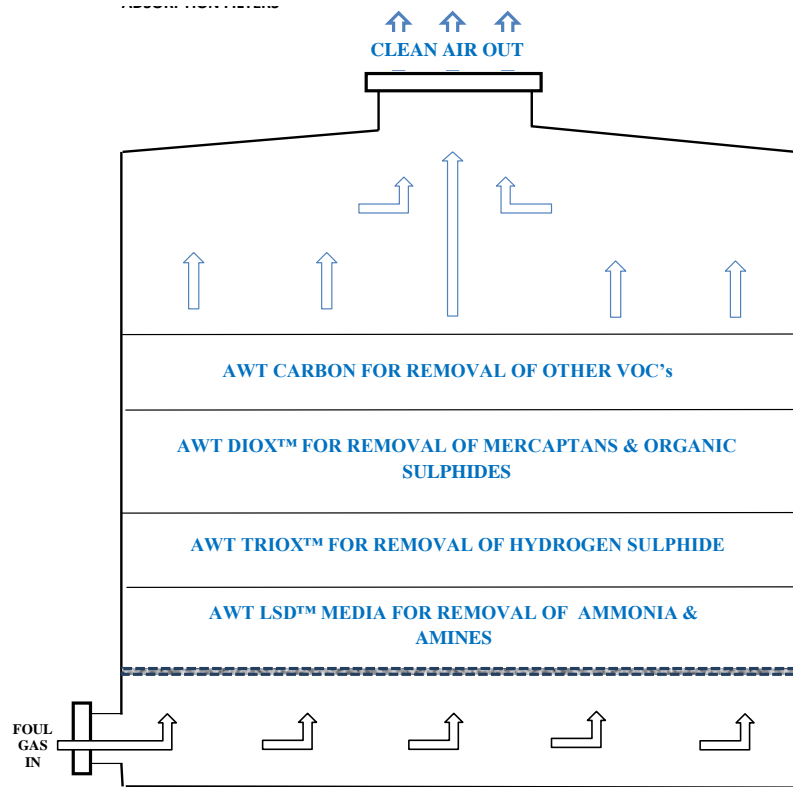




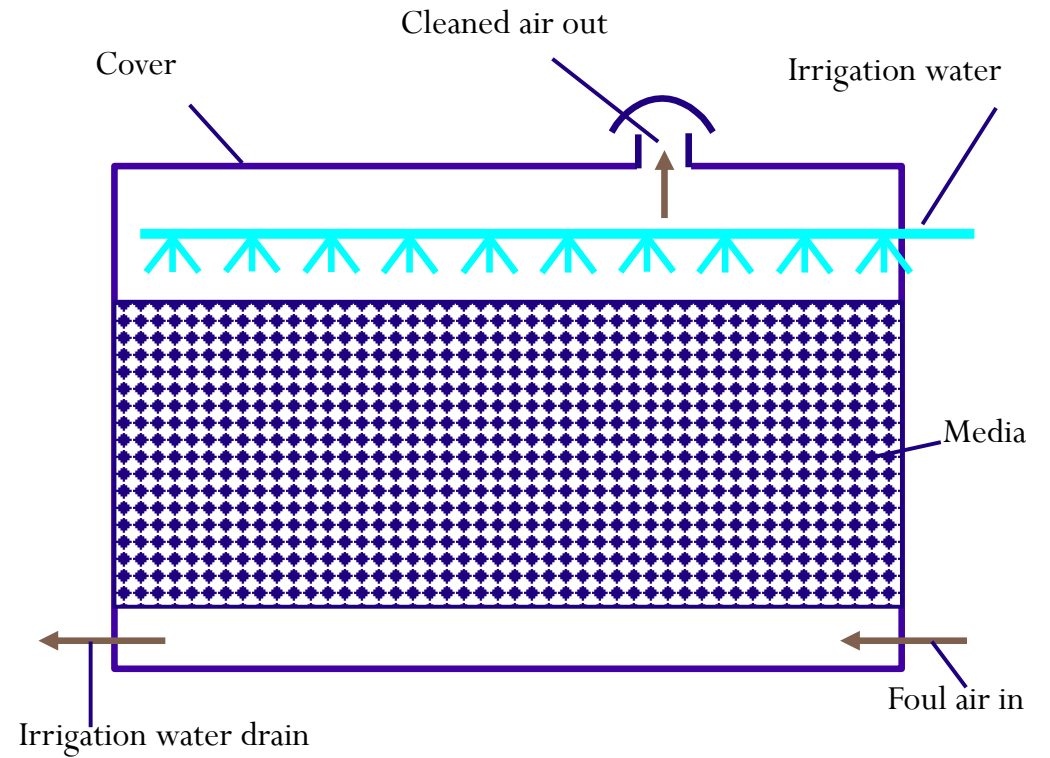


## Appendix 2: Odour Abatement Systems

### Peacemaker



### Biofilter



### Appendix 3: Odour Management Tasks

Task	Frequency	Performance Indicators	Method	Remedial Actions
Extraction fan visual inspection	Weekly	No damage/ leakage/ signs of corrosion	Visual inspection	If fan is damaged raise a job via site OPEX or STORM
Extraction fan noise	Weekly	Increase noise or vibration from the fan motor	Listen	If fan is damaged raise a job via site OPEX or STORM
Check physical integrity of ducting and covers	Weekly	No signs of degradation or other damage and no holes. Covers on tanks closed	Visual inspection	Close covers  If ducting/ covers are damaged raise a job via site OPEX or STORM
Check media pressure drop	Monthly	As per O&M		Check fan performance
Check fan motor, belt condition and tension	Annually	As per O&M	As per O&M	Adjust tension. If parts need repair/ replacement raise a job via site OPEX/ STORM
Measure hydrogen sulphide in the outlet gas stream	6 monthly or as agreed in writing by the Environment Agency	tbc  (BAT 34 doesn't mention H <sub>2</sub> S)	External contractor CEN TS 13649 for sampling NIOSH 6013 for analysis	Check functionality of odour control unit & if necessary arrange for media replacement
Measure ammonia in the outlet gas stream	6 monthly or as agreed in writing by the Environment Agency	tbc  (BAT 34 requires 0.3 - 20mg//Nm <sup>3</sup> )	External contractor  EN ISO 21877	Check functionality of odour control unit & if necessary arrange for media replacement
Measure odour in the outlet gas stream	6 monthly or as agreed in writing by the Environment Agency	tbc  (BAT 34 requires 200-1,000 ouE/Nm <sup>3</sup> )	External contractor  BS EN 13725	Check functionality of odour control unit & if necessary arrange for media replacement

## Appendix 4: 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

<b>Odour Complaint Investigation Report Form</b>	
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"> <li>What does it smell like?</li> <li>Intensity</li> <li>Duration (time)</li> <li>Constant or intermittent?</li> <li>Other comments?</li> </ul>	
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 5: Standard Operating Procedure for Complaints Responses

### Standard Operating Procedure (SOP)

<b>Title</b>	<i>Odour Customer Complaints On-site (Waste)</i>
<b>Why</b>	<i>To improve our ODI SIM (Service Incentive Mechanism) Compliance and improve the customer experience, also this will provide Severn Trent with a procedure for any odour complaints if Enviromental Health ask for evidence.</i>
<b>Who</b>	The Wholesale Operations Non Infra Team Manager shall have overall responsibility for implementing this procedure. The procedure must be followed by Technical Operators and Senior Technicians responsible for the day to day operation of sewage treatment works.
<b>Scope</b>	This SOP covers how to respond on-site to customer complaints relating to odour at a sewage treatment works.

#### Must Haves (H&S, Quality, Quantity, Environment, Training, Resources)

- Standard PPE
- Up to date site odour checklist highlighting areas on site that have odour issues
- Access to CROSS
- Must have a Wind Sock on all occupied sewage treatment sites

**Remember – ‘Stop, Think, Take 20’**

#### Summary Must Do's

*Enter here no more than 10 key points / requirements of this SOP*

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Contact the customer within 24hrs of complaint (Team Manager)</li> <li>2. All customer complaints must be investigated via reactive site odour check within 3 days of complaint (Operative)</li> <li>3. Proactive site odour checklist once a month, except once a week June-August</li> </ol> | <ol style="list-style-type: none"> <li>4. Pass on completed site odour checklist to Environmental Health</li> <li>5. All complaints recorded on CROSS (Team Manager)</li> <li>6. Detailed report of customer complaints sent to COSC to form central record (Team Manager)</li> <li>7. Must complete next steps/actions from site odour check (Team Manager/Operative)</li> </ol> |
|--|---|

**Detailed step-by-step guide: Proactive**

Step	Procedure	Why
1	If possible liase with Environmental Health and walk around site to identify areas where odour is present	Developing good working relationship with external regulators
2	Create a site odour checklist and site map highlighting areas with odour issues (see Wanlip STW as an example in references)	It provides a structured and consistent approach to checking site odour levels
3	Every month a site operative must complete a site odour checklist, every week during summer months	This is to create an audit trail to act as evidence of site odour
4	Carry out site odour checklist using site map of highlighted areas where historic odour issues have occurred and record next steps throughout the process	If assets are out of service or not operating correctly this can affect odour levels
5	Check wind direction using on site wind sock where present	Is customer complaint up wind or down wind of site
6	Check weather conditions	Dry or misty conditions will increase the likelihood of odour issues
7	Record flows into works	Higher flows can flush septic sewage out of the network
8	Check site golden measures for action limit breaches and specify any that could influence odour levels	For example high sludge levels in a primary settlement tank can lead to septic sludge
9	Check if there is a increase in odour levels around plants operated by other companies on a Severn Trent site (e.g. Biffa food waste plant at Wanlip STW)	
10	Check if there are any other operational issues potentially effecting odour	There could have been a change in circumstances on site (e.g. an incident has occurred or new assets/processes installed)
11	Check if there are any factors outside of the site that are influencing site odour levels	E.g. Petfoods in Melton discharging high strength waste into the network
12	Carry out and complete next steps	
13	Store proactive site odour reports electronically and forward onto Environmental Health (if applicable)	To create records to refer to, to build relationship with Environmental Health and allow customers to view a public record

**Detailed step-by-step guide: Reactive**

Step	Procedure	Why
1	Team manager/site operative receive customer complaint via COSC or direct customer contact	
2	Record customer details in actions/next steps of the site odour check list	Help track and keep a record on site of customer odour complaints
3	If contacted by COSC, must contact customer within 24 hours of complaint	To ensure that we maintain a good relationship with our customers
4	If direct customer contact then liase with COSC and inform them of the odour complaint	To ensure that Severn Trent have a central record of customer odour complaints
5	Create site odour checklist if not already produced as part of proactive work	
6	Carry out site odour checklist using site map of highlighted areas where historic odour issues have occurred and record next steps throughout the process (follow from step 4 in proactive process)	If assets are out of service or not operating correctly this can affect odour levels
7	Carry out and complete next steps	
8	Store reactive site odour reports electronically <b>and forward onto Environmental Health (if applicable) CROSS</b>	To create records to refer to, to build relationship with Environmental Health and allow customers to view a public record
9	<b>What do we do now? Who contacts the customer? (COSC or team manager is it COSC unless direct contact?)</b>	
10	If persistent or compliant is escalated (Severn Trent heirarchy or local MP) then invite customer for site visit	

### Records, Appendices & References

Site specific odour checklist form

### Document Control & Governance:

<b>Owners Name</b>	James Stalbow
<b>Owners Role</b>	Non-Infra Improvement Manager
<b>Date of Next Review</b>	TBC

<b>Version Number</b>		<i>Draft1</i>
<b>Revision History</b>		<i>First draft</i>
<i>Version 1</i>	<i>Date</i>	<i>Notes</i>
	<i>04/05/2017</i>	<i>First issue</i>
<p><b>The only valid version of this SOP is the electronic version held in Waterpedia.</b>  <b>If this is a printed version it is only valid on the date of printing.</b>  <b>Ensure this SOP is still within the current review period</b>  <b>If not 'DO NOT USE' and contact your line manager for the new version</b></p>		

**Appendix 5: Newthorpe 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 / Cakepad			
Permit Compliance			
Bioresources Operations			
Production Operations			
Broxtowe Borough Council			
Environment Agency			