Strongford STW

Odour Management Plan

Revision	Purpose/Description	Originated	Checked	Reviewed	Authorised	Date
1	Improvement condition 10 submission - OMP	K Williams	S Gough	J Chapman	G Wood	07/09/2017
2	Improvement condition 10 – OMP resubmission	J Chapman	C Borradaile	K Daily	L Fry	26/06/2019
3	Improvement condition 10 – OMP resubmission	J Chapman	C Borradaile	K Daily	L Fry	23/01/2020
4	Updated to reflect new sludge process & feedback from tranche1	L Cherry				12/2021
5	Updated in response to EA comments on tranche 1 OMPs	J Chapman	M McAree	S Whitehouse	J Chapman	Jan 2024
6	Updated in response to EA comments on cellulose May 25	J Chapman	M McAree	S Whitehouse	J Chapman	June 2025
7	Updated in response to EA comments on application June 25	J Chapman	M McAree	S Whitehouse	J Chapman	July 2025
8	Updated to include ammonia trial	J Chapman	M McAree	S Whitehouse	J Chapman	January 2026

Contents

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*' (IED permit) and '*Non-hazardous and inert waste: appropriate measures for permitted facilities' (cellulose permit)* require for activities which are likely to give raise 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 application for sludge processes, ammonia recovery, and cellulose recovery at Strongford Sewage Treatment Works which will be operated by Severn Trent Water.

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

- Odour management: comply with your environmental permit.
- 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 document 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 Strongford Sewage Treatment Works is located approximately 2km to the north of Barlaston and 6km to the south of Stoke on Trent. The approximate site centre is at National Grid Reference (NGR) SJ 87930 39120.

Strongford STW treats a population equivalent of 361,135 (2025 figures). The Sludge Treatment Facility treats indigenous sludge from the STW, and raw sludge imports from satellite sites.

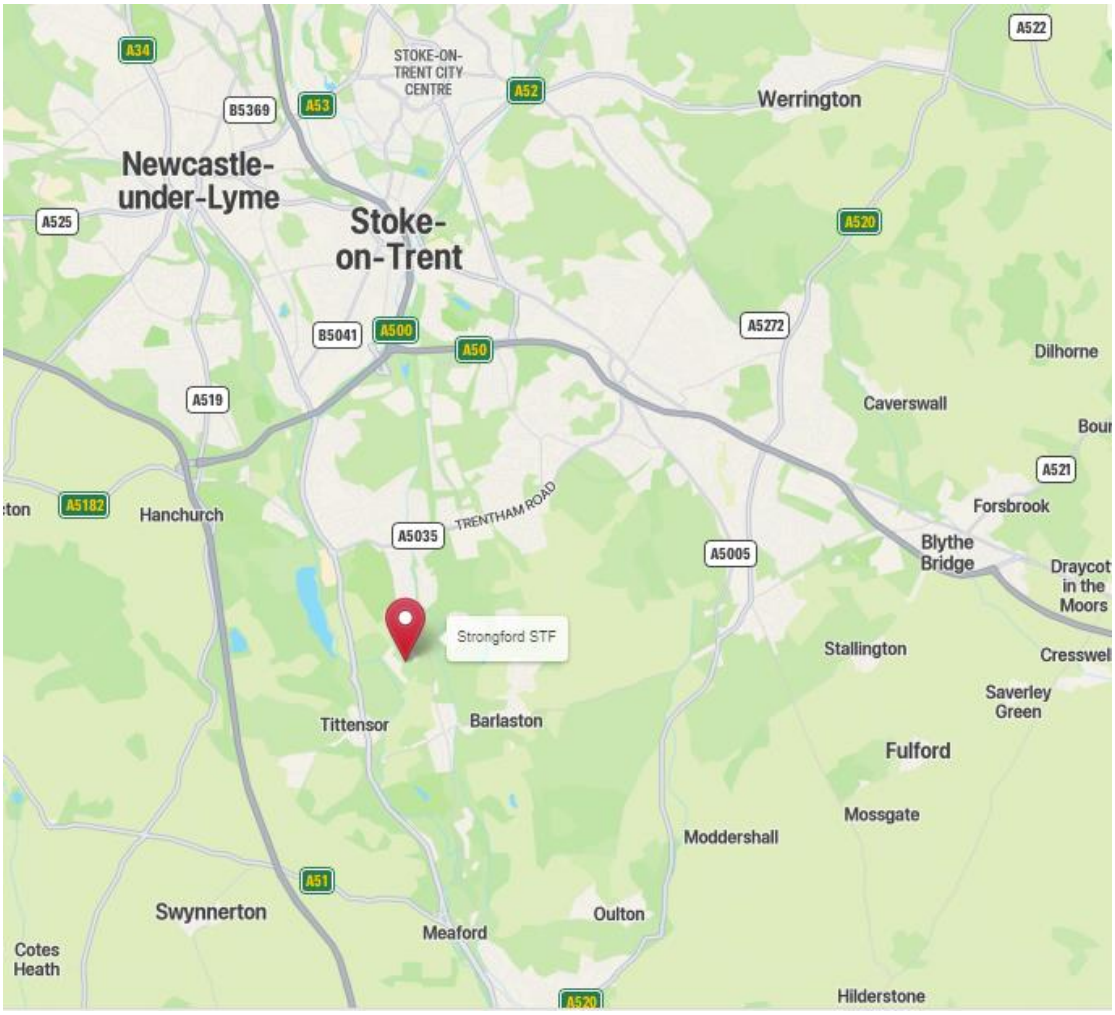
The site is able to import 1,102,683 m3 of non-hazardous waste per annum for treatment. Import of trade waste for digestion only is no longer permitted on this site.

The current discharge permit (T/01/36052/R) levels are 12mg/l BOD, 30mg/l SS, 3 mg/l ammonia and 1mg/l phosphorus. The final effluent is discharged into the River Trent.

The site has a number of permitted activities covered by a bespoke installations environmental permit (IED permit). This covers the sludge operations at the site, which has a permit boundary matching the site fenceline. Sludge operations include anaerobic digestion, various pre- and post- digestion stages including thermal hydrolysis and liquor treatment, gas utilisation, and gas upgrading. Newly added activities include Cellulose recovery at the Inlet of the Sewage Treatment Works (where cellulose is extracted for recovery from the incoming urban waste water), and an Ammonia Recovery Plant as part of the sludge liquor treatment plant. A full list of activities can be found within Schedule 1 of the installations environmental permit.

The site location is shown in figure 1.

Figure 1 Site location



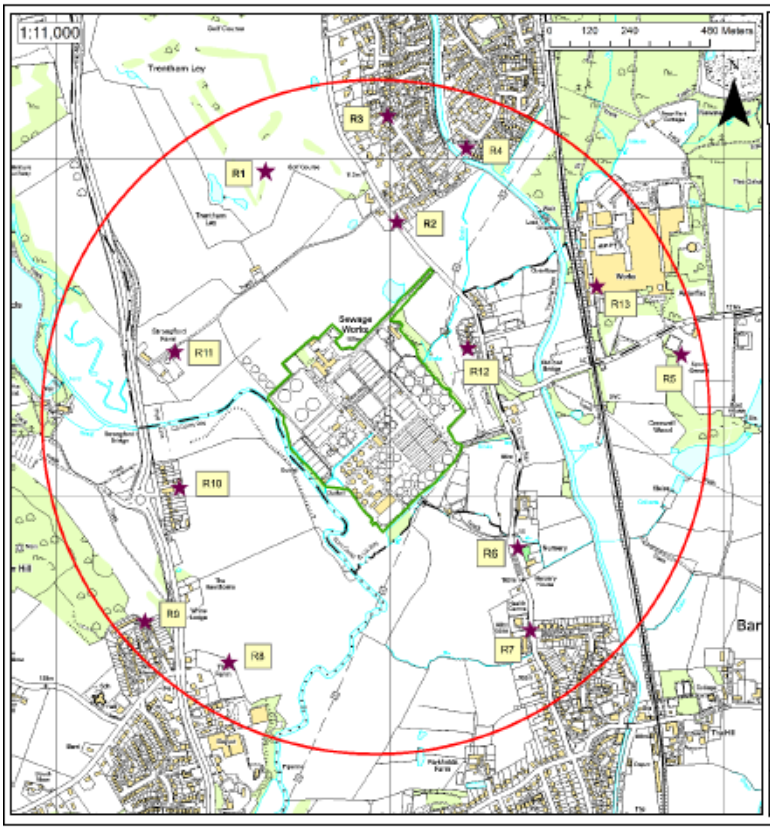
3) Site Surroundings

Strongford STW is mainly bounded by farmland, which could potentially give rise to intermittent odours throughout the farming calendar. Trentham village is located to the north of the site, which also includes the visitor attractions of Trentham gardens and a monkey forest. To the East of the site there is another visitor attraction, the World of Wedgwood. The villages of Barlaston and Tittensor are located to the South East and South West of the site respectively.

Sensitive receptors

The map in Figure 2 identifies the nearest residential, commercial and industrial receptors within a 1km radius of the site. Strongford sits on natural wet loamy and clay soil atop a Secondary A aquifer. The closest SSSI site sits 935m West of the site (King's and Hargreaves Wood), whereas the closest marked Local Nature Reserve is over 3km to the East. Strongford falls within an AQMA (Air Quality Management Area). Stoke-on-Trent City Council have an NO2 management zone in place for the whole City of Stoke-on-Trent. Further details can be found in the Air Quality Impact Assessment.

Figure 2 Strongford - Sensitive Human Receptor Locations



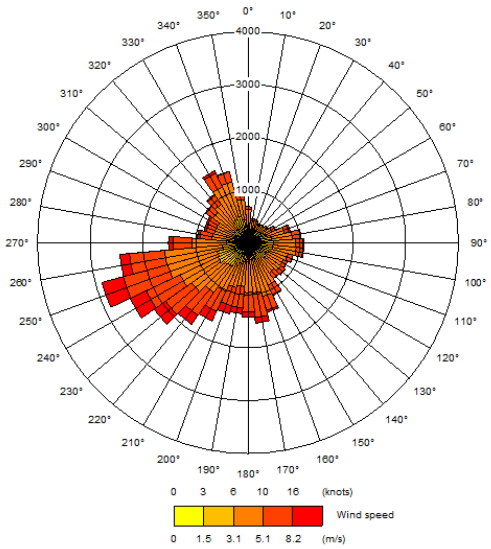
STRONGFORD STW ODOUR MANAGEMENT PLAN

KEY
1km Radius
Installation Boundary

Receptor	NGR		Distance from Facility (km)	Direction from Facility
	X	Y		
R1 Recreational - Golf Course	387,676	339,957	0.8	North
R2 Residential – Main Road	388,020	339,814	0.59	North
R3 Residential – Oldacres Road	387,993	340,128	0.9	North
R4 Residential – Jonathan Rd & Wellbury Close	388,229	340,033	0.85	North East
R5 Recreational – Sports Ground	388,873	339,420	0.94	East
R6 Residential – Nursery House	388,383	338,847	0.55	South East
R7 Residential – Main Road/Allotments	388,420	338,604	0.77	South East
R8 Residential – The Farm	387,517	338,508	0.84	South West
R9 Residential – Main Road/Monument Lane	387,266	338,629	0.91	South West
R10 Residential Area	387,369	339,025	0.62	West
R11 Residential – Strongford Farm	387,355	339,428	0.64	West
R12 Residential – Off Old Barlaston Road	388,233	339,440	0.35	East
R13 Industrial – World of Wedgwood	388,619	339,623	0.77	East

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

Figure 3: RAF Shawbury Wind Rose 2022.



4) Process Overview

Wastewater Treatment

The majority of wastes are received at Strongford via the wastewater network of pipes and are regulated under the Urban Waste Water Treatment E&W Regulations, and so do not form part of this Odour Management Plan.

The import of tankered trade waste to the inlet of the wastewater treatment works is captured as a waste activity within the current installations environmental permit. These activities are subject to waste pre-acceptance and acceptance standard procedures. Tankers will be assessed and either ordered to discharge directly into the tankered point at the inlet, or to the inlet holding tank for temporary storage prior to discharge to the inlet.

Cellulose Recovery

A cellulose recovery process flow diagram is found in Appendix 1.2.

A percentage of the total wastewater treatment works influent is conveyed to a drum screen (cell wash), ensuring only the cellulose fibres are recovered from the process. The mixture is then passed to the finer 'INTENSIEVE®'. The longer cellulose fibres are captured on the screens. These processes are all deemed as part of the Urban Waste Water Treatment process at the site.

Following the cleaning process, the treatment of the cellulose is classified as a 'waste' activity. The separated fibres are passed to a cell press, leaving a cellulose product at about 35-40% dry solids. Following additional drying, the cellulose is transferred to a skip or other covered storage, prior to offsite recovery. The drier has one air vent which discharges through carbon media.

Sludge Treatment

A sludge treatment process flow diagram is found in Appendix 1.1.

Under the installations environmental permit, imported raw liquid sludge from satellite sites is screened and then transferred to 2 No. thickened sludge holding tanks. The imported sludge screen is connected to an odour control unit.

Figure 4: Raw sludge Reception tank and odour control unit

Indigenous SAS is held in a buffer tank prior to being thickened using belt thickeners. The belt thickeners are located in a building. Polymer is added to aid the thickening process. The thickened sludge is transferred to 2 No. thickened sludge holding tanks. The thickened sludge tanks are connected to an odour control unit.

Indigenous primary sludge is screened and then held in a buffer tank prior to being transferred to the thickened sludge holding tanks.

The combined sludge is screened again and then held in 1 No. screened sludge buffer tank before being centrifuged using 2 No. centrifuges. Polymer is added to aid the dewatering process. The raw sludge cake is held in 2 No. silos. The centrifuges and cake silos are connected to an odour control unit. Imported raw sludge cake may be discharged into the cake storage silos, or as a contingency temporarily held within a dedicated bay (Bay 6) within the site cake pad (our preference is not to handle it twice though, so only used with manager approval and as contingency).

The raw cake is treated in 2 No. thermal hydrolysis plants (THPs) prior to being digested in 6 No. mesophilic anaerobic digesters. Sludge is held in the digesters for the required time stated on the HACCP plan.

The anaerobic digesters will now be operable in parallel mode, where the feed is equally split to digesters operating independently of each other, or in series mode, where digesters are arranged in sequences to transfer sludge between them for digestion.

Series mode, using a proprietary control scheme called "**EPHYRA**", amends the filling and transferring process currently utilised in the digesters to a progressive fill and transfer of sludge in the digesters

in sequence. This ensures a more consistent and treated digestate output. The movement of sludge will be controlled by pumps between the digesters.

Digested sludge will now be is transferred to the repurposed Digester 2, now a digested sludge storage tank, then dewatered using 3 No centrifuges. The 2 former digested sludge storage tanks will be for contingency use only. Residence time for sludge in the digested sludge storage tank is not fixed as they are primarily for balancing flows to the centrifuges.

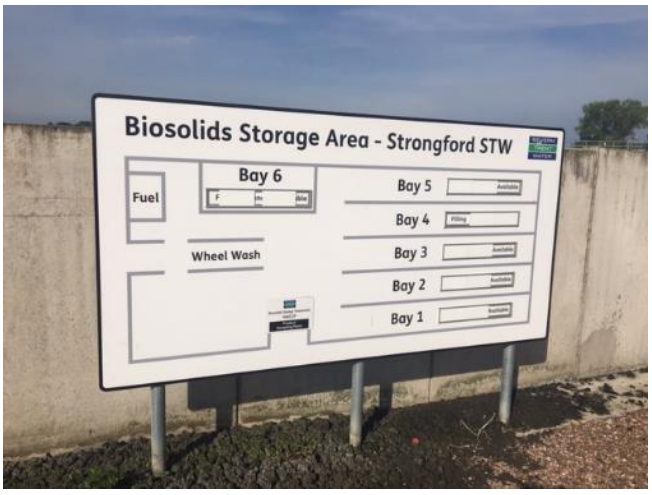
Digested sludge from digested sludge storage tank (former Digester 2) will be progressed to an installation of a vacuum methane degassing equipment. This is installed to recover entrained biogas from the digested sludge with the intention to reduce the emissions released during cake storage and centrifuge operation. This gas will be connected to the digester gas collection line. There are two "**ELOVAC**" units. These can be bypassed if required based on equipment operation, this bypass is controlled by software. There are vent points from the system in the emergency requirement to release gas from the system to prevent explosions.

The centrifuges are located in a building. Polymer is added to aid the dewatering process. Centrate will be returned to the head of the works via a liquor treatment tank. The sludge cake produced (Biosolids) is transferred via conveyors to the adjacent sludge cake pad.

Once on the cake pad, it is analysed to check if it can be landspread in accordance with the requirements of the Sludge (Use in Agriculture) Regulations 1989 (as amended), and Biosolids Assurance Scheme compliance. 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. The HACCP plan for Strongford is found on Severn Trent's internal "Waterpedia".

Figure 5: Cake pad chutes A, B & C

Figure 6: Cake Pad Layout



The biogas generated during the anaerobic digestion process is transferred to the gas bag. The gas storage is equipped with emergency PRVs. The site has gas engines for the combustion of biogas and generation of electricity. The site also exports upgraded gas to the grid via the Biogas to Grid plant. A flare is located at the site for burning of biogas during periods of engine / boiler downtime and a second flare handles waste biomethane from the gas to grid plant should the export route not be available.

5) Hours of operation

Waste is processed through the plant 24 hours a day through a computer controlled process. There are no permitted restriction times on the delivery of tankered waste to the site. Severn Trent will aim to only allow permitted 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

Strongford STW served a population equivalent of 353,637 in 2020/21. The THP has capacity to treat 29,200tds/annum.

Under permit EPR/MP3097FY (IED) the site is currently permitted to accept 618,675m3 of non-hazardous waste for digestion and 500,000m3 inlet imports annually. These quantities include indigenous UWWTD derived sludge from within Strongford STW. 15,000m3 of raw sludge is imported to the site for THP treatment.

The Cellulose recovery activity is expected to produce 4 tonnes a day of dried cellulose, equating to an annual production of 1460 tonnes per year.

The Ammonia recovery activity is expected to produce 720m^3 a day of ammonium sulphate, but as an enclosed unit, is not expected to add to the odour profile of the site.

7) Waste material accepted

Severn Trent Water accept tankered trade and domestic wastes into the inlet works. Raw sewage sludges (liquid and cake) are accepted into the sludge treatment route. Raw cake may also be accepted in sealed skips on a dedicated separate cake pad within the site.

The full list of EWC wastes that we are permitted to accept at the site can be found in Schedule 2 of the permit. This permit is available to site staff, contractors and visitors at reception.

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. All trade waste loads will be tested on arrival at site as per the trade waste Standard Operating Procedure (SOP) **SOP03 TTW Nonconformance Procedure**. Any loads with odour potential will be assessed by the trade waste technicians during the lab testing process. Tankers can be unloaded using gravity only (no pressure discharge) to reduce potential odour egress from that point. If loads are deemed too odorous for

discharge, the trade waste technicians will reject the tanker and send the haulier offsite as per the Standard Operating Procedure.

Cake imports to the THP arrive in sealed tankers or skips and either discharged directly to the silos for the THP or stored in sealed skips on the raw cake pad pending availability of capacity in the THP.

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.

Trade Waste Rejection Procedure

Any Non-Conforming Tankered loads will be dealt with appropriately as per Standard Operating Procedures (SOP).

Where waste is deemed to contain a level of contamination greater than that set out in the SOP, or is considered to be a malodorous load, the Trade Waste Technicians 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.

Severn Trent Water's document: **SOP03 TTW Nonconformance Procedure** addresses:

1. Identified Risks
2. Roles and Responsibilities
3. Training and Competence
4. Duty of Care paperwork
5. Contaminated Loads
6. Differences against approval analysis
7. Other non-conformances
8. Load rejection

A full version of the latest SOP03 TTW Nonconformance Procedure can be found locally on SharePoint.

Waste imported for dewatering and storage only

Digested sludges are imported from other Severn Trent STFs for dewatering/storage. All our sludge is treated in accordance with the site HACCP plan & is tested on a regular basis. Once at Strongford, imported digested sludge is discharged into storage tanks which feed the de-watering process & treated in the same way as indigenous sludge – our centrifuges are enclosed units & 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 via an imported/mobile treatment plant. 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.

Waste utilised in Cellulose Recovery only
The inputs to the cellulose recovery plant are from indigenous influent received under UWWTD at Strongford Sewage Treatment Works. There are no other wastes input to this process. Influent from UWWTD processes are non-hazardous and excluded from Controlled Waste Regulations. The subsequent mechanical treatment of this waste is deemed a waste activity.

Waste utilised in Ammonia Recovery only
The inputs to the ammonia recovery plant are from indigenous digestate liquors, from on-site anaerobic digestion. These are non-hazardous, and there are no other waste inputs to this process. The subsequent treatment of this waste is regulated under UWWTD processes and outside the scope of this OMP.

8) Permitted Area

The area covered by permit EPR/MP3097FY is shown in figure 7.

Figure 7: Permitted Area (IED permit)

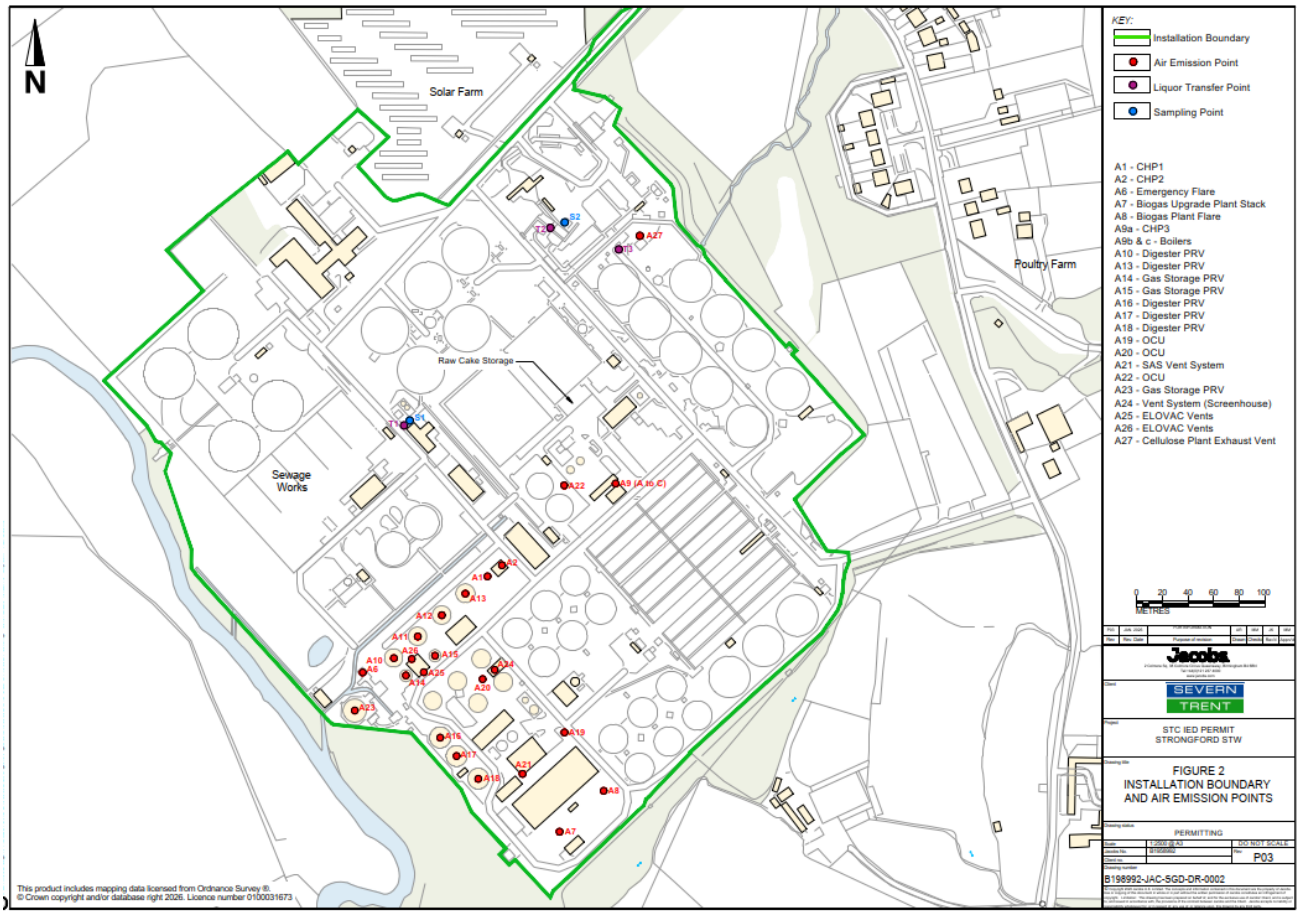


Table 1: Air Emissions Points (IED permit)

Emission point reference and location (NGR/Latitude & Longitude)	Source	Parameter	Components	Odour Risk
A1 NGR: SJ 87925 39139	CHP engine 1 (running on biogas)	NOx	Products from biogas combustion	Low - Combustion plant is regularly maintained and appropriately sized to manage volumes of gas
		SO2		
		CO		
		Total VOCs		
A2 NGR: SJ 87941 39150	CHP engine 2 (running on natural gas)	NOx	Products from biogas combustion	Low - Combustion plant is regularly maintained and appropriately sized to manage volumes of gas
		CO		
	CHP engine 2 (running on biogas)	NOx		
		SO2		
		CO		
		Total VOCs		
A6 NGR: SJ 87835 39067	Auxiliary flare stack for CHP engines	NOx	Products from biogas combustion	Low - the flare is utilised for the safe disposal of surplus gas in the event of
		CO		
		Total VOCs		

				plant breakdown, or a surplus of gas above the level that can be safely stored or utilised. Use of emergency flare is recorded.
A7 NGR: SJ 87993 38935	Biogas upgrading plant stack	No parameter set	Products from biogas combustion	Low - Boiler is regularly serviced.
A8 NGR: SJ 88035 38968	Auxiliary flare for gas to grid plant	NOx CO Total VOCs	Products from biogas combustion	Low - the flare is utilised for the safe disposal of surplus gas in the event of export to the grid being prevented
A9a NGR: SJ 88039 39214	CHP engine 3 (running on biogas)	NOx SO_2 CO Total VOCs	Products from biogas combustion	Low - Combustion plant is regularly maintained and appropriately sized to manage volumes of gas
A9b NGR: SJ 88039 39214	Package boiler 1 (fuelled on biogas)	NOx SO_2 CO	Products from biogas combustion	Low - Boiler is regularly serviced.
A9c NGR: SJ 88039 39214	Package boiler 2 with HRSG (fuelled on natural gas)	NOx CO	Products from biogas combustion	Low - Boiler is regularly serviced.
A10 – A13 NGR: SJ 87859 39079 NGR: SJ 87878 39096 NGR: SJ 87896 39112 NGR: SJ 87915 39129	Digester pressure relief valves	No parameters set	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/repaired promptly to minimize biogas emissions. PRVs are subject to monitoring via site systems and visual checks by site personnel.
A14 - A15 NGR: SJ 87868 39064 NGR: SJ 87891 39081	Gas storage vessels pressure relief valves	No parameters set	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/repaired promptly to minimize biogas emissions. PRVs are subject to monitoring via site systems and visual checks by site personnel.
A16 -A18 NGR: SJ 87896 39017	Digester pressure relief valves	No parameters set	Biogas (mixture of methane & carbon dioxide)	Low - PRVs are only activated in emergency situations to maintain safety within the biogas

NGR: SJ 87908 39003 NGR: SJ 87924 38984				system and are re-seated/repaired promptly to minimize biogas emissions. PRVs are subject to monitoring via site systems and visual checks by site personnel.
A19 NGR: SJ 87991 39020	Odour control unit (imported sludge well)	No parameter set	Odour from imported raw sludge	Low – OCU has been chosen for the use and sized correctly. Subject to regular monitoring and checking by contractor
A20 NGR: SJ 87922 39059	Odour control unit (buffer tank)	No parameter set	Odour from indigenous sludge	Low – OCU has been chosen for the use and sized correctly. Subject to regular monitoring and checking by contractor
A21 NGR: SJ 87959 38987	Ventilation system (SAS belts)	No parameter set	Odour from indigenous SAS	Low – OCU has been chosen for the use and sized correctly. Subject to regular monitoring and checking by contractor
A22 SJ 87992 39213	Odour Control unit (THP)	No parameter set	Odour from THP unit	Low – OCU has been chosen for the use and sized correctly. Subject to regular monitoring and checking by contractor
A23 SJ 87828 39037	Gas storage vessels pressure relief valves	No parameters set	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/repaired promptly to minimize biogas emissions. PRVs are subject to monitoring via site systems and visual checks by site personnel.
A24 NGR: SJ 87935 39069	Ventilation system (Imported Sludge Screenhouse)	No parameter set	Odour from imported raw sludge	Low – OCU has been chosen for the use and sized correctly. Subject to regular monitoring and checking by contractor
A25 NGR: SJ 87875 39077	ELOVAC vent	No parameter set	Biogas (mixture of methane & carbon dioxide)	Low – ELOVAC plant is regularly maintained and appropriately sized to manage volumes of gas
A26 NGR: SJ 87883 39068	ELOVAC vent	No parameter set	Biogas (mixture of methane & carbon dioxide)	Low – ELOVAC plant is regularly maintained and appropriately sized to manage volumes of gas
A27	Cellulose recovery	No parameter set	Waste heat from Drier/Hygienator	Low – cellulose is dried

NGR: SJ 88046 39414	plant exhaust vent			
Vents from tank(s)	Oil / fuel storage tanks	-	Gases from oil storage	Low – Tanks are regularly maintained

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 2: Strongford site capacity details

Tank Type	Number	Volume (each) (m^3)	Construction
Digesters	3	2900	Concrete
	3	2540	Concrete
Digested Sludge Storage Tanks (existing – to be contingency only)	2	3500	Concrete
New digested Sludge Storage Tank (formally Digester 2)	1	2500	Concrete
Blending Tanks (pre-digestion)	5	540	Concrete
ELOVAC units	2	8	Steel
Import Tank	1	150	Concrete
SAS buffer tank (not included – unthickened)	1	130	Steel
LTP Tanks	2	1,500	Steel
Inlet Holding Tank	1	150	Steel
Raw cake silos	2	150m^3	Steel
Cake pad	1	10,500m^3	Concrete
Sulphuric acid tank	2	30m^3	Carbon steel

Ammonium sulphate tank	1	100m^3	Steel

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.

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.

BAT Improvements (IED)

We are committed to covering tanks to limit odour further where required in line with BRef. Our plan is based on the following approach to covering and abating emissions from tanks.

- The first approach is for the most active tanks, for example the pre-centrifuge tank. We aim to cover, then harvest the additional gas from the covered tanks and recycle this into the existing CHP engines situated on site.
- For less active tanks, our second approach will be looking at options of covering tanks and then abating emissions via methane/carbon filters and/or OCU's, we are also looking at additional methane removal via new technology (for example Elovac)

We are already carrying out some trials with contract partners to help us define the right options for site.

11) Inventory of Odorous Materials

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: Summary of principal odour sources identified at Strongford STW

Stage of treatment	Nature of odourous source	Quantities & Retention Time	Odour risk/ mitigation using source/ pathway/ receptor model (Risk assumed during normal operation)
Sewage treatment inlet works	• Raw sewage (not part of this permit) • Imported tankered domestic waste & thin raw sludges. (EWC 200304) • Liquor returns from onsite thickening & dewatering processes.	Dry weather flow for the site is 120,000 m^3/day Minimal retention time - inlet works are designed to process flows not store them. Inlet holding tank is enclosed.	**Risk before mitigation - Moderate. Risk after Mitigation - Low** **Risks (before mitigation)** - Localised odour as tankered trade and domestic wastes enter the inlet. These wastes are immediately mixed with crude sewage and enter the UWWT process. Liquor returns & imports have moderate FIDOL score. Inlet channels are open **Source mitigation** - Trade Waste technicians monitor the waste (see trade waste rejection procedure). 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. **Pathway/receptor mitigation** - Inlet works is screened by trees
Cellulose recovery plant	• Hygienator vent	Percentage of inlet flow divert to plant Output approximately 4m^3 per day.	**Risk before mitigation - Low. Risk after Mitigation - Low** **Risks (before mitigation)** – Enclosed process handling UWWTD flow **Source mitigation** – Cellulose plant is enclosed with cellulose output subject to washing and drying prior to storage to remove entrained material. **Pathway/receptor mitigation** – Recovery plant is screened by trees
SAS thickening building	• SAS from onsite sewage treatment process. • Polymer is added to aid thickening. • Liquors are produced.	3 x SAS belts Minimal retention time - belts process sludge rather than storing it.	**Risk before mitigation - Low. Risk after Mitigation - Low** **Risks (before mitigation) -** raw SAS has a low FIDOL score. polymer is odourless. **Source mitigation** - SAS is thickened as soon as possible after production. Belts are located inside a building. Air is extracted through HEPA filters. Liquors returned to head of sewage treatment works as soon as possible. **Pathway/receptor mitigation** - n/a odour controlled at source
Imported and	• Raw sludge imports from satellite STWs. (EWC 190805)	1 x skip (6.1 m^3)	**Risk before mitigation - High. Risk after Mitigation - Low** **Risks (before mitigation) -** raw sludge can have a high FIDOL score.

indigenous sludge screens	• Screenings from raw sludge imports • Liquors from the consolidation process		**Source mitigation** - Skips emptied regularly via contract with Biffa. Liquors are returned to the head of the works as soon as possible. **Pathway/receptor mitigation** - n/a odour controlled at source
Pre-digestion sludge blending tanks	• Raw sludge imports from satellite STWs. (EWC 190805) • Primary and SAS from onsite sewage treatment processes.	5 x raw sludge tanks (2700m^3 total capacity)	**Risk before mitigation - High. Risk after Mitigation - Low** **Risks (before mitigation)** - raw sludge can have a high FIDOL score **Source mitigation** - Tank is covered and connected to a Peacemaker odour control system. **Pathway/receptor mitigation** - n/a odour controlled at source
Raw sludge thickening	• Raw sludge imports from satellite STWs. (EWC 190805) • Primary and SAS from onsite sewage treatment processes.	2 x centrifuges 2 x cake silos (300m^3 total capacity)	**Risk before mitigation - High. Risk after Mitigation - Low** **Risks (before mitigation)** - raw sludge can have a high FIDOL score **Source mitigation** - Centrifuges and silos are enclosed and connected to an odour control unit. **Pathway/receptor mitigation** - n/a odour controlled at source
Thermal hydrolysis plant	• Raw sludge and cake imports from satellite STWs. (EWC 190805) • Primary and thickened SAS from onsite sewage treatment processes.	2 x Cambi B6-4 The site HACCP requires a minimum THP batch time of 20 minutes. (Check HACCP plan on Waterpedia for the latest requirements). Enclosed vessels	**Risk before mitigation - High. Risk after Mitigation - Low** **Risks (before mitigation)** - raw sludge can have a high FIDOL score **Source mitigation** - Treatment units are enclosed. Ferrous may be dosed if required to control H_2S emissions. **Pathway/receptor mitigation** - n/a odour controlled at source
Digesters - Enclosed tanks with Pressure Relief Valves (PRV's)	• 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.	6 digesters (16,308m^3 total capacity) Design manual minimum retention time is 12 days. The current site HACCP plan requires a minimum retention time (check on Waterpedia for the latest requirements)	**Risk before mitigation - Low. Risk after Mitigation - Low** **Risks (before mitigation) -** digestion takes place in enclosed tanks. Antifoam is not odorous. **Source mitigation -** Digesters are enclosed tanks. 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. **Pathway/receptor mitigation** - n/a odour controlled at source
Digested sludge	Digested sludge from onsite digestion process	2 holding tanks (7,500m^3 total capacity)	**Risk before mitigation - Low. Risk after Mitigation - Low** **Risks (before mitigation) -** digested sludge has a low FIDOL score **Source mitigation -** Odour is minimised through process control. We optimise digester operation to ensure that digested sludge has a low FIDOL

holding tank		Sludge is held in the tanks as specified in the HACCP plan (check HACCP plan on Waterpedia for the latest requirements).	score. Sludge is only kept in the digested sludge tanks for the time required by the site HACCP plan. **Pathway/receptor mitigation** - n/a odour controlled at source
Sludge cake storage pad	Dewatered cake storage on open pad	10,500 tonnes maximum storage capacity 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. Cake is stored on site for an average of 6 to 8 weeks. **Pathway/receptor mitigation** - cake is not moved on windy days.
CHP engine stacks (Biogas/ H2S)	Combustion of biogas produced onsite	2 x Jenbacher Combined Heat and Power Units	**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 to grid plant Flare	Combustion of biogas produced onsite.	1 x flare stack	**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
Cellulose recovery plant	Air emission from cellulose drier	1 x Exhaust vent	**Risk before mitigation - Low. Risk after Mitigation - Low** **Risks (before mitigation) –** Infrequent release of dehumidified air to atmosphere **Source mitigation –** Gases are passed through an activated carbon filter. **Pathway/receptor mitigation** - n/a odour controlled at source
Ammonia Recovery Plant	• Chemical storage • Boiler • Treated output	2 x 30m^3 sulphuric acid product tanks 100m^3 Ammonium sulphate enclosed tank	**Risk before mitigation - Low. Risk after Mitigation - Low** **Risks (before mitigation) –** Emissions from these sources are odourless **Source mitigation** – Storage units are enclosed and boiler stack is connected to a carbon filter. **Pathway/receptor mitigation** - n/a odour controlled at source

12) Odour Control Units

The following odour control units have been installed on the Strongford sludge route. Their location is shown on the site plan in section 8:

Table 4: Strongford Odour Control Units

Parameter	Raw imported sludge reception well (A19)	Sludge blending tanks (A20)	THP cake reception, silo and centrifuges (A22)
OCU Type	1 x moderator and 1 x P3000 Peacemaker	3 x BIOMOD biofilters and 1 x P6000 Peacemaker	1 x BIOMOD biofilter and 1 x P2000 Peacemaker
System details	Fully enclosed systems, vent to atmosphere via a single exhaust point		
Media type	Peacemaker Oxidising Chamber - pellets impregnated with stabilised chlorine dioxide. Polishing stage - Absorptive (carbon) media.		
Media Quantity (kg)	2,080	6,000	2,000
Media Life (Years)	Peacemaker Media pro-actively replaced every 5 years. ME30 specifies design life of 5 year minimum		
Design Inlet Parameters			
Airflow (m3)	450	560	200
Hydrogen Sulphide	Average 50mg/m3, Peak 200mg/m3 (design manual)		
Stack Outlet Performance			
Odour Conc. (OUE/m3)	95% reduction (design manual & ME30)		
Hydrogen Sulphide	99% reduction (design manual & ME30)		

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

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 section 13 for details). Abatement equipment media is pro-actively replaced on a 5 yearly basis, or earlier if monitoring shows an issue.

BIOMOD
Is a biological pre-treatment stage that contains a volcanic media that supports biomass for odour removal. The media is kept moist using final effluent. 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. Diagrams of the odour control units are found in Appendix 2 and 3.

Peacemakers
Peacemakers are a form of dry chemical scrubber manufactured by Air-Water Treatments Ltd (AWT). They are fully enclosed units with an exhaust point. They are more suitable than biological systems such as biofilters in areas where odour loads vary. They also have the advantage that they do not require irrigation water. Peacemakers are single package units consisting of two internal 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. There is a diagram of a Peacemaker unit in Appendix 2.

Cellulose Recovery Plant:
There is no additional abatement fitted to the cellulose plant. Warm air is recirculated within the plant to dry the recovered cellulose in the hygienator process which also includes washing to remove contraries. The vent on the unit is not in routine operation as it is used to remove excess heat.

Ammonia Recovery Plant:
There is an additional carbon filter on site for the stack emissions from the ASL plant boiler. The emissions are minimal, but this is an extra precaution Severn Trent are taking. Full details of the carbon filter will be updated here as the trial progresses.

13)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 (IED) and Urban Waste Water process (Cellulose recovery). For example: digesters are monitored for %DS, feed rate (both

recorded on JRP), temperature, pH, VFA, gas quality and H_2S (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 Tasks).
- 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 plants via a specialist contractor, 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 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 odour management guidance) 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.

14) Odour risk assessment

Table 4: Incident/Emergency Control Measures (1km distance from sensitive receptors)

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	• Majority of tankered waste accepted at site is Severn Trent derived waste, and would be assessed for any malodour at the producing site before transport. • Third-party wastes: Site procedures for pre-acceptance assessment of waste & quarantine/ rejection of nonconforming loads. • Loads are dealt with promptly after acceptance, and discharged into treatment at the earliest opportunity. • 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. • 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	• 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	• 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	• Visual inspection 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	Digesters are alarmed to indicate pressure	Medium	• 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	• Regular site checks carried out. • Design includes selection of correct pipework for pressure and flow loads.	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 control unit damaged or malfunctioning	Detected by site staff	Medium	• Regular checks carried out by site staff (Appendix 3). • Media pro-actively replaced.	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	Dual electricity supply to site.	
Human error – staff, managers, visitors	Regular checks Detected by site staff	Medium	• Staff training and supervision. • Visitor inductions.	Site staff clean any spills promptly. Near misses are reported on SafetyNet.
Malfunction or damage caused by unauthorised visitors (Vandalism)	Regular checks Detected by site staff	Medium	• Security measures are in place including controlled access gates operated in accordance with our Closed gate policy. • Perimeter fence and CCTV.	Issues are reported on SafetyNet.

Fire and/or explosion results in sludge spill/ odour release	Detected by systems Detected by site staff	Medium	• 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 SafetyNet & 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	• Scheduled stack emissions testing in accordance with requirements set out in the Environmental Permit. • CHPs serviced by STW trained technicians as per manufactures recommendations & 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	• 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.
Flooding from river/ blocked drains results in sludge spills	Detected by site staff.	Low	• The general site has wider works designed to minimise risk of localised works flooding due to storm surges. • Site wide drainage system linked to main sewage works, which includes additional capacity in storm tanks within the works to manage additional flows	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 team/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.
Damage to fabrication of cellulose recovery unit	Visual inspections	Medium	• Onsite & remote process monitoring checks • Visual inspection of the cellulose unit	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 chemical storage tank	Visual inspections	Low	• Regular site checks carried out. • Design includes selection of correct tank, bunding, pipework and traffic barriers for contents (Chemical Safety standards). • Security measures are in place including controlled access gates operated in accordance with our Closed gate policy. • Perimeter fence and CCTV.	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. Local issues are reported on SafetyNet.

15) 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.

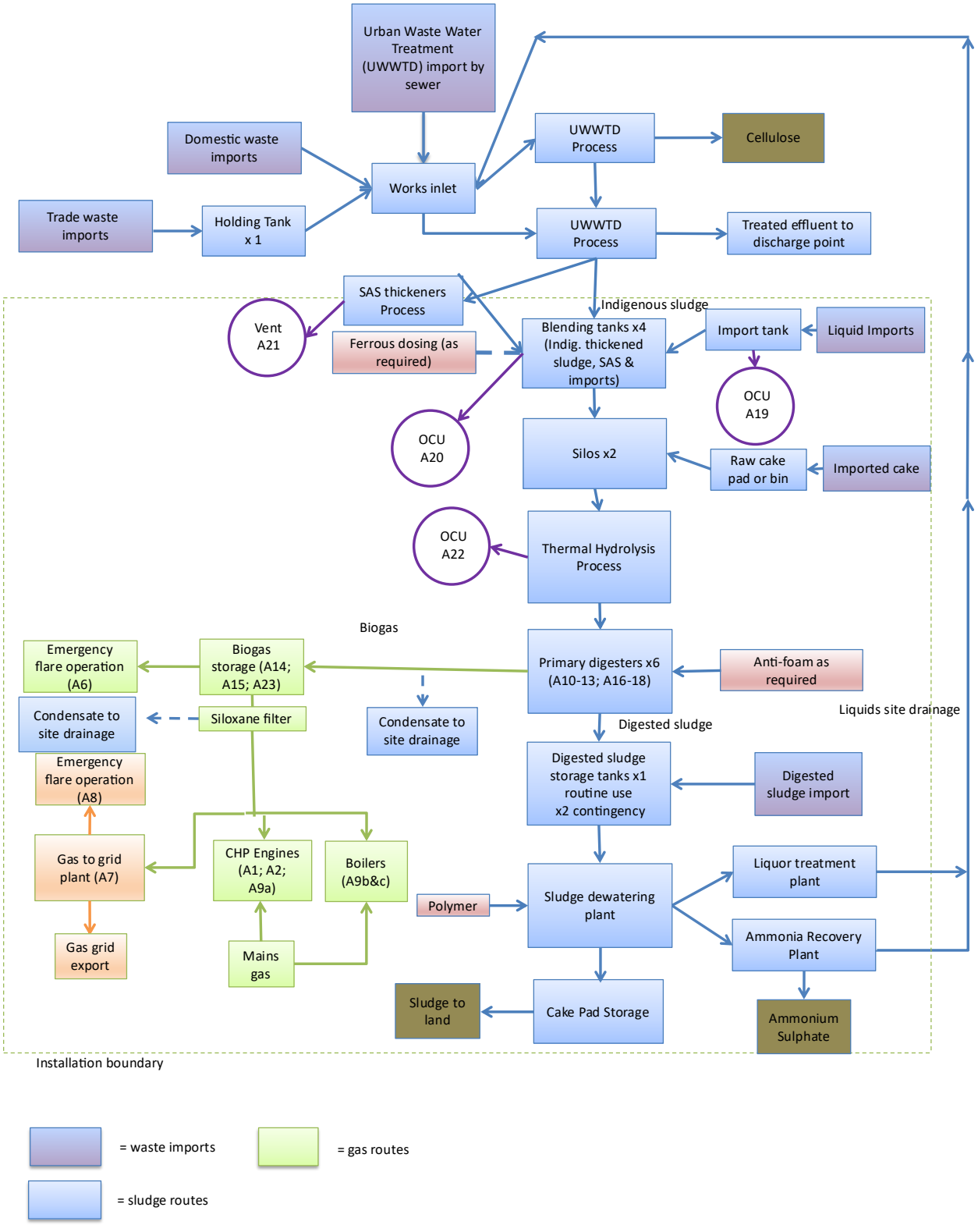
The EMS management review team review the MI (Management Information) data, which will include odour complaints.

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.

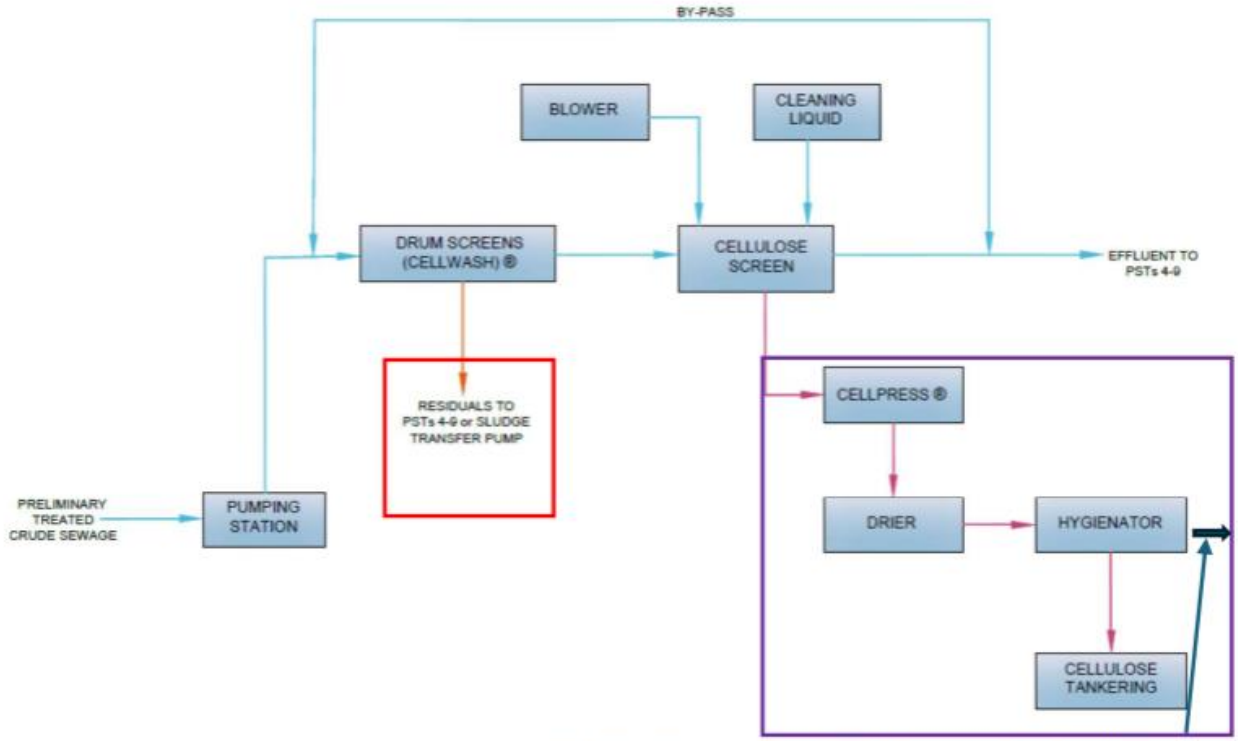
Where odour issues are prevalent, we would adopt the stance taken at our Wanlip Sewage Treatment Works during 2017/18. Live odour surveys were set up weekly with the local Council. Severn Trent also engaged with local residents and invited customers to site to investigate the locations on site and potential 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 5/6, or a phone call to the Local Environment Officer as per the contacts section (Appendix 6)

Appendix 1.1 Sludge Process Flow Diagram



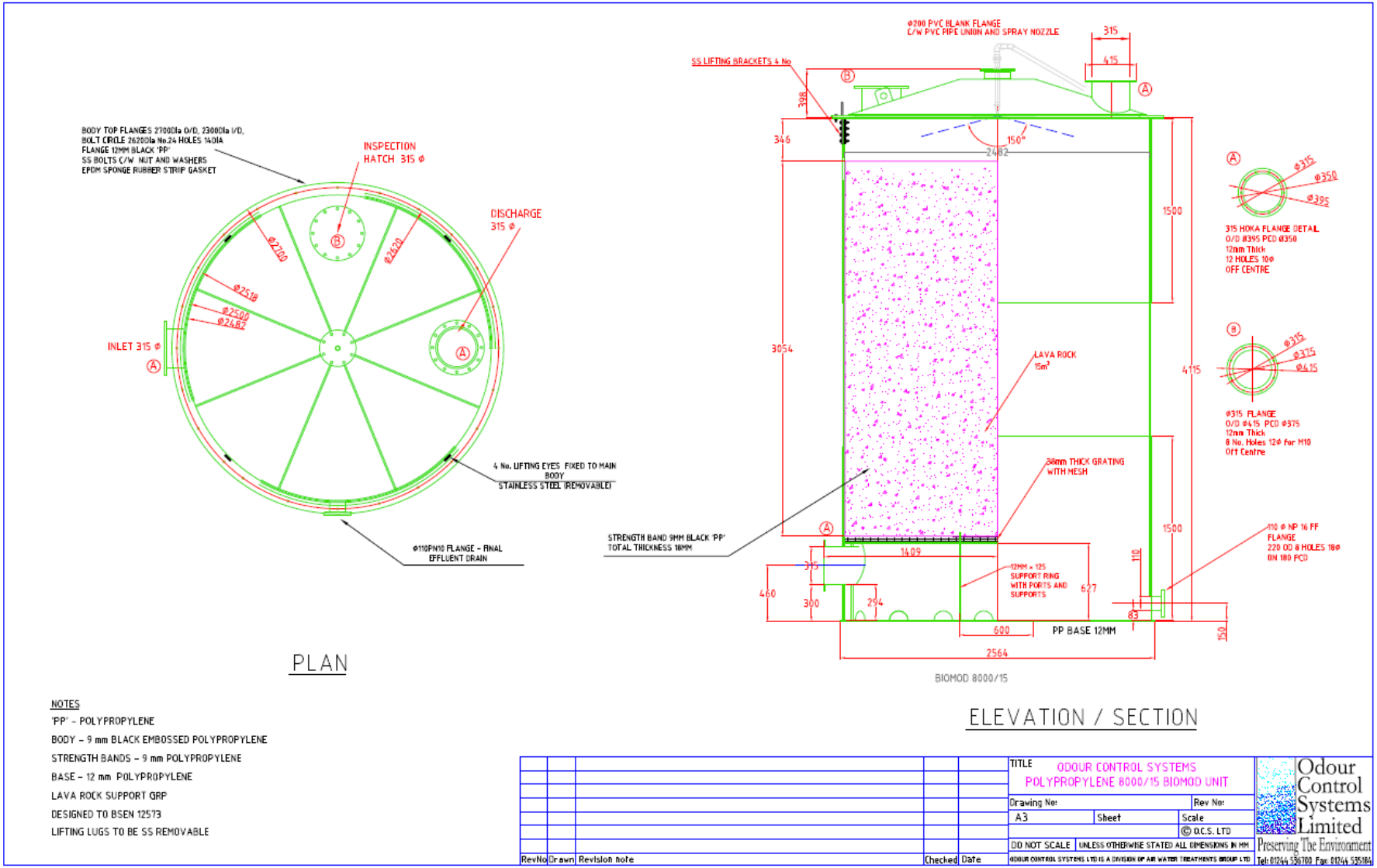
Appendix 1.2 Cellulose Process Flow Diagram (Cellulose Permit)



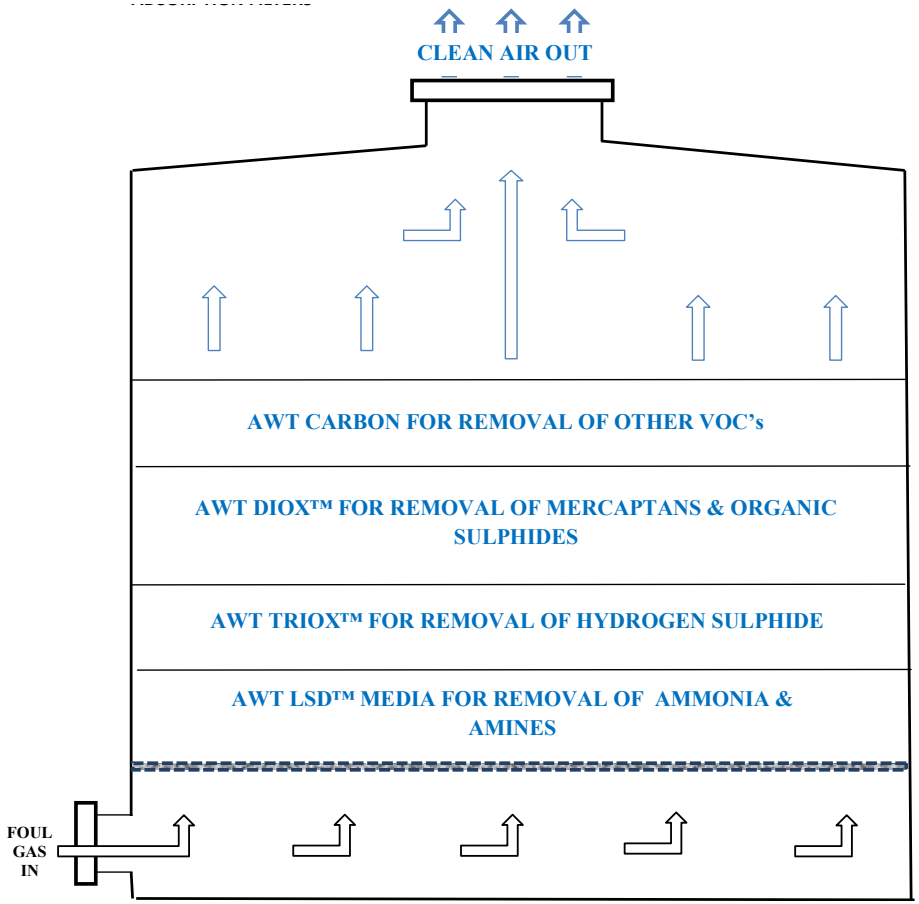
Effluent discharge from the Cellpress and air emmission point from the dryer/hygienator at some point

Appendix 2 Odour Abatement Systems

Biofilter



Peacemaker


CLEAN AIR OUT
AWT CARBON FOR REMOVAL OF OTHER VOC's
AWT DIOX™ FOR REMOVAL OF MERCAPTANS & ORGANIC SULPHIDES
AWT TRIOX™ FOR REMOVAL OF HYDROGEN SULPHIDE
AWT LSD™ MEDIA FOR REMOVAL OF AMMONIA & AMINES
FOUL GAS IN

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_2S)	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^3)	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^3)	External contractor BS EN 13725	Check functionality of odour control unit & if necessary arrange for media replacement
Cellulose Unit Odour Management Tasks	*TBC on commissioning*			
Ammonia Recovery Plant Management Tasks	*TBC on commissioning*			

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

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: • 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 5: Standard Operating Procedure for Complaints Responses

Standard Operating Procedure (SOP)

Title	***Bioresources - Customer Odour Complaints***

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)
• 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
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.
6. The Company employs a service to proactively encourage customers to contact STW known as "PIPE UP" to highlight issues with sites and assets.

SOP - Reactive Measures

Site specific issues are handled by Customer Operations Service Centre (COSC) initially, with an escalation route to the Service Recovery team in Network Control if required. Both teams liaise with relevant stakeholders, but the ownership is on one person to contact the customer. Our Customer Call Centre (COSC) handles the contact and liaises between the customer, Network Control, the operational team and associated contractors to resolve issues and answer queries. All complaints are recorded, logged and staged in the CROSS Microsoft Dynamics system (MSD). The contact and interaction record is also in both CMP (Customer Management Portal)/SAP where applicable.

We report on all complaints that we receive from our communication routes (WhatsApp, telephone etc). For trade waste and biosolids we have customer facing team members who respond to customer complaints. If we have a customer complaint about operations or logistics it would be dealt with by the relevant team manager. Any lessons learnt are communicated to the teams and any improvements made to our processes to help prevent re-occurrence.

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 6 Strongford Contacts

Area of Site	Company Responsible	Contact Name	Phone Number
Sludge Screening Rag Skip		REDACTED FOR EA ISSUE	
Inlet Grit			
Odour Control Units			
CHP Units	STW		
Trade / Domestic Waste	STW		
Biosolids / Cakepad	STW		
Permit Compliance	STW		
Bioresources Operations	STW		
Wastewater Recycling Operations	STW		
Stoke-on-Trent Council	-		
Environment Agency	-		