



Asset Management Asset Standard Odour Management Plan

Bracknell STW

BRACS1ZZ

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0 Document Control & Procedures

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0.3 Document Control

0.3.1 Document Change Request

Whilst Standards are mandatory, it is recognised that one process may not cover every eventuality and a document user may identify an improvement that does not compromise the objectives of the procedure; in this instance a change request against the Standard should be raised.

Information exchange is essential in supporting continuous improvement of the Standards, and a common document and data change request process is provided via the "TAPS" application available via the TW Portal. Within TAPS "Service Catalogue" menu option there are links and instructions for raising change requests for a variety of subjects.

Change requests are automatically sent to the Standards Process Team, and will be approved by the team, or escalated to the relevant governance group and/or standards board for approval depending upon the potential impact and complexity of the request.

It is a business requirement to comply with standards. Compliance issues will be escalated to the relevant governance group for further action as appropriate.

For further information/advice, please e-mail: am.standards@thameswater.co.uk

Owner Review Requirements

Document to be reviewed when any changes are made to the site or processes

Local Review Requirements

Site Manager should be informed when handwritten amendments are made to this document

Revision No	Reason for Revision	Prepared by	Approved by	Date
1	Creation of OMP in new standard format	[REDACTED]		April 2014
1.1	Minor amendment to wording for strategic sludge storage	[REDACTED]	[REDACTED]	October 2016
2.0	Updated alongside new Sludge Treatment Centre permit application	[REDACTED]	[REDACTED]	March 2022

2.1	Sludge Treatment Centre Permit Application resubmission	[REDACTED]	[REDACTED]	November 2023
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0.4 Sign Off

Operations Area Manager	██████████	Date: November 2023
Performance Manager	██████████	Date: November 2023

0.5 Glossary of Terms

TERM	DESCRIPTION
AD	Anaerobic Digestion
BNR	Biological Nutrient Removal
CHP	Combined Heat and Power
CSM	Customer and Stakeholder manager
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016
FFT	Flow to Full Treatment
H4	Environment Agency - How to comply with your permit – H4 Odour Management, March 2011
ICA	Instrumentation Control & Automation
IED	Industrial Emissions Directive
OCU	Odour Control Unit
OMC	Operational Management Centre
OMP	Odour Management Plan
PFT	Picket Fence Thickener
PM	Performance Manager
PS	Pumping Station
PST	Primary Settlement Tank
Receptors	Sensitive receptors are any fixed buildings or installations where odour annoyance may occur, such as residential homes, schools, hospital, offices, shops or garden centres. Open areas such as playgrounds and public footpaths should also be listed where these are known to have been affected by odour.
SAP	Thames Water's enterprise resource and planning system
SCADA	Supervisory Control And Data Acquisition
SHT	Sludge holding tank

SOM	Site Operating Manual
STC	Sludge Treatment Centre
STW	Sewage Treatment Works
TCM	Technically Competent Manager
TM	Team Manager
UWWTD	Urban Waste Water Treatment Directive

1 Introduction

This Odour Management Plan (OMP) forms part of Bracknell STW Best Operating Practice and is a constituent part of the Environmental Management System (EMS). A key related document is the Site Operating Manual (SOM) – this document can be found as a hard copy in the Bracknell STW administration building and on Thames Water's SharePoint database, within the EMS pages.

The purpose of this OMP is to define how the potential and actual sources of odour from Bracknell STW are identified, and how, as far as is reasonably practicable, they are controlled and recorded. It is primarily a management guide; detailed operational procedures are contained within the SOM.

Changes to OMP procedures are captured in the SOM as part of the periodic reviews of this document..

The effectiveness of the odour control measures will be reviewed annually or sooner if any of the following occur:

- If the site in question acquires any other permitted activity with the potential to increase the risk of odour off site.
- When significant changes are made to the site which may affect odour, e.g. capital spend.
- As a result of a change in pattern of odour complaints, increase in public concern and as soon as possible after a significant incident.
- When the site management changes.
- If there is a material change in relevant regulations or guidance.
- If there is an odour release incident
- If a contingency measure is triggered

This OMP is an operational document that has been developed following a review of the potential risk areas for odour release. It details operational and control measures appropriate to the reduction or elimination of the impact of odours from wastewater treatment works. It provides detail to allow operators and maintenance staff to understand the operational procedures for both normal and abnormal conditions.

This OMP was updated in 2022 to incorporate appropriate odour control measures for activities that will be newly regulated under an Environmental Permit issued under the Environmental Permitting (England and Wales) Regulations 2016 (EPR), following the principles transposed through the Industrial Emissions Directive. This follows the reinterpretation of the Industrial Emissions Directive in exclusion of UWWTD activities - meaning that anaerobic digestion (AD) on a Sewage Treatment works now needs an Environmental Permit.

The Odour Management plan has been structured to distinguish between the two regulatory regimes, which are fully described in the Site Information chapter. The wastewater treatment process is covered by the Urban Wastewater Treatment Directive (UWWTD). The Environmental Permit for the Sludge Treatment Centre (STC) covers various process including but not limited to, the AD process, combustion of biogas in the CHP plant and the storage of resulting sludge. This OMP responds to odour risks from both UWWTD and STC permitted processes (referred to as the Sludge Treatment Centre Permit).

This OMP is stored electronically on SharePoint within the EMS page. A hard copy is kept on site within the Site Operating Manual.

1.1 Relevant Guidance

Where this Odour Management Plan relates to STW activities regulated under the UWWTD this OMP may still draw upon elements of best practice taken from H4 but this should not be inferred as H4 being applicable to these activities.

The following guidance has been used to inform the contents of the OMP where it relates to activities regulated under EPR through the Sludge Treatment Centre Permit. This guidance does not apply to UWWTD activities:

- Environment Agency - How to comply with your permit – H4 Odour Management', March 2011 (H4)
- Commission Implementing Decision (EU) 2018/1147 of 10 August 2018 establishing best available techniques (BAT) conclusions for waste treatment, under Directive 2010/75/EU of the European Parliament and of the Council (Waste Treatment BAT Conclusions)

The OMP format used is in line with that adopted for other Thames Water sites.

2 Site Information

2.1 Location and Receptors

Site Address:

Bracknell STW
Hazelwood Lane
Bracknell
Berkshire
RG42 5NE
Permit Number: EPR/FP3301MX/A001
What 3 words: offer.spaces.remain

Bracknell STW is located to the north of Bracknell town centre, in a rural area. Much of the surrounding land belongs to Thames Water. Isolated properties are located to the north and north-west.

Bracknell STW serves a Population Equivalent of 82,000.

The works serves the catchment of Cranbourne, Winkfield, Newell Green, Popeswood and Bracknell and Bracknell New Town. Pumped flows are received from two terminal pumping stations – Binfield and Bracknell. Both are within a mile of the site and flow constantly. There are no major septicity issues.

Receptors

The nearest receptors are given in Table 2.1 and have been marked on site location map in Figure A of Appendix 4.

Table 2.1 Location of potentially sensitive odour receptors.

Receptor Number	Receptor Type	Receptor Name	Approximate distance to the nearest site boundary (km)	Direction from the site	Receptor sensitivity
1	School	Warfield CE Primary School, Woodhurst Site	1.18	South-East	High
2	School	Kennel Lane School	1.3	South-East	High
3	School	Binfield Pre-School	1.39	South	High

4	School	Meadow Vale Primary School	1.7	South	High
5	School	King's Academy Binfield	1.42	South-West	High
6	School	Binfield Church of England Primary School	1.95	West	High
7	Hospital	Binfield Surgery	1.67	West	High
8	Hotel	Novello House	0.37	North	High
9	Commercial	Headingly Stables, Livery & Equine Recuperation	0.28	North	Low
10	Residential Areas	Housing at The Walled Garden	0.7	South-West	High
11	Commercial	Jealott's Hill International Research Centre	1.85	North-East	Medium
12	Residential Areas	Housing at Forest Rd	0.64	South-East	High
13	Residential Areas	Housing South from Forrest Rd Along Temple Way	1.11	South	High
14	Recreational	Binfield Football Club	0.54	West	High
15	Residential Areas	Housing at Cabbage Hill Ln	0.36	West	High
16	Industrial	Butlers of Binfield (car workshop)	1.13	North-East	Low
17	Commercial	Moss End Garden Village (shopping centre)	1.11	North-East	Medium
18	School	Newbold College of Higher Education	1.84	South-West	High
19	School	Newbold School	2	South-West	High
20	Commercial	Golfplex	1.41	South-West	Medium
21	Residential Areas	Binfield Village (east of York Road)	0.86	West	High

22	Residential Areas	Binfield Village (west of York Road along Terrace Road North)	1.2	West	High
23	Residential Areas	Binfield Village (south of B3034 Along Terrace Road South)	1.3	South-West	High
24	Open Space	Binfield Cemetery Stubbs Hill	0.52	South-West	Low
25	Hotel	Spinney House	1.53	North-West	High
26	Recreational	Jocks Lane Recreation Ground	1.33	South	Low
27	Recreational	Garth Meadows	1.2	South	Low
28	Recreational	Anneforde Place Play Area	1.29	South	Low
29	Recreational	Woodhurst Park Monument	0.65	South	Low
30	Hotel	The Admiral Cunningham Hotel	1.13	South	High
31	Hotel	Scotlands House Campsite	1.31	South-East	High
32	Residential Areas	Around and west of Gibbins Lane	1.9	South-East	High
33	Residential Areas	Harvest Ride	0.87	South	High

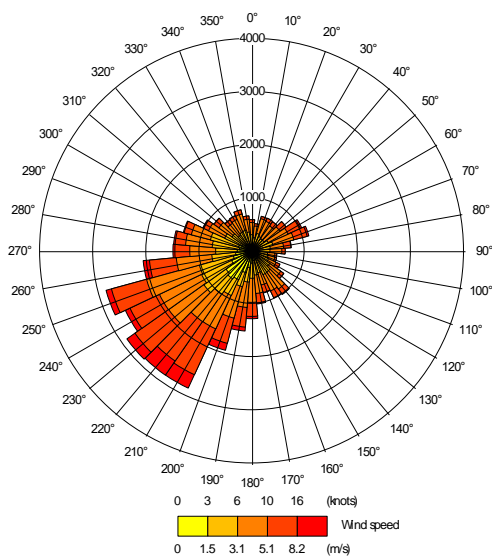
2.2 Off-site sources of odour

The only off-site sources of odour identified at Bracknell are farms located behind the cake barns .

2.3 Wind Rose and Weather Monitoring

Farnborough Airport meteorological station (approximate location NGR E 485336 N 153761) is located approximately 18.2 km south of the site and is considered the closest most representative meteorological monitoring station to the site. Data is recorded at the meteorological station in hourly measurements and the figure below presents the relationship between the frequency and speed of wind from compass point directions for the combined years 2015 – 2019. The figure illustrates the predominant wind direction to be southwesterly, which means receptors northeast of the site would have the highest probability of experiencing potential increases in odour emissions.

Figure 2.31: Farnborough meteorological station 2015 – 2019



There is no on-site weather station at Bracknell. Weather on site can be reviewed if complaints are received or during periods of abnormal operations. The internal ‘Weather’ SharePoint site provides adverse weather information, and the UK Met Office website can also be used.

2.4 Site Layout and Treatment Processes

Details of the site layout and treatment processes are given in the following sections of the Site Operating Manual and are therefore only given summary attention in this OMP:

Section	Description
1	Governance & Control

2	Location, key layout plans and diagrams. Site services, including power, water, drainage, SCADA and ICA. Consent details, process overview, chemical and waste handling.
3	Detailed description of each treatment process, including sludge and odour control.
4	Maintenance
5	Plant control, monitoring, and logging.

Bracknell STW is a filter works with sludge treatment by digestion and sludge dewatering by belt presses.

2.5 Process Description

2.5.1 UWWTD activities

Preliminary Treatment

- All sewage received at the Inlet Works is pumped from catchment pumping stations.
- There are 3no. 6mm Longwood fine screens that screen the crude sewage.
- Debris trapped in the screen is removed automatically, washed and compacted before being discharged to skip.
- Following screening, grit is removed via a Pista grit trap.
- Ferric Sulphate is dosed after the inlet and before the Primary Sedimentation Tanks to assist in the removal of Phosphorus.

Storm Management

- After screening and grit removal, excess flows from the Inlet run to five sequentially filled circular storm tanks.
- The first tank in the sequence acts as a balancing tank and returns flow through a manually controlled valve to the Inlet, via the general duty pumping station.
- When the tanks are full excess flows pass to an overflow line that joins the Final Effluent line downstream of the Flow to River meter and Final Effluent sampling point before the outfall.

Primary Treatment

- The screened and de-gritted sewage is distributed between seven circular Primary Sedimentation Tanks.
- Settled sewage flows over the perimeter outlet weirs of the tanks onto secondary treatment.
- The sludge is removed from each tank by a dedicated pump.

Secondary Treatment

- Biological treatment of the settled sewage is carried out by double filtration process.
- First filtration stage:
 - There are 4no. Reaction driven, "Biodeck" plastic media high rate filters.
 - Followed by settlement in 4no. Humus tanks.
- Second filtration stage:
 - Sewage is pumped to the second stage filtration process.

There are 9no. reaction driven, random packed stoned media secondary filters.
Settlement in 6no. second stage humus tanks before discharge to the watercourse.

- There are facilities to re-circulate the secondary stage effluent back through the secondary filters during low flows or high ammonia.
- The Humus sludge from both stages is returned to the Inlet Works.

2.5.1 Activities under Sludge Treatment Centre Permit

The STC treats both indigenous sludges and imported sludges. Indigenous sludge is generated from the incoming flow to the STW, which passes to the Primary Settlement Tanks and through the aerobic treatment process under the UWWTD. Sludge is drawn off and pumped to a Picket Fence Thickener (PFT) where the sludge is thickened.

Imported sludge from other works is delivered to a sludge offloading point via tankers, is screened and pumped to the Thickener Feed Tank and then to the Sludge Thickening Plant where it is thickened with the addition of a polymer. All such imports are subject to appropriate waste pre-acceptance and acceptance checks, prior to acceptance.

Liquors from both the PFT and Sludge Thickening Plant is returned to the Works Inlet via Liquor Return Pumping Station 1 and the site drainage for further treatment. Indigenous thickened sludge and imported sludge are both pumped to the Digester Feed Tank where they are mixed. An OCU abates the PFT and Digester Feed Tank.

The Head of Works import is located upstream of the rag and grit screens and storm offtake. Mixed sludge is then pumped to one of the four Primary Digester Tanks at the site. Sludge within the Primary Digester Tanks is heated via dedicated heat exchange systems using heat generated on site by the CHP engine or two boilers. Primary Digester Tanks are partially subsurface with fixed roofs and fitted with Pressure Relief Valves (PRVs).

Following treatment over an appropriate number of days within the Primary Digester Tanks, sludge is pumped to one of four Secondary Digester Tanks, which are arranged in series so that sludge cascades through the four Secondary Digester Tanks from tank number 4 to tank number 1. Digested sludge is held in the Secondary Digester Tanks for an appropriate retention time to ensure that the required level of pathogen kill is achieved in order to comply with digested sludge cake output quality requirements.

Digested sludge is then pumped to the aboveground Dewatering Feed Tank, adjacent to the enclosed Cake Barn before the digested sludge is pumped inside of the Cake Barn to the Digested Sludge Dewatering Plant where it is dewatered with the addition of a polymer. Digested sludge dewatering liquors return to the inlet for further treatment via the Liquor Return Pumping Station 2.

Digested sludge cake is transferred via conveyors and deposited on engineered made ground within the fully enclosed and odour abated Cake Barn for storage prior to removal from the site under the Sludge Use in Agriculture Regulations (SUiAR) (1989), and in accordance with the Biosolids Assurance Scheme (BAS).

Biogas from the Primary Digester Tanks is captured and transferred to a double membrane Biogas Storage holder. The biogas transfer pipeline is equipped with condensate pots that capture entrained moisture from the generated biogas and allow it to be drained into the site drainage system for treatment. The Biogas Storage is fitted with PRVs as a safety precaution in the event of over pressurising the system. The biogas is taken from the storage vessel for combustion in a CHP engine, generating electricity for use within the site, and heat to maintain temperatures in the Primary Digester

Tanks. This is classified as an 'existing' combustion plant under the Medium Combustion Plant Directive (MCPD).

In the event that additional heating is required for the Primary Digester Tanks, there are two dual fuelled auxiliary boilers that can combust biogas or fuel oil. An emergency flare is available for use during periods of essential maintenance and for emergency use. The flare is utilised under 10% of the year or less than 876 hours per year.

This OMP includes the import of treated sludge cake from other works, for temporary storage in the Cake Barn, pending offsite recovery. All such imports will be subject to appropriate waste pre-acceptance and acceptance checks, prior to import, including checking whether the incoming cake complies with the requirements of SuiAR and BAS.

Imported treated sludge cake is offloaded into an area of the Cake Barn, so as to be stored separately to indigenous sludge cake. The waste stream is the same as that arising from the treatment of sludge within the Bracknell STC with the same characteristics, composition and eventual end use – application to land. As such, the infrastructure which is acceptable for use for site cake is appropriate for the imported material.

Cake is stored on an impermeable surface within the Cake Barn, for the shortest time practicable, the duration depending on factors such as prevailing weather and availability of the landbank.

3 Site Management Responsibilities and Procedures

3.1 Site Roles

Figure 3.1 - Site Roles

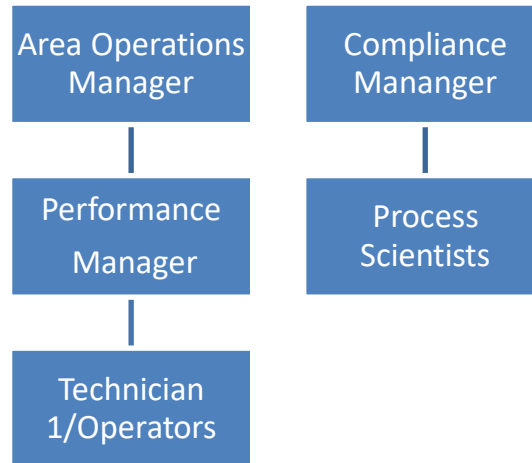


Table 3.1 - Tasks and Responsibilities

Role	Tasks and Responsibilities
Regional Operations Manager	Responsible for the overall performance of STW in this region.
Area Operations Manager	Responsible for the overall performance of the STW and catchments areas.
Performance Manager	Responsible for overall performance of the STW and will be responsible for <ul style="list-style-type: none"> • odour control and management at the site • day to day implementation of the OMP • dealing with customer complaints • assessing the scope of, and updating, the OMP as it is implemented. • Responsible for day to day operation of the STW
Duty Manager	The duty manager is centrally based (off-site) and is responsible for event management across the business.
Customer Centre	Responsible for receiving all customer calls, logging them and passing them to the appropriate operational departments.
Technically Competent Manager	Hold the required WAMITAB qualification to support the activities on site under EPR, ensuring permit conditions are complied with.
Process Technician 1	Day to day duties include maintaining and operating process equipment.

Role	Tasks and Responsibilities
Customer and Stakeholder Manager (CSM)	Responsible for managing liaison with all external customers and stakeholders in liaison with customer centre, escalation team, local govt. liaison team etc.
Compliance and Optimisation Manager	Responsible for process investigations and technical assistance.
Process Scientist	Reports to Compliance and Optimisation Manager. Responsible for process monitoring, improvement and troubleshooting.

The site is manned during normal working hours.

3.2 Key Contacts

Thames Water Website – www.thameswater.co.uk

Role	Name	Email address	Phone Number
Operations Area Manager	Chris McKenna	[REDACTED]	[REDACTED]
Performance Manager	Mark McCoy	[REDACTED]	[REDACTED]
Customer Centre	Bracknell STW	[REDACTED]	[REDACTED]
Technically Competent Manager	Mark McCoy	[REDACTED]	[REDACTED]
Senior Process Scientist	Estela AlvarezMoreta	[REDACTED]	[REDACTED]

3.3 Operator Training

Staff working on site undergo a site induction that is carried out by the Performance Manager. The site induction includes direction to the presence and location of the various operational procedures which include the SOM and the OMP. In addition, Site Tech 1's undergo a specific programme of training which covers management of activities on site.

The Sludge Treatment Centre permit requires that a Technically Competent Manager holding a relevant WAMITAB qualification is in place at the site, and meets a weekly site attendance requirement.

All training records are currently held on Learning on Tap and local LOAD documents where they are accessible by the site Performance Manager and individual members of staff.

4 Odour Critical Plant Operation, Monitoring and Management Procedures

4.1 Odour Sources, Critical Issues and History

In the last 5 years,2017-2022 Bracknell has received 2 formally recorded odour complaints.

An Odour Risk Assessment is included as Appendix 1.

Critical Odour Issues, Emergency Response and Mitigation Measures are summarised in Table 4.3-4.7.

4.2 Identification of Odour Critical Plant

Odour prevention and reduction is achieved at Bracknell through at least an annual review, or sooner as mentioned in Section 1, of the Odour Risk Assessment, Odour Improvement Plan and Odour Management Plan. In combination with the maintenance and monitoring carried out on site mentioned in sections 4 and 5.

Through our Odour Management Plans and maintenance procedures, the primary focus is on effective process control to minimise the risk of off-site odour nuisance. Similarly, our site-based frontline Wastewater Treatment Operations team are focussed on effectively managing the on-site process.

4.2.1 Odour Risk Assessment

An Odour Risk Assessment has been carried out and a copy is included in Appendix 1.

The Odour Risk Assessment is not a 'one-off' exercise but an on-going process. The Odour Risk Assessment should be reviewed whenever the site undergoes an operational or capital change which could significantly affect odour.

It is constructed in the following manner:

- Each part of the treatment process is considered under different operating modes – e.g. normal, failure, abnormal: system overload, summer conditions, maintenance etc.
- The nearest customers to the particular odour source are identified.
- The likely frequency and duration of occurrence for each eventuality is identified.
- A score is assigned to the severity (0 – 5) of odour under each operating mode.
- A score is assigned to the probability (0 – 5) of causing an odour nuisance for each operating mode.
- Multiplying the severity of odour and probability of causing an odour nuisance generates a 'Current Odour Emission Risk' score. Between 0 (zero risk) and 25 (maximum risk), this is used to decide where mitigation should be applied in the short term, and determine where in the longer term enhanced improvement measures are required. Where improvements are identified as necessary (i.e., where suitable mitigation measures are not already in place), entries are made onto the Odour Improvement Plan.
- The need for operational mitigation, enhanced measures and customer communication is stated and brief details given.

Items scored in the Odour Risk Assessment with a risk score greater than 10, and where existing operational mitigation measures are not sufficiently robust, will have Improvement Plans generated to address the odour issues. There Odour Improvement Plan for Bracknell STW is included in appendix 2.

4.2.2 Potential Odour sources

The following list of potential UWWTD odour sources been identified during the risk assessment:

- Incoming Sewers & Reception Wet Well
- Storm & Balancing Tanks
- Screens & Screening Conditioning, Drainage & Rag Skip Management
- Grit Removal Equipment, Drainage & Grit Skip Management
- Flow & Distribution to Primary Settlement Tanks
- Primary Settlement Tanks

- Primary Raw Desludge Pumping
- Flow & Distribution to Secondary Treatment
- Primary Filters
- Primary Humus Tanks
- Interstage Pumping Station
- Secondary Filters
- Flow & Distribution to Secondary Settlement
- Secondary Humus Tanks
- Scum Removal System
- Humus Chambers & Pumping
- Final Effluent

The following list of potential odour sources under the STC permitted area been identified during the risk assessment:

- Sludge Reception, Wash down & Drainage
- Skip Management – Sludge import
- Sludge Thickening (drum thickener)
- Primary Raw Sludge Thickening & Pumping (PFT)
- Sludge Blending & Mixing
- Return Liquors
- Digester Feeding, Mixing & Discharge
- Secondary Digestion, Mixing & Discharge
- Emergency storage tanks
- Dewatering Feed Tank
- Beltpresses
- Liquor Return
- Cake Barn & Drainage(including cake imports)
- Vehicle Movements & Wash Down
- Biogas Storage
- CHP
- Boilers
- Waste Gas Burner
- Odour Control Units

4.2.3 Odour Critical Plant

The following list of odour critical plant has been identified during the risk assessment

- Primary Digestion (if digesters become sick)

4.3 Waste Storage for Sludge Treatment Centre Permit

Waste is not stored on site prior to treatment through the UWWTD or AD process. A list of the main tanks relating to the sludge treatment process and their associated volumes and retention times is shown below.

Table 4.0 Sludge Treatment Centre Permit Tank Inventory

Tank Purpose	Number	Operational Volume (m ³)	Construction	Average Retention time under normal operations
Sludge import tank	1	147	Steel	24 hours
Picket Fence Thickener	1	464	Steel	24 hours
Thickener feed tank	1	82	Concrete	24 hours
Digester Feed Tank	1	82	Concrete	24 hours
Primary Digester Tank	4	487	2x concrete, 2x steel	16 Days
Secondary Digester Tank	2	487	2x Concrete	12 Days
	2	340	2x Concrete	12 Days
Emergency storage tanks	3	800	Concrete	24 hours

Dewatering Feed Tank	1	235	Steel	24hours
Liquor Balancing Tank	1	544	Steel	24 hours
Auxiliary Boiler Diesel Tank	1	6,000 litres	Steel	
Cake Barn Generator Diesel Tank	1	16,000 litres	Steel	

An inventory of potential odorous materials relating to the Sludge Treatment Centre Permit is shown in Table 4.1 below. Air Emission Points are listed, and the locations shown on the site plan in Figure C of Appendix 4.

Table 4.1 Odorous materials for Sludge Treatment Centre Permit

Odorous and potentially odorous material (any solid, liquid or gas)	Location of odorous materials on site	Maximum quantity on site at any given day	Maximum time held on site (hours or days)	EWC Codes	Type of Emission	Odour potential High Risk / Medium Risk / Low Risk
Cake (Including imported cake)	Cake Barn	5000 tonnes	Up to 3 months	19 06 06	Point Source (OCU)	Low
Biogas	See Air Emission Point Plan	Gas bag capacity is 1580m ³	Continuous operation	N/A	Point Source	Low
Releases from OCU	See Section 5.1.2	NA	NA	NA	Point Source	Medium
Liquor	Continuously pumped to head of works Liquor balancing tank	Continuously pumped to head of works	Continuously pumped to head of works	16 10 02	Diffuse Point source (see OCU entry)	Low
Imported sludge	Sludge Import Tank	Refer to Table 4.0 Site Tank Inventory	Retention times for each stage of the process are detailed in Table 4.0	19 08 05	Point Source (see OCU entry)- currently not operational	Medium/ High
Primary Sludge	Picket Fence Thickener and Digester Feed Tank, Thickener Feed tank	Refer to Table 4.0 Site Tank Inventory	Retention times for each stage of the process are detailed in Table 4.0	19 08 05	Point Source (see OCU entry)- currently not operational Diffuse	Medium/ High
Digested sludge	Dewatering feed tank	Refer to Table 4.0 Site Tank Inventory	Retention times for each stage of the process	19 08 05	Diffuse	Medium

Odorous and potentially odorous material (any solid, liquid or gas)	Location of odorous materials on site	Maximum quantity on site at any given day	Maximum time held on site (hours or days)	EWC Codes	Type of Emission	Odour potential High Risk / Medium Risk / Low Risk
			are detailed in Table 4.0			
Sludge Screenings	After sludge import tank	-	-	19 08 01	Diffuse	Low

Table 4.2 Odorous raw materials for Sludge Treatment Centre Permit

Raw Material	Odorous	Storage	Mitigation	Odour Risk
Flopam FO4650MPM	Not odorous	2,000 L stored in 1,000L in IBCs stored on portable bund	Contained with lid	Low Low Low
FB508 Powder	Not odorous	3,000K stored in 1,000 Kg bulk bags in cake barn	Stored within building	Low
WP White Diesel	Petroleum	6,000L in diesel day tank 16,000 L in diesel tank	Contained with lid	Low
Chevron HDAX 6500 LFG	Petroleum	1,200 L within tank inside the CHP container	Contained with lid	Low
Delo XCL	Solvent	2,000L stored within 2x 1,000L in IBCs on portable bunds	Contained with lid	Low

Low odour raw materials are chosen for use, as far as practicable.

4.4 Odour Control Measures

The SOM referred to above complies with Thames Water's Asset Standards – Operating Standards. It states the operational procedures to be followed in order to maintain and operate plant to agreed company standards. These standards include, where appropriate, procedures for ensuring that generation of odour is kept to a minimum.

The routine operational tasks carried out at Bracknell STW to specifically mitigate against generation of odour are listed in the above SOM.

Refer to tables 4.3-4.7 for a summary of routine mitigation tasks, as well as intermittent, abnormal, and emergency event mitigation tasks, carried out at this site.

4.4.1 Odour Control Units

Sludge Odour Control Unit (OCU 2) A10

The Odour Control Unit is an ATS unit. It is sited adjacent to the Cake Barn and extracts air from the 'high' odour sources (belt filter presses, conveyors, the liquor balancing tank and liquor pumping station 2) which is treated by a first stage lava rock biological filter unit followed by a carbon polishing stage. The air from the 'low' odour sources (cake barn) will be extracted separately and treated by the carbon polishing stage only.

Figure 4.1 Process Flow Diagram of OCU

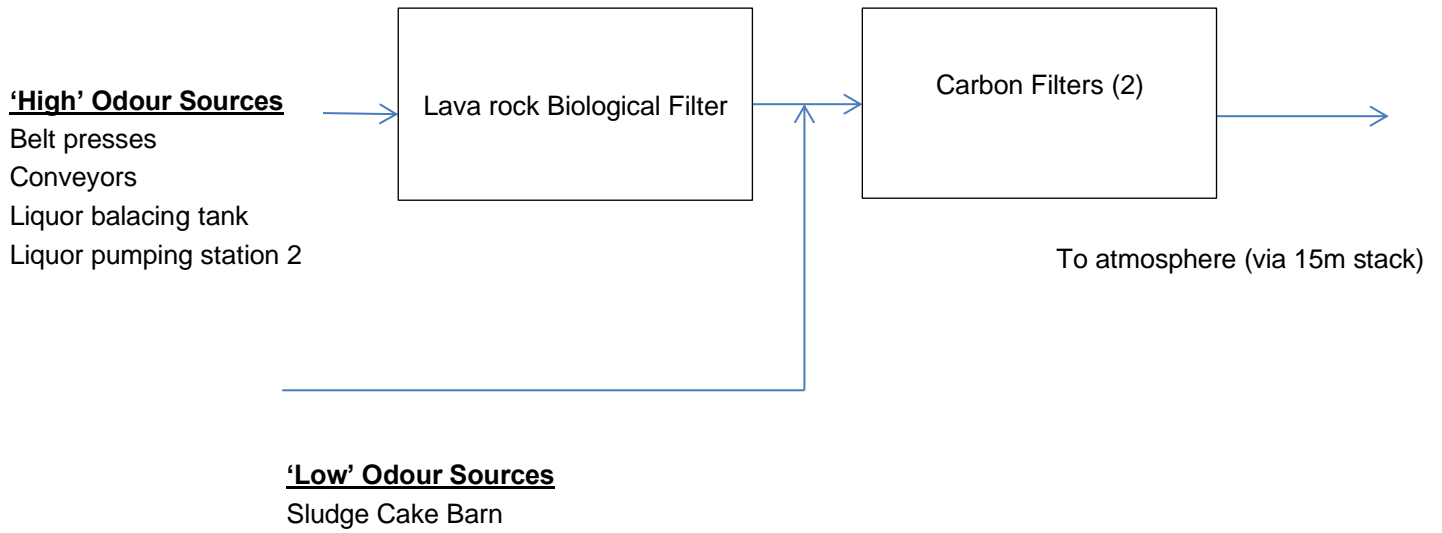
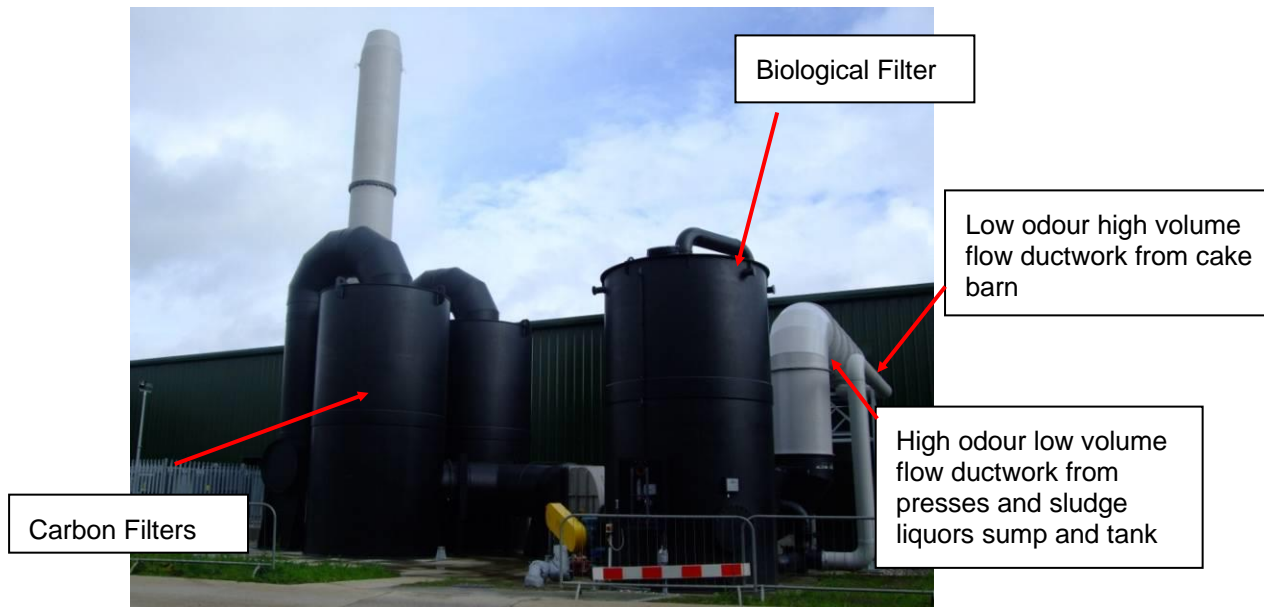


Figure 4.2 Photo of OCU



The total air flow is then directed through the final treatment stage consisting of 2 no. Double bed carbon filters. Carbon filters are installed in parallel, i.e. each treating 50% of the airflow. Isolation dampers have been provided on each carbon filter to enable isolation of individual filters whilst the remaining filter remains in operation treat 100% of the total air flow. The treated air is discharged to atmosphere via a 15m stack.

The OCU is important part of the digested sludge facility; it is required to be in operation to remove any need to zone (with respect to flammable atmospheres) the equipment within the building. Power will be cut off to the plant (belt presses and conveyors) if low air flow is detected within the OCU. The OCU was also required as a planning condition.

OCU 1 (A11)

There is an additional OCU (OCU 1)A11 on site that is currently not operational, however is due to be upgraded as part of the WAP programme as indicated within the Odour Improvement Plan (Appendix 2). This unit is a single stage biofilter that serves the PFTs, Digester Feed Tank, Rotamat Screens and Imported Sludge Buffer Tank.

4.4.2 Site Specific Measures and abnormal events

H4 has been used to guide the preparation of this OMP where it relates to activities regulated under the Sludge Treatment Centre Permit. As this guidance does not apply to UWWTD activities, where reference to H4 is made within this document this should not be inferred as H4 being applicable to UWWTD activities. Specific tasks and measures taken in intermittent, abnormal, and emergency events associated with the control of odours at Bracknell STW are summarised in the tables below.

In addition to the information in the tables below, the operations team also undertake daily and/or weekly checks of each part of the process to ensure they are operating correctly. These checks are summarised in Appendix 5 and 6.

Table 4.3: Summary of routine odour mitigation tasks for assets under UWWTD

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale
General		Ensure site is kept clean and tidy	Site Tech 1s Team Manager	Visual Inspection	Daily	Spillage identified.	Clean up as soon as possible and no later than the end of the day.
		Any spillages to be cleaned up as soon as practicable	Site Tech 1s	Visual Inspection	Daily	Spillage identified	Clean ASAP
		Site odour acceptability	Site Tech 1s	Qualitative assessment	Daily	Elevated odour on site identified.	Reports to Performance Manager at team huddle/SAP Plus entry where corrective action identified. For a spillage; immediate/asap resolution

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale
Incoming Sewers & Reception Wet Well	Sewage (Low)	Ensure that housekeeping around the inlet area is good. Since it is a raised inlet the odours generated from accumulated screenings or grit deposits can spread across the site. The inlet is situated at the south of the site well away from the isolated houses.	Site Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site
Storm & Balancing Tanks Linked tasks in appendix 5 section 2.6	Sewage (Low)	There is a hydraulic restriction in the pumping station which makes it hard to empty the storm tanks back to the works. This can lead to old and septic storm sewage being left in the tanks. The tanks have to be manually pumped out.	Site Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site
Screens & Screening Conditioning, Drainage & Rag Skip Management Linked tasks in appendix 5 section 2.3 and 2.4	Sewage/musty (Low)	General housekeeping, skips removed as required when full, manual cleaning available, PPM	Site Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site
Grit Removal Equipment, Drainage & Grit Skip Management Linked tasks in appendix 5 section 2.5	Septic (Low)	General housekeeping, skips removed as required when full, manual cleaning available, PPM	Site Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale
Flow & Distribution to Primary Settlement Tanks	Sewage (Low)	Constantly moving flow, low impact	Site Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site
Primary Settlement Tanks Linked tasks in appendix 5 section 3	Sewage (Low)	During summer, low flows cause increased retention times and septicity within the primary settlement tanks (PSTs). Operations take one or more tanks out of service at these times to avoid this problem. PST desludge lines can block due to fat or rag accumulations. Operations jet the line from time to time to prevent this. Thus avoiding potential sludge spills.	Site Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site
Primary Raw Desludge Pumping	Raw sewage (Low)	Enclosed pipework below ground	Site Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site
Flow & Distribution to Secondary Treatment	Raw sludge (Low)	Enclosed pipework below ground	Site Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale
Primary Filters Linked tasks in appendix 5 section 4.2	Earthy (Low)	Checked daily, rotation failure alarm.	Site Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site
Primary Humus Tanks Linked tasks in appendix 5 section 5	Earthy (Low)	Daily checks, general housekeeping, PPM once a month	Site Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site
Interstage Pumping Station	Earthy (Low)	Constantly moving flow, low impact. Pump failure alarm, one standby pump available	Site Tech 1s	Daily site rounds	Daily	Visual check	Escalate to find fault (rag/power)
Secondary Filters Linked tasks in appendix 5 section 4.2	Earthy (Low)	Checked daily, rotation failure alarm.	Site Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site
Secondary Humus Tanks Linked tasks in appendix 5 section 5	Earthy (Low)	Daily checks, general housekeeping, PPM once a month	Site Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale
Humus Chambers & Pumping	Earthy/humus (Low)	Daily checks, visually monitored	Tech 1s	Daily site rounds	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site

Table 4.4: Summary of routine odour mitigation tasks for assets under Sludge Treatment Centre Permit

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale
General		Ensure site is kept clean and tidy	Site Tech 1s Team Manager	Visual Inspection	Daily	Spillage identified	Clean up as soon as possible and no later than the end of the day.
		Any spillages to be cleaned up as soon as practicable	Site Tech 1s	Visual Inspection	Daily	Visual Checks Daily	Clean up spill

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale
		Site odour acceptability	Site Tech 1s	Qualitative assessment	Daily	Elevated odour on site identified.	Reports to Performance Manager at team huddle/SAP Plus entry where corrective action identified. For a spillage; immediate/asap resolution
Sludge Reception, Screening, Wash down & Drainage Linked tasks in appendix 6 section 1 and 2	Raw sludge (Low)	The sludge import area is located quite centrally on the site. Pumped into an enclosed tank. It is a fully sealed concreted area which facilitates spillage clean-up. The sludge Rotomats do block occasionally. They are unblocked as fast as possible and the rags cleaned away in to the skip. Ensure tankers are coupled correctly	Site Tech 1s	Visual Inspection	Daily	.Blockage	Escalate to find/clear blockage, clean any spill to site
Skip Management – Sludge import	Raw sludge (Low)	Skips removed within 24 when full.	Site Tech 1s	Daily visual checks. Skips removed as required	Daily	Visual	Changed regularly

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale
Sludge Thickening (drum thickener)	Sludge odours (Medium)	Ensure covers are on. Both the Picket Fence Thickener (PFT) and the drum thickener have hatches which need to remain closed to minimise odour release.	Site Tech 1s	Daily checks. Levels in the tank and flow rates monitored by HMI, Manual checks	Daily	Visual/Alarms	Cleaned regularly
Primary Raw Sludge Thickening & Pumping (PFT) Linked tasks in appendix 5 section 8.2	Sludge (Low)	Ensure covers are on. The PFT is known to be at risk of septicity if sludge is retained in the tank too long. This can happen if there are high levels of sludge imports. The sludge imports take priority and the PFT desludge is inhibited. A quick response would be to divert imports for a time, or if the tank is really septic it would have to be drained or tankered out.	Site Tech 1s	Visual inspection	Daily	Visual/.Blockage	Escalate to find/clear blockage, clean any spill to site
Sludge Blending & Mixing Linked tasks in appendix65 section 3	Raw sludge (Low)	Tank covered, level are checked via HMI, levels also visually checked. Constantly mixed, low impact.	Site Tech 1s	Visual inspection	Daily	Visual/.Blockage	Escalate to find/clear blockage, clean any spill to site
Return Liquors	Sludge odours (Low)	Covered and connected to OCU, daily visual check as per site rounds see appendix 5 & 6. Levels alarmed via WOCC.	Site Tech 1s	Visual inspection	Daily	Visual/.Blockage	Escalate to find/clear blockage, clean any spill to site

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale
Digester Feeding, Mixing & Discharge Linked tasks in appendix 6 section 6	Sludge (Low)	Enclosed, sludge levels monitored by HMI as per site rounds see Appendix 6.	Site Tech 1s	Visual inspection	Daily	Visual/.Blockage	Escalate to find/clear blockage, clean any spill to site
Secondary Digestion, Mixing & Discharge Linked tasks in appendix 6 section 7	Digested sludge/Earthy (Low)	Air mixed, constant movement, as per site rounds see appendix	Site Tech 1s	Visual inspection	Daily	Visual/.Blockage	Escalate to find/clear blockage, clean any spill to site
Dewatering Feed Tank	Digested sludge (Low)	The sludge buffer tank which feeds the beltpresses is an open tank, but it is air-mixed.	Site Tech 1s	OCU monitored by regional SCADA	Daily	Visual/.Blockage	Escalate to find/clear blockage, clean any spill to site
Beltpresses Linked tasks in appendix 6 section 12	Digested sludge (Low)	Enclosed building, odour controlled.	Site Tech 1s	OCU monitored by regional SCADA	Daily	Visual/.Blockage	Escalate to find/clear blockage, clean any spill to site

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale
Liquor Return Linked tasks in appendix 6 section 10	Digested Sludge (Low)	Covered and odour controlled Underground in pipes. Flow is monitored via local HMI. Volume is monitored daily. High level alarm on regional SCADA.	Site Tech 1s WOCC	Visual Inspection SCADA	Daily Continuous	Visual/.Blockage	Escalate to find/clear blockage, clean any spill to site
Cake Barn & Drainage (including cake imports) Linked tasks in appendix 6 section 16 and 17	Digested Sludge (Low)	Keep doors closed, fully enclosed and odour controlled Cake in storage forms a crust after a day or two reducing risk of odour. No additional turning or handling during cake storage. Imports subject to pre-acceptance checks.	Site Tech 1s	Visual inspection and routine OCU checks	Daily	Visual/.Blockage	Escalate to find/clear blockage, clean any spill to site
Vehicle Movements & Wash Down Linked tasks in appendix 6 section 17	Digested Sludge (Low)	wheelwash and covered vehicles, manual cleaning available	Biorecycling	Visual inspection	Daily	Visual/.Blockage	Escalate to find/clear blockage, clean any spill to site
Biogas Storage Linked tasks in appendix 6 section 8	Methane odourless, slight H ₂ S (Low)	Enclosed system, gas bag storage	Site Tech 1s	SCADA - There are multiple alarms for gas bag pressure on regional SCADA	Daily	Visual/.Blockage	Escalate to find/clear blockage, clean any spill to site

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale
CHP Linked tasks in appendix 6 section 9	Exhaust (Low)	Maintained by CHP, local HMI, failure alarm	CHP team	Monitored on SCADA	Daily	visual/alarms	Escalate, clear
Boilers Odour control packages Linked tasks in appendix 5 section 9	Exhaust (Low)	Inspected by contractors twice a year, checked on daily rounds.	Contractors	Visual inspection	Daily	visual/alarms	Escalate, clear
	Digested sludge (low)	Routine monitoring undertaken by contractor and daily site rounds carried out by ops	Contractors Site Tech 1s	routine inspections Visual inspection	Monthly Daily	visual/alarms	Escalate, clear

Table 4.5: Intermittent, abnormal, and emergency events for assets under UWWTD

Process stage	Event	Status	Ops mitigation	Odour risk after mitigation
Storm & Balancing Tanks	Storm tanks manually emptied, have to be pumped out.	Ab	Manual pumping out for storm return	L
Screens & Screening Conditioning, Drainage & Rag Skip Management	Screens blocked	Ab	Unblock and return to service ASAP	L

Process stage	Event	Status	Ops mitigation	Odour risk after mitigation
Grit Removal Equipment, Drainage & Grit Skip Management	Summer/hot weather grit skip becomes more odorous	Ab	Replace skip, take old one off site. Hose down area to clear up fallen material. Skips to be removed the next day.	L
Primary Settlement Tanks	Blocked tank	Ab	Clear blockage and drain tank, possibility for contactor cleaning	M
Primary Settlement Tanks	Summer/hot weather low flows	Ab	Take PST(s) out of service to decrease retention time	M
Primary Raw Desludge Pumping	Blocked line potential spills from chamber	Ab	Jet line	L
Primary Filters	Rotation failure	Ab	Repair, return flow to filters	L
Primary Humus Tanks	Bridge failure- rising sludge	Int	Tank drained with detritus, direct flow to other tanks,	L
Secondary Filters	Rotation failure	Ab	Repair, return flow to filters	L
Secondary Humus Tanks	Bridge failure- rising sludge	Int	Tank drained with detritus, direct flow to other tanks,	L

Table 4.6: Intermittent, abnormal, and emergency events for assets under Sludge Treatment Centre Permit

Process stage	Event	Status	Ops mitigation	Odour risk after mitigation
Sludge Reception, Screening, Wash down & Drainage	Rotomat blocked	Ab	Unblock and return to service ASAP	M
Sludge Reception, Screening, Wash down & Drainage	Spillages	Ab	Immediate clean up	M
Primary Raw Sludge Thickening & Pumping	Septic sludge	Ab	Tanker out	M
Return Liquors	Pumps failure	ab	Repair failure, export liquors to another site, spares kept on site	L
Digester Feeding, Mixing & Discharge	pH dropping, sick digesters	Ab	Reduce feed and maybe reseed	M
Digester Feeding, Mixing & Discharge	Operation of Whessoe due to CHP failure or other reasons	Ab	Repair CHP and reduce feeding of digesters	L
Secondary Digestion, Mixing & Discharge	Septic sludge from digester problems	Ab	Tanker out (same as for digesters)	L
Emergency storage tanks	In use	Ab	Emergency use	L
Dewatering feed tank	Air mixing failure	Ab	Fix fault consider to use of temporary mixing	L
Cake barn and drainage	Damage to roller shutter doors	Ab	Repair door asap	L
Cake barn and drainage	Damage to internal gas monitor resulting in open door	Ab	Replace monitor asap	L

Process stage	Event	Status	Ops mitigation	Odour risk after mitigation
Waste Gas Burner	If producing excess gas and burner fails	Ab	Repair burner	M
OCU	OCU failure	Ab	Alarm sent to WOCC who notify ops	L

Table 4.7: General Intermittent, abnormal, and emergency events

Incidents and emergencies	Event	Status	Ops mitigation	Odour risk after mitigation
Fire	Failure of OCU fans or sludge building	E	Stop imports, tanker from site.	Low/Medium
Severe weather	Transport of sludge from site inhibited resulting in back up of sludge in site resulting in additional odour release from tanks and PSTs	E	Event unlikely as there is provision for two weeks storage on site	Low
Flooding	Flooding causing process or equipment problems	E	Not an identified problem at Bracknell. Site incident procedures would be followed.	Low
Illness/absence of key staff	Accumulation of sludge/loss of odour control etc.	E	Task allocation is independent of individual staff.	Low
Power cuts	Loss of power to fans leading to loss of odour control	E	Emergency power generation for critical activities until power restored.	Low
Other incidents	Transport of sludge to land inhibited for other reasons leading to back up of sludge in site resulting in additional odour release from tanks and PSTs	E	Provision for two weeks storage on site. Transport to other STWs if necessary	Low

4.4.3 Spillages

Spillages significant enough to cause odorous emissions will be cleared as soon as practicable. The person discovering the spillage will inform site management, who will utilise resources as required to clear it.

Spill response guidance is also available in the Pollution Prevention Essential Standard at [Environmental Management System - Pollution Prevention \(sharepoint.com\)](#).

4.5 Routine Monitoring

Overall plant performance is assessed daily as part of the generic Site and Sludge inspections rounds, which apply to Thames Water large STW sites, and have been included in Appendices 5 and 6, respectively.

The objective of these are to ensure that treatment processes, including odour control, are checked for effective operation as per the SOM. Any of the checks that result in performance of the process outside of the limits defined in the SOM or a fault being detected will require an Operator to change the process to bring the plant back into acceptable limits or the fault needs to be logged and reported for follow up maintenance/repair.

Various process parameters are monitored using a combination of online instruments (to measure flows, temperatures, pressures, levels); samples that are taken to our UKCAS accredited laboratories, or run through sampling tests at the on-site laboratories (%DS, pH, alkalinity, ammonia).

The online instruments all have signals that are taken back to the site SCADA system and these 'alarm' if the readings are outside pre-set trigger points. Similarly, laboratory analysis samples will have expected ranges, which if outside of these, a notification is sent to the site process controllers.

In all instances that parameters are out of 'range', the operational teams will carry out an investigation to understand the cause and initiate corrective actions. If the reasons are not obvious, the process optimisation team is contacted to evaluate further.

Additionally, each week the various recorded parameters are recorded in the site Cockpit reports to look at trends. These are used to establish if there are gradual changes in performance over time so that early intervention can be carried out.

A range of process parameters are subject to routine monitoring or checking to ensure that the digestion process is operating optimally.

- pH: At a conventional digestion site such as Bracknell the processes is maintained around pH 7 but within the range 6.72 – 7.6 (this is % dry solids and digester load dependant) for healthy operation.
- alkalinity: Levels dependant on feedstock characteristics (primary sludge: surplus activated sludge (SAS) ratio). Conventional digestion typically, 3,500 - 5,000mg/litre range.
- temperature: minimum target of 38°C. This is maintained within the range 36-40°C.
- Hydraulic Retention Time(HRT): minimum target is 15-days, there is no upper limit. Retention times shall not be less than 12-days during plant outages to keep the product pathogen kill efficiency control.

- OLR (organic loading rate): see table below - this is dependent on the primary/SAS ratio. Bracknell fits into the first row of the table.
- Dry solids feed: see table below. Bracknell has a target of 6% dry solids but this can vary between 3-8% and impacts the HRT.

Type of Digestion	0%- 35% SAS ^x	36%- 45% SAS	46%- 50% SAS	51%- 55% SAS	>55% SAS	Max Feed %DS
MAD* in Conventional Digestion	3	2.5	2	1.75	n/a	6
MAD after Pre-pasteurisation	4.5	4	3.5	3	n/a	7
MAD after Acid Hydrolysis	4.5	4	3.5	3	n/a	7
MAD after Thermal Hydrolysis	7	6.5	6	5.5	5.5	14

* mesophilic anaerobic digestion

^x surplus activated sludge, arising from the UWWTD treatment route.

- VFA (volatile fatty acid) concentration: There is no specific range for VFAs as it depends on the feedstock. It is used as an indicator of digester health rather than a process control. The production of organic acids depends on the volume of solids fed to the digester. The typical range for VFAs in a primary digester is between 50 and 800 mg/L. When VFA concentrations climb above 1000 mg/L, the digester could be overloaded or experiencing other problems.
- Ammonia - Ammonia concentrations of 50 to 1000 mg/L are beneficial, but ammonia levels of 1500 to 3000 mg/L (pH greater than 7.4) could be inhibitory but not always. An ammonia concentration higher than 3000 mg/L for prolonged period is toxic.
- VFA to Alkalinity ratio: Very important parameter to monitor for digestion process. The VFA to alkalinity ratio of below 0.4 is good and above this threshold value means diminishing alkalinity and low pH i.e. sour digester content. As long as this ratio is maintained higher VFA and alkalinity digester content can be acceptable and the digestion process is deemed healthy. Anaerobic digestion process is always controlled based on holistic parameters based but not based on single parameter.

Sniff Testing

Sniff testing has been incorporated into our Odour Improvement Plan (Appendix 2). This is to allow time to ensure that the most effective sniff testing can be carried out using personnel not sensitised to smells on site.

The procedure will be undertaken in response to complaints or if a risk of odour nuisance at sensitive receptors is expected and/or has been substantiated.

- Sniff testing will be carried out at by someone not routinely based at site, who are less sensitised to odour produced on site.
- Assessing potential odour sources within the Urban Waste Water Treatment (UWWT) and Sludge Treatment Centre (STC) processes and attempt to trace the odour to its source.
- The procedure and recording form which will be used can be found in appendix 7 of the OMP.

Further details of routine monitoring tasks are included in the Site Operating Manual.

4.6 Record Keeping

Records of routine monitoring, site and sludge inspection rounds and sludge blanket checks are kept on SAP. Records of skip management, and any spillages and remedial actions are held in the ELogbook. Sludge blanket levels are recorded on run charts and electronically via the Cockpit.

A monthly condition report on the OCU is sent to the team manager by the contractor and stored on SharePoint.

4.7 Emergency Response and Incident Response Procedures

Emergencies such as fire, flood and severe weather are managed by Thames Water's Incident Management and Business Resilience team. The processes employed can be found on Thames Water's SharePoint site and are entitled: 'Incident Management Arrangements'. This is a company confidential document and therefore, is not included in the Appendices of this document.

Hazard reporting and accidents are all recorded on the Health and Safety software database SpheraCloud (<https://sphera.com>) and monitored by Thames Water's Safety, Health & Wellbeing team.

In the event of power failure, the site will run on island mode for critical plant. However, as this doesn't include the odour control units there is a potential temporary risk of odour until power is restored.

Absence of key staff should not affect the running of Bracknell STW, as Tech 1s from other sites can be called upon to cover, if required.

Irrespective of such constraints, our Operations Team and odour contractor have recommended consideration of the following techniques either proactively (so accompanying planned or reactive works with known odour risk) and in an investigative capacity attached to an incident:

- (a)** Targeted use of 'Jerome' hydrogen sulphide analysers
- (b)** Targeted use of sniff tests ('calibrated nose')
- (c)** H₂S measurements of stored materials where septicity is either present, or the material is at risk of septicity from continued storage especially in the open air, for example, prior to de-watering where measurements of sulphide & dissolved O₂ would inform a condition assessment. Quantities and storage times precipitating a need for such assessments. This recommendation is being raised with the Area Process Scientist.
- (d)** Inclusion of temporary odour suppressants/misting agents and continued access to process critical spares (odour minimisation by early intervention).
- (e)** Further expansion of odour risk within site incident planning (this is already referenced in Tables 4.5, 4.6 & 4.7 under relevant Intermittent; Abnormal Operation & Emergency scenarios)
- (f)** Temperature assessment in secondary digestion tanks on the basis that increased temperatures give greater potential for volatilisation of odours
- (g)** For PSTs, asset condition (wear/damage) would consider odour risks where assets are taken offline
- (h)** Telemetry/alarms of whessoe valve releases – there is an existing phased project within TWUL to enhance this at our sludge locations

5 Maintenance and Inspection of Plant and Processes

5.1 Routine Maintenance

5.1.1 General Requirements

Site staff have a schedule to ensure routine maintenance for key mechanical items. In addition, a dedicated maintenance team provide additional support for more specialised equipment, e.g. regular calibration of Dissolved Oxygen probes.

In addition to the routine operational tasks, planned preventative and defect maintenance of plant is carried out. Plant which may have an impact on odour release is assigned an appropriate criticality rating to ensure effective performance is maintained. Plant assessed to be odour critical is listed in Section 4.2.3 above.

All maintenance is captured on the corporate system SAP, which generates work requests for the various activities for the treatment process assets at the appropriate frequency

5.1.2 OCU Selection and Performance Validation

Sludge OCU (OCU 2) A10 Serves the Sludge belt filter presses, conveyors, the liquor balancing tank, liquor pumping station 2 and the cake barn

Biofilter

Original manufacturer	ATS Air Technologies system
Height x Width x Length	Ø2,500mm x 5,500mmH
Inlet duct diameter	Ø300mm
Media	LavaRok
Design Airflow rate (estimated)	2,546 Am ³ /hr
Design H ₂ S inlet load	847 ppm (max) 150 ppm (average)
Design removal efficiency	98%
Irrigation type	Timed

Carbon filters

Height x Width x Length	2 off 2 off Ø3,000 mm x 6,500 mmH
Inlet duct diameter	Ø300mm
Media	Carbon
Design Airflow rate	40,716 m ³ /hr
Design H ₂ S inlet load	2 ppm (max) 2 ppm (average)

Design removal efficiency	99%
Duty/stand by fan	2x duty stand by fans
Stack discharge volume	9m/s

Nominal design back calculated by ERG

For continuous monitoring:

- OCU failed alarm sent through to WOOC

For periodic operational monitoring:

- Inlet and outlet Hydrogen Sulphide concentrations recorded and assessed for removal efficiency and below maximum designed inlet loading during monthly inspections. Following the monthly inspections, hydrogen sulphide concentrations are trended by ERG which would enable identification of a decrease in H₂S removal. Should this occur, ERG would include this in the recommendation section of their inspection report, for example media replacement.
- System integrity checked during daily site rounds and monthly inspections to confirm extraction points and routes undamaged.

Evidence of the systems continuing ability to treat the input flow are confirmed by monthly inlet and outlet odorous gas (hydrogen sulphide) concentrations. Examples of such reductions are given in 5.1.3 iii) of the OMP

There is an additional OCU (OCU 1)A11 on site that is currently not operational, however is due to be upgraded as part of the WAP programme as indicated within the Odour Improvement Plan (Appendix 2).

5.1.3 Maintenance and Monitoring of Odour Control Units

At Bracknell STW there is a service contract with a specialist Contractor for the OCU. They carry out monthly inspections of the OCU. The detail below highlights the scope of work required from our OCU Maintenance Contractors through their monthly visits.

Operation and maintenance of OCUs is delivered in accordance with the Company's Asset Standards and Equipment Maintenance Standards. This is either delivered in house by Operations or outsourced to contractors. Refer to the Odour Control Unit Asset Standard and Site Operating Manual for more information. The scope of this table includes anticipated monitoring requirements of emissions to air from the OCU outlets; TWUL's own site round checks as they pertain to OCUs; followed by a further five key performance indicators reflecting discussion with our specialist OCU inspection contractor as of greatest relevance to Bracknell.

Table 5.1 : Performance Monitoring and Maintenance Checks

Parameter	Monitoring Method	Action if red flag identified and Expected timescales	Frequency	Biofilter	Carbon	Chemical scrubber
Performance monitoring						
Gas inlet temperature (5-40C)	Temperature probe	Investigate any anomalies relating to temperature, such as individual process checks	Monthly	X	X	X
Gas outlet temperature (5-40C)	Temperature probe	Investigate any anomalies relating to temperature, such as individual process checks				

Version 2.1

Gas inlet flow rate or velocity (6m/sec)	Calibrated velocity meter	Investigate any anomalies relating to flow rates; velocities and pressure drop across the system by measuring the inlet and outlet pressure. Check fan functionality; presence of obstructions; bring forward contractor service. If fan replacement needed c. 2* months minimum typical duration depending on severity of issue/condition of back up fan (*time of order to mobilisation; assumes second duty fan runs; timescale includes time to install replacement and fabrication). If solely an electrical issue, recourse to TWUL ICA Technician mostly likely within a week. Other root causes are usually blocked media; duct and failure of non-return dampers around fan sets.	Monthly	X	X	X
Gas outlet flow rate or velocity (6m/sec)	Calibrated velocity meter		Monthly	X	X	X
Gas inlet humidity (Post biofilter humidification > 90% Carbon units <70%)	Hygrometer	Check any preheaters fitted to system before carbon, or check irrigation is working on biofilter.	Monthly	X	X	-
Back pressure (to assess media thatching or media compaction) Typically systems work around 0.5 kPa	Calibrated digital pressure meters	Values above threshold would be 'RAG' banded in the OCU contractor inspection reports. If pressure gauges are over-pressurised to the extent fouling is or has occurred to be treated as high priority. Check for blockages, poor FFE quality/check if media is of a type susceptible to biodegradation.	Monthly	X	X	X
pH of discharge irrigation water (2-3pH)	pH paper	Less than 2 increase irrigation.	Monthly	X	-	-
pH of scrubber liquor (9.2 pH)	Calibrated pH probe (calibrated with standard solutions)	Recalibrate pH probe and check dosing and chemical availability	Continuous	-	-	X
Redox potential of scrubber liquor (700-730 mV)	Calibrated redox probe (calibrated with standard solutions)	Recalibrate redox probe and check dosing and chemical availability	Continuous	-	-	X
Gas inlet/outlet concentrations for hydrogen sulphide (50ppb used for media change out)	Drager Tubes/CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11 *	Check functionality of odour control unit. If repair or replacement media required raise a job on SAP or APS risk and arrange for contractor repair. Timescale Bespoke to root cause/see later entries. Arrange re-test post remedial work. Major repairs up to 6 months depending on complexity	Monthly/ 6 monthly	X	X	X
Gas inlet/outlet concentrations for ammonia (20mg/m3)	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis *	Check functionality of odour control unit. If repair or replacement media required raise a job on SAP or APS risk	6 monthly	X	X	X

		and arrange for contractor repair. Timescale Bespoke to root cause/see later entries. Arrange re-test post remedial work. Major repairs up to 6 months depending on complexity				
Gas inlet/outlet concentrations VOCs and RSH	RSH – Drager tubes VOC – PID as isobutylene		Quarterly	x	x	x
Maintenance checks and inspections						
Check integrity of tank covers for damage and ensure access hatches are closed		Close hatches ASAP	Daily	X	X	X
Check building & door integrity for damage or leakage; doors closed (if required)		Closed doors ASAP	Daily	X	X	X
Check damper positions on ductwork are in the correct positions		Correct positioning	Daily	X	X	X
Check irrigation and humidification systems are functioning		Turn on systems or investigate malfunction.	Daily	X	-	-
Check for free discharge of effluent from drain		Investigate blockage	Daily	X	-	-
Check irrigation water supply is working at required rate		Visual check on flow gauge, investigate if required.	Monthly ¹	X	-	-
Check condensate removal points for free flow of liquid		Visual check	Daily/Monthly ¹	X	X	X
Check OCU condition for signs of damage or leaks		Call specialist contractor if identified	Daily / Monthly ¹	X	X	X
Check general ductwork for signs of damage or leaks		Condition of ductwork would be 'RAG' banded in the OCU contractor inspection reports. If broken, then odours not being conveyed to OCU and can be indicated by low inlet load. Worst case the ductwork is disconnected ('sucking air') such that odour removal is not taking place.	Daily / Monthly ¹	X	X	X
Check spray pattern from irrigation nozzles and clean nozzles as required		Adjust spray pattern, clean the strainer and unblock nozzles or replace as deemed necessary. Timescale durations of c. 2 weeks where just irrigation required.	Daily / Monthly ¹	X	-	X
Check flexi joints between fans and ductwork for leaks		Contractor inspection reports 'RAG' band these issues with a level of detail to then inform the maintenance response. Timescale durations of 1 to 2 months typical depending on	Monthly	X	X	X

	complexity (time of order to mobilisation)				
Check fans for excessive vibration or noise, belt tension and bearing temperature	Contractor inspection reports 'RAG' band these issues with a level of detail to then inform the maintenance response. Timescale durations of 1 to 2 months typical depending on complexity (time of order to mobilisation)	Monthly	X	X	X
Check irrigation water pH	Contractor inspection reports 'RAG' band these issues with a level of detail to then inform the maintenance response. Timescale durations of 1 to 2 months typical depending on complexity (time of order to mobilisation)	Monthly	X	-	-
Check irrigation pumps condition and operation	Contractor inspection reports 'RAG' band these issues with a level of detail to then inform the maintenance response. Timescale durations of 1 to 2 months typical depending on complexity (time of order to mobilisation)	Monthly	X	-	
Check chemical reagent levels and supply	Order when required. Ensure no low-level alarms.	Weekly	-	-	X
Check chemical dosing and blow down pump condition and operation	If outside pH levels, investigate. Initiates blow down to correct level.	Daily/Monthly	-	-	X
Check blow down rate is within correct range	If outside pH levels, investigate. Initiates blow down to correct level.	Monthly	-	-	X
Check ph and Redox probes are working and in calibration	Contractor inspection reports 'RAG' band these issues with a level of detail to then inform the maintenance response. Timescale durations of 1 to 2 months typical depending on complexity (time of order to mobilisation)	Monthly	-	-	X
Check recirculating liquor strainer and replace if necessary	Flows recorded on SCADA	Monthly	-	-	X
Check water softener is working correctly (if installed)	Water hardener test papers used to check water quality.	Monthly	-	-	X
Check dampers are operational and in good condition	Swap over duty fan to stand by fan and record flow volumes to identify issue.	Monthly	X	X	X
Inspect electrical control panel and check for faults and alarms	Visual inspection by monthly contractor and investigation any alarm conditions.	Monthly	X	X	X
Simulate duty / standby fan and pump changeover	Contractor inspection reports 'RAG' band these issues with a level of detail to then inform the maintenance response. Timescale durations of 1 to 2 months typical depending on	Monthly	X	X	X

	complexity (time of order to mobilisation)				
Check H ₂ S meter is functioning and calibrated (if installed)	Check calibration is still in date during monthly contractor inspection.	Monthly	X	X	X

**Only on OCU's that fall within the STC permit*

Condition of the media in the OCU is monitored by performance checks and by additional testing as required.

The OCU is currently inspected on a monthly basis by a contractor and reports are sent to the team manager. Figure 5.1 below highlights the scope of work required from our OCU Maintenance Contractors through their monthly visits. Monitoring during the visits is as follows:

- Monthly – flow (m³/h), differential pressure(kPa) and hydrogen sulphide(ppm) at both the inlet and outlet. Where applicable, monitoring may also include fan hours run and removal efficiency of hydrogen sulphide.
- Quarterly – VOC(ppm) and mercaptans(ppm) at the inlet and outlet.

The OCU is specifically designed to minimise the release of odour, bioaerosols and microorganisms.

Optimum flow rates; trigger levels; odorous components/concentrations in the gas stream and associated physical properties are all important to OCU function and are described below:

(i)Optimum flow rate through the system to allow for effective treatment.

A '**Maximum velocity in duct work**'; rather than volume; is the key design aspect informing effective treatment for new/existing OCUs. Not exceeding 10m/second in a piece of ductwork will avoid noise break out; the industry benchmark for new plant being 8m/second. Given velocity is directly related to the volume; the specification is +/- 20% to reflect instrumentation variation; and therefore the OCU is checked to see **if they can meet 6m/second** with escalation in monthly contractor inspection reports where this value is not reached. This is a good indicator of functionality, appropriate sizing, and system health.

ii) The trigger levels/ranges for action if processes monitoring parameters are breached/ outside optimal parameters.

All OCUs, irrespective of media type, *will stipulate a minimum of 30 seconds retention time*, for a biofilter to achieve a minimum of 95% removal efficiency. A minimum of 2-3 seconds retention time for a carbon filter is stipulated.

H₂S readings are reported in the monthly service reports which inform odour equivalents (OEs). The accepted OEs for H₂S at 0.5 part per million is equivalent to 1,000 odour units. A "red action" would be raised for any value 3 parts per million on the discharge from the biofilter and 0.5ppm from the subsequent carbon filter. There is a relationship between increases in discharge efficiency from the biofilter since if this rises it will start to exhaust the carbon filter defining the red action. Contextual knowledge must inform any triggers for action; rather than focusing on a single value. Where there is a single stage OCU the 'red action' would be raised for any value 0.5ppm from the OCU.

Trigger levels are more difficult to identify for other parameters, such as mercaptans and ammonia since the design assumptions for OCUs are informed by H₂S removal. Removal for these parameters is therefore limited. For Total VOCs, *in respect to methane rather than small chain VOCs*, there is no removal.

From a qualitative value, from visual inspections, 'red flags;' would include if irrigation pipework to the biofilter is broken (no water entry to media); neither extraction fan running; broken ductwork leading to the OCU sucking in atmospheric air.

On identification of such red flags, such that the effective function of the OCU is at risk of being compromised, the following actions would be taken:

- (i) For significant issues relating to any aspect of 'condition monitoring' - including effective function of the biofilters - impacting upon parameter reductions at the inlet/out; differential pressures or irrigation volumes – the Performance Manager would urgently contact Head of Maintenance at ERG to book in reactive maintenance attention. Timescales would be of highest priority but response times/duration dependent on the issue identified
- (ii) For issues relating to housekeeping (leaks) or issues relating to OCU power supply (electrics) – for example, impacting either fan operation - these would be referred to a TWUL Electrician for assessment and either rectified by the area operational team or escalated to an external contractor where repairs are more complex. Timescale for expectation of resolution would typically be within 24 hours.

For either (i) and (ii) if any significant pollution risk (odour) was identified the Performance Manager would contact TWUL's incident help desk. A supporting risk would be recorded in APS (risk assessment software) to support funding where a need for remedial works was identified.

iii) Odorous components in the gas stream and concentrations of emissions

The monthly contractor inspections of each OCU provide data for H₂S; VOC; Mercaptans (R_sH). The sampling methodology being Drager (gas analysis) tube for c. 30 seconds to 2 minutes duration.

To achieve an appropriate level of surveillance on OCU performance, outside of the contractor monthly inspections, there is additional oversight from the Operations Management Team through

- Daily site rounds by Thames Water technicians. These are Psion based checks using SAP Plus for escalations including, for example, internal MANDAT tickets or identifying a need for contractor support. The tasks in the daily checks mirror the numbered tasks in the contractor 'Monthly Health Checks'. See Figure 5.1 and section 9 in Appendix 5 in the OMP.

iv) Physical properties of the air stream at point of control i.e., humidity, optimum temp, pH for effective odour control

For **humidity**, *the gas is humidified before being received by a biofilter*, so this parameter has less relevance. Biofilters post humidification standard being > 90%. Carbon units humidity standard should be set at <70%.

For **temperature**, this is fairly constant throughout the year as this is informed by the need to achieve fairly constant temperatures in the digestion process. A range of 20 to 40°C being standard.

pH will be slightly variable depending on the H₂S that is there from the condensing air stream contributing to SO₂ formation. This tends not to be an issue at the biofilter itself since the active component of the biofilter will in itself produce SO₂ as a waste product from converting the H₂S.

pH off a bio-scrubber is checked on the quarterly inspections since it might suggest an issue with the active component of the biofilter being impacted by the accumulation of its waste product thereby making the lower part of the bed inactive. A pH of 2 to 3 would be expected as a theoretical upper limit to liquor discharged from the biofilter but recorded values are significantly less; pH 4 to 5 being typical (reflecting the logarithmic scale). Note if efficiency of the process is being impacted; pH would also be part of the investigative checks (i.e., more than quarterly).

Figure 5.1 – Monthly OCU Health Checks

Monthly Health Checks

Biofilter

Please enter any comments you may have in the yellow comments boxes

Number	Task	Comments
1	Examine ductwork for any signs of damage or leaks and check condensate drains are free flowing	
2	Visually inspect the Odour control system will be made and any defects or deterioration of the housings will be reported.	
3	Check the airflow through the system and any anomalies investigated.	
4	Measure the pressure drop across the system by measuring the inlet and outlet pressure. Record any abnormalities	
5	Measure the contaminate levels (primarily H2S) at the inlet and at the stack	
6	Check visually all fans, check for excessive noise and report any necessary maintenance to be undertaken as applicable.	
7	Examine the irrigation system to ensure correct operation including spray pattern, clean the strainer and unblock nozzles or replace as deemed necessary.	
8	Take a sample of the drainage water and measure the pH value and compare to target pH value (this is not pH 7 for modern biotech)	
9	Check all hatches and doors for integrity and ensure they are closed	

Chemical Scrubber

Please enter any comments you may have in the yellow comments boxes

Number	Task	Comments
1	Examine ductwork for any signs of damage or leaks and check condensate drains are free flowing	
2	Check visually all fans, check for excessive noise and report any necessary maintenance to be undertaken as applicable.	
3	Visually inspect the Odour control system will be made and any defects or deterioration of the housings will be reported.	
4	Check the airflow through the system and any anomalies investigated.	
5	Measure the pressure drop across the system by measuring the inlet and outlet pressure. Record any abnormalities	
6	Measure the contaminate levels (primarily H2S) at the inlet and at the stack	
7	Check visually all fans, check for excessive noise and report any necessary maintenance to be undertaken as applicable.	
8	Examine the recirculation pumps and distribution pipework to ensure correct operation, clean the strainer and check trough / distributor.	
9	Carry out a functional check of the dosing system ensuring target pH and Redox are achieved, and validate the probe calibration using a handheld unit.	
10	Calibrate if necessary	
11	Visually check the seals of all hatches note any leaks	
12	Visually check the wet scrubber housing, note any significant deterioration	
13	Scrubber dosing cabinet - Check chemical dosing pumps for leaks	
14	Scrubber dosing cabinet - Check that dosing rates are correct	
15	Scrubber dosing cabinet - Check all valves, instruments and pipe-work for leaks	
16	Scrubber dosing cabinet - Check inside of cabinet for chemical residue and dirt and wash if necessary	
17	Scrubber dosing cabinet - After wash down check catch-pot high level alarm is working before draining	

Carbon Adsorber

Please enter any comments you may have in the yellow comments boxes

Number	Task	Comments
1	Examine ductwork for any signs of damage or leaks and check trapped condensate drains are free flowing. If a manual drain valve is provided, operate the valve until the flow of condensate ceases and leave valve in closed position.	
2	Check visually all fans, check for excessive noise and report any necessary maintenance to be undertaken as applicable.	
3	Visually inspect the Odour control system will be made and any defects or deterioration of the housings will be reported.	
4	Check the airflow through the system and any anomalies investigated.	
5	Measure the pressure drop across the system by measuring the inlet and outlet pressure. Record any abnormalities. Read off Delta-P gauge if fitted or using a portable manometer	
6	Measure the contaminate levels (primarily H2S) at the inlet and at the stack	
7	Check visually all fans, check for excessive noise and report any necessary maintenance to be undertaken as applicable.	

5.1.4 Records

Monthly OCU monitoring reports are sent to the Performance Manager and stored on SharePoint..

5.2 Fault Reporting

Faults identified during routine inspections are reported to the Team Manager who assesses criticality before entering the task into the job scheduling system for allocation to an appropriate person to a timescale appropriate to the criticality.

5.3 Emergency Repairs

24-hour maintenance cover is available at the discretion of the Team Manager or Duty Manager, with planned follow up.

Less urgent repairs are assessed for criticality and dealt with during normal working hours.

6 Customer Communications

6.1 Customer Odour Complaints Process

Customer contacts regarding Bracknell STW will be made via the Customer Services Centre, Operations will investigate and take appropriate action. Complaints may also be received from the local council and Environment Agency.

Customers / residents are encouraged to communicate with local Thames Water Operations via the Customer Centre to report if they are noticing odour from Bracknell STW, to ensure that all contacts are recorded and actioned. Customers have 3 main options to report complaints to Thames Water:

1. Thames Water Website – “Report A Problem” at <https://www.thameswater.co.uk/contact-us/report-a-problem/report-a-problem-online>.
2. Email - customer.feedback@thameswater.co.uk with the subject ‘Bracknell Sewage Treatment Works’
3. Telephone - Customer Services 0800 316 9800

If the customer / resident would prefer to contact either Bracknell Forest Council or the Environment Agency instead, their contact details are as follows:

- Bracknell Forest Council – Environmental Services
Telephone: 01344 352000
- Environment Agency – 0800 80 70 60

Customer contacts regarding Bracknell STW that are received directly on site are responded to by the local Operations team. The Performance Manager, at the earliest opportunity, will inform the Customer and Stakeholder Manager (CSM) of the contact details in order that they can ensure the complaint is captured and recorded by the Customer Services Centre.

Complaints received via Customer Services Centre:

- Complaint information is logged electronically by the Customer Services Centre.
- An action is raised to Waste Operations Control Centre (WOCC) who contact the CSM by telephone and email the complaint information to both the CSM and Performance Manager
- The Performance Manager and CSM will review the complaint and take action to investigate (see section 6.3)
- The CSM is responsible for contacting the customer and updating them on the outcome of the investigation.
- Any problems are noted and remedial work actioned. An update of action taken and feedback given to the customer is emailed to the WOCC by the CSM.
- The WOCC update the electronic complaint report and it is closed down.

Complaints received via email or post:

- Complaint information is logged electronically by Customer Relations and allocated a Case Manager.
- The complaint is emailed to the CSM who reviews the complaint and investigates with the Performance Manager (see section 6.3).
- Actions taken are emailed back to the Case Manager who updates the electronic system and updates the Customer.

Complaints received via Customer Centre out of normal working hours

- For a large number of calls, or serious concerns, the Out of Hours Coordinator will be contacted to respond.
- For all other calls Bracknell STW site management will investigate and respond the next working day.

6.2 Customer Communication Plan

The Customer Communication Plan in Appendix 3 identifies how and when contact will be made with customers and stakeholders in relation to stable, abnormal and emergency site operation.

6.3 Investigating a complaint

Upon receiving a complaint Thames Water have 24 working hours to respond to the customer with an update. Within these 24 hours, the Customer & Stakeholder Manager will contact the Performance Manager who will carry out an investigation to determine whether the odour source is coming from the Thames Water site. If the odour is decided to be from the Thames Water site, then the root cause is investigated.

Should the source of the odour be confirmed as coming from the Thames Water Operations then the Performance Manager will review all activities currently taking place on site, including any maintenance, cleaning, and non-standard activities to identify the root cause, and ensure appropriate mitigation measures are in place.

If the Performance Manager cannot identify the source of the odour, but complaints persist, the Customer & Stakeholder Manager will ensure the customer who made the complaint is contacted, and obtain further details. These details include their address in relation to the site location, the time of occurrence and for how long. If odour problems continue to persist, Thames Water may even ask the customer to keep a detailed odour diary to ensure their issue can be fully addressed.

The root cause investigation may include site walkaround checks, which look for irregularities such as spillages / open doors and hatches, ensuring appropriate measures as detailed in table 4.3-6 are in place. It may also include off-site visits to the Customer location.

When the root cause of the odour is found, the customer will be updated with an explanation and provided with a timescale for its resolution. Furthermore, the situation is assessed for hazards to determine any possibility of health risk to the local community.

To ensure any limitations regarding everyday staff becoming desensitised to the odour, if site odour complaints persist with no result in locating its source, personnel who do not spend prolonged time on a single site, such as the Area Operations Manager, will participate in the walkaround checks.

6.4 Notification of Operations with Potential to Cause an Odour Problem

Where operations may impact on local residents, notification will be made to the Customer Centre who will log the details on their Bulletin Board. This will be used to provide information directly to customers who call with queries. Letter drops may also be used.

The Environmental Health Officer of Bracknell Forest Council 01276 707100 will be contacted directly if there are risks of odour generation (e.g. digester cleaning, tank cleaning or process issues). NOTE: This will only take place on known sensitive sites where Local Authorities and the EHO are already involved

If notified by the Environment Agency that the activities are giving rise to pollution outside the site due to odour, Thames Water shall investigate and carry out a review of the OMP and appropriate measures if deemed necessary.

Appendices

Appendix 1. Odour Risk Assessment



Bracknell%20Odour%
20Risk%20Assessmen

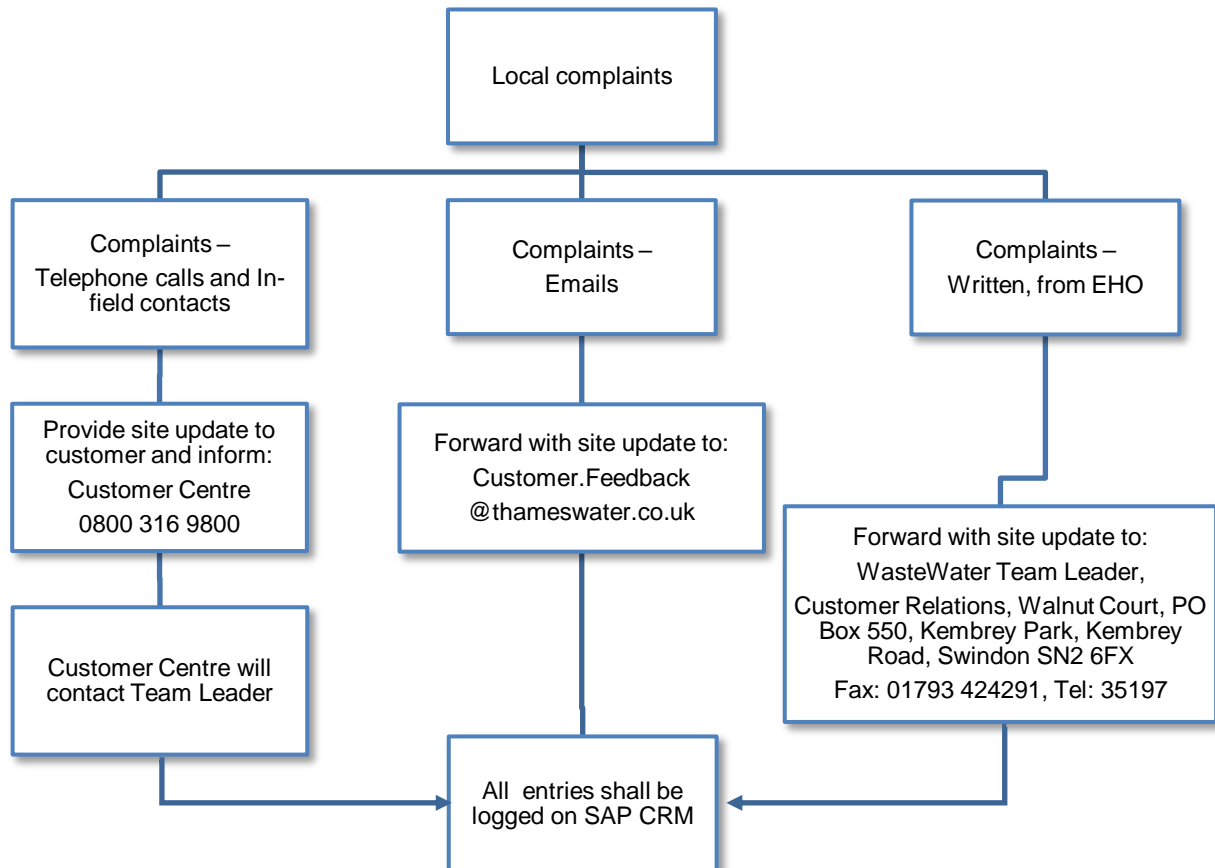
Appendix 2. Odour Improvement Plan

Process Stage	Owner	Summary - Plan	Action	Challenges	Measures to mitigate	Timescale for completion
WAP Programme	Mark McCoy	Project includes automated return of storm tanks and investigating automated cleaning systems		N/A	Manual clean of storm tank when required	AMP8
WAP Programme	Mark McCoy	Project includes replacement/refurbishment of Sludge Tank OCU which is not currently operational		N/A	Sludge blankets kept to minimum, Sludge Daily site Rounds completed.	AMP8
OCU	Mark McCoy	Ongoing recommendations from ERG monthly inspections		Achieving funding		ongoing
Sniff Testing	Odour Specialist	Implement sniff testing procedure	Procedure written for	Resource	Site Round, Monthly health	6 months from permit issues

Appendix 3. Customer Communications Plan

Complaints Process

All locally received complaints are re-directed to the Customer Centre. Please see below for details.



IMPORTANT NOTE:		
Any communications received from the local Member of Parliament or senior council officers need to be forwarded to the Local/Regional Government Liaison person:		
Name:	Miles Evans	Huw Thomas
Telephone:	07747 647304	07747 640011

Communications

Level 1	Stable operations: Compliant with Operational Asset Standards.			
Communications Approach	Standard regular proactive contact with key stakeholders.			
Stakeholders External	Frequency of Contact	Method of Contact	Aim of Contact	TW Contact/Level
Bracknell Forest Council Environmental Health Department	As required but at least quarterly	Telephone / email / meeting	Update on operational activity on site	Performance Manager and Customer & Stakeholder Manager
Local residents associations (<i>if applicable</i>)	As required but at least annually	Telephone / email / meeting	Update on operational activity on site	Performance Manager and Customer & Stakeholder Manager
Environment Agency	As required	Telephone / email / meeting	Update on operational activity on site	Performance Manager and environmental permitting team
Stakeholders Internal	Frequency of Contact	Method & Level of Contact	Aim of Contact	TW Contact/Level
Press Office	As required	Report sent out by operations to the business	Update the business on operational activity on site	Duty Manager
Customer Centre (Swindon)	As required	Report sent out by operations to the business	Update the business on operational activity on site	Duty Manager

Level 2	Unstable operations: <ul style="list-style-type: none"> Non-compliant with Operational Asset Standards on one or more sub-processes leading to increased odour risk. 			
Communications Approach	As Level 1 plus: <ul style="list-style-type: none"> Use of Contact Centre Bulletin Boards/Briefing Contact Centre agents/Briefing statement with Q&A prepared for the press office (to use reactively). Monthly discussions with, and quarterly visits from, the EHO. Commence proactive communications with other stakeholders. 			
Stakeholders External	Frequency of Contact	Method & Level of Contact	Aim of Contact	TW Contact/Level
Bracknell Forest Council Environmental Health Department	Immediately then monthly	Telephone / email / meeting	Report unstable operation with action plan	Performance Manager and Customer & Stakeholder Manager
Local residents associations (<i>if applicable</i>)	Immediately then monthly	Telephone / email / meeting	Report unstable operation with action plan	Performance Manager and Customer & Stakeholder Manager
Environment Agency	Potential for notification procedure	As required as per notification procedure	As required as per notification procedure	Pollution desk
Stakeholders Internal	Frequency of Contact	Method of Contact	Aim of Contact	TW Contact/Level
Press Office	Immediately then weekly	Q&A prepared for press office by Operations	To enable the press office to deal with queries from the press (reactive only).	Duty Manager
Customer Centre (Swindon)	Immediately then weekly	Telephone / email	To enable the Customer Centre to deal with queries from the press (reactive only).	Duty Manager
Other areas/stakeholders outside Bracknell STW potentially impacted				
Stakeholder	Frequency of Contact	Method of Contact	Aim of Contact	TW Contact/Level
Local businesses	Immediately then monthly	Telephone / email / meeting	Report unstable operation with action plan	Performance Manager and Customer & Stakeholder Manager

Level 3	Emergency <ul style="list-style-type: none"> Temporary or transient activities not deemed to be compliant with Operational Asset Standards. High risk of odour emitting plant. 			
Communications Approach	As level 2 plus: <ul style="list-style-type: none"> Odour event set up internally (including OOH's cover from OMC (Kemble Court)). Weekly discussions with EHO. Monthly Stakeholder meetings, (internal and external – include MPs, Councillors, schools, businesses etc.). Press release may be required. 			
Stakeholder External	Frequency of Contact	Method of Contact	Aim of Contact	TW Contact/Level
Bracknell Forest Council Environmental Health Department	Immediately then weekly	Telephone / email / meeting	Report emergency event with action plan and update with progress	Level 5 Manager (Operations Manager) / Level 4 Manager (Regional Operations Manager)
Local residents associations (if applicable)	Immediately then monthly	Telephone / email / meeting	Report emergency event with action plan and update with progress	Performance Manager and Customer & Stakeholder Manager
Councillors / Local MP	Immediately then monthly	Telephone / email / meeting	Report emergency event with action plan and update with progress	Level 5 Manager (Operations Manager) / Level 4 Manager (Regional Operations Manager)
Environment Agency	As required as per notification procedure	As required as per notification procedure	As required as per notification procedure	Pollution desk
Stakeholders Internal	Frequency of Contact	Method of Contact	Aim of Contact	TW Contact/Level
Press Office	Immediately then daily	Q&A and press release prepared by press office	To enable the press office to deal with reactive queries from the press and prepare a media strategy if required.	Duty Manager
Customer Centre (Swindon)	Immediately then daily	Telephone / email	To enable the Customer Centre to	Duty Manager

			deal with queries from customers (reactive only)	
Other areas/stakeholders outside Bracknell STW potentially impacted				
Stakeholder	Frequency of Contact	Method of Contact	Aim of Contact	TW Contact/Level
Local businesses	Immediately then monthly	Telephone / email / meeting	Report emergency event with action plan and update with progress	Process / Site Manager

Appendix 4. Site Drawings

Figure A - Site Location Map



Figure B - Site Plan

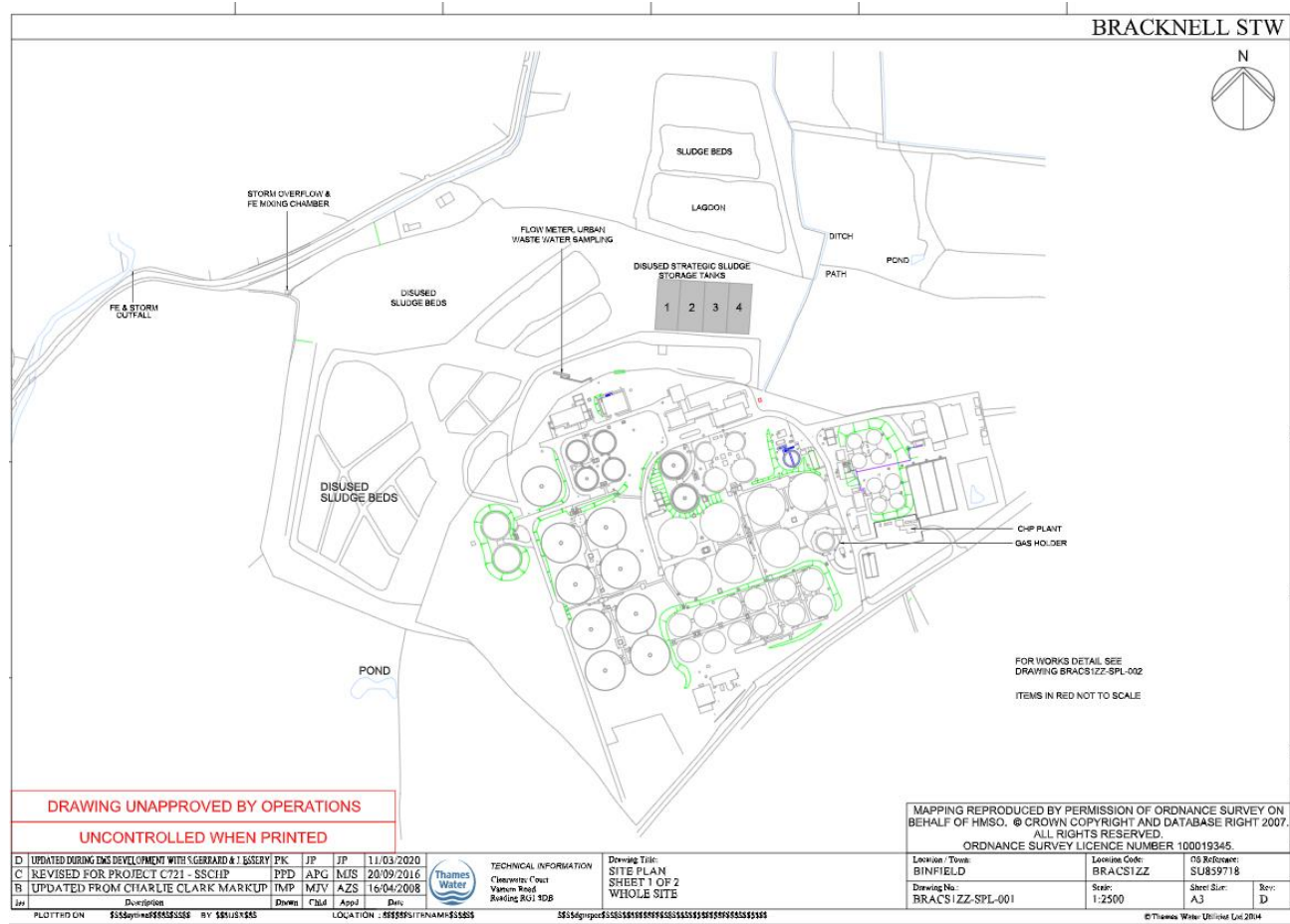


Figure C - Area Permitted under Sludge Treatment Centre Permit

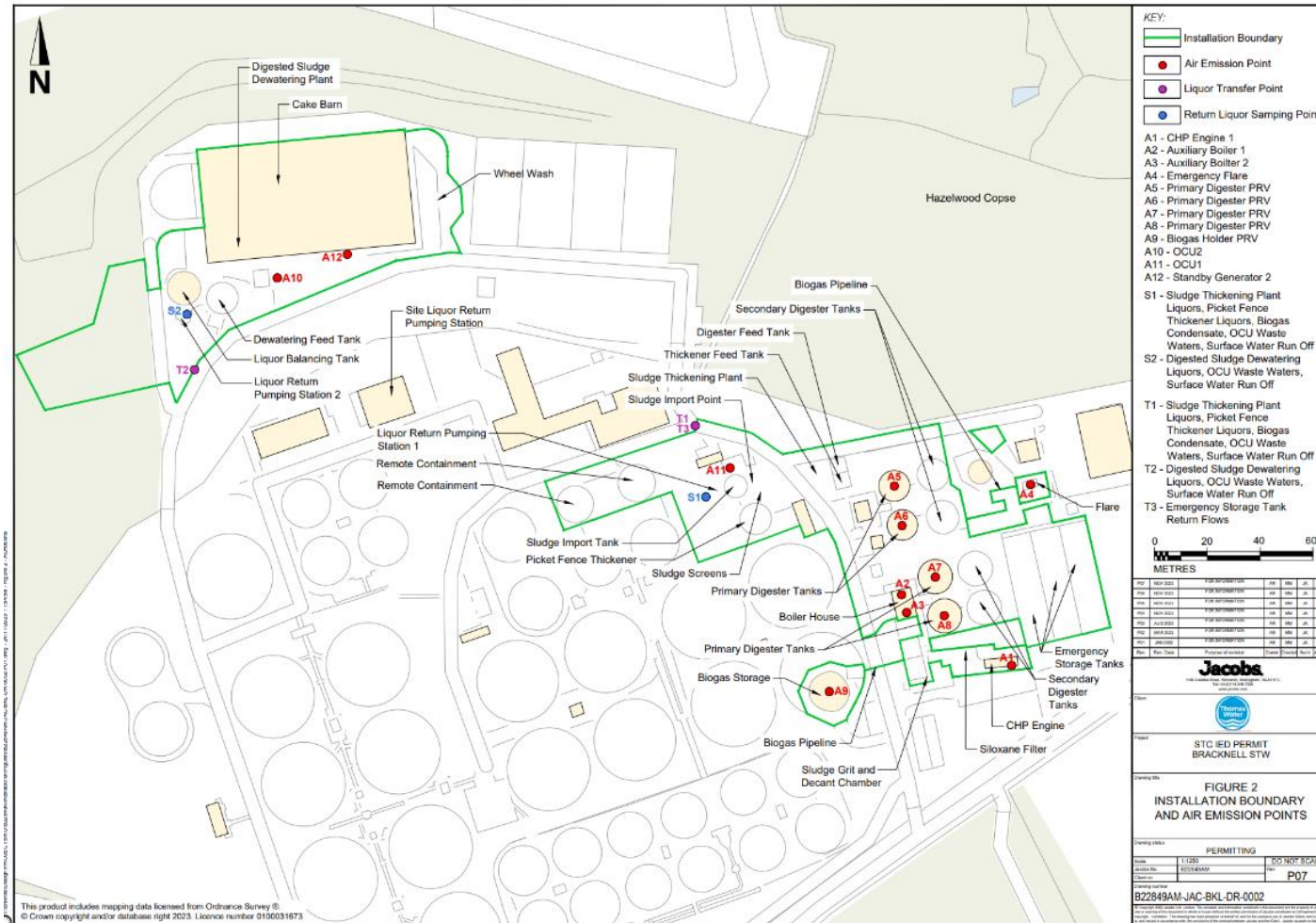
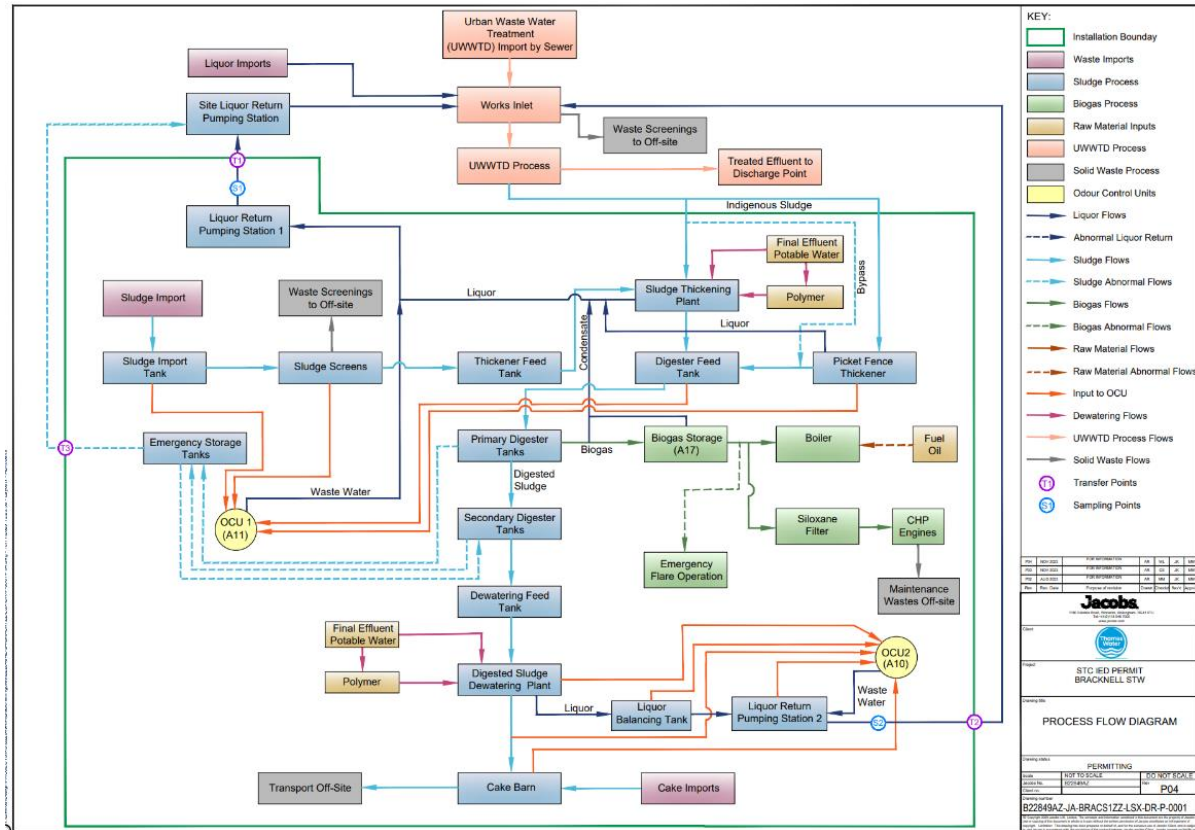


Figure D - Process Block Diagram

Figure E - Process Block Diagram for Sludge Treatment Centre Permit



Appendix 5. Site Rounds

ID	Instruction	Daily	Weekly
1	Final Effluent		
a)	Check the effluent quality at the sample point. Sample (ammonia, phosphorus, temperature & turbidity) in accordance with SOM. Record in site log book & via Direct Text.	X	
b)	Check final effluent sampling point is accessible. Highlight to manager if need to clean inline monitor, channel/chamber.	X	
c)	Check storm sampling point is accessible. Highlight to manager if need to clean inline monitor, channel/chamber.	X	
d)	Visual check on point of discharge to the watercourse if accessible. Check operability of outfall flap valve if fitted.	X	

ID	Instruction	Daily	Weekly
e)	Check storm discharge point, if shared & if accessible.	X	
f)	Compensation water pumps. Check and clear ultrasonic head of cobwebs etc.	X	
g)	Check data and operation of inline monitor. Check inline monitor installation for damage, take appropriate action where required.	X	
h)	Remove and clean inline monitor probe.		X
i)	Check flow meter & flume is clear of debris. Take appropriate action.	X	
2	Preliminary Treatment	Daily	Weekly
a)	Check Crude sewage appearance. Does it look normal for the site?	X	
2.1	Cess Waste Reception Point		
a)	Note any suspicious activity or discharges as required	X	
b)	Check logger system is operating correctly	X	
c)	Check all pipework is in good condition	X	
d)	Where a macerator is fitted, check operation and oil reservoir	X	
e)	Where a manual stone trap is fitted, clear of accumulated material	X	
f)	Check grit bins are available and stocked with grit for winter	X	
g)	Carry out general housekeeping, remove litter, clear debris, washdown any spillages, empty bins	X	
h)	Ensure all signage is in good condition, clean and legible	X	
i)	Check washdown equipment is operating correctly	X	
2.2	Inlet / storm pumping station	Daily	Weekly
a)	Check Ammeter reading, Too high could indicate a blockage. Too low could indicate an air lock or impeller damage. Where reading is unusual ensure appropriate action is taken.	X	
b)	Check the well level is within the normal operating limits taking into account the flow conditions at the time (such as storm conditions & peak flow to site). If level is too low or high, this could indicate control issues or pumping issues.	X	
c)	Check condition of the wet well. Does it have more than the usual scum or debris floating on top that will indicate the need for a wet well clean?	X	

ID	Instruction	Daily	Weekly
d)	Check fault light(s) are not on, take appropriate action as required.	X	
e)	Check flow rate (where meter is fitted); is it within the normal operating range?	X	
f)	Inspect buildings, kiosks and control/switchgear panels for general condition, damage and that they are securely locked. Clean and tidy the interior of the buildings and/or Kiosks. Remove rubbish from site or if large volume arrange for collection.	x	
g)	Listen for undue pump noise and check for undue vibration by safely touching the lifting chain or guide rail.	X	
h)	Check non-return valve is operating correctly Non return valves prevent water from flowing back through the pump when it is not in operation. If a weighted arm is fitted is it at the usual angle? If it is low and chattering it could indicate the pump is blocked.	X	
i)	Check operation of the ultrasonic level control. Is it reading correctly? Compare the well level with the normal readout from the display. Check hard wired control floats, clean as required. Are floats weighed down with rag or debris preventing them from lifting if the water level rises?	X	
j)	Check pumps, pipelines and couplings for leaks where possible.		X
k)	Start the cleaning cycle manually where required.	X	
l)	Pumps - Log hours run		X
m)	Pumps - Log kWhrs		X
2.3	Screen(s) / macerator(s)	Daily	Weekly
a)	Check inlet channel level is normal taking into account the flow conditions at the time (such as storm conditions & peak flow to site).	X	
b)	Check screen operation and check for screenings carryover. Check for blockages and blinding (hairpinning) on screen panels and remove where necessary. Check for rag rolling or rag balls upstream of the screen and remove where necessary. Check for any grit build up in front of screen	X	
c)	Inspect debris disposal mechanism for correct operation and verify screenings are being removed. Check & clean any obstructions impeding the operation of screen mechanisms.	X	
d)	Check screens bypass is available and clean	X	
e)	Clean area around screen.		x

ID	Instruction	Daily	Weekly
	Check & clean screen panels of any obstructions.		
f)	Visually check auto lubrication systems (grease pot) are functioning correctly, take appropriate action to replace them if needed. Inspect grease pots and fill them when level is below the standard. Use grease nipples to lubricate required parts of screen.	X	
g)	Visually check unit and its associated equipment for the following: Safety & security with all panels locked & guards secure and in good condition. Excessive noise or vibration Overheating External damage, leaks, missing fixings Where applicable, ensure main and brush drives turn and that brushes are spinning	X	
h)	Check operation of wash water system for screens Ensure wash water pressure of spray bar is correct. Check the inline filter is present, clean and feeding the spray bars (where applicable). Check the spray bar pattern and clean the spray bar nozzles as required.	X	
i)	Check & clean accumulation of screenings and fat from debris disposal mechanism Check & clean launder chutes and channels for accumulation of grit, sand, rag, fat,	X	
j)	Check the lip, labyrinth or other seals between the screen and the channel wall are making an effective seal.	X	
k)	Visual check on the screenings removal brushes for blinding and wear. Clean the brushes as required. Ensure the brushes are in correct contact with the screen and that screenings are being removed.	X	
l)	Check and clean instrumentation probes, floats and ultrasonic heads (where applicable).	X	
2.4	Screenings handling	Daily	Weekly
a)	Check control system and amps on panel for normal levels / operation, take appropriate action as required. Jumping amps indicates a blockage.	X	
b)	Where installed, visual check for normal operation of macerator. Look for visible blockages/build up on unit, high flows in front of macerator. Listen for unusual noise. Take appropriate action as required.	X	
c)	Where installed, check and empty stone trap.	X	
d)	Clean area around screenings handling units and skips.		X
e)	Check operation of wash water system for screenings handling.	X	

ID	Instruction	Daily	Weekly
	Check the inline wash water filter is present, clean and feeding the spray bars (where applicable) Ensure wash water pressure of spray bar is correct. Check the inline filter is present, clean and feeding the spray bars (where applicable). Check the spray bar pattern and clean the spray bar nozzles as required.		
f)	Check screenings product quality and quantity, Check level of screenings in skip and change skip when full.	X	
g)	Check operation of auto drain.		X
h)	Where installed check operation of the trough desludge system. Check for grit build-up in trough - hose out where required.		X
i)	Visual check on condition and operation of brushes (ensure trough is being cleaned). If blinding occurs regularly have wear on screw brushes checked.		X
j)	Check screw conveyor and brushes for wear and central running.		X
k)	Clean and check mesh for blinding and hairpinning.		X
2.5	Grit removal	Daily	Weekly
a)	Check mechanical plant is operating correctly. Check equipment– Compressor, Rake, Detritor & Pista grit.	X	
b)	Check manually de-gritted constant velocity channels for build-up of grit, take appropriate action as required.	X	
c)	Check inflow and outflow for normal rate of flow and correct distribution.	X	
d)	Check volume, dryness and quality of grit produced.	X	
e)	Remove rag from the areas around baffles and mechanical equipment	X	
f)	Log manual de-gritting operations where required.	X	
g)	Log abnormal grit volumes.	X	
h)	Clean grit channel as required. Check grit build up in inlet channels and clean out if necessary.		X
i)	Check operation of wash water system and check the inline filter is present, clean and feeding the spray bars (where applicable)	X	
j)	Check aerated grit channels for air flow and bubble pattern (where applicable).	X	
2.5	Skips	Daily	Weekly
a)	Check skip capacity is adequate, and inform contractor when skip is full.	X	
b)	Rake skip where required.	X	

ID	Instruction	Daily	Weekly
c)	Remove excess water if there is a facility to do so.	X	
d)	Ensure only prescribed material is in the skip. Remove any materials not prescribed.	X	
2.6	Storm separation and treatment	Daily	Weekly
a)	Check Flow To Full Treatment penstock is set at correct level.	X	
b)	Check storm return system is operational, manually return storm contents where required.	X	
c)	Check storm tanks cleaning system, check level sensors, check tanks are clean and empty outside of storm conditions.	X	
d)	Check and clear storm screens where required. (automatic clearance and manual clearance linked to safe system of work)	X	
e)	Check screens bypass is available and clean	X	
f)	Check and clear/replace any outlet screening sacks		X
g)	Check separation weirs and clean where required.		X
h)	<u>During storm</u> check that the flow to treatment is normal. (Treating Flow To Full Treatment)		X
i)	Log abnormal flows. Log storm discharge flows. Log storm flows in dry weather conditions.		X
j)	Log storm events.		X
k)	Remove any debris in the system.		X
l)	Storm LTA – Visually check area is clean and operating within site parameters. Remove any debris.		X
m)	Storm LTA – Check for short circuiting during operation. Inspect banks for leakage		X
2.7	Flow measurement	Daily	Weekly
a)	Check site is within flow permit (treating Flow To Full Treatment before going to storm). Check that flow is going through site as expected.	X	
b)	Check flow meter and flume and clean where required	X	
c)	MCERTS – Log & record flow meter readings	X	
d)	Check EDM (Event Duration Monitor) sensor is clean and weir is free of debris	X	
3	Primary Treatment- Primary Settlement Tanks	Daily	Weekly
a)	Check and log sludge level by dipping tanks (Mon/Wed/Fri)	X	
b)	Check bridge/scrapper operation	X	

ID	Instruction	Daily	Weekly
c)	Check de-sludge pump(s) and timer for normal operation	X	
d)	Check scum boards for breaks or carry under	X	
e)	Check scum trap for normal operation and clean/hose out	X	
f)	Check settled sewage quality (visual check only)	X	
g)	Check stilling chamber for rag, clear as necessary	X	
4	Secondary Treatment		
4.1	Secondary Treatment – Activated Sludge	Daily	Weekly
a)	Check air filters indicators for normal readings. Check blower control panel. Check the blowers for normal operation. Check there are no illuminated fault lights.	X	
b)	Check and record dissolved oxygen (D.O) readings, where probes are installed.	X	
c)	Sample, measure and record Mixed Liquor Suspended Solids (MLSS) /RASS concentration and sludge settleability (Stirred Specific Volume Index) (SSVI), (Monday/Wednesday/Friday)	X	
d)	Vent condensate from air lines		X
e)	Check SAS pump(s) are operating correctly	X	
f)	Check and record sludge return from the final settlement tanks (RAS rate)	X	
g)	Check D.O probe and / or timers are carrying out the correct control functions. Aeration control function.	X	
h)	Check flow distribution to aeration lanes if more than one lane present	X	
i)	Log changes to RAS rate, Log flows (where meters are fitted), Log KWh, Log SAS Rate.	X	
j)	Check and record bubble pattern and size of the bubbles	X	
k)	Check mixers for rotation in anoxic (un-aerated) zones	X	
l)	Check recycle pumps are running, as required (Biological Nutrient Removal -BNR plants)		X
m)	Check redox monitor is operating correctly (BNR plants)		X
n)	Check VFA / liquor return (BNR plants)		X
o)	Check and record rate and frequency of SAS removal	X	
p)	Withdraw the D/O probe from the tank and remove clean		X
4.2	Secondary Treatment – Biological Filters	Daily	Weekly

ID	Instruction	Daily	Weekly
a)	Visually check for correct flow distribution across the filter (radial distribution)	X	
b)	Keep filter surface clear of all debris and any significant moss or weed growth. Deal with ponding as appropriate.	X	
c)	Where recirculation is installed, check for normal operation at the correct flow rate	X	
d)	Check all air vents and under drains are clear and not flooded	X	
e)	Clear distribution arm orifices and or weir plates of debris	X	
f)	Remove end caps and rod/flush arms - clear debris from open channel arms	X	
g)	Check for appropriate flow distribution between filters to suit filter size	X	
h)	Check operation of distributor arms (uniform speed of rotation)	X	
i)	Check for leakage at the centre column seals and end caps. Short circuiting etc.	X	
j)	Check rotation timer. Check alignment of rotation alarm sensor and target plate	X	
5	Secondary Settlement – Humus Tanks / Final Settlement Tanks	Daily	Weekly
a)	Check correct operation of desludging pump(s) or valve(s)	X	
b)	Check scraper/bridge operation where installed	X	
c)	Check and log blanket level with portable blanket meter where detectors not fitted. (Monday, Wednesday, Friday)	X	
d)	Check tank surface for buildup of floating debris. Visually check effluent quality over the weir for solids carry over	X	
e)	Check RAS pump(s) are operating correctly (FSTs only)	X	
f)	Check Bellmouth and de-rag where required	X	
g)	Check effectiveness of weir brushes, chains, “other systems” where fitted	X	
h)	Check scum boards for breaks or carry under	X	
i)	Check scum removal system for correct operation, clear any fouling where necessary	X	
j)	Check flow of recirculation bleed back/constant draw off where used	X	
k)	Check operation of fixed blanket detectors and alarms		X
l)	Check operation of Mallard pump by test running in hand, where installed		X

ID	Instruction	Daily	Weekly
m)	Clear overflow weirs and launder channels of any build-up that will affect the tanks or effluent performance	X	
6	Chemical Dosing	Daily	Weekly
a)	Check that chemical is discharging, rather than dosing pump running dry (any nozzles blocked?)	X	
b)	Check chemical storage tank level - reorder as required. Log level in storage tank, Log discharge rate.		2 days a week
c)	Check for excessive vibration in the dosing pump		2 days a week
d)	Check the level in the internal bund and empty as required. Report any abnormalities.		2 days a week
e)	Visual check for leaks on tanks and visible chemical lines		2 days a week
f)	Check the trace heating system		2 days a week
g)	Check external storage tank bund for rainwater and/or chemical. Empty as appropriate.		X
7	Tertiary Treatment		
7.1	Low Head Sand Filter	Daily	Weekly
a)	Check smooth movement of bridge, unusual sounds and vibrations, and abnormal flow patterns	X	
b)	Check water level in each filter, compare with other units and relate to flow rate, and last backwash	X	
c)	Check unit isn't in bypass	X	
d)	Check for evidence of chemical leaks	X	
e)	Check cleanliness of carriage & filter area	X	
f)	Check sodium hypochlorite level in the bridge tanks where fitted and fill from bulk tank	X	
g)	Check sodium hypochlorite bulk tank level	X	
h)	Check the amount of sand in the wash water	X	
i)	Check the colour of the backwash water	X	
j)	Check the correct amount of hypochlorite is being dosed	X	
k)	Check water level in each filter, compare with other units and relate to flow rate, and last backwash	X	
l)	Log backwash timer settings and head loss	X	
m)	Log flows and flow rate, where meters are fitted	X	
n)	Clean the level sensor head		X

ID	Instruction	Daily	Weekly
o)	Log clarity of feed (compare with final effluent)	X	
7.2	Disc Filter	Daily	Weekly
a)	Log backwash pressure	X	
b)	Check frequency of backwash is within correct range		X
c)	Check bypass is not working during normal operations	X	
d)	Check depth in and out of the drum for normal operation	X	
e)	Check drum is rotating in correct mode and sounds normal	X	
f)	Check all ancillaries are operating normally	X	
g)	Log flows and flow rate where meters are fitted	X	
h)	Sample and record turbidity on feed (compare with final effluent)	X	
i)	Inspect inside filter for large pieces of debris		X
j)	Check for accumulation of weed in backwash trough		X
k)	Check and clean backwash water strainer.		X
l)	Check for soundness of mesh panels by lifting inspection panels		X
m)	Check wash water pressure and nozzles for normal operation		X
8	Raw Sludge Holding & Thickening		
8.1	Sludge Holding Tanks	Daily	Weekly
a)	Check mixing regime is correct	X	
b)	Log levels in tank(s)	X	
c)	Decant liquors	X	
d)	Check tank(s) for ragging and blockages and clear or remove (where safe access is possible)	X	
e)	Check that holes on sludge cage(s) are clear where fitted, Clean sludge cage(s) dewatering holes (where safe access is possible)	X	
f)	Log tanker movements and compare with schedule	X	
g)	Ensure any crust build up does not interfere with any control equipment/alarm floats	X	
8.2	Picket Fence Thickener	Daily	Weekly
a)	Check fence is rotating & “stop, look, listen,” for mechanical issues.	X	
b)	Check weir overflow quality and the surface of the unit. Clear any buildup of debris	X	
c)	Log blanket measurements / pump timers	X	
d)	Sample from discharge pump (run manually if necessary) and assess product quality. Sample, analyse and record % dry solids	X	

ID	Instruction	Daily	Weekly
	entering the PFT. Sample, analyse and record % dry solids out (Monday, Wednesday, Friday)		
e)	Check control system is operating normally	X	
f)	Log any changes to settings or duty	X	
g)	Log sludge flows in (where meters fitted) and out	X	
h)	Visually assess the dry solids & flow entering the PFT	X	
i)	Log hours run meters	X	
j)	Remove buildup of debris on the rake	X	
8.3	Belt Thickeners	Daily	Weekly
a)	Check for good floc formation. Check sludge on the top belt and assess the conditioning of the sludge. Check belt drainage and filtrate quality	X	
b)	Check product quality & quantity. Check condition of hopper	X	
c)	Visually check auto lubrication systems (grease pot) are functioning correctly, take appropriate action.	X	
d)	Sample, analyse & record % Dry Solids on feed and sludge/cake (Monday, Wednesday, Friday)	X	
e)	Check sludge feed rate and log	X	
f)	Check poly dosing system. Log polymer usage, note each bag change/delivery. Make adjustments to optimise	X	
g)	Ensure wash water pressure is available at a minimum of 6 bar	X	
h)	Clean belt steering paddles and check they are functioning correctly	X	
i)	Clean hopper level probes and check they are functioning correctly	X	
j)	Wash Station - Check formation of spraying fans, rotate internal brush to clean spray nozzles. (Minimum twice daily)	X	
k)	Visual Check - Hydraulic Power Pack - Check oil level and top up using clean equipment and fresh oil as required, maintain as close to full level as possible. Oil level must not be allowed to fall below 3/4 as this will cause serious damage	X	
l)	Jet wash clean the belt filter.	X	
m)	Use low pressure water hose to clean complete machine, frame, rollers and hoppers.	X	
n)	Check condition of Belt Filter for blinding / blockages / good filtration	X	
o)	High pressure steam clean the belt from underside.		X

ID	Instruction	Daily	Weekly
p)	High pressure steam clean complete machine, frame rollers and hoppers avoiding all electrical and instrumentation equipment		X
q)	Check condition of Belt Filter for wear i.e. Creasing / condition of seam to avoid failure / breakage and damage to other components		X
8.4	Drum Thickeners	Daily	Weekly
a)	Check for good floc formation. Check sludge feed rate. Check product thickness (visually). Check filtrate quality	X	
b)	Visually check auto lubrication systems (grease pot) are functioning correctly, take appropriate action.	X	
c)	Sample for % dry solids analysis and record (Monday, Wednesday, Friday)	X	
d)	Check spray bar nozzles to ensure they are clear and spraying correctly. Check spray bar wash water pressure	X	
e)	Clean probes in discharge hopper, hose down and carry out cleaning duties	X	
f)	Log polyelectrolyte used – each drum/bag change	X	
g)	Log sludge inlet flow meter, monitor throughput	X	
h)	Check & clean flocculator tanks		X
i)	Check appearance of mesh, adjust cleaning and cleaning pause intervals if necessary.	X	
j)	Clean dry solids monitors sensors		X
k)	Clean foot valves on washwater suction lines		X
l)	Clean mechanical filter on washwater booster set		X
m)	Clean washwater booster secondary screen in channel		X
n)	Jet/remove fat deposits from thickened sludge discharge pipework		X
o)	Log hours run		X
9	Odour Control	Daily	Weekly
	Tasks for all Odour Control Units		
a)	Check covers, hatches and doors are closed	X	
b)	Confirm duty fan running and standby fan availability	X	
c)	Check damper position to ensure they have not been tampered with	X	
d)	Check ductwork for any signs of damage or leaks	X	
	Specific tasks for Biofilter OCU		

ID	Instruction	Daily	Weekly
e)	Check the spray pattern from the irrigation nozzles and clean nozzles where required. (If possible)	X	
f)	Check for free discharge of effluent water to drain	X	
g)	Check for free discharge on any condensate removal points	X	
Specific tasks for Chemical Scrubber OCU			
h)	Check water softener availability, check salt reservoir level, and top up if required.	X	
i)	Check stocks in bulk chemical tanks and reorder if required – tanker delivery	X	
j)	Check that the Redox and pH are within the agreed range – on dosing skid	X	
k)	Check duty and standby dosing pumps are available for each bulk chemical	X	
l)	Check the duty scrubber liquor recirculation pump is running and the standby is available in auto	X	
m)	Check that there is free drainage of scrubber blow-down liquor to drain	X	
n)	Check differential pressure gauges are within design range (if fitted)	X	
o)	General check for leaks in the scrubber liquor recirculation and dosing system – raise follow on work if any defects are identified	X	
Specific tasks for Carbon OCU			
p)	Examine ductwork for any signs of damage or leaks and check trapped condensate drains are free flowing. If a manual drain valve is provided, operate the valve until the flow of condensate ceases and leave valve in closed position.	X	
q)	Check differential pressure gauge for over-pressure (if provided) – indicates media fouling	X	
10	On Site Pumping	Daily	Weekly
a)	Pumping System(s) (Drainage, Interstage, Washwater, Recirculation, Return Liquors etc.) operating correctly?	X	
b)	Check Ammeter reading - too high could indicate a blockage. Too low could indicate an air lock or impeller damage.	X	
c)	Check the well level is within the normal operating limits - taking into account the flow conditions at the time. If level is too low or high, this could indicate control issues or pumping issues.		
d)	Check condition of the wet well- does it have more than the usual scum or debris floating on top that will indicate the need for a wet well clean?		

ID	Instruction	Daily	Weekly
e)	Check fault light(s) are not on	X	
f)	Check flow rate (where meter is fitted); is it within the normal operating range?	X	
g)	Check for undue pump noise and vibration by safely touching the lifting chain or guide rail.	X	
h)	Check non-return valve. Non return valves prevent water from flowing back through the pump when it is not in operation. If a weighted arm is fitted, is it at the usual angle? If it is low and chattering it could indicate the pump is blocked	X	
i)	Check operation of the ultrasonic level gauge. Is it reading correctly? Compare the well level with the normal readout from the display.	X	
j)	Check pumps, pipelines and couplings for leaks. Check for visible leaks.	X	
k)	Start the cleaning cycle manually where required	X	
l)	Pumps - Log hours run	X	
m)	Pumps - Log kWhrs	X	
n)	Check hard wired control floats - are floats weighed down with rag or debris preventing them from lifting if the water level rises.	X	
o)	Washwater Pumping - Check the pipe line pressure from a gauge (where installed) on the pressure vessel or the pipe line manifold. Possible indication of strainer blockage	X	
p)	Washwater Pumping - Check operation of surge vessels (where installed).	X	
q)	Washwater Pumping - Check the strainers. If necessary, put automatic strainers in manual clean and inspect the manual strainers where local conditions allow.	X	
r)	Washwater Pumping - Check automatic filters are operating correctly	X	
11	Distribution Chambers	Daily	Weekly
a)	Inspect all weirs and brush clean. Remove any debris, scum, algal growth, blanket weed, grit, etc. from the chamber. Check flow split is correct.	X	
b)	Ensure any rag is removed, especially from around the penstocks, gate valves and their spindles. Ensure none of this passes over the weir.	X	
c)	Check that all valve, penstock and weir operating positions are correctly set.	X	
d)	Check chamber for any visible leaks	X	

Appendix 6. Sludge Rounds

	Instruction	Daily	Weekly
1	Liquid Sludge Import Facilities	Daily	Weekly
a)	Check sludge logger device is fully operational	X	
b)	Check that the pattern of imports is in line with site requirements/agreement with tanker operators.	X	
c)	Check general area is clean and tidy	X	
d)	Check reception tank for rag/grit build up		X
2	Sludge Screen	Daily	Weekly
a)	Check sludge screen operation	X	
b)	Check screened sludge quality	X	
c)	Check / clean moisture sensor	X	
d)	Visually check unit and its associated equipment for the following: Safety & security with all panels locked & guards secure and in good condition. Excessive noise or vibration Overheating External damage, leaks, missing fixings	X	
e)	Visually check auto lubrication systems (grease pot) are functioning correctly, take appropriate action to replace them if needed. Inspect grease pots and fill them when level is below the standard. Use grease nipples to lubricate required parts of screen.	X	
f)	Carry out checks on cold weather operation systems before frost sets in	X	
g)	Check screenings quality & quantity		X
h)	Check general area is clean and tidy		X
i)	Check washwater is operating correctly during period of sludge discharge Ensure wash water pressure of spray bar is correct. Check the inline filter is present, clean and feeding the spray bars (where applicable). Check the spray bar pattern and clean the spray bar nozzles as required.		X
j)	Clean steel probes on rotamat screen		X

	Instruction	Daily	Weekly
3	Sludge Buffer & Blending Tanks “Sludge Blending Tank” refers to a tank, into which more than one type of sludge is fed, requiring mixing: normally immediately prior to sludge digestion or dewatering. It may on some sites be referred to as a sludge holding tank or digester feed tank.	Daily	Weekly
a)	Check that mixer is operating correctly. Mixers are normally inhibited if the sludge level falls below a set level to protect the impellor, pump or blower.	X	
b)	Check for signs of stratification or poor mixing and rectify where necessary	X	
c)	Check pH and if less than 5 attempt to reduce septicity and freshen sludge	X	
d)	Check for ragging and blockages and clear or remove (where safe access is possible)	X	
e)	Check amps on mixer motor		X
f)	Check tank control system		X
4	Sludge Treatment Inter Process Pumping	Daily	Weekly
a)	Check Ammeter reading, Too high could indicate a blockage. Too low could indicate an air lock or impeller damage. Where reading is unusual ensure appropriate action is taken.	X	
b)	Check flow rate (where meter is fitted); Is it within the normal operating range?	X	
c)	Check the well level is within the normal operating limits taking into account the flow conditions at the time. If level is too low or high, this could indicate control issues or pumping issues.	X	
d)	Check operation of the ultrasonic level gauge. Is it reading correctly? Compare the well level with the normal readout from the display.	X	
e)	Listen for undue pump noise and check for undue vibration by safely touching the lifting chain or guide rail.	X	
f)	Check pumps, pipelines and couplings for visible leaks	X	
g)	Check non-return valve is operating correctly Non return valves prevent water from flowing back through the pump when it is not in operation.	X	

	Instruction	Daily	Weekly
	If a weighted arm is fitted is it at the usual angle? If it is low and chattering it could indicate the pump is blocked.		
5	Pasteurisation	Daily	Weekly
a)	Check batch rates according to sludge levels	X	
b)	Check digester temperatures in relation to pasteurisation plant	X	
c)	Check hmi panel	X	
d)	Check operation of biotherm reactor aeration blower package.	X	
e)	Check heat exchanger performance	X	
f)	Check digested sludge buffer tanks	X	
g)	Check blended sludge buffer tanks	X	
h)	Check operation of biotherm reactor mixer	X	
i)	Check operation of heat exchanger mixer	X	
j)	Check operation of scum cutter	X	
k)	Check pump and valve operation	X	
l)	Log and record flows, pressures and temperatures	X	
m)	Check % ds of feed sludge to pasteurisation plant (Monday, Wednesday, Friday)	X	
n)	Check, remove and clean temperature probe		X
6	Primary Sludge Digestion	Daily	Weekly
a)	Check sludge discharge to limpet chambers, where installed. Clear any blockages	X	
b)	Check digester feed system is working Clear any blockages	X	
c)	Check digester heating system is working & temperatures are within HACCP range.	X	
d)	Check digester mixing system is operating correctly	X	
e)	Log digester temperatures (HACCP) Log inlet and outlet temperatures of each boiler Log inlet and outlet temperatures of sludge and water in heat exchangers	X	
f)	Log sludge feed volumes into each digester and establish the retention time (HACCP)	X	
g)	Check operation of sludge and water recirculation pumps	X	

	Instruction	Daily	Weekly
	Check pumps, pipelines and couplings for leaks where possible.		
h)	Monitor water supply where glycol is not used to heat exchanges that are exposed to elements, Ensure water is drained when heat exchanges are not in use.	X	
i)	Log use of secondary fuel within boilers.	X	
j)	Sample sludge into and out of digester. Analyse and record % dry solids. (Monday, Wednesday, Friday.) Analyse and record % volatile matter. (3 times a week Monday – Thursday)	X	
k)	Check digesters for foaming on the top.		X
l)	Remove grit from base of digester if facility is provided. Do not leave grit removal operation unattended and ensure valve is fully closed before leaving task.		X
m)	Sample, measure and record pH of digested sludge		X
7	Secondary Sludge Digestion	Daily	Weekly
a)	Check mixing system, for short-circuiting or separation, Mix before transfer to the next process, where facilities exist	X	
b)	Decant supernatant liquor when required	X	
c)	Log status of each tank	X	
d)	Record number of day's storage	X	
8	Biogas Handling, Storage, & Utilisation.	Daily	Weekly
a)	Check all condensate traps manually and drain or top up if necessary. This check is required twice daily in prolonged periods of warm weather. Check automatic u-tubes visually, to ensure that there are no gas leaks or freezing Check automatic drain traps working correctly. Use manual drains if automatic drains not working, report defects	X	
b)	Check glycol pressure relief valve and ensure liquid level visible in sight glass	X	
c)	Check pressure/vacuum relief (whessoe) valves are not passing biogas. Listen for gas passing, note any unusual smell, visual check of valve.	X	
d)	Check for genuine operation of flare stack / waste gas burner, e.g. chp is at full power and there is excessive gas make	X	

	Instruction	Daily	Weekly
e)	Check and record dehumidifier temperature	X	
f)	Log gas volumes: produced, flared, to chp, to boilers	X	
g)	Sample, monitor & record methane composition of biogas	X	
h)	Manually check gas isolation valve handle operation by closing & opening valve.		X
9	CHP & Biogas Power Management	Daily	Weekly
a)	Check automatic drain traps working correctly. Use manual drains if automatic drains not working, report defects	X	
b)	Check for genuine operation of flare stack / waste gas burner, e.g. CHP is at full power and there is excessive gas make	X	
c)	Check glycol pressure relief valve and ensure liquid level visible in sight glass	X	
d)	Check & log hours run	X	
e)	Check & log kwh exported (where relevant)	X	
f)	Check & log kwh generated	X	
g)	Check & log kwh used on site	X	
h)	Check & log use of secondary fuel	X	
i)	Check & log gas used	X	
j)	Check & log heat liberated from engine, heat dumped, heat liberated from boilers	X	
k)	Check & log engine temperatures and pressures, by exception	X	
l)	Check & log gas stream for methane composition		X
m)	Check automatic u-tubes to ensure that there are no gas leaks or freezing		X
n)	Check pressure/vacuum relief (whessoe) valves are not passing biogas. Listen for gas passing, note any unusual smell, visual check of valve.	X	
10	Liquor Treatment	Daily	Weekly
a)	Check return liquors and return rate	X	
11	Chemical Dosing	Daily	Weekly
a)	Check that chemical is discharging, not just dosing pump running (any nozzles blocked?)	X	
b)	Check chemical storage tank level - reorder as required	X	

	Instruction	Daily	Weekly
c)	Check for excessive vibration in the dosing pump	X	
d)	Check the level in the internal bund and empty as required	X	
e)	Check for leaks on visible chemical lines	X	
f)	Check the trace heating system	X	
g)	Check external storage tank bund for rainwater and/or chemical. Empty as appropriate.		X
h)	Check the correct amount of chemical is being delivered for the conditions		X
i)	Check storage tank can take delivery before delivering		X
12	Sludge Dewatering – Belt Press	Daily	Weekly
a)	Check poly dosing system, Log polymer usage, note each bag change/delivery, Make adjustments to optimize	X	-
b)	Check sludge feed rate and log	X	
c)	Check sludge on the top belt and assess the conditioning of the sludge, Check belt drainage and filtrate quality	X	
d)	Check product quality & quantity, Check condition of stockpile	X	
e)	Visually check auto lubrication systems (grease pot) are functioning correctly, take appropriate action.	X	
f)	Ensure wash water pressure is available at a minimum of 6 bar	X	
g)	Clean belt steering paddles and check they are functioning correctly	X	
h)	Clean hopper level probes and check they are functioning correctly	X	
i)	Wash station - check formation of spraying fans, rotate internal brush to clean spray nozzles. (minimum twice daily)	X	
j)	Visual Check - Hydraulic power pack - check oil level top up using clean equipment and fresh oil as required, maintain as close to full level as possible. Oil level must not be allowed to fall below 3/4 as this will cause serious damage	X	
k)	Jet wash clean the belt filter.	X	
l)	Use low pressure water hose to clean complete machine, frame, rollers and hoppers.	X	
m)	Check condition of belt filter for blinding / blockages / good filtration	X	

	Instruction	Daily	Weekly
n)	Steering flaps - check condition and correct operation for activation of the hydraulic steering mechanism and check for wear and replace as required	X	
o)	Sample, analyse & record % dry solids on feed and cake, (Monday, Wednesday, Friday)	X	
p)	High pressure steam clean the belt from underside.		X
q)	High pressure steam clean complete machine, frame rollers and hoppers avoiding all electrical and instrumentation equipment		X
r)	Check condition of belt filter for wear i.e. Creasing / condition of seam to avoid failure / breakage and damage to other components		X
13	Sludge Dewatering – Centrifuge	Daily	Weekly
a)	Check condition of stockpile, Check quality of product	X	
b)	Check kwh, amps and hours run	X	
c)	Check poly dosing system	X	
d)	Check quality of centrate	X	
e)	Check sludge feed rate, Check quality of product in feed	X	
f)	Visually check auto lubrication systems (grease pot) are functioning correctly, take appropriate action.	X	
g)	Log hours run	X	
h)	Log kwh hours run	X	
i)	Log polymer usage, note each bag change/delivery	X	
j)	Log sludge flow rate	X	
k)	Log volume of cake produced	X	
l)	Make adjustments to get optimum throughput, product quality and poly dosing	X	
m)	Sample, analyse & record % dry solids on feed and cake (Monday, Wednesday, Friday)	X	
14	Poly Make Up, Storage, & Dosing – Liquid	Daily	Weekly
a)	Poly make up storage & dosing – liquid - check supply of polymer held in IBC; Top up, replace, order as appropriate	X	
b)	Liquid - check dosing pumps & settings	X	
c)	Liquid - check dilution water is available	X	

	Instruction	Daily	Weekly
d)	Liquid - clean up any spillages of liquid	X	
e)	Liquid - log usage of polymer i.e. IBCs level	X	
f)	Liquid - log settings of dosing pumps	X	
g)	Liquid - log type of polymer	X	
h)	Liquid - check polymer flowmeter pressure – if above 3 bar clean filter and mixer		X
i)	Liquid - check made up solution appears ok	X	
j)	Liquid - check bunded area for spillages	X	
15	Poly Make Up, Storage, & Dosing – Powder	Daily	Weekly
a)	Dry powder - check dosing pumps & settings	X	
b)	Dry powder - check supply of polymer held in silo; Top up, replace, order as appropriate	X	
c)	Dry powder - check bunded area for spillages	X	
d)	Dry powder - check dilution water	X	
e)	Dry powder - check dry room / silo is heated, dry and doors are closed	X	
f)	Dry powder - check made up solution appears ok	X	
g)	Dry powder - check polymer is dry and flowing, look at screw drive and discharge to wetted head – “JETWET”	X	
h)	Dry powder - clean up any spillages	X	
i)	Dry powder - log settings of dosing pumps	X	
j)	Dry powder - log type of polymer, check using correct polymer.	X	
k)	Dry powder - log usage of polymer i.e. bags used	X	
l)	Dry powder - check polymer flowmeter pressure – if above 3 bar clean filter and mixer		X
16	Sludge Cake Transfer	Daily	Weekly
a)	Visually check auto lubrication systems (grease pot) are functioning correctly, take appropriate action.	X	
b)	Check conveyor rollers & keep clear	X	
c)	Check drive bearings for wear & operation	X	
d)	Check electric trip wire emergency stop wire	X	
e)	Keep general area clean. Clear up any spillages	X	

	Instruction	Daily	Weekly
f)	Check belt condition	X	
17	Sludge Cake Storage	Daily	Weekly
a)	Ensure silo not filled above 70% capacity. Inform Bio-recycling of any changes to sludge production.	X	
b)	Keep general area clean to minimise odour	X	
c)	Log & record each storage pad bay activity and status if applicable	X	
d)	Check wheel wash is operational	X	

Appendix 7 Odour sniff testing protocol

Purpose

Sniff testing is conducted to assist in managing odours to prevent or minimise the risk of adverse odour impact offsite.

Frequency

The procedure is to be undertaken in response to complaints or if a risk of odour nuisance at sensitive receptors is expected and/or has been substantiated.

Pre-requisites for the assessor

The assessment is undertaken by a member of staff trained in the procedure. The assessment in response to complaints will be carried out by someone not based on site. The member of staff will normally be office based rather than operations based. This means that their senses are less likely to become affected by any site odours.

Assessors must comply with the following:

- They should not consume strongly flavoured food or drink (this includes coffee) at least half an hour before conducting the assessment.
- They should not smoke at least half an hour before conducting the assessment.
- They should not consume confectionary or soft drinks must be avoided for the duration of the assessment.
- Scented toiletries including perfume, deodorant or aftershave should not be applied less than an hour before conducting the assessment.
- If the assessment requires travelling between locations in a vehicle, this vehicle must not contain deodorisers / air fresheners.
- If the assessor has a cold, sore throat, or sinus trouble they should not conduct the assessment.

Prior to the commencement of the inspection, the operator shall check the weather data including the wind direction, wind speed, temperature and rainfall.

Odour complaint investigation

Where possible, odour complaints will be actively investigated by an assessor. Timely receipt of a complaint is essential if such investigations are to have any value.

At each location the following procedure is undertaken:

- a. The assessor will stand facing the wind and breathe deeply, for a period of 3-5 minutes.
- b. The following information is recorded using the odour monitoring form.
 - i. Time, wind speed and direction, temperature, precipitation.
 - ii. The type of any odour(s) detected.
 - iii. The intensity of any odours detected on a scale of 0 to 6.
 - iv. The persistence of the any odours detected i.e. constant or intermittent.
 - v. The likely source of any odours detected (e.g. a specified onsite IED source, a specified non IED sources, offsite odour source, etc).
 - vi. Any abnormal conditions on site that may account for the odour e.g. broken duct, open door, unusual operation, spillage etc.

The pre-requisites for assessors and monitoring approach are as defined in the sniff testing procedure with the following exceptions:

- The first assessment should be conducted at the complainant's location.
- If site odours are detected, the assessor shall move back towards the site, assessing potential odour sources within the Urban Waste Water Treatment (UWWT) and Sludge Treatment Centre (STC) processes and attempt to trace the odour to its source.
- On site operations shall also be reviewed to identify any abnormal site operations or activities that could be responsible for elevated odour levels.
- The sensitivity of the offsite location to odours should be recorded as a comment.

The findings of the investigation should be reported back to the Thames Customer Services Centre so that feed-back can be provided to the complainant.

Odour monitoring form

Date: _____ Assessor name: _____

Time	Location	Receptor sensitivity (off site locations only)	Wind speed & direction	Temperature (degrees)	Rainfall (y/n)	Odours detected (description)	Intensity (0 – 6)	Persistence (intermittent / constant)	Perceived source	Other comments

Intensity			Receptor Sensitivity		
1 Very faint odour	3 Distinct odour	5 Very strong odour	Low (e.g. footpath, road)		
2 Faint odour	4 Strong odour	6 Extremely strong odour	Medium (e.g. industrial or commercial workplace)		
			High (e.g. housing, pub/hotel etc.)		

---- End of OMP ----