Asset Management
Asset Standard
Odour Management Plan

Riverside STW

RIVES1ZZ

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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
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1.1	Initial Review			5th Dec 2008
1.2	Draft	[redacted]		5th Mar 2009
1.3	Review	[redacted]		24th Jun 2010
1.4	Review	[redacted]		5th Oct 2010
2.0	Updated for Digestion Plant and STW Upgrade Projects	[redacted]		11th May 2011

Revision No	Reason for Revision	Prepared by	Approved by	Date
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6.0	Review and update of OMP	[redacted]		February 2017
7.0	IED Permit Application	[redacted]	[redacted]	January 2022
7.1	Revised sludge treatment centre permit	[redacted]	[redacted]	November 2023

0.3 Sign Off

Operations Area Manager	[redacted]	Date: December 2023
Process Manager	[redacted]	Date: December 2023

0.4 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
DWF	Dry Weather Flow
EA	Environment Agency
EHO	Environmental Health Officer
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	Process 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
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 the Riverside 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 Riverside administration building and on Thames Water's asset record database SharePoint, within the EMS pages.

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

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 Performance Manager 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.

The OMP was updated in 2021 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 AD on a Sewage Treatment works now needs a 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 within SharePoint.

Regulatory Guidance

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)

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

2 Site Information

2.1 Location and Receptors

Site Address:

Riverside STW
Creekside
Rainham
Essex
RM13 8QS
EPR Permit number: EPR/GB3739DY/V003
What 3 words: coins stages crowned

Riverside STW is situated to the west of Rainham in the south-west corner of the London Borough of Havering. The STW was first operational in the 1920s and currently has a throughput of 397,000 population equivalent. The existing STW treats flow from a mixed domestic and industrial catchment. It currently serves an area which includes Romford, Hornchurch, Dagenham, Brentwood and Rainham

(For Site Location Map see Appendix 4.)

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.

The site is sandwiched between the A13 which lies approximately 200m to the south of the site and a mainline railway which lies to the north. Ferry Road Industrial Estate abuts the south-eastern boundary. There are also industrial units to the north of the railway and to the south of the A13. There is open land to the west of the site. Several houses are situated close to the north east of the STW site boundary.

The nearest receptors are summarised in Table 2.1 below:

Table 2.1 - Location of potentially sensitive odour receptors.

Receptor Number	Receptor Address	Receptor type	Approximate distance to the nearest site boundary (m)	Direction from the site.	Receptor Sensitivity

1	Industrial Parks surrounding Consul Avenue	Industrial and commercial	On Boundary	North West	Medium
2	Industrial Estates surrounding Ferry Lane	Industrial, waste management and commercial	On Boundary	South East and South	Medium
3	Creekside	Residential	On boundary	East	High
4	F J Church Recycling centre	Waste Management	100	North	Medium
5	Havering Colleges Rainham	School	120	North East	High
6	Mudlands Industrial Estate	Industrial	140	North	Medium
7	Industrial estates surrounding Creek Way	Industrial and commercial	200	South West	Medium
8	New Road	Residential, commercial and industrial	250	North, North West and North East	High
9	New City College Rainham Construction & Engineering	School	300	North East	High
10	CEME Campus	Business Centre	300	West	Medium

11	Residential area surrounding Upminster Road South	Residential and commercial	350	East and North East	High
12	Tesco Extra	Supermarket	400	North East	Medium
13	Rainham train station	Train station	400	East	Low
14	National Trust Rainham Hall	Recreational	400	East	Medium
15	La Salette Catholic Primary school	School	550	North East	High
16	Residential area surrounding Wennington Road	Residential and commercial	550	East and North East	High
17	Rainham Recreation Ground	Recreational	575	North East	Medium
18	Tesco Dagenham Depot	Commercial	700	North West	Medium
19	Rainham Village Primary School and Nursery	School	725	North East	High
20	New Beginning Nursery	School	725	East	High
21	Rainham Methodist Church	Church	825	East	Medium

22	Beam Park - Countryside	Residential, industrial, and recreational	850	North West	High
23	Newtons Primary School	School	875	North West	High
24	Ingrebourne Hill Bike Park	Recreational	900	North East	Medium
25	Ford Motor Company	Industrial	900	South West	Medium
26	Mardyke Open Space	Open space	975	North West	Low
27	Brookway Open space	Open space	1000	South East	Low
28	Residential area surrounding Rainham Road	Residential	1100	North and North East	High
29	Beam County Primary School	School	1300	North West	High
30	Harris Academy Rainham	School	1300	East	High
31	Rainham Bowls Club	Recreational	1300	East	Medium
32	Brady Primary School	School	1350	East	High
33	Beam Parklands Country Park	Open space	1400	North West	Low

34	Residential area surrounding New Road	Residential and commercial	1400	North West	High
35	Whybridge Infant and Junior School	School	1500	North East	High
36	Brenda Blakemoore Community Centre	Recreational	1500	North East	Medium
37	Residential area surrounding Upminster Road North	Residential and commercial	1500	East and North East	High
38	Dagenham Music Academy	School	1600	North West	High
39	The Brittons Academy	School	1750	North East	High
40	Residential area surrounding Rainham Road South	Residential	1750	North West	High
41	Rainham Cemetery	Cemetery	1750	East and North East	Medium
42	Industrial units surrounding Fisher's Way	Industrial and commercial	1750	South	Medium

43	Bretons Manor and Outdoor Recreation Centre	Recreational	1800	North	Medium
44	Essex Water Company Pumping Station	Utilities	1800	North West	Medium
45	Teresa Greene Community Centre	Recreational	1800	North West	Medium
46	Kilnbridge Waste Management	Waste management	1800	North West	Medium
47	Parsonage Farm Primary School	School	1800	North East	High
48	The Leys	Recreational	1900	North West	Medium
49	The Leys Primary School	School	1900	North West	High
50	Hornchurch Country Park	Open space	2000	North East	Low
51	Dagenham United FC	Recreational/Commercial	2000	North West	Medium
52	Spring Farm Park	Recreational	2000	East	Medium
53	Toilet Hire London	Commercial	2000	South East	Medium
54	Veolia Rainham Landfill	Waste management	2000	South	Low

2.2 Off-site sources of odour

Within the Ferry Lane Industrial Estate are several odour sources including, an aluminium smelting facility.

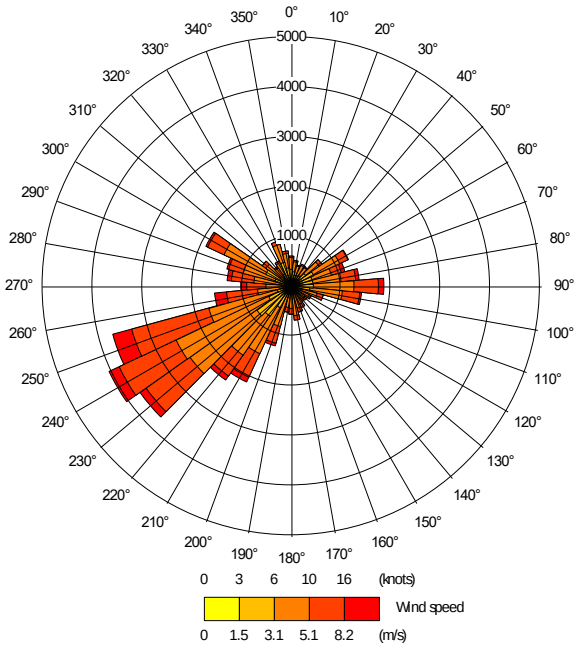
Waste facilities to the North west, South West and South East also have the potential to generate odour.

Occasionally, muck spreading is undertaken on some of the nearby agricultural land.

2.3 Wind Rose and Weather Monitoring

London/City Airport meteorological station (approximate location NGR E 543189 N 180444) is located approximately 8.8 km west-southwest 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 2016 – 2020. 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: **London/City Airport Wind Rose,2016- 2020**



There is a site weather station at Riverside with a daily record kept on site. 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

For site plans, see appendix 4. Further 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.

2.5 Process Description

2.5.1 UWWT Activities

The process flow diagrams for the main treatment process are shown in Appendix 4.

The sewage that arrives at Riverside is mainly domestic, the remainder being made up of rainwater run-off and a small proportion of industrial effluent. The average influent flow to Riverside STW is 113,000 m^3 per day.

Sewage flows arrive at the inlet works via the low level and high level sewers. Trade effluent is discharged into the high level inlet prior to screening. Incoming flows gravitate through the 3 No. screens serving the high level sewer, or 2 No. screens serving the low level sewer. Screened material is passed through a screen handling units and discharged into a skips or a bunded area prior to removal off site. Washpactor return flows are discharged to the low level inlet prior to screening.

After screening, the flows are directed to the inlet pumping station. The combined inlet flow is then pumped to elevated inlet channel and onwards towards 2 No. detritors. Prior to the detritors, a side flow storm overflow weir is installed in the elevated channels to separate some of the storm flows and direct them to the storm tanks. Under normal operating conditions, both detritors are in duty mode. 2 No. open grit skips receive grit from the detritors.

Following the detritors, flows gravitate towards the flow measurement chamber prior to the PST distribution chambers, or under storm conditions flow over the storm weir and along a storm channel prior to 9 No. storm tanks. The storm tanks fill sequentially. Once storm flows have abated, the retained storm sewage is returned back to the inlet pumping station and on to treatment. The storm tank return is controlled manually from the control room

The elevated raw sewage channels around the high level outlet of the inlet pumps prior to the detritus area, together with the PST de-sludging chambers are covered (with off gases treated in OCU2).

From the PST distribution chamber, the flow is then split into two parallel streams of circular primary settlement tanks, with each bank served by its own distribution channel. Each bank of PSTs consists of 4 No PSTs (8 No. in total), each fitted with automated desludge timers.

Settled sewage from PST Bank A flows to Flow Distribution Chamber 3 (FDC 3), where it is distributed to Activated Sludge Plants (ASP) A and D. Return Activated Sludge (RAS) form both ASP A and D is discharged to FDC 3.

Settled sewage from PST Bank B flows to FDC 1, where it is distributed to ASPs B and C. Return Activated Sludge (RAS) from both ASP B and C is discharged to FDC 1.

ASP A comprises four lanes each with 5 No surface aerators.

ASP B is a diffused air plant served by 4 No blowers operating as duty/duty/assist/ standby.

ASP C is a surface aeration plant comprising 4 lanes each served by 7 No surface aerators.

ASP D is a diffused air plant comprising 5 lanes and is served by 3 blowers operating as duty/duty assist/standby.

All four ASPs have distinct anoxic zones.

Outflow from ASPs A & D are combined in FDC 4 and distributed to 4 No Final Settling Tanks (FST) A and 2 No FST D. FSTs A all have rotating half-bridge suction scrapers and FSTs D have rotating half bridge scrapers.

Outflow from ASPs B & C are combined in FDC 2 and distributed to 4 No Final Settling Tanks (FST) B and 2 No FST C. FSTs C have fixed bridge scrapers and FSTs B have rotating half bridge suction scrapers.

Following final settlement, the final effluent gravitates to the tidal pumping station. From the tidal pumping station the final effluent either gravitates to the river or, during high tide conditions, is pumped.

RAS from plants A & D is returned to FDC 3 and from plants B & C to FDC 1. Surplus Activated Sludge (SAS) is returned to the head of the works for co-settlement in the primary tanks.

Washwater

A washwater pumping station abstracts final effluent from the effluent carrier. Washwater is delivered, using 3 No duty and 1 No standby pumps into the site-wide washwater ring main at a pressure of 4 bar. After pumping, and prior to delivery into the ring main, the effluent is screened in 2 No multi-disc screens, which have auto backwash.

The washwater storage tank, located near to the digesters, is filled from the ring main and provides supplies to two further booster sets.

The low-pressure booster set provides wash water for filter belt press (FBP) and centrifuge polyelectrolyte dilution and centrifuge wash water at a pressure of 5.8 bar. It comprises three pumps, dual auto-backwash filters, and an accumulator.

The high-pressure booster set provides wash water for the high- and low-level inlet screens, the FBPs and the THP service water at a pressure of 8.8 bar. It comprises three pumps, dual auto-backwash filters, and an accumulator.

2.5.2 **Sludge Treatment Centre Permit Activities**

The STC treats both indigenous sludge and import sludges. Indigenous sludge is generated from the incoming flow to the STW which passes through the aerobic treatment process under the UWWTD. Indigenous sludge from the Sludge Buffer Tanks is pumped via Sludge Screens to the Sludge Blending Tanks.

Imports of sludge from other works are delivered to a sludge offloading point into the Sludge Buffer Tanks from tankers. All such imports are subject to appropriate waste pre-acceptance and acceptance checks, prior to acceptance. Indigenous sludge and imported sludge combine in the Sludge Buffer Tanks and are pumped to the Sludge Blending Tanks, as described above. From the Sludge Buffer Tanks, sludges can be pumped to the Sludge Holding Tank, as required.

Beckton Sludge Imports are pumped to the Sludge Blending Tanks, where they combine with the indigenous and imported sludge. Blended sludge is then subject to dewatering in the Pre-THP Dewatering Plant, with liquors being returned via the Liquor Return Tank and Return Liquor Pumping Station to the Works Inlet for further treatment via the aerobic process. Dewatered sludge is pumped to the THP Feed Silos.

Thickened sludge is stored within THP Feed Silos before being pumped to the Thermal Hydrolysis Plant (THP) Process which is a pre-treatment stage prior to digestion. Anaerobic digestion takes place within one of four aboveground concrete Primary Digester Tanks.

Following treatment over an appropriate number of days with the Primary Digester Tanks, sludge is transferred to one of the two Digested Sludge Dewatering Buffer Tanks. Digested sludge is transferred to Sludge Dewatering Presses where the digested sludge is dewatered using belt presses before it is transferred to the enclosed Cake Barn for storage prior to removal from site under the Sludge Use in Agriculture Regulations 1989 (SUiAR), and in accordance with the Biosolids Assurance Scheme (BAS). Liquor from the dewatering plant is returned via a Liquor Return Tank and Return Liquor Pumping Station for further treatment via the aerobic process.

This OMP includes the import of Undigested Sludge Cake from other works is imported to the Cake Barn for rewetting using the Mobile Cake Rewetting Plant followed by biological treatment. Following rewetting with final effluent, the sludge is pumped to the Sludge Blending Tank and mixes with other sludges before being dewatered with the Pre-THP Dewatering Plant.

Biogas from the Primary Digester Tanks is captured and transferred to one of two double membrane Biogas Storage holders. 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 holders and Primary Digester Tanks are fitted with pressure release valves (PRVs) as a safety precaution in the event of over pressurising of the system.

The biogas is taken from the Biogas Storage for combustion in CHP Engines, generating electricity for use both within the site and for export to the grid, and heat (to raise steam) for the THP process. These are classified as an 'existing' combustion plant under the Medium Combustion Plant Directive. In the event that additional steam is required for the THP process, biogas or natural gas may be used in the onsite dual-fuelled heat recovery boilers to provide heat to the THP plant. In the event there is excess biogas, i.e. more than the CHP Engines or boilers can utilise, or in the event that the CHP Engines are unavailable, there is one ground mounted Emergency Flare. The flare is utilised under 10% of the year or less than 876 hours per year. The CHP Engines and heat recovery boilers are currently operated under an Environmental Permit which will be merged with this permit.

This OMP includes the import of treated sludge cake from other works, for temporary storage within 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 within 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 Riverside 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 engineered 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

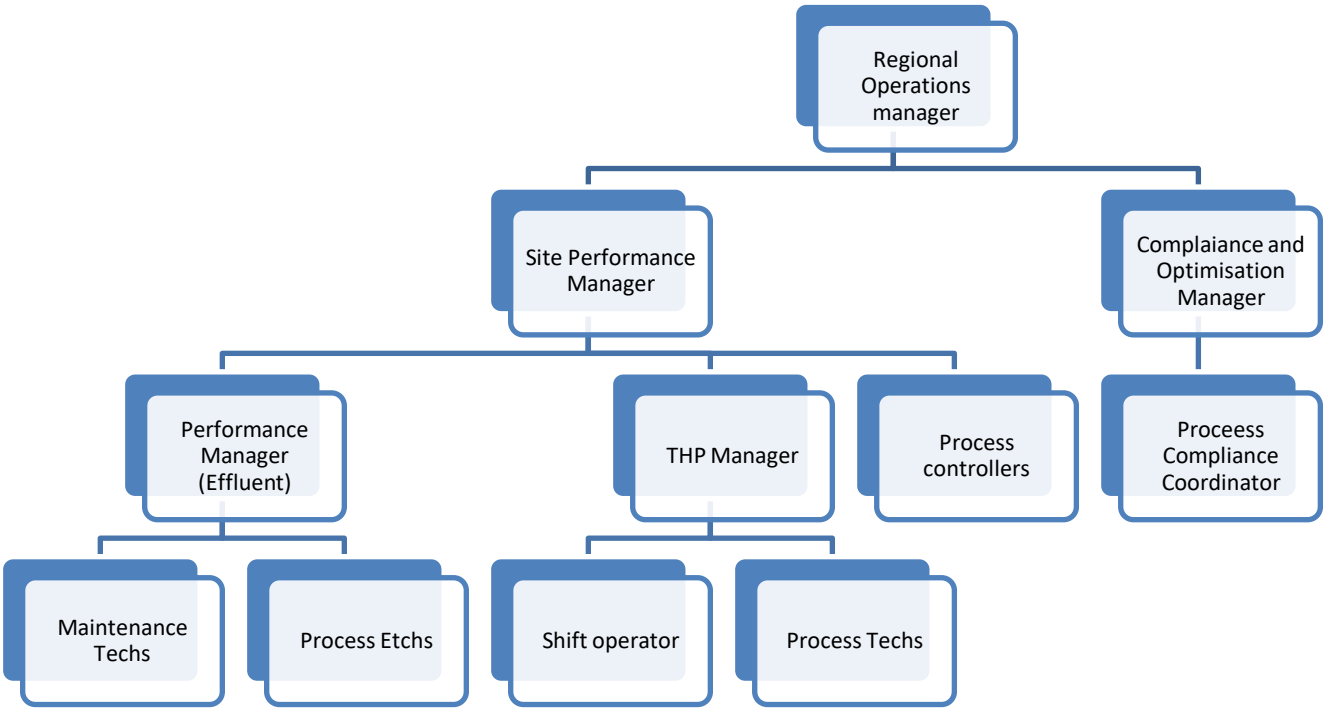


Table 3.1 - Tasks and Responsibilities

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, , including assessing the scope of, and updating the OMP as it is implemented.

Role	Tasks and Responsibilities
Performance Manager	Responsible for overall performance of the STW and will be responsible for: • odour control and management at the site • day to day implementation of the OMP • assessing the scope of, and updating, the OMP as it is implemented. • dealing with customer complaints • day-to-day operation of the STW • Responsible for overall performance of the STW • Ensuring staff Thames Water staff undergo appropriate training
Technically Competent Manager	Hold the required WAMITAB qualification to support the activities on site under EPR, ensuring permit conditions are complied with.
Customer and Stakeholder Manager	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 Compliance Coordinator	Reports to Process Optimisation and Reporting Manager. Process monitoring, improvement and troubleshooting.
Team Manager	Responsible for day-to-day operation and improvement of the STW.
Technician 1 Day Works	Day to day duties include maintaining and operating process equipment.
THP Technician	Day to day duties include maintaining, operating and optimising process equipment and, recording site data
Process Controllers	Monitoring and recording of site data and operating process plant.
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.

The site is manned 24 hours per day and 7 days per week.

3.2 Key Contacts

Role	Name	Email address	Phone Number
Operations Area Manager	[redacted]	[redacted]	[redacted]
Process Manager	[redacted]	[redacted]	[redacted]
Customer Centre	Riverside STW	customer.feedback@thameswater.co.uk	0800 316 9800
Technically Competent Manager	[redacted]	[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.

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

4 Odour Critical Plant Operation, Monitoring and Management Procedures

Odour prevention and reduction is achieved at Riverside 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.

4.1 Odour Sources, Critical Issues and History

Riverside received two odour complaints in 2018, none in 2019, one in 2020, one in 2021 and one formally recorded in 2022

An odour risk assessment of the activities at Riverside and mitigation under normal and abnormal conditions is given in Appendix 1.

An Odour Improvement Plan is included as Appendix 2.

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

4.2 Identification of Odour Critical Plant

4.2.1 Odour Risk Assessment

The Odour Risk Assessment is not a ‘one-off’ exercise but an on-going process.

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. The Odour Improvement Plan for Riverside 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:

- General Odour
- Site Drainage
- Incoming sewers
- Inlet PS
- Screening
- Skips/wheelie bins
- Storm Tanks and Channels
- Inlet Works
- Grit Removal Plant
- Primary Settlement Tanks
- ASP Plant
- Final Settlement Tanks
- RAS/SAS transfer and pumping
- OCU 2

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

- Vehicle Movements & Wash Down
- Sludge buffer tanks
- Sludge holding tanks
- Sludge Reception and screening
- Sludge thickening
- Odour Control Units (OCU 1 & 3)
- Sludge pumping
- Digesters
- Cake movements
- THP feed silo
- Thermal Hydrolysis Plant
- Digested Sludge dewatering buffer tanks
- Sludge dewatering
- Cake storage (including imports)
- Flare
- Biogas storage
- CHP
- Mobile rewetting plant

4.2.3 Odour Critical Plant

The following list of odour critical plant has been identified at Riverside STW during the Odour Risk Assessment:

- PSTs (including scrapers and sludge removal systems)
- Storm Tanks
- THP Plant
- Sludge Buffer Tanks
- Gas holders

4.2.4 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)	Material	Average retention time (where applicable)
Sludge Blending Tanks	2	745	Steel	2-6 hours
Primary Digester Tanks	4	4,863	Steel	21 days
Digested Sludge Dewatering Buffer Tanks	2	166	Steel	2-6 hours
Liquor Return tank	1	54	Concrete	Constrain flow
Sludge Buffer Tanks	2	1700	Concrete	2-6 hours
Sludge Holding Tank	1	3173	Concrete	Emergency use only
THP Feed Silos	2	25	Steel	2-6 hours
THP Streams	2			
THP Streams THP Pulper Tank	2	34	Steel	Constant use – 30 mins
THP Streams THP Reactor Tank	8	13	Steel	Constant use – 30 mins

THP Streams THP Flash Tank	2	42	Steel	Constant use – 30 mins
Centrifuge polymer silo	1	25	Steel	NA
Digested sludge polymer silo	1	25	Steel	NA
Anti-foam silo	1	38	Plastic	NA
Ferric Chloride tank	2	35	Plastic	NA

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 imports)	Cake Barn	5000 tonnes	Up to 3 months	19 06 06	Point source	Low
Biogas	PRV/Whessoe valve releases; gas storage vessel; unburnt methane from CHP engine. See Emission Point Plan.	Gas holder capacity is 1580m3	Continuous operation	N/A	Point Source	Low
Releases from OCUs	see detailed consideration in Section 4.3.2.	Variable throughput is specific to each OCU.	Continuous operation	N/A	Point Source	Medium/high

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
Liquor	Site drainage and liquor return tank	Liquor is continuously pumped to the head of works	Continuous pumping of liquors from liquor return pumping well.	16 10 02	Diffuse	Low
Blended Sludge	Pre THP dewatering plant Sludge buffer 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)	Medium/high
Sludge import	Sludge buffer tank; sludge blending tanks	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)	Medium/high
Undigested Cake Imports	Mobile Cake Rewetting Plant in Cake Barn	100 tonnes	1 day	19 02 06	Point Source	Low/Medium

Table 4.2 Odorous raw materials for Sludge Treatment Centre Permit

Raw Material	Odorous	Storage	Mitigation	Odour Risk
1. FO4490VHM 2. Flopam Fo5465AF	Not odorous	1. 25 tonnes stored in a bunded silo 2. 25 tonnes stored in bunded silo	Fully contained	Low

Flofoam 681 F	Mild odour	38 m3 stored in a bunded silo	Fully contained	Low
Ferric chloride 40% solution ICL 40%	Chlorine	2x 35m3 stored in bunded silo for digesters (+ 2x inlet 15m3 each)	Fully contained	Low
Mobil Pegasus 605 Ultra 40	Oil	5,000 litres stored in bunded tank (waste oil stored in 5,000 litre Dirty Oil Tank). Lubricant Oil: 300 litres Make Up Tank	Fully contained	Low
ES Compleat PG Premix	Not odorous	2,000 litres stored in bunded IBCs	Fully contained	Low
sodium bisulphite Nalco 77211	Sulphurous	700 litres in bunded tanks	Fully contained	Low
Nalco Nexguard 22310	Ammoniacal	700 litres in bunded tanks	Fully contained	Low
sodium hydroxide (20% solution) Nalco 77224	Not Odorous	700 litres in bunded tanks	Fully contained	Low
PDV Salt	Not odorous	9 tonnes, in 12.5kg bags stored outside water treatment kiosk		Low

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

4.3 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. Refer to risk assessment in Appendix 1 where these measures are summarised as "Normal Mitigations"

4.3.1 Specific Odour Mitigation Measures

- **Baseline Control Measures**

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 Riverside STW are summarised in the tables below.

The routine operational tasks carried out at Riverside STW to specifically mitigate against generation of odour are also listed in the tables below.

- **Odour Protocols**

As a result of planning conditions imposed as a result of planning consent for the sludge digestion plant, the following protocols have been drawn up and agreed with the London Borough of Havering:

  - Hydrogen Sulphide Monitoring and Odour Emissions Protocol which shall include the matters set out in Condition 20.

  - Olfactometric Testing and Performance Protocol which shall include the matters set out in Condition 22.

  - Riverside Sludge Treatment Facility Capacity Protocol for the Sludge Treatment Facility which shall include the matters in Condition 23.

  - Sludge Cake Store Ventilation Protocol which shall include the matters set out in Condition 26.

  - Primary Settlement Tank Odour Potential and Emissions Protocol which shall include the matters set out in Condition 27.

  - Sludge Depth Monitoring Protocol (for the primary settlement tanks) which shall include the matters set out in Condition 28.

The STW shall be operated in accordance with the approved Protocols which cannot be changed without the prior written approval of the Local Planning Authority. In the event of a conflict between the OMP and any Protocol the provisions of the Protocol shall prevail.

The Protocols are attached as Appendices to this OMP.

The purpose of Table's 4.3 – 4.7 shall be to identify site specific emergency response procedures and mitigation measures relating to site odour generation and release. It shall include:

- Generic odour issues and mitigation measures relating to site-specific process stages; and,
- Additional site-specific odour issues and mitigation measures associated with process stages identified under the site Odour Risk Assessment.

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 Clean up as soon as possible and no later than the end of the day.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 up as soon as possible and no later than the end of the day

		Site odour acceptability. As a routine, staff should continually be conscious of levels of on-site odour and should report any significant change or increase in odour to the Team Manager. In particular, it is important to monitor odour from the grit skip and storm tank areas. Any reports should be investigated immediately, and the appropriate action taken. Ensure that areas of work are left clean and tidy after process/ maintenance activities.	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
			Tech1	Visual	Daily		
Screening Linked tasks specified in Appendix 15 section 2.3	Sewage (L)		Tech1	Visual	Daily	Screens not working, skips overfilled or spilling.	Visually check that the screens are working. Ensure that channels are flowing freely. Ensure that the skips are not over filling or spilling. If any issues are found or reported, then jobs would be raised on sap and allocated to the relevant team to rectify the issues.

Skips/wheelie bins Linked tasks specified in Appendix 15 section 2.4	Sewage (L)	The number of skips /bins kept to minimum and where possible, kept closed. There shall be a routine collection. However, routine daily inspections shall ensure that bins are not overfilled and that extra collections are arranged if required.	Process Controller	Visual	Daily	Bins overfilling and rubbish spilling over.	Daily check to ensure that the skips are not overfilling or spilling. Any issues found would be reported to the process controller and a job would be raised for the relevant team to rectify or clean up. Bins should be kept to a minimum and kept shut at all times.

Storm Tanks and Channels Linked tasks specified in Appendix 14 section 2.6	Sewage (L)	The tanks and channels shall be kept empty and clean. Operations staff to regularly monitor incoming flow so that the storm tank contents can be returned to the works as soon as possible after the high flows have abated. Any residues left in the tanks will be assessed by site management for odour emission potential, taking into account the season and the number of tanks affected, and resources utilised as required to manually clear them.	Tech1 / Team Manager	Visual	At least daily following a storm event until all tanks are clear.	Organic material left in the bottom of the tank once it has been emptied.	As the flow to the storm tanks is returned to the inlet, the team will carry out visual checks on the tanks to assess if they require cleaning. As good practice the tanks should be clean, and all settled material should be removed to prevent odour emissions. If there was a build up of organic material in the tank then a job would be raised with the Process controller

Storm Tank Inlet Channel	Sewage (L)	It is anticipated that with the arrangement whereby the tanks fill sequentially but the entire inlet channel is used throughout the storm event, sludge will build up in the storm tank inlet channel. Any residues left in the channels will be assessed by site management for odour emission potential, taking into account the season, and resources utilised as required to clear them. The channel should be inspected after it has been used and in any case cleared of any sludge within 1 week.	Process Controller / Team Manager / Tech 1	Visual	As required	Organic material left in the bottom of the tank once it has been emptied.	As the flow to the storm tanks is returned to the inlet, the team will carry out visual checks on the tanks to assess if they require cleaning. As good practice the tanks should be clean, and all settled material should be removed to prevent odour emissions.

Inlet Works	Sewage (L)	Keep area tidy. Skips collection and inspection as above.	Tech1	Visual	Daily	Excessive odour or spillages of grit and rag.	Daily check to ensure that the skips are not overfilling or spilling. Any issues found would be reported to the process controller and a job would be raised for the relevant team to rectify or clean up. Excessive odour would be investigated to ensure that there is not a build up of waste in the skips or drying pads.

Grit Removal Plant Linked tasks specified in Appendix 14 section 2.5	Sewage (L)	Ensure detritor inlet baffles are free of rags. Ensure grit is clean and free from other debris. If significant amounts of organic matter in grit, report to Team Manager who will take action to review the process accordingly. Grit automatically loads into skips. Due to the size of the skip, regular collection is not operationally essential. However, regular monthly collection should be instigated if odour emissions from the skip increase. Odour emissions from the grit area should be closely monitored by Operational staff.	Tech 1	Visual	Daily	Skips overfilling with grit material.	Daily check to ensure that the skips are not overfilling or spilling. Any issues found would be reported to the process controller and a job would be raised for the relevant team to rectify or clean up. Or a contractor to empty the skip. The check would also include the skips are filling as a level load evenly. All issues that are found should be raised with the process controller who will raise the jobs with the maintenance team or the

							management to resolve.
Primary Settlement Tanks Linked tasks specified in Appendix 14 section 3	Sewage (L)	Ensure scum removal system is working correctly. Monitor the sludge blanket depth. The desludging frequency should be increased if the sludge blanket depth increases above the limit set by the Sludge Depth Monitoring Protocol (Appendix 9). Any tank taken of service for more than 24 hours shall be emptied. The empty tank should be washed down immediately.	Tech1	Visual	Daily – Monday to Friday	If the plant is out of service for long periods of time or if the sludge levels rise above the sludge depth monitoring protocol. Or if there is a build up of scum on the surface.	If the sludge blankets get to high then the tank should be de-sludged manually by operating the drain valves. If the tank is out of service longer than 24 hours, then the tank should be drained and cleaned before it is re-commissioned. All issues that are found should be raised with the process controller who will raise the jobs with the maintenance team or the management to resolve.

ASP Plant Linked tasks specified in Appendix 14 section 4	Settled sewage (L)	Keep the settled sewage channel and surrounding area clear. Use hypochlorite dosing when required to control filamentous foaming.	Tech1	Visual	Daily	Build up of foam on the surface of the aeration lanes.	In extreme cases we can dose hypochlorite into the process to reduce foaming. In most cases we can control the build up of foam by turning on the water spray bars to break it up to sink it. All issues that are found should be raised with the process controller who will raise the jobs with the maintenance team or the management to resolve.

Final Settlement Tanks Linked tasks specified in Appendix 14 section 5	Final Effluent (L)	Make sure the launder channels are kept clear. If taken out of service, the tank must be drained. Any residues left in the tanks and channels will be assessed by site management for odour emission potential and these cleared as required.	Tech1	Visual	Daily	A build up of scum on the surface or in the channels. High sludge blanket levels in the tank. Or if the tank is out of service for longer than an hour.	If the build up of organic material get too severe, or the sludge blankets get to high or start to lift of off the bottom of the tank, then the tank should be taken out of service and cleaned. All issues that are found should be raised with the process controller who will raise the jobs with the maintenance team or the management to resolve.

RAS Pump Houses	RAS (L)	The chambers are to be kept clear.	Tech1	Visual	As required	Excessive odour or a visible build up of material in the chambers.	Area would be cleaned with hoses to push the build up through the process. All issues that are found should be raised with the process controller who will raise the jobs with the maintenance team or the management to resolve.

OCU 2 Linked tasks specified in Appendix 14 section 9	H2S (L)	The OCU shall be checked in accordance with the O & M manual at least once per week to ensure that the irrigation system and ventilation fans are working . The duty fan are automatically alternated on a weekly basis. H2S will be measured, on a weekly basis between the biofilter and the Peacemaker units (with a measurement technique with a sensitivity of no more than 0.1ppm) to identify any operational problems with the biofilter and prevent premature saturation of carbon filters. The plant shall be maintained as per the maintenance schedule. Outlet H2S emissions are continuously monitored in accordance with the Hydrogen Sulphide Monitoring and Odour Emissions Protocol. If the outlet H2S concentration significantly increases, measurements of the H2S at the inlet and outlet of both stages of the OCU shall be taken to determine the removal efficiency - this would be escalated up the management / supervisory chain. If the removal efficiency is unsatisfactory, the OCU shall be inspected for mal-performance and remedied as appropriate. If the trend is still evident the Team Manager should arrange for a specialist assessment of the OCU.	Tech 1	Visual SCADA	Weekly/ monthly Continuous	Excessive odours around the area or if the plant experiences a failure. Hi readings of H2S / alarms on the scada system in the control room.	Initially, our maintenance team or dayworks team would investigate and try to fix the issue. For catastrophic failures, we may need to call-in third-party contractors to remedy the issue. All issues that are found should be raised with the process controller who will raise the jobs with the maintenance team or the management to resolve.

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	Odour risk if mitigation fails
Sludge Blending & Mixing Linked tasks specified in Appendix 15 section 3	Sludge (L)	Kept covered	PM	Visual Inspection	Daily	Failure of plant. Odour issues.	All tanks are covered and connected to the OCU unit. Maintenance team would carry out initial investigations and repair if possible. Some jobs may be passed to contractors to repair. All issues that are found should be raised with the process controller who will raise the jobs with the maintenance team or the management to resolve.	Medium

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
General		Ensure that areas of work are left clean and tidy after process/ maintenance activities. Ensure site is kept clean and tidy	Site Tech 1s Team Manager	Visual Inspection	Daily	Visible signs of rubbish or old equipment left around site.	Clean any areas that have been left untidy. Raise action against any contractors that are found to be leaving a mess around site. Carry out regular site walks to ensure that a high standard of cleanliness is maintained. Ensure that everyone is inducted to site to ensure that they are aware of where the bins are located or how to deal	

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
							with their waste materials.	
		Any spillages to be cleaned up as soon as practicable	Site Tech 1s	Visual Inspection	Daily	Visible signs of spillages	Clean up spillage as soon as possible.	
		Site odour acceptability As a routine, staff should continually be conscious of levels of on-site odour and should report any significant change or increase in odour to the Team Manager. In particular, it is important to monitor odour from the grit skip and storm tank areas. Any reports should be investigated immediately and the appropriate action taken.	Site Tech 1s	Qualitative assessment	Daily	Site odour detectable by personnel.	Site sweep should be undertaken to find the source of the odour and a job should be raised for the relevant team to attend and remedy the issue. All issues that are found should be raised with the process controller who will raise the jobs with the maintenance	

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
							team or the management to resolve	
Vehicle Movements & Wash Down Linked tasks specified in Appendix 15 section 16 and 17	Digested sludge (L)	Keep movements to a minimum and cover wagons	Sludge Management	Visual Inspection	As required	Excessive cake or duct on the roads around site. Or wheels wash breaking down	For excessive build-up of cake or duct. Investigate the cause to stop the spread of further emissions. Ensure that lorries are covered, that they are driving through the wheel washes after they have been in the cake barn and ensure that they are not bring in contaminants from outside.	Low

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
							If the wheel wash is broken then raise a job for the maintenance team to fix it. Order a road sweeper to clear the emissions around site.	

OCU 1 Linked tasks specified in Appendix 14 section 9	H2S (L)	The OCU shall be checked in accordance with the O & M manual at least once per week to ensure that the irrigation system and ventilation fans are working. The duty fan are automatically alternated on a weekly basis. H_2S will be measured, on a weekly basis between the biofilter and the Peacemaker units (with a measurement technique with a sensitivity of no more than 0.1ppm) to identify any operational problems with the biofilter and prevent premature saturation of carbon filters. A H2S monitor provides continual readings with manual checks to verify accuracy. The plant shall be maintained as per the maintenance schedule. Outlet H_2S emissions are continuously monitored in accordance with the Hydrogen Sulphide Monitoring and Odour Emissions Protocol. If the outlet H_2S concentration significantly increases, measurements of the H_2S at the inlet and outlet of both stages of the OCU shall be taken to determine the removal efficiency - this would be escalated up the management / supervisory chain. If the removal efficiency is unsatisfactory. The OCU shall be inspected for mal-performance and remedied as appropriate.	Tech 1	Visual SCADA	Weekly/ monthly Continuous	Odour release from the OCU. Any physical defects Alarms on SCADA	Investigate the issue to determine the best course of action. The process controllers are monitoring the alarms 24 hours a day, 7 days a week. They would initially raise a job for maintenance to investigate any alarms that show up in the control room. Once the cause of the issue has been found then raise a job for either maintenance or operations team to attend to remedy.	Low

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
		If the trend is still evident the Team Manager should arrange for a specialist assessment of the OCU.					For some larger jobs then we may need to raise orders with specialist contractors to remedy defects or change the filter media when it has reached the end of its life span.	

OCU 3 Linked tasks specified in Appendix 14 section 9	H2S (L)	The OCU shall be checked at least once per week to ensure that the ventilation fans and irrigation pumps are working in accordance with the O & M manual. The duty fan is alternated on a weekly basis. The plant shall be maintained as per the maintenance schedule. See Appendix 10 Outlet H_2S emissions are continuously monitored in accordance with the Hydrogen Sulphide Monitoring and Odour Emissions Protocol. If the outlet H_2S concentration significantly increases measurements of the H_2S at the inlet and outlet of both stages of the OCU shall be taken to determine the removal efficiency - this would be escalated up the management / supervisory chain. If the removal efficiency is unsatisfactory, the OCU shall be inspected for mal-performance remedied as appropriate. If the trend is still evident the Team Manager should arrange for a specialist assessment of the OCU.	Tech 1	Visual	Weekly/ monthly	Odour release from the OCU. Any physical defects Alarms on SCADA	Investigate the issue to determine the best course of action. The process controllers are monitoring the alarms 24 hours a day, 7 days a week. They would initially raise a job for maintenance to investigate any alarms that show up in the control room. Once the cause of the issue has been found then raise a job for either maintenance or operations team to attend to remedy.	Low

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
							For some larger jobs then we may need to raise orders with specialist contractors to remedy defects or change the filter media when it has reached the end of its life span.	

Cake Barn & Drainage(including imports) Linked tasks specified in Appendix 15 section 16 and 17	Cake (L)	In an enclosed building with roller shutter doors, under negative pressure. Refer to Sludge Cake Store Protocol. 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.	Viridor driver / Tech 1 s	Visual	Daily	Roller shutters not operational or extraction system faulty.	Any issues found would be reported to the process controller. Likewise, if the alarms were detected on the SCADA system by the process controllers then a job would be raised for the maintenance or operations team to attend and investigate the issue. If it can be remedied by the site team then the repairs or remedial actions would be completed as soon as possible. For	Low

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
							larger or more complex jobs, a job would be raised for a specialist contractor to remedy the fault.	
Mobile rewetting plant	Sludge (L)	In Cake Barn – see above entry	Tech 1 s	Visual	Daily	See above entry	See above entry	Low

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
Vehicle Movements & Wash Down Linked tasks specified in Appendix 15 section 16 and 17	Cake (L)	Covered vehicles, vehicles are loading inside building.	Viridor Tech 1	Visual	Daily	The back cover for the lorry is defective or not covering properly.	Report to fleet team to call out a repair team. The lorry should be repaired before it leaves site with a load or the load should be emptied before the lorry leaves site if the driver is not able to get the cover to work.	Low

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
Sludge buffer tanks	Sludge (L)	Odour extracted, abated by OCU and covered tanks. Keep area tidy. Ensure covers are kept closed. Ensure that unused tanks are kept empty.	Tech 1	Visual SCADA	Daily Continuous	Failure of plant or odour issues.	All tanks are covered and connected to the OCU unit. Maintenance team would carry out initial investigations and repair if possible. Some jobs may be passed to contractors to repair. All issues that are found should be raised with the process controller who will raise the jobs with the maintenance team or the management to resolve.	Medium

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
Sludge Reception Linked tasks specified in Appendix 15 section 1	Sludge (L)	Sealed tanks, odour extracted, abated by OCU. Ensure tankers coupled correctly	Tech 1	Visual SCADA	Daily Continuous	Failure of plant, tanks, or odour issues.	All tanks are covered and connected to the OCU unit. Maintenance team would carry out initial investigations and repair if possible. Some jobs may be passed to contractors to repair. All issues that are found should be raised with the process controller who will raise the jobs with the maintenance team or the management to resolve.	Low/medium

Sludge thickening Linked tasks specified in Appendix 14 section 8	Sludge (L)	Sludge ewatering building	Tech 1	Visual	Daily	Odour issues in the building. Any physical defects Alarms on SCADA	Investigate the issue to determine the best course of action. The process controllers are monitoring the alarms 24 hours a day, 7 days a week. They would initially raise a job for maintenance to investigate any alarms that show up in the control room. Once the cause of the issue has been found then raise a job for either maintenance or operations team to attend to remedy.	Low

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
							For some larger jobs then we may need to raise orders with specialist contractors to remedy defects or change the filter media when it has reached the end of its life span.	

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
Digester Linked tasks specified in Appendix 15 section 6	Hydolysed sludge (L)	Sealed, fixed roofs. Pressure relief valves measured by SCADA	Tech 1	Visual SCADA	Daily Continuous	Visual leaks or de-gritting of the digesters Any physical defects Alarms on SCADA	Occasionally the digesters must be de-gritted into the drains. This would be done in a bunded area which would be cleaned up immediately. Any other issues or alarms would be raised with the process controller and allocated to the maintenance team or operations to investigate and remedy.	Low

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
Thermal Hydrolysis Plant	Thickened sludge (L)	Pressure relief valves - Valve protected from unnecessary emissions with bursting disk and pressure switch, connected to SCADA to indicate failure of bursting disc.	Tech 1	Visual SCADA	Daily Continuous	Visible leaks or defects. Alarms on scada.	Any other issues or alarms would be raised with the process controller and allocated to the maintenance team or operations to investigate and remedy. The area would be cleaned up as soon as it was safe for people to work in the area.	Medium/high

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
THP Feed silos	Thickened sludge (L)	Enclosed sludge silos connected to OCU1	Tech 1	SCADA	Continuous	Visible leaks or defects. Alarms on scada.	Any other issues or alarms would be raised with the process controller and allocated to the maintenance team or operations to investigate and remedy. The area would be cleaned up as soon as it was safe for people to work in the area.	Low

Odour source	Odour and offensiveness L/M/H	Specific odour management tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale	Odour risk if mitigation fails
Sludgeholding tanks Linked tasks specified in Appendix 15 section 3	Sludge (L)	Covered storage tanks (connected to OCU) with air mixing	Tech 1	SCADA	Continuous	Visible leaks or defects. Alarms on scada.	Any other issues or alarms would be raised with the process controller and allocated to the maintenance team or operations to investigate and remedy. The area would be cleaned up as soon as it was safe for people to work in the area.	Low
Sludge dewatering	Digested sludge ()		Tech 1	Visual	Daily			Low

Table 4.3: Intermittent, abnormal, and emergency events for assets under UWWTD

Process stage	Event	Status	Ops mitigation	Expansion of TWUL operational response to odour under Int/Ab//E events	Odour risk after mitigation
PSTs	Maintenance or failure of scrapers Accumulation of sludge in tank leading to increased septicity, scum accumulation and odour release from tank and downstream processes Need to drain tank to repair scrapers leading to odour release from tank surface and downstream processes and as tank is emptied	Ab	As maintenance schedule or emergency maintenance call-out if unable to drain tank. Maintain low levels of sludge in the PSTs under normal operation Before draining tank, remove as much sludge from the tank as possible by drainage and pumping Maintain a small flow through the tank to reduce septicity Wash down tank as soon as drained	The maintenance team would be called to investigate and remedy the issue in the first couple of hours. If the TW teams are unable to remedy the issue, then a job maybe raised for a contractor to carry out repairs. If the tank is out of service for 24 hours or longer then operations would drain and clean the tank.	Medium
PSTs	Maintenance or failure of PST de-sludging Accumulation of sludge in tank leading to increased septicity, scum accumulation and	Ab	As maintenance schedule or emergency maintenance call-out if unable to drain tank. The desludging facility must be repaired within 24	The maintenance team would be	Medium/high

	odour release from tank and downstream processes May need to drain tank Floating crust/fat/vegetation – manually clean Hot weather – contact process and compliance to advise.		hours. If this is not possible, the tank must be drained within 24 hours. Before draining tank, remove as much sludge from the tank as possible by drainage and pumping Maintain a small flow through the tank to reduce septicity Wash down tank as soon as drained	called to investigate and remedy the issue in the first couple of hours. If the TW teams are unable to remedy the issue, then a job maybe raised for a contractor to carry out repairs. If the tank is out of service for 24 hours or longer then operations would drain and clean the tank	
Aeration	Floating crust/fat/vegetation Hot weather	Ab	Manually clean Contact process and compliance coordinator to advise	The operations team would initially try to break up any foaming or crust with water jets or poles and remove it safely. These areas are checked daily by the ops teams to ensure that there is no	Low

				significant build up.	
Aeration	High ammonia due to centrate returns High turbulence Repair to air domes Hot weather	Ab	Primary settling tank odour potential and emissions plan Isolate air main Drain down and clean tank Turn on spare bars in anoxic zone	The process controllers would raise a job initially for our operations or maintenance team to investigate any issues that are found on the aeration lanes. Issues with domes or on the main pipework are usually passed to contractors to repair as they are bigger jobs. The lane would be taken out of service and cleaned in preparation for the repairs.	Low
Final settlement tanks	Scraper fail Belmouth valve fail Tank drained down for maintenance	Ab	Drain down and clean tank	If there are any major issues on our final settlement tanks they are taken	Low

				out of service within an hour and drained as soon as the operations team are available. This has to be done to prevent pollutions from rising blankets or emissions from sludge going septic.	
Detritors	Failure. Odour release during drainage and cleaning of detritors	Ab	As maintenance schedule. Empty detritors are cleaned of debris on drainage. Prior to cleaning a small flow is maintained to minimise septicity	If the tanks are taken out of service, then they would be drained and cleaned as part of the job.	Low
Works Inlet	Septic sewage from low flows / sewer cleaning	Ab	Contact Networks Team / Planned event: monitor and control flows	This would be raised with the network team to investigate.	Medium
Works Inlet	Large spillage due to combination of power failure and loss of emergency generation	Ab	Temporary generators and temporary pumps / Overpump	We have back up power generators that can power the site during power lose.	Medium

Screening	Septic sewage from low flows or sewer cleaning	Ab	Contact Networks Team / Planned event: monitor and control flows		Medium
Screening	Large spillage due to combination of power failure and loss of emergency generation	Ab	Temporary generators		Medium
Screening	One screen/pit out for maintenance	Ab	Other screens will take up the flow		Low
Screening handling	Skips not emptied	Ab	Cover skips and call skip framework supplier	Raise urgent call with the skip company to get the skips emptied. Skip levels are monitored daily by the ops team.	Medium
Storm tanks	Failure of amajets leading to sludge accumulation	Ab	Manually clean storm tanks as soon as practicable	There is a manual tank cleaning program in place to clean the tanks when they are not in use.	Medium
RAS/SAS chambers and pumping	Failed pump	Ab	Use stand by pumps	We have spare pumps as a back up.	Low

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

Process stage	Event	Status	Ops mitigation	Expansion of TWUL operational response to odour under Int/Ab//E events	Odour risk after mitigation
Sludge consolidation (Sludge buffer tanks)	Sludge spillage / overfill	Ab	Daily visual inspections, clear spillage	Process controller would investigate the over fill and raise jobs for maintenance to repair any issues found. The operations team would clean up any spillages.	Medium
Sludge consolidation(Sludge buffer tanks)	Inspection hatch left open	Ab	Close hatch		Medium
Sludge consolidation (Sludge buffer tanks)	Failure of odour control unit	Ab	Replace / Repair faulty equipment	Investigate the issue to determine the best course of action. The process	Medium

				controllers are monitoring the alarms 24 hours a day, 7 days a week. They would initially raise a job for maintenance to investigate any alarms that show up in the control room. Once the cause of the issue has been found then raise a job for either maintenance or operations team to attend to remedy. For some larger jobs then we may need to raise orders with specialist contractors to remedy.	

Sludge Reception	Overfilling of tank with sludge discharge to inlet works via works drain and Trade Sewer	Ab	Daily visual inspections, stop transfer from Beckton STW	Process controller would investigate the over fill and raise jobs for maintenance to repair any issues found. The operations team would clean up any spillages.	Low/Medium
Sludge holding tanks	In use	Ab			Low
Odour Control Units	Failure. Odour release from tanks	Ab	As maintenance schedule or emergency maintenance call-out.	Investigate the issue to determine the best course of action. The process controllers are monitoring the alarms 24 hours a day, 7 days a week. They would initially raise a job for maintenance	Low

				to investigate any alarms that show up in the control room. Once the cause of the issue has been found then raise a job for either maintenance or operations team to attend to remedy. For some larger jobs then we may need to raise orders with specialist contractors to remedy defects or change the filter media when it has reached the end of its life span.	

Sludge Screens	Strain press failure leading to operation of standby unit or by-pass	Ab	Change over to standby unit	Change duty of screen or bypass screens. Investigate and remedy issue with maintenance or operations team. Larger jobs may require contractors to complete.	Low
Sludge Thickening	Failure of automatic washdown on shutdown necessitating removal of enclosure	Ab	Manual cleaning		Low
THP feed Silos	Bridging of sludge in silos. Water/air injection to collapse bridged sludge.	Ab	Clean up area	Investigate and clear blockage. Clean area as soon as possible.	Low
Sludge pumping	Failure of pumps or sludge pipeline to Reception Tanks. Storage of sludge in system including PSTs leading to odour release from surface of PSTs	Ab	Emergency maintenance call-out. Duty /standby transfer pumps 24-h emergency call out on failure	Investigate and remedy issues. Prolonged events may require the use of tankering of	Low

				sludge to other sites.	
Digester	Pressure release. Identified by sensor to SCADA	Rare	Respond to alarm and determine and remedy cause	Investigate and remedy issues. Prolonged events may require the use of tankering of sludge to other sites.	Low
Digester	Failure of digestion process. Storage of sludge in system including PSTs leading to odour release from surface of PSTs	Ab	As maintenance schedule or emergency maintenance call-out. Cease pumping sludge from Beckton and reactivate Centrifuge dewatering at Beckton until process has recovered. If necessary, tanker Riverside co-settled sludge off-site to further reduce digester throughput.	Investigate and remedy issues.	Low
Cake disposal	Prolonged bad weather, foot and mouth outbreak or other problems with cake disposal route to land. Cake is not allowed to be stored outside the cake store and so the odour impact is low	Ab	When Cake Store is full, transport cake to alternative sites for storage or disposal or to landfill. Disposal of Sludge including all records and accounts are managed by Thames Water Biorecycling taking into account the cross-company availability of land and other strategic storage locations	The cake would have to be transferred to other site that can accept it.	Low
Thermal Hydrolysis Plant	Annual shut down for pressure vessel certification. Flushing out of unit with steam and water prior to inspection. Washout discharged to digesters.	Int	Ensure that the maintenance is carried out as quickly as possible to reduce exposure time	This is a planned event, so all precautions are taken to	Medium

				reduce odour and risk.	
Thermal Hydrolysis Plant	Breakdown including off-gas treatment. Close one THP stream and inhibit flows from Beckton. If drain down of tanks required will be flushed with steam/water as above.	Ab	Clean up spillage and carry out maintenance as quickly as possible	Drain and clean would have to be coordinated to ensure minimum odour / impact/	Medium
Thermal Hydrolysis Plant – digester feed pumps	Removal of pump for maintenance washdown to works drain	Ab	Replace pump with spare		Low
Thermal Hydrolysis Plant	Significant vapour leak to THP vessel	Ab	Shut down vessel and rectify leak	Investigate and remedy issue as soon as possible. Once identified, isolate plant and clean area.	High
Thermal hydrolysis Pant – cooling	Normal sludge throughput velocity adequate to prevent scaling. In case of blockage, high pressure washwater available to clear blockages into digester feed pipework.	Ab	Unblock and clean up area		Low
Sludge dewatering – digested sludge buffer tanks	Overfilling of tank with sludge discharge to inlet works via works drain and Trade Sewer	Ab	Upstream cascade stopping of plant eventually stopping transfer from Beckton		Low

Sludge dewatering	Removal of pump for maintenance washdown to works drain Shutdown. Necessitating removal of enclosure and manual cleaning	Ab	Clean up area		Low
Sludge cake transfer	Breakdown of conveyor requiring hand removal of sludge cake.	Ab	Clean up area		Low
Cake storage (including digested and undigested imports)	Emissions through exhaust stack exceed agreed limits	Ab	remove cake from site if requried. Consider stopping cake imports	Investigate and remedy. Pause operation if the exceedance is unacceptable.	Low
Biogas system	Gas holders reach 95% leading to operation of flare stack Gas holders reach 100% leading to venting through PRVs	Ab	Investigate lack of gas usage		Medium

Table 4.7: General Intermittent, abnormal, and emergency events

Incidents and emergencies	Event	Status E (emergency)	Ops mitigation	Expansion of TWUL operational response to odour under Int/Ab//E events	Odour risk after mitigation

Fire	Failure of fans or sludge building	E	Use of SHTs for storage of sludge. 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 plus additional storage in the existing sludge holding tanks		Low
Flooding	Flooding causing process or equipment problems	E	Not an identified problem at Riverside. 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	Transport to other STWs if necessary		Low

4.3.2 Odour Control Units

The required outlet emission standards are set out in the Hydrogen Sulphide Monitoring and Odour Emissions Protocol included as an appendix to this document.

OCU 1 A13 (STC)

The sludge blending tanks, THP feed silos, digested sludge dewatering buffer tanks and liquor return tank are covered and off gases treated in OCU 1. The centrifuges and filter belt presses have individual odour control enclosures and off gases from these items of plant together with the enclosed thickened sludge and dewatered sludge conveyors are also treated in OCU 1.

The OCU comprises 1 No lava rock bioscrubber units followed by dual activated carbon adsorption units.

OCU 2 (UWWTD)

The elevated raw sewage channels around the high-level outlet of the inlet pumps prior to the detritus area, together with the PST de-sludging chambers are covered to reduce odour emissions and off gases treated in OCU 2.

The OCU comprises 1 No lava rock bioscrubber units followed by dual activated carbon adsorption units.

OCU 3 A14 (STC)

The sludge buffer tanks and the sludge holding tank are covered and extracted to a biofilter odour control unit. The ventilation is provided by 2 No. fans which are intended to operate as duty/standby.

There is an additional stack on site for ventilation from the Cake Barn (A15).

THP Odour Control

All flash steam and odorous gases are returned to the Pulper. A controlled flow of the non-condensable gases is released from the pulper to a counter current water-cooled foul gas cooler. All condensed liquid is fed back in to the pulper.

The foul gases from both lines are compressed and injected into the sludge line to the digesters.

4.3.3 Spillages

Spillages significant enough to cause odorous emissions must be cleared within 24 hours if assessed as an odour risk. The person discovering the spillage informs site management who will assess the significance of the spillage and utilise resources as required to clear it. Out of normal working hours, the Process controller will act as the site manager in this regard.

The main area of spillage is within the low-level inlet chambers, where overflow of the channels can occur at times of high flow. This is contained within the inlet area and is cleaned up as soon as flows subside.

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

4.4 Routine Monitoring

Overall plant performance is assessed daily as part of the generic Site and Sludge Rounds, which apply to Thames Water large STW sites, and have been included in appendices 15 and 16, 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 so that the required sewage cake output quality is achieved.

- pH: At a THP digestion site such as Riverside the processes is maintained around pH 8 but within the range 7.5-8.6 (this is % dry solids and digester load dependant) for healthy operation
- alkalinity: Levels dependant on feedstock characteristics (primary sludge: surplus activated sludge (SAS) ratio). Advanced digestion (THP) typically, 5,000 - 10,000mg/litre (target range from 6,000-8,000 mg/litre) but is dependent on % dry solids and digester load.
- temperature: minimum target of 40°C for advanced digestion. This is maintained within the range 36-45°C for THP AD.
- HRT (hydraulic retention time): 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. Riverside fits into the fourth row of the table.
- Dry solids feed: see table above, Riverside has a target of 10%DS, but this can vary between 8-14%DS 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 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 17 of the OMP.

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

4.4.1 Performance Checks and Testing

- **Control points**

Sewage and sludge treatment and handling processes are controlled from the control room. Most plant can also be controlled locally.

Continuous monitoring of H_2S concentration & flow emissions from each OCU stack and the Cake Store emissions stack are displayed in the control room.

- **Performance checks**

In addition to normal operating procedures checks are made and recorded on:

  - Level of sludge in the PSTs in accordance with the Sludge Depth Monitoring Protocol
  - Monitoring for effective operation of the Odour Control Units OCU 1, 2 & 3 is carried out on a monthly basis
  - Continuous monitoring of the H_2S emissions from all OCUs and the Sludge Cake Store Exhaust air stack in accordance with the Hydrogen Sulphide Monitoring and Odour Emissions Protocol and the Sludge Cake Store Ventilation Protocol.

With respect to the Odour Control Units these receive:

- Weekly visual checks to ensure fans and recirculation pumps are working. Any problems are reported to the Process Controller for action to be initiated.
- Weekly monitoring of inlet and outlet hydrogen sulphide concentrations on both stages of the OCUs using Gastech tubes or similar instruments. Record in site log and include a "cross check" of the fixed monitoring equipment (Tech 1).

4.5 Record Keeping

Records of routine monitoring, inspections and sludge blanket checks are kept on SharePoint. Records of skip management, which collect wastes generated from UWWTD activities, and any spillages and remedial actions are held in the ELogbook. Sludge blanket levels are recorded on run charts and electronically via the Cockpit. There is a SCADA system on this site.

A monthly condition report on the OCUs is sent to the team manager by the contractor.

4.6 Emergency Response and Incident Response Procedures

Emergencies such as fire, flood and severe weather are managed by Thames Water's Business Resilience and Security team. The processes employed can be found on Thames Water's portal intranet site and are entitled: 'Security and Emergency Risk Management Process' and 'Event Management Procedure'. These are company confidential documents and therefore, are 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 Health, Safety & Environment team.

In the event of power failure, the site will run on island mode for the whole plant. The primary source of power for Riverside STW is the CHP plant which is capable of generating 4 MW/h. During peak demands this is assisted by supplies from the grid.

Should the CHP plant fail, the whole plant may be supplied with power from the grid.

Should both the Grid and CHP supplies fail, 2 No diesel gensets have been installed capable of generating up to 1.75 MW/h each.

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

The site is also equipped with emergency grab packs which are held within the main control room.

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) For PSTs, asset condition (wear/damage) would consider odour risks where assets are taken offline
(g) Telemetry/alarming 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 has 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 procedures are detailed in the SOM, and when carried out 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

OCU 1 (STC) A13

Biofilter

Height x Width X Length	4880 x4880 x 3600 mm
Media type	LavaRok
Cells	1
Design Air Flow Rate	6,300 m3/hr
Design H2S inlet load	26 ppmv
Duty Standby extraction	Yes

Carbon filters

The second stage of the OCU treatment comprises of two pairs of carbon filters (with different carbon media) which are designed to work in series. The first pair of filters contain plain activated carbon, whilst the second pair contain caustic carbon and a final polishing layer of JASORB P-8. A pair of duty/standby fans provide the motive force for this total volume of air, drawing the air through the biofilter then pushing this air through each pair of carbon filters and finally out through a common discharge stack.

Based on 6,800 Am^3/hr flows through each pair of filters, each carbon filter is designed for half of this flow at 3,400 Am^3/hr.

	Activated Carbon Filter	*JASORB--P Filters*
Original manufacturer	*ERG (2019 modification)*	*ERG (2019 modiifcation)*
Height x width x length	Φ3.1m x 1.5mH	Φ2.86m x 2.4mH
Inlet duct diameter	500 mm	500mm
Media depth	700	Carbon: 500 JASROB: 250
Design inlet H2S load	Designed to remove VOCs	1.3 ppm (average) 2.9 (max)

Nominal design criteria backcaluated by ERG

For continuous operational monitoring:

- Continuous H2S outlet monitoring with alarms
- Continuous air flow monitoring with alarms
- Exhaust fan alarms to identify loss of extraction

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 H_2S 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.

OCU 2 (UWWTD)

For continuous operational monitoring:

- Continuous H2S outlet monitoring

- Continuous air flow monitoring with alarm
- Exhaust fan alarms to identify loss of extraction

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 H_2S 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.

OCU 3 (STC) A14

Original manufacturer	Hibernia
Height x Width X Length	3660- x2400 x 2450 mm
Media type	Seashell
Cells	2
Design Air Flow Rate	1,150 m3/hr
Design H2S inlet load	5 ppm (average) 50 ppm(max)
Duty Standby extraction	Yes

Nominal design criteria backcaluated by ERG

For continuous operational monitoring:

- Continuous H2S outlet monitoring
- Continuous air flow monitoring with alarm
- Ventilation system alarms to identify loss of extraction

OCU circulation alarmsFor 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 H_2S 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

5.1.3 Maintenance of Odour Control Units

At Riverside 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 Riverside.

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				
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					
Gas inlet humidity (Post biofilter humidification > 90%	Hygrometer	Check any preheaters fitted to system before carbon, or check irrigation is working on biofilter.	Monthly	X	X	-

Carbon units <70%)						
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 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	6 monthly	X	X	X
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 complexity (time of order to mobilisation)	Monthly	X	X	X
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 monhtly 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 complexity (time of order to mobilisation)	Monthly	X	X	X
Check H_2S 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 OCUs is monitored by performance checks and by additional testing as required.

The OCUs at Riverside are covered by a service and maintenance contract. External contractors inspect the OCUs on a monthly and quarterly basis and reports are sent to the Performance Manager. Appendix 17 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 (m^3/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.

>50ppb hydrogen sulphide will be used as a threshold value for media change out. More detailed maintenance procedures are located in the SOM.

The OCUs are 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 Carbon filters and a minimum of 2 seconds for a chemical scrubber.

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. Where a biofilter/bioscrubber is alone a 'red action' would be raised for any value above 0.5pmm on the discharge regardless off the removal efficiency.

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 (RsH). 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

- Visibility using local SCADA control panels for OCUs , which records fan status
- 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 Appendix 17 and section 9 in Appendix 14 in the OMP. There is connectivity between the site rounds and SCADA, for example, if excessive noise is recorded this could relate to an operational fault in OCU fan, and in turn, is visualised on the local SCADA screens.

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^{o}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).

5.1.4 Records

Maintenance history records are kept on SharePoint.

5.2 Fault Reporting

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

5.3 Emergency Repairs

24-hour maintenance cover is available at the discretion of the Process Controller 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 Riverside STW will be made via the Customer Services Centre, logged, and passed (directly, or via the WOCC) to local Operations (Process Manager and Team Manager) via e-mail. 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 Services Centre to report if they are noticing odour from Riverside 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 'Riverside Sewage Treatment Works'

3. Telephone - Customer Services 0800 316 9800

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

Havering BC – Environmental Services
Telephone: 01708 432037

Environment Agency
Incident hotline: 0800 80 70 60
Email: incident_communications_service@environment-agency.gov.uk

Customer contacts regarding Riverside 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 Riverside 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 the Wastewater Control Centre have 24 working hours to respond to the customer with an update. Within these 24 hours, the Customer & Stakeholder Manager will contact to 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 4.3-4.6 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 Customer Stakeholder Manager 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.

For assets under STC permit, we notify the EA in accordance with the permit conditions and notifications procedure, see appendix 3.

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

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0SERV%20Odour%20

Appendix 2. Odour Improvement Plan

Odour Implementation Plan Riverside STW

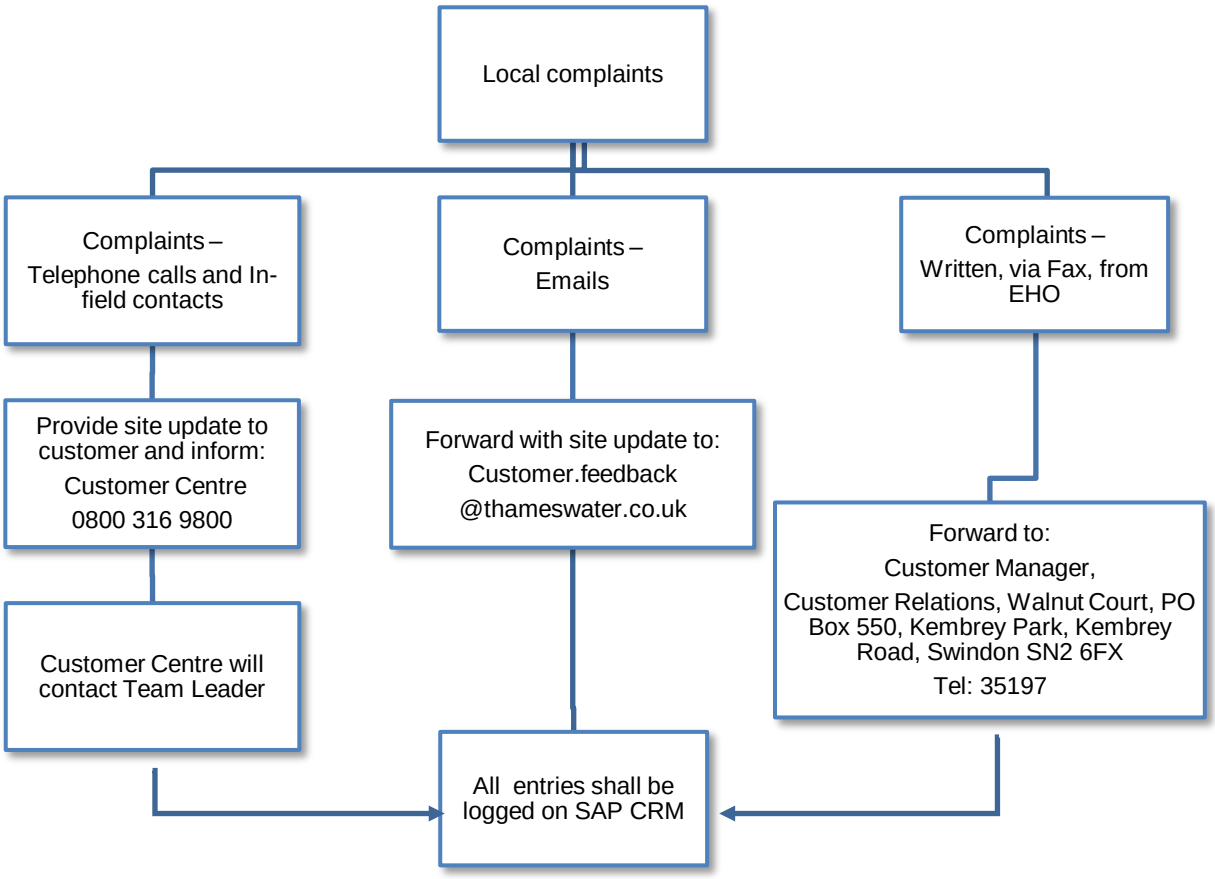
Review Date Oct-23

Process Stage	Owner	Plan	Action	Expected difficulties	Measures to mitigate	Timeframe
Consolidation roofs	Christian Squibb	Remove and replace	Plans to remove and replace these which is over 1.1M and still awaiting it to be funded. Risk 140834 has been raised.	Funding	Tanks with failing roofs are not in use so do not produce odour	AMP8
OCU	Christian Squibb	Action recommendations laid out by monthly health checks	Action recommendations laid out by monthly health checks	Funding		Ongoing
Sniff testing	Odour Specialist	Implement sniff testing procedure	Procedure written for sniff testing, in order to achieve effective sniff testing personnel needs to be identified to carry out the procedure who are not acclimatised to smells on site.	Resource	Site Round, Monthly health checks	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: Mark Mathews Telephone: 07747 647 862

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**
Havering Borough 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 *(if applicable)*	As required	Meeting	Update on operational activity on site	Performance Manager and Customer & Stakeholder Manager
Community Working Group	As required but at least quarterly	Meeting	Update on operational activity on site	Performance Manager and Customer & Stakeholder Manager
Environment Agency	As required as per notification procedure	As required as per notification procedure	As required as per notification procedure	Pollution desk or Performance Manager and Customer & Stakeholder Manager
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: • Non-compliant with Operational Asset Standards on one or more sub-processes leading to increased odour risk.			
Communications Approach	As Level 1 plus: • 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**
Havering Borough Council Environmental Health Department	Immediately then as required	Telephone / email / meeting	Report unstable operation with action plan	Performance Manager and Customer & Stakeholder Manager
Local residents associations *(if applicable)*	Immediately then as required	Telephone / email / meeting	Report unstable operation with action plan	Performance Manager and Customer & Stakeholder Manager
Community Working Group	Immediately then as required	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 as required	Q&A prepared by press office with Operations	To enable the press office to deal with queries from the press (reactive only).	Duty Manager
Customer Centre (Swindon)	Immediately then as required	Telephone / email	To enable the Customer Centre to deal with queries from the press (reactive only).	Duty Manager
Other areas/stakeholders outside Riverside STW potentially impacted				
Stakeholder	**Frequency of Contact**	**Method of Contact**	**Aim of Contact**	**TW Contact/Level**
Local businesses	Immediately then as required	Telephone / email / meeting	Report unstable operation with action plan	Performance Manager and Customer & Stakeholder Manager

Level 3	Emergency • 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: • Odour event set up internally (including OOH's cover from OMC). • 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**
Havering Borough Council Environmental Health Department	Immediately then as required	Telephone / email / meeting	Report emergency event with action plan and update with progress	Level 5 Manager (Operations Manager)
Local residents associations *(if applicable)*	Immediately then as required	Telephone / email / meeting	Report emergency event with action plan and update with progress	Level 5 Manager (Operations Manager)
Councillors / MPs for local areas	Immediately then as required	Telephone / email / meeting	Report emergency event with action plan and update with progress	/ Level 4 Manager (Regional Operations Manager)
Community Working Group	Immediately then as required	Telephone / email / meeting	Report emergency event with action plan and update with progress	Level 5 Manager (Operations Manager)
Press Office	Immediately then as required	Q&A and press release prepared by press office with Operations	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 as required	Telephone / email	To enable the Customer Centre to deal with queries from customers (reactive only)	Duty Manager
Environment Agency	As required as per notification procedure	As required as per notification procedure	As required as per notification procedure	Pollution desk
Other areas/stakeholders outside Riverside STW potentially impacted				
Stakeholder	**Frequency of Contact**	**Method of Contact**	**Aim of Contact**	**TW Contact/Level**
Local businesses	Immediately then as required	Telephone / email / meeting	Report emergency event with action plan and update with progress	Performance Manager and Customer & Stakeholder Manager

Appendix 4. Site Drawings

Figure A - Site Location Map and Receptors

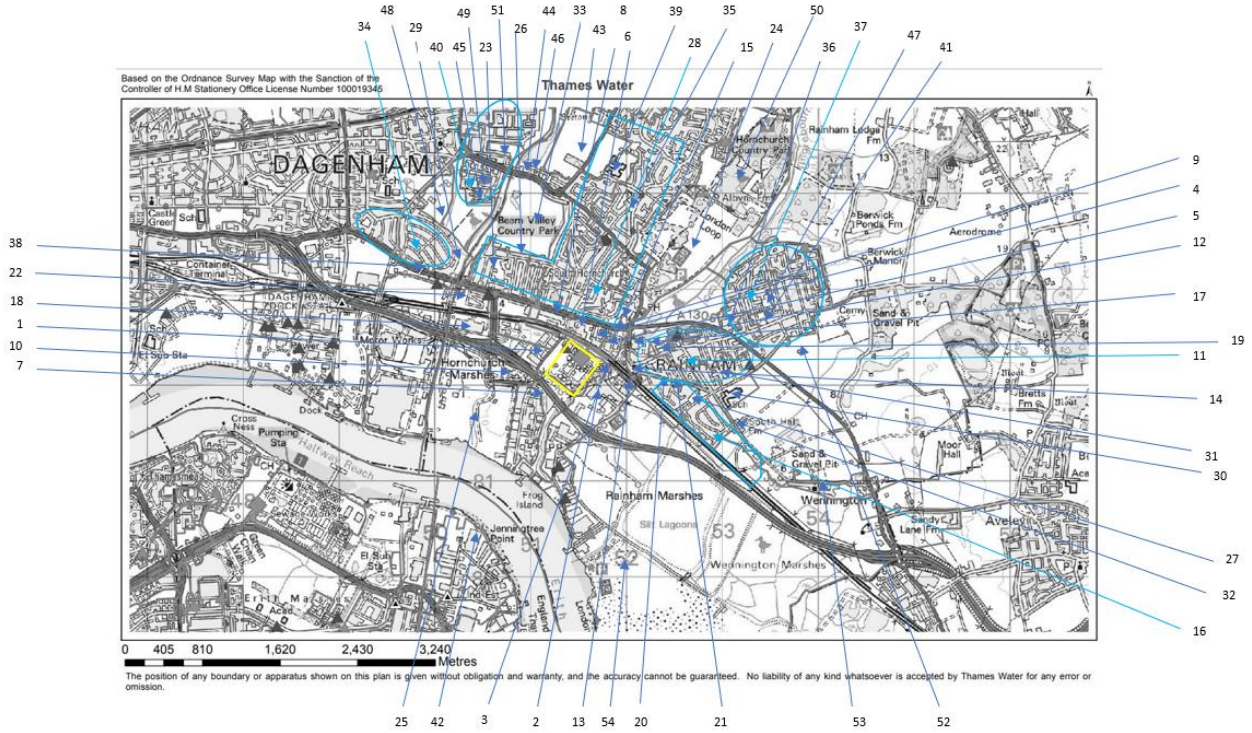


Figure B - Site Plan

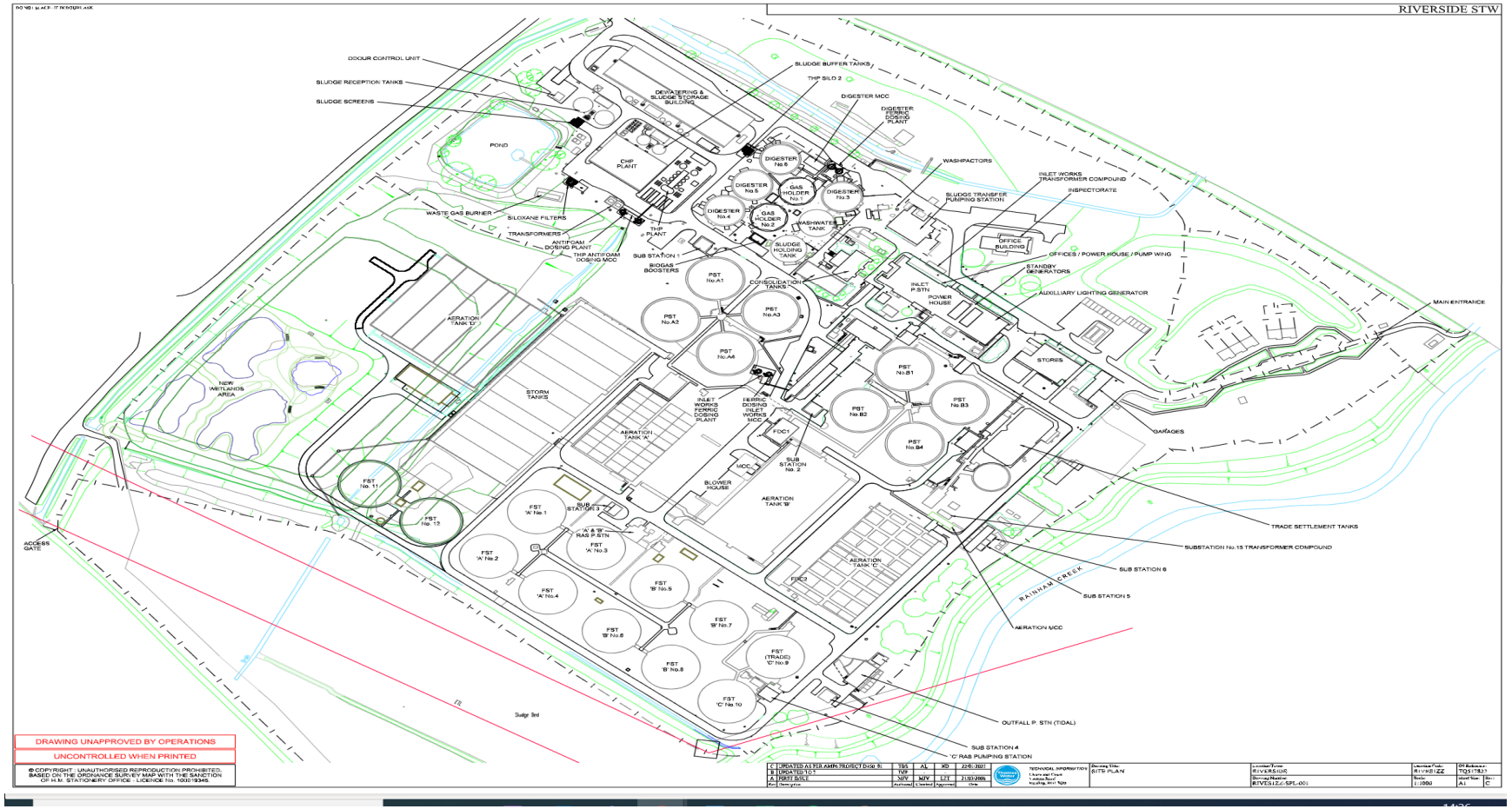


Figure C - Site Plan Showing Area of Permitted Activities

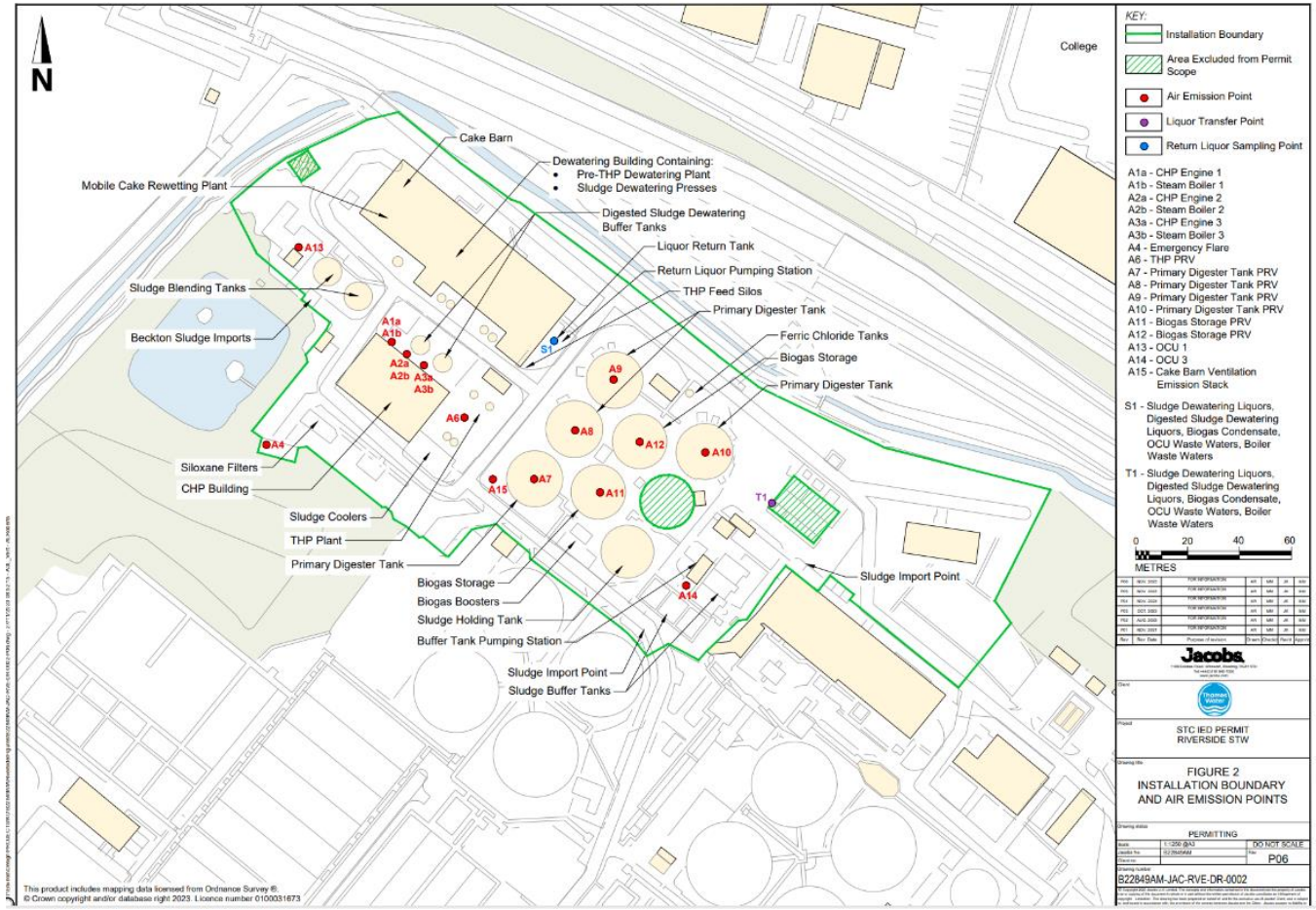
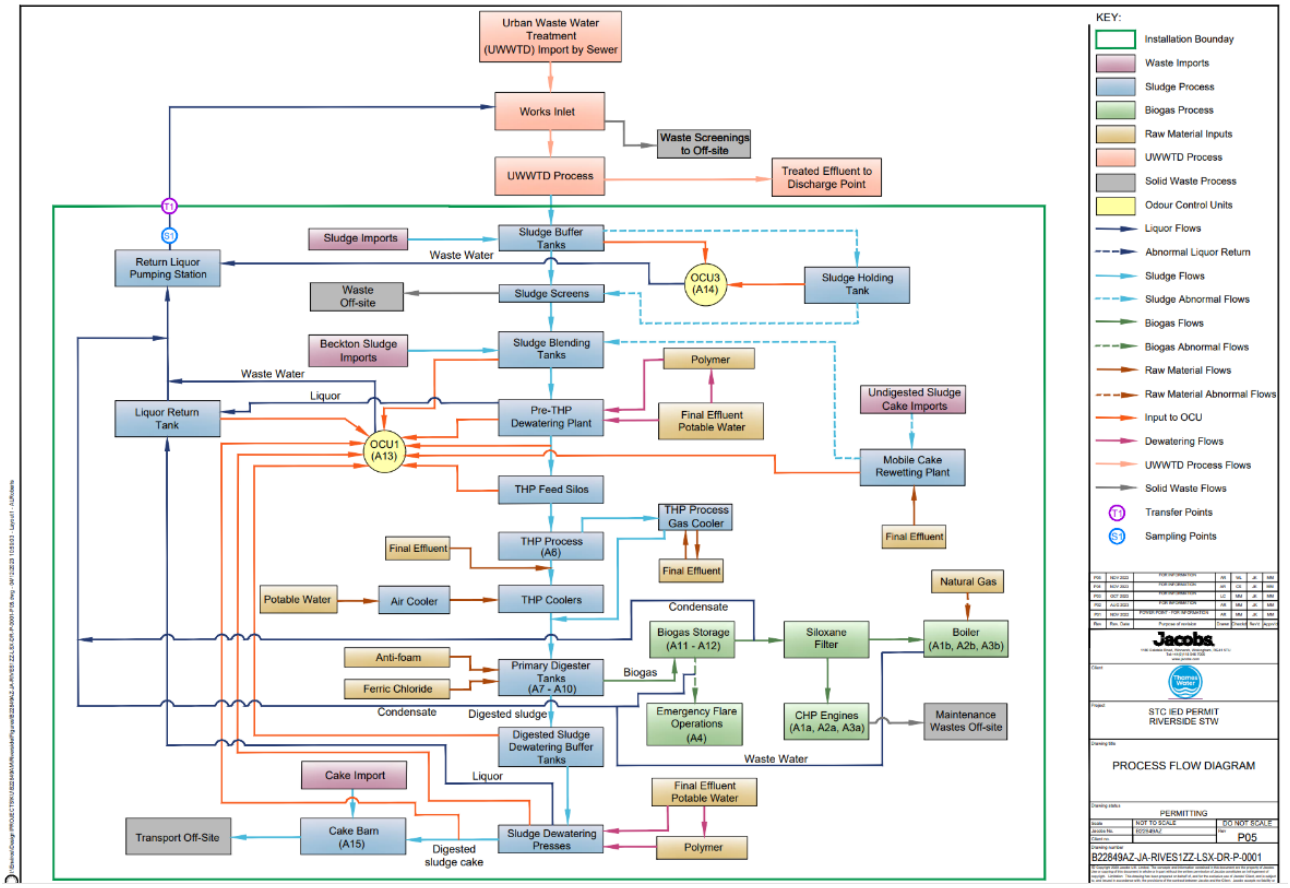


Figure D - Process Block Diagram for EPR Activities



Appendix 5. Hydrogen Sulphide Monitoring and Odour Emissions Protocol

File located within Asset Doc, local copy saved by Performance Manager – 1 PDF document.

Appendix 6. Olfactometric Testing and Performance Protocol

File located within Asset Doc – 1 PDF document.

Appendix 7. Riverside Sludge Treatment Facility Capacity Protocol

File located within Asset Doc – 1 PDF document.

Appendix 8. Sludge Cake Store Ventilation Protocol

File located within Asset Doc – 1 PDF document.

Appendix 9. Primary Settlement Tank Odour Potential and Emissions Protocol

Files located within Asset Doc – 2 PDF documents: Appendix 9a. PST Odour Potential and Emissions Protocol and Appendix 9b. Appendix A.

Appendix 10. Sludge Depth Monitoring Protocol

Files located within Asset Doc – 3 PDF documents: Appendix 10. Sludge Depth Monitoring Protocol, Appendix A: *Refer to Riverside STW OMP Appendix 13 - Riverside Best Operating Task Frequency* and Appendix B: *Refer to Riverside STW OMP Appendix 12 - Riverside STW PST Drain Down and Isolation Procedure*.

Appendix 11. Odour Control Unit 3 Maintenance Schedule

File located within Asset Doc – 1 PDF document.

Appendix 12. Riverside STW PST Drain Down and Isolation Procedure

File located within Asset Doc – 1 PDF document.

Appendix 13. Riverside Best Operating Task Frequency

File located within Asset Doc – 1 PDF document.

Appendix 14. 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**	
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**	

ID	Instruction	Daily	Weekly
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**	
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**

ID	Instruction	Daily	Weekly
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. Check & clean screen panels of any obstructions.		**x**
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**	

ID	Instruction	Daily	Weekly
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. 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.	X	
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	

ID	Instruction	Daily	Weekly
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**	
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)	During storm 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**

ID	Instruction	Daily	Weekly
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/scraper operation	**X**	
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**	

ID	Instruction	Daily	Weekly
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
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

ID	Instruction	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
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

ID	Instruction	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**
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**

ID	Instruction	Daily	Weekly
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 entering the PFT. Sample, analyse and record % dry solids out (Monday, Wednesday, Friday)	**X**	
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**	

ID	Instruction	Daily	Weekly
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**
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**

ID	Instruction	Daily	Weekly
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		
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**	

ID	Instruction	Daily	Weekly
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?		
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**	

ID	Instruction	Daily	Weekly
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 15. 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**	

	Instruction	Daily	Weekly
g)	Check operation of sludge and water recirculation pumps Check pumps, pipelines and couplings for leaks where possible.	**X**	
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**	

	Instruction	Daily	Weekly
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**	
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

	Instruction	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**	
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**	

	Instruction	Daily	Weekly
m)	Check condition of belt filter for blinding / blockages / good filtration	**X**	
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**	

	Instruction	Daily	Weekly
c)	Liquid - check dilution water is available	**X**	
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**	

	Instruction	Daily	Weekly
e)	Keep general area clean. Clear up any spillages	**X**	
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 16 Monthly 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.	

Appendix 17 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 deodorises / 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 ---