Asset Management
Asset Standard
Odour Management Plan

Slough STW

SLOUS1ZZ

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0 Contents

Figures and Tables:

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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

Document Control

Revision No	Reason for Revision	Prepared by	Approved by	Date
1	Creation of OMP in new standard format	[redacted]	[redacted]	October 2013
2	Annual review of OMP			October 2015
2	Roles & Responsibilities updated throughout document			October 2015
2	Environmental Permit replaced by Waste Management Licence – document updated to			October 2015

	reflect changes in legislation	[redacted]	
2	Reference to Sludge Lagoons & Sludge Drying Plant removed		October 2015
2	Additional information added on Digested Sludge Holding Tanks & High Level Pumping Station		October 2015
2	Odour control unit section updated		October 2015
2	Performance Checks & Testing Section updated		October 2015
2	Summary of Critical Odour Issues, Emergency Response and Mitigation Measures updated		October 2015
2	Complaints received on site at Slough STW section updated. Notification of Operations with Potential to Cause an Odour Problem section updated		October 2015
2	Odour Management Action Plan updated		October 2015
2	Communications section updated		October 2015
2	H4 form updated		October 2015
3	Review of OMP		March 2016
4	Updated alongside IED permit application		March 2021
4.1	New Sludge Treatment Centre Permit Application		July 2022
4.2	Sludge Treatment Centre Permit Application resubmission		May 2023

0.3 Sign Off

Operations Area Manager	[redacted]	Date:
Performance Manager		Date:

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
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 effected 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 Slough 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 Slough STW administration building and on Thames Water's database SharePoint, within the EMS pages.

The purpose of this OMP is to define how the potential and actual generation of odour from Slough STW are identified, and how, as far as is reasonably practicable, they are controlled and recorded. It is primarily a management guide; detailed operational procedures are contained within the SOM 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 management changes.
- If there is a material change in relevant regulations or guidance.
- If there is an odour release incident
- If a contingency measure is trigger

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 technicians and maintenance staff to understand the operational procedures for both normal and abnormal conditions.

This 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 anaerobic digestion (AD) on a Sewage Treatment works now needs an Environmental Permit.

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

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

1.1 Relevant Guidance

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

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

- Environment Agency - How to comply with your permit – H4 Odour Management', March 2011 (H4)
- Commission Implementing Decision (EU) 2018/1147 of 10 August 2018 establishing best available techniques (BAT) conclusions for waste treatment, under Directive 2010/75/EU of the European Parliament and of the Council (Waste Treatment BAT Conclusions)
- Environment Agency, Appropriate measures for the biological treatment of waste, Consultation draft July 2020.

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:

Slough STW
Wood Lane
Slough
Berkshire
SL1 9EB
What3words ref: react.bulb.tidy
EPR Permit number to be included when issued

Slough STW is a large treatment works located a mile or so to the west of Slough. The site is bounded by the M4 to the immediate north, beyond which a large housing development has recently been constructed in Cippenham. To the south and east it is more rural, there being Dorney to the SW and Eton Wick to the south, both within a mile of the site boundary.

Slough STW currently provides wastewater treatment for a population equivalent of 226,000 and receives sewage flows from the catchment area covering Slough, Chalvey, Oakley Green, Burnham, Langley and Eton, Taplow, Hedgerley Hill, Stoke Poges. Eton Wick, Eton College, Dorney and Datchet.

The catchment receives considerable trade waste discharges including food and chemical manufacture.

Receptors

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

Table 2.1 - Location of potentially sensitive odour receptors.

Receptor Number	Receptor Address	Receptor type	Approximate distance to the nearest site boundary (m)	Direction from the site.	Receptor Sensitivity
1	Wood Lane	Residential	Adjacent	Multiple	High
2	Telford Drive	Commercial / Residential	500m	North East	High
3	M4 Motorway	Road	Adjacent	North	Low
4	Haswell Crescent	Residential	200 m	North	High
5	Jubilee River	Open Area	330 m	South	Low
6	F.C Cippenham	Football Club	260 m	North	High
7	Eltham Avenue	Residential	260m	North	High
8	History on Wheels Motor Museum	Museum	950 m	East	High
9	Eton Wick Road (B3026)	Residential	1000 m	South	High
10	Dorney Common	Open Area	1100 m	South West	Low
11	Royal Windsor Racecourse	Racecourse	2000 m	South	High
12	Eton Dorney School	School	1900 m	West	High
13	Lake End Road (B3026)	Residential	1800 m	West	High
14	Mercian Way Park	Open Area	780 m	North West	Low
15	Western House Academy	School	500 m	North	High
16	Lower Cippenham Lane	Residential	850 m	North	High
17	The Westgate School	School	1050 m	North East	High
18	Twinches Lane	Commercial	1200 m	North East	Medium
19	Bath Road Retail Park	Commercial	1600 m	North	Medium
20	Slough Trading Estate	Industrial	2000 m	North	Medium
21	Cippenham School	School	1350 m	North West	High

22	St Andrews Way	Residential	1100 m	North West	High
23	Burnham Train Station	Transport	1950 m	North	Medium
24	Burnham Abbey	Church	1800 m	North West	High
25	Chalvey Grove	Residential	1300 m	East	High
26	Montem Academy	School	1300 m	East	High
27	Church Street	Residential	2000 m	East	High

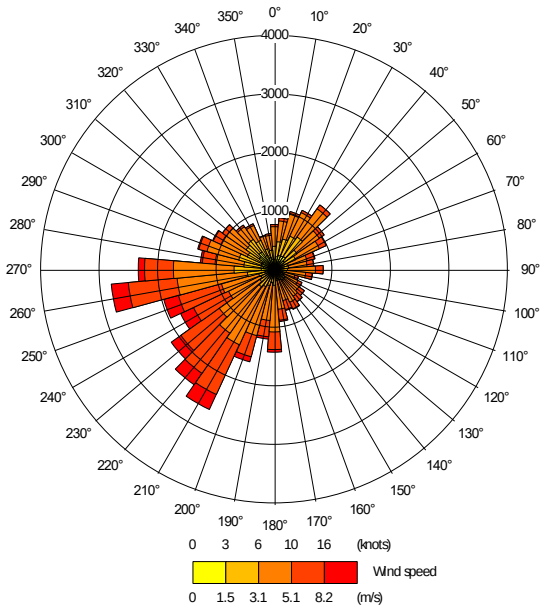
2.2 Off-site sources of odour

To the Southwest of site, Dorney Common has been identified as having the potential to generate odour due to grazing cattle.

2.3 Windrose and Weather Monitoring

Heathrow Airport meteorological station (approximate location NGR E 506952 N 176574) is located approximately 13.0 km east-southeast of the site and is considered the closest most representative meteorological monitoring station to the site. Data is recorded at the meteorological station in hourly measurements and the figure below presents the relationship between the frequency and speed of wind from compass point directions for the combined years 2015 – 2019. The figure illustrates the predominant wind direction to be west-southwesterly / southwesterly, which means receptors northeast of the site would have the highest probability of experiencing potential increases in odour emissions.

Figure 2.3.1 Heathrow Wind Rose, 2015- 2019



A windsock is located on site to determine wind direction.

There is a MET office weather station on-site at Slough STW, this is owned by a third party.

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 UWWTD activities

Flow enters the works from five pumping stations to a raised inlet works where dosed with Ferric Sulphate for odour and struvite control. The flow continues through four 6 mm Lockwood step screens that feed into two Mega washer screening handling units whcih discharge into two compactor skips.

Screened flow then passes through a 'flow to treatment' penstock. There are two Dorr Detritors for grit removal and an inline 'Magflow' meter that measures the flow to treatment. There are also four balancing tanks that overflow to four storm tanks that discharge to land treatment.

Screened flow passes to four circular PSTs (Primary Settlement Tanks). Sewage passes to six diffused air aeration lanes configured for BNR (Biological Nutrient Removal). Mixed liquors pass to six circular FST (Final Settlement Tanks). Approximately 60 % of FST effluent is treated by four disc filters for solids removal.

2.5.2 Activities under Sludge Treatment Centre Permit

The STC comprises an offloading point for permitted imported wastes, consisting of cess, septic tank and similar related wastes, close to the inlet of the sewage treatment works. These wastes are imported by road, normally from tankers and tanker vehicles, and consist of liquids and associated sludges from domestic and municipal sources that are similar in composition to those materials

derived from the sewer network and managed via the UWWTD route. These operations are covered by the existing waste management licence at the site.

A second new waste operation at the same site is for the import of non-hazardous treated sludge cake from other works, for temporary storage on the site cake pad, 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. Cake will be offloaded and visually checked. The waste stream is the same as that arising from the treatment of sludge within the Slough 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.

All imported cake will be stored on an impermeably cake pad, for the shortest time practicable, the duration depending on factors such as prevailing weather and availability of the landbank.

There are two PFTs on site which receive pumped sludge in parallel from the primary settlement tanks, with each tank pumping dewatered sludges in turn to the sludge blending tank, via a common sludge line. In-line 'munchers' are installed pre- and post-picket fence thickening on the sludge line to reduce rag content of the sludge. Both of the PFT tanks are covered and connected to an odour control unit (OCU F – A15) for odour abatement. Liquids from the PFTs weirs out of the tank and drains back to the works inlet.

SAS from the UWWTD process gravitates to a common chamber before being pumped to the two aquabelts within the SAS building, that are used to dewater SAS. Here the sludge is thickenedwith the use of a bulk powder polymer, which is added to sludge to aid coagulation. Liquor from the aquabelt drains to the main pumphouse and is returned to the works inlet.

Sludge is pumped via a dedicated sludge line to the sludge blending tank, where it is mixed with thickened primary sludge and imported sludge.

Imported sludge from other waste water treatment sites is imported via two import lines into an imported sludge holding tank which is covered and connected to an OCU (OCU A – A12). Imported sludge is accepted via a sludge logger. The imported sludge passes through a screen, to remove inorganic material which is discharged into a skip, before the sludge gravitates to the imported sludge holding tank and is then pumped to the sludge blending tank.

Separate sludge lines feed in the thickened primary sludge, thickened SAS and imported sludge to the sludge blending tank. The sludge blending tank is covered and connected to an OCU (OCU A – A12).

Five sludge transfer pumps transfer sludge to the primary digester tanks. There are six primary digester tanks at Slough STC. The primary digesters are of concrete construction with external clad insulation.

Following treatment over an appropriate number of days within the primary digesters, sludge is transferred to one of two digested sludge holding tanks. These are rectangular tanks of concrete construction, of which one tank is covered and connected to an OCU (OCU E – A14) but the other is uncovered. Sludge is then transferred to one of three, open topped, above ground secondary digestion tanks located at the site. Digested sludge is held in these tanks for an appropriate retention time to ensure that the required level of pathogen kill is achieved in order to comply with digested sludge cake output quality requirements

Digested sludge is then transferred to the site centrifuges where it is dewatered before it is transferred by conveyor to the cake pad for storage prior to removal from site under the Sludge Use in Agriculture Regulations 1989, and in accordance with the Biosolids Assurance Scheme (BAS). Centrate is returned via the site drainage system to the works inlet. Centrate from the centrifuge is

returned to the head of the works via the site drainage system, with a set of pumps used to return centrate and surface waters from the High-Level pumping station back to the works inlet. High level pumping station is connected to an OCU (OCU C – A13).

Biogas from the primary digesters is captured and transferred to a double membrane gas holder (gas bubble) for storage. 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 holder is fitted with pressure release valves as a safety precaution in the event of over pressurising the system.

The biogas is taken from the storage vessel for combustion in a CHP engine, generating electricity for use both within the site and for export to the grid, and heat to maintain primary digester temperature. This is classified as an 'existing' combustion plant under the Medium Combustion Plant Directive. In the event that additional heating is required for the primary digesters, biogas may be used in the onsite boilers to provide heat to the digesters. In the event there is excess biogas, i.e. more than the CHP or boilers can utilise, or in the event that the CHP is unavailable, there are two ground mounted emergency flares. These are utilised under 10% of the year or less than 876 hours per year.

Site drainage from operational areas is captured within the site wide drainage system and returned to the works inlet of the sewage treatment works for treatment within the UWWTD treatment route.

3 Site Management Responsibilities and Procedures

3.1 Site Roles

Figure 3.1 - Site Roles

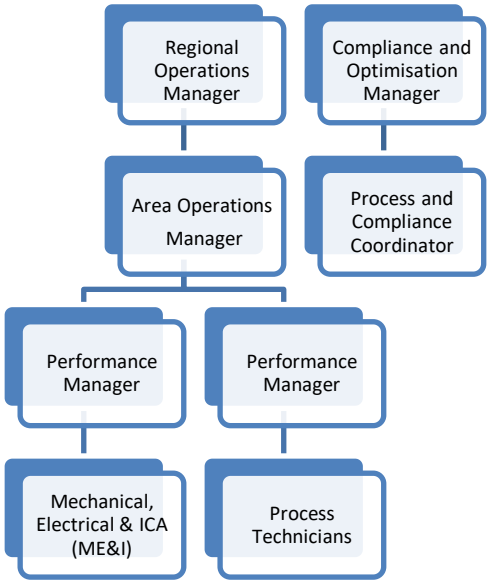


Table 3.1 - Tasks and Responsibilities

Role	Tasks and Responsibilities
Regional Operations Manager	Responsible for the overall performance of STW in this region.
Area Operations Manager	Responsible for overall performance of the STW in the area, including assessing the scope of, and updating the OMP as it is implemented.
Performance Manager	Responsible for overall performance of the STW and will be responsible for • Ensuring staff Thames Water staff undergo appropriate training • 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
Technically Competent Manager	Hold the required WAMITAB qualification to support the activities on site under the STC Permit, ensuring permit conditions are complied with.
Technician 1 / Operator	Day to day duties include maintaining and operating process equipment.
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.

Role	Tasks and Responsibilities
Compliance and Optimisation Manager	Responsible for process investigations and technical assistance
Process Compliance Coordinator	Reports to Compliance and Optimisation Manager. Responsible for process monitoring, improvement and troubleshooting.
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 from 7:30am – 3:30pm on a normal working day and can be attended by standby staff out of working hours.

3.2 Key Contacts

Role	Name	Email address	Phone Number
Area Operations Manager	[redacted]		
Performance Manager			
Technically Competent Manager			
Customer and Stakeholder Manager			
Customer Centre			

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 Slough through at least an annual review of the Odour Risk Assessment, Odour Management plan and Odour improvement 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

The site has a history of odour complaints over a number of years, and a number of major Capital projects have been funded with a view to addressing these issues. Formally recorded complaints received; 2in 2017, 2 in 2018, 0 in 2019, 6 in 2020, 5 in 2021 and 1 in 2022.

An Odour Risk Assessment is included as Appendix 1.

An Odour Improvement Plan is included (where applicable) as Appendix 2

Critical Odour Issues, Emergency Response and Mitigation Measures are summarised in Tables 4.2 to 4.6.

4.2 Identification of Odour Critical Plant

4.2.1 Odour Risk Assessment

An Odour Risk Assessment has been carried out and a copy is included in Appendix 1.The Odour Risk Assessment is not a ‘one-off’ exercise but an on-going process. The Odour Risk Assessment is reviewed whenever the site undergoes an operational or capital change which could significantly affect odour.

It is constructed in the following manner:

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

Items scored in the Odour Risk Assessment with a risk score greater than 10, are classified as Odour Critical Plant, 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 Slough STW is included in Appendix 2.

4.2.2 Potential Odour Sources

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

- Incoming Sewers & Reception Wet Well
- Cess Reception, Discharge, Wash down & Drainage
- Storm & Balancing Tanks
- Screens & Screening Conditioning, Drainage & Rag Skip Management
- Grit Removal Equipment, Drainage & Grit Skip Management
- PSTs
- Fats, Oil & Grease Scum Removal System
- Activated Sludge Lanes & Zones
- Final Settlement Tanks
- Scum Removal System
- Final Effluent
- Inlet Works OCU D
- Western Area Pumping Station OCU B

The following list of potential odour sources under the Sludge Treatment Centre Permit been identified during the risk assessment:

- Sludge Reception, Screening, Wash down & Drainage
- Cess Reception, Discharge, Wash down & Drainage
- Skip management
- Primary Raw Sludge Thickening and Pumping
- SAS Thickening and Pumping
- Sludge Blending and Mixing
- Return Liquors
- Digester Feeding, Mixing and Discharge
- Secondary Digestion, Mixing and Discharge
- Centrifuge
- Cake Pad & Drainage
- Biogas Storage
- CHP
- Boilers
- Waste Gas Burner
- Stand by generators
- OCUs A, C, E & F

4.2.3 Odour Critical Plant

The following list of odour critical plant[1] has been identified during the risk assessment:

- Storm & Balancing Tanks
- Screens & Screening Conditioning, Drainage & Rag Skip Management
- Sludge Reception, Screening, Wash down & Drainage
- Primary Raw Sludge Thickening & Pumping
- Sludge Blending & Mixing
- OCUs

[1] Odour critical plant is equipment that may cause off-site odour if not operating correctly

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)	Construction	Retention Time
Picket Fence Thickeners	2	314	Steel	12 hours per day operation time
Imported Sludge Holding Tank	2	254	Concrete	<12 hours
Sludge Blending Tank	1	450	Concrete	<12 hours
Primary Digester	4	2,282	Concrete	15 days
	2	2,118	Concrete	15 days
Digested Sludge Holding Tank	1	514	Concrete	<36 hours
	1	514	Concrete	<36 hours
Secondary Digester	3	3,197	Steel	7 days
Polymer Tank (for dewatering)	1	20,000 litres	Steel	N/A
Main diesel tank (maintenance workshop and digesters 1-4)	1	60,000 litres	Steel	N/A
Boilerhouse 1 diesel day tank (digesters 1-4)	1	2,700 litres	Steel	N/A
Boilerhouse 2 diesel tank	1	10,000 litres	Steel	N/A

High level fuel tank (for mobile plant)	1	25,000 litres	Steel	N/A

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

Table 4.1 Odorous materials for Sludge Treatment Centre Permit

Odorous and potentially odorous material (any solid, liquid or gas)	Location of odorous materials on site	Maximum quantity on site at any given day	Maximum time held on site (hours or days)	EWC Codes	Type of emission	Odour potential High Risk / Medium Risk / Low Risk
Cake (including imported cake)	Cake Pad	4000 tonnes	90 days	19 06 06	Diffuse	Low
Biogas	PRV/Whessoe valve releases; gas storage vessel, unburnt methane from CHP engine. See emission point plan.	Gas holder capacity is 3,460m^3	Continuous operation	N/A	Point Source	Low
Releases from OCUs	See detailed consideration in 5.1.2	Variable output	Continuous operational	N/A	Point source	Low
Liquor	Site wide drainage system, high level pumping station	Liquor is continuously pumped to the head of works	Continuous pumping of liquors	16 10 02	Diffuse	Low
Raw imported sludge	Imported Sludge Holding Tank & Sludge	Refer to Table 4.0 Site Tank Inventory	Retention times for each stage of the process are	19 08 05	Point source (See OCU entry)	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
	Blending Tank, and/or Works Inlet		detailed in Table 4.0			
Primary Sludge	PFTs and Sludge Blending 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
Thickened sludge import	Imported Sludge Holding Tank and Sludge Blending Tank	Refer to Table 4.0 Site Tank Inventory	Retention times for each stage of the process are detailed in Table 4.0	19 02 06	Point source (see OCU entry)	Medium/High
Surplus Activated Sludge	RAS SAS Well; SAS mixing tank	-	-	19 08 05	Diffuse	Medium/high
	SAS Dewatering Plant & Sludge Blending 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
Raw Sludge screenings	Before Imported Sludge Holding Tank	1 Skip	Skips emptied within 1 week of being full	19 08 01	Diffuse	Low / Medium

Table 4.2 Odorous raw materials for Sludge Treatment Centre Permit

Raw Material	Odorous	Storage	Mitigation	Odour Risk
Sludge polymer Flopam FO4698XXR Flopam EM640 LOB	Not odorous Not odorous	1.5 tonnes stored in 750kg bulk bags 20,000L bunded silo	Located within building	Low
Anti-foam Flofam 681 F Flofam 139 F	Not odorous	1,500L in IBCs on portable bunds 2,000L in IBCs on portable bunds	Contained with lid	Low
Biogas	N/A	NA	N/A	Low
Diesel: Boilers White Diesel	Petroleum	60,000L in bunded fuel tank 10,000Lin bunded fuel tank 25,000L in bunded fuel tank	Contained with lid	Low
Lubricating oils Mobil Pegasus 605 ultra-40	Not odorous	2.2 tonnes in bunded 1,200L clean oil tank	Contained with lid	Low
Glycol coolant Delo XLC antifreeze coolant	Not odorous	2.0 tonnes in1,000L IBCs stored on portable bund	Contained with lid	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.

4.3.1 Odour Control Units

There are currently 6 Odour Control Units on site.

Two OCUs which abate UWWTD activities:

- OCU B; Consisting of a large size carbon filter and 2 direct drive extract fans, it abates the Western Area Pumping.
- OCU D; Consisting of a constantly irrigated large size lava rock bio-filter, a chemical scrubber, 2 polishing carbon filters, and 2 direct drive extract fans, it abates the Inlet Works.

Four OCUs which abate Sludge Treatment Centre activities:

- OCU A (A12); Consisting of a large size carbon filter and 2 direct drive extract fans, it abates the Sludge Blending Tank and Imported Sludge Holding Tank.

- OCU C (A13); Consisting of a large size carbon filter and 2 direct drive extract fans, it abates the High Level Pumping Station.

- OCU E (A14); Consisting of a constantly irrigated large size lava rock bio-filter, 2 polishing carbon filters, and 2 direct drive extract fans, it abates the Digested Sludge Holding Tank.

- OCU F (A15); Consisting of 3 intermittently irrigated medium size calcified seaweed bio-filters, and 2 direct drive extract fans, it abates Picket Fence Thickeners and SAS belts.

4.3.2 Site Specific Measures and abnormal events

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

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

Tables 4.3-4.7 – Summary of Critical Odour Issues, Emergency Response and Mitigation Measures

The purpose of Table 4.3-4.7 shall be to identify site specific emergency response procedures and mitigation measures relating to site odour generation and release. They 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.

Daily and weekly Site Round and Sludge Round checks are also carried out on each part of the process to ensure correct operation, these are shown in Appendix 5 and 6. A weekly checklist is also used to specifically check the odour control units. This is shown in Appendix 7.

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

Odour Source	Specific Odour Management Tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action and timescale
General	Housekeeping – keep site clean and tidy, clean spills as soon as possible and filled skips must be removed from site.	Site Tech 1s	Visual Inspection	Daily	Spills observed, full skips observed	Clear up spills, arrange for skips to be emptied- 1 Week
Inlet Works	The whole of the Inlet Works is covered and ventilated to the Inlet Works OCU D.	N/A	Continuous – SCADA	Continuous		
	Covers are not removed for longer than is needed if necessary to remove covers to perform certain tasks	Site Tech 1s	Visual Inspection	As required	Covers observed not being closed as required for normal operation	Replace covers if possible, use of temporary tarpaulin sheets to contain odour emissions if covers cannot be secured, report any damage to Performance manager – 1 Week
Cess Reception, Discharge, Wash down & Drainage	Discharged directly to inlet works through close coupled connector	TW Biorecycling & Site Tech 1s	Quantity managed by TW Biorecycling	Daily	Spillage/ rag/ debris observed in	Report any damage to performance manager,

Linked tasks specified in Section 2.1 of appendix 6					Cess import facility	advise commercial team if facility is damaged and close to customers, repairs to be completed be at earliest opportunity before facility is re opened
Storm & Balancing Tanks Linked tasks specified in 2.6 of appendix 5	Due to drainage gradient particular vigilance is required when cleaning the tank.	Site Tech 1s	Visual Inspection	Daily	Period of incoming flows exceeding 1150 LPS FFTT for site, Scada or visual checks reveal contents in tanks	Tanks to be emptied with priority on storm tanks when site conditions permit(FFTT levels) , tank cleaning to occur at earliest opportunity when weather conditions permit.
Screens Linked tasks specified in 2.3 of appendix 5	Screenings are fed into enclosed compacted skip, replaced when full.	Site Tech 1s	Visual Inspection	Daily	Visual daily checks, scada alarms reveal screenings not being fed to	Skips to be ordered when ¾ full(av 1 week delay for replacement skips), if

					skips/unit in bypass	equipment fails, rag will divert into the open bay. Performance manager to be advised asap . Action timeline will depend on severity of technical issue.
Grit Removal Linked tasks specified in section 2.5 of appendix	Ensure full skips are removed and replaced.	Site Tech 1s	Visual Inspection	Daily	Full skips observed	
Flow & Distribution to Primary Settlement Tanks	Underground pipework. Ferric dosing at end of the inlet controlling hydrogen sulphide release.	Site Tech 1s	Visual Inspection	Daily	Daily scada checks on Ferric sulphate pump operation and tank levels(Scada will alert when re order levels reached)	Advise performance manager daily of any issues preventing normal operations through scada and visual equipment checks
Primary Settlement Tanks	Clear any hopper blockages. For Scum or sludge build-up on surfaces, sludge dip levels are monitored. This can also be an indication of failure of desludging systems.	Site Tech 1s	Manual visual Inspection	Daily	Drainage observed to be blocked, manual sludge	Advise performance manager daily of any issues

Linked tasks specified in section 3 of appendix 5					levels recorded	preventing normal operations
Fats, Oil & Grease Scum Removal System	Clear any hopper blockages.	Site Tech 1s	Visual Inspection	Daily	Daily visual observation	Advise performance manager daily of any issues preventing normal operations
Primary Raw Desludge Pumping	Pipework contained and underground.	Site Tech 1s	Visual Inspection	Daily	Daily Scada checks for efficiency of pumping operation	Use of backup desludging pumps in event of equipment failure- all issue to be reported to performance manager asap
Flow & Distribution to Secondary Treatment	Underground pipework. Ferric dosing at end of the inlet controlling hydrogen sulphide release.	Site Tech 1s	Visual Inspection	Daily	Daily Scada checks for efficiency of pumping operation	Advise performance manager daily of any issues preventing normal operations through scada and visual equipment checks

Activated Sludge Plant Lanes & Zones Linked tasks specified in section 4.1 of appendix	Ensure correct process control and repairs carried out.	Site Tech 1s	Visual Inspection	Daily	Daily scada checks, daily visual checks of D.O probes and sprinkler system as per local operational procedure.	Advise performance manager daily of any issues preventing normal operations through scada and visual equipment checks
Final Settlement Tanks Linked tasks specified in section 5 of appendix 5	Daily monitoring for sludge levels. Process control and repair.	Site Tech 1s	Units are monitored by the SCADA system for failures	Daily	Daily visual checks , daily manual tank dips, scada alarms for blanket levels are P1	Advise performance manager daily of any issues preventing normal operations through scada and visual equipment checks
Scum Removal System	Daily monitoring for sludge levels. Process control and repair.	Site Tech 1s	Units are monitored by the SCADA system for failures	Daily	Daily scada checks, daily visual checks	Advise performance manager daily of any issues preventing normal operations through scada and visual

						equipment checks
RAS Chambers & Pumping	Daily monitoring for sludge levels. Process control and repair. Drain and clean.	Site Tech 1s	Units are monitored by the SCADA system for failures	Daily	Daily scada checks, daily visual checks	Advise performance manager daily of any issues preventing normal operations through scada and visual equipment checks
SAS Chambers & Pumping	Daily monitoring for sludge levels. Process control and repair. Drain and clean.	Site Tech 1s	Units are monitored by the SCADA system for failures	Daily	Daily scada checks, daily visual checks	Advise performance manager daily of any issues preventing normal operations through scada and visual equipment checks
Filtration – Tertiary treatment disc filters Linked tasks specified in Section 7 of appendix 5	Daily monitoring. Process control and repair when required.	Site Tech 1s	Units are monitored by the SCADA system for failures	Daily	Daily scada checks, daily visual checks, regular quarterly servicing and cleaning of units	Advise performance manager daily of any issues preventing normal operations through scada

						and visual equipment checks
Back Wash Returns	Daily monitoring. Process control and repair when required.	Site Tech 1s	Units are monitored by the SCADA system for failures	Daily	Daily scada checks, daily visual checks	Advise performance manager daily of any issues preventing normal operations through scada and visual equipment checks
Final Effluent Linked tasks specified in Section 1 of appendix 5	Daily sampling and corrective process control action.	Site Tech 1s	Units are monitored by the SCADA system for failures	Daily	Daily scada checks, daily visual checks and samples which are sent to lab for analysis.	Advise performance manager daily of any issues preventing normal operations through scada and visual equipment checks
Western Area Pumping Station OCU B Linked tasks specified in section 9 of	All routine site checks as per SOM.	Site Tech 1s	As Described in SOM	Weekly	Scada alarms, visual inspections of equipment as part of environmental site round	Advise performance manager daily of any issues preventing normal operations

appendix 5 and appendix 7					(weekly activity)	through scada and visual equipment checks
	Odour control units are subject to regular preventative maintenance, checked on a monthly basis monthly by specialist Framework contractors who Monitor performance, through pH and H2S measurements and report to TL.	Contractor	As Described	Monthly	Condition reports received from odour contractor	Performance manager to arrange for repairs as required with APS risk raised for funding as appropriate
	Units are monitored by the SCADA system for failures	N/A	SCADA	Continuous	Daily monitoring of Scada system for correct operation of asset	Performance manager to arrange for repairs as required with APS risk raised for funding as appropriate
	Media is replaced as per TWUL asset standards and recommendation from monitoring contractor to asset standard.	Site Tech 1s	As described in Asset Standard	As required	Condition reports received from odour contractor	Performance manager to arrange for repairs as required with APS risk raised for funding as appropriate

Inlet Works OCU D Linked tasks specified in section 9 of appendix 5 and appendix 7	All routine site checks as per SOM.	Site Tech 1s	As Described in SOM	Weekly	Visual observations reported to performance manager as part of weekly environmental site round	Performance manager to arrange for repairs as required with APS risk raised for funding as appropriate
	Odour control units are subject to regular preventative maintenance, checked on a monthly basis monthly by specialist Framework contractors who Monitor performance, through pH and H2S measurements and report to TL.	Contractor	As Described	Monthly	Condition reports received from odour contractor	Performance manager to arrange for repairs as required with APS risk raised for funding as appropriate
	Units are monitored by the SCADA system for failures	N/A	SCADA	Continuous	Daily monitoring of Scada system for correct operation of asset	Performance manager to arrange for repairs as required with APS risk raised for funding as appropriate
	Media is replaced as per TWUL asset standards and recommendation from monitoring contractor to asset standard.	Site Tech 1s	As described in Asset Standard	As required	Condition reports received from	Performance manager to arrange for repairs as required with

					odour contractor	APS risk raised for funding as appropriate

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

Odour Source	Odour Offensiveness L/M/H	Specific Odour Management Tasks	Responsibility	Monitoring	Monitoring Frequency	Trigger for action	Remedial action & timescales	Odour risks if measures fail
Sludge Imports, Sludge Reception, Screening, Wash down & Drainage Linked tasks specified in section 1 and 2 of appendix 6	Sludge (M)	The reception tanks and screens should remain covered at all times.	Site Tech 1s	Visual Inspection	Daily	Visual reports from site techs	Dependant on nature of issue,may include use of temporary tarpaulin to contain odour emissions, may require capital investment, minor issues should be rectified within 1 week.	High
		Ensure tankers are coupled correctly	Site Tech 1s	Visual inspection	daily	spillage	Clear spillage ASAP not later than end of day	High
		Area is ventilated to an OCU A	N/A	Continuous – SCADA	Continuous	Visual reports from site techs	Dependant on nature of issue,may include use of temporary tarpaulin to contain odour emissions, may	High

							require capital investment, minor issues should be rectified within 1 week	
Cess Reception, Discharge, Wash down & Drainage Linked tasks specified in section 2.1 of appendix 6	Sewage (L)	Discharged directly to inlet works through close coupled connector. Ensure tankers are coupled correctly.	TW Biorecycling & Site Tech 1s	Quantity managed by TW Biorecycling	Daily	Visual site checks by site techs, reports from customer users	Dependant on nature of issue,may include use of temporary tarpaulin to contain odour emissions, may require capital investment, minor issues should be rectified within 1 week. Clear any spillage asap but not later than end of day.	Low
Skip Management Linked tasks specified in section 2.5 of appendix 5	Sludge (L)	Skip management	Site Tech 1s	Visual Inspection	Daily	Visual site checks by site techs	Site tech's / performance to order replacement skips as required – should be completed within 1 week	Low
Primary Raw Sludge Thickening and Pumping	Sludge (M)	The PFTs are kept covered at all times; the inspection covers are used for observation only.	Site Tech 1s	Visual Inspection	Daily	Visual site checks by site techs	Replace and secure covers, use of tarpaulins to contain odour emissions- aim to	High

Linked tasks specified in section 8 of appendix 5							complete within 2 days	
		In the event of plant failure or sludge inversion, then the tanks must be emptied.	Site Tech 1s	Visual Inspection	As required	Visual site checks by site techs	Tank to be emptied and drained if possible within 1 week	High
		Area is ventilated to OCU F.	N/A	Continuous – SCADA	Continuous	Scada monitoring of plant availability, site checks by site tech's	Performance manager to arrange for repair work to be carried out- 2 week timescale	High
SAS Thickening and Pumping	Sludge (L)	Connected to OCU F	Site Tech 1s	OCU monitored by SCADA, Visual Inspection	Daily	Scada monitoring of plant availability, site checks by site tech's	Performance manager to arrange for repair work to be carried out- 2 week timescale	Low
Sludge Blending and Mixing Linked tasks specified in section 3 of appendix 6	Sludge (M)	Area is ventilated to an OCU A. Follow events procedure when cleaning.	Site Tech 1s	OCU monitored by SCADA, Visual Inspection	Daily	Scada monitoring of plant availability, site checks by site tech's	Performance manager to arrange for repair work to be carried out- 2 week timescale	Medium/high
Return Liquors	Sludge (L)	Underground pipework, covered.	Site Tech 1s	SCADA, process control, visual inspection	Daily	Scada monitoring of plant availability,	Performance manager to arrange for repair work to be carried out as required- timescales dependant on nature of issue	Low

Digester Feeding, Mixing & Discharge Linked tasks specified in Section 6 of appendix 6	Sludge (L)	Ensure spills are cleaned up ASAP and events procedure followed in any sludge event, plant failure. Covered tanks.	Site Tech 1s	Visual Inspection	Daily	Scada monitoring of plant availability, site checks by site tech's	Dependant on availability of tanker crews- should be cleared within 5 working days	Medium
Secondary Digestion, Mixing & Discharge Linked tasks specified in Section 7 of appendix 6	Digested sludge (L)	Constant monitoring as part of site operation procedure. Uncovered secondary digesters are located far from sensitive receptors on the south-east of the site.	Site Tech 1s	Visual Inspection	Daily	Scada monitoring of plant availability, site checks by site tech's	Dependant on availability of tanker crews- should be cleared within 5 working days	Low
Centrifuge Linked tasks specified in Section 13 of appendix 6	Earthy (L)	Constant monitoring as part of site operation procedure	Site Tech 1s	Visual Inspection	Daily	Scada monitoring of plant availability, site checks by site tech's	Dependant on availability of tanker crews- should be cleared within 5 working days	Low
Digested Sludge Holding Tanks Linked tasks specified in Section 8.1 of appendix 5	Earthy (L)	Area is ventilated to an OCU E.	N/A	Continuous – SCADA	Continuous	Scada monitoring of plant availability, site checks by site tech's	Dependant on availability of tanker crews- should be cleared within 5 working days	Low
Cake Imports	Earthy (L)	Cake removal is carried out. Vehicles covered. Communication with biorecycling team – informed of	Site Tech 1s	Visual inspection	Daily	Scada monitoring of plant availability, site checks by site tech's	Dependant on availability of tanker crews- should be	Low

		cake build up. Install temporary odour masking measures if required. Regular collection of cake for removal off site. Cake in storage forms a crust after a day or two reducing risk of odour. Odour prevented during handling by limited drop heights, tipper trucks deposit sludge onto pad from height of less than 2m. Pre-acceptance checks on incoming digested cake. No additional turning or handling during cake storage. If long-term storage was needed temporary covers would be considered. Recessed cake pad provides wind barrier.					cleared within 5 working days	
Cake Pad & Drainage Linked tasks specified in Section 16 & 17 of appendix 6	Earthy (L)	Cake removal is carried out. Communication with biorecycling team – informed of cake build up. Install temporary odour masking measures if required. Regular collection of cake for removal from site. Cake in storage forms a crust after a day or two reducing risk of odour. No additional turning or handling during cake storage. If long-term storage was needed temporary covers would be considered.	Site Tech 1s	Visual Inspection	Daily	Scada monitoring of plant availability, site checks by site tech's	Dependant on availability of tanker crews- should be cleared within 5 working days	Low

		Recessed cake pad provides wind barrier.						
High Level Pumping Station Linked tasks specified in section 10 of appendix 5	Earthy (L)	Covers are not removed for longer than is needed if necessary to remove covers to perform certain tasks	Site Tech 1s	Visual Inspection	As required	Scada monitoring of plant availability, site checks by site tech's	Replace and secure covers, use of tarpaulins to contain odour emissions- aim to complete within 2 days	Low
		Area is ventilated to a OCU C.	N/A	Continuous – SCADA	Continuous			Low
Vehicle Movements & Wash Down	None	Daily checks by site staff	Site Tech 1s	Visual Inspection	Daily	Daily visual checks by site tech's	N/A	Low
Biogas Storage Linked tasks specified in Section 8 of appendix 6	Residual sulphur compounds (L)	Follow process control and ensure swift repair in any failure, such as whesso venting due to blockage.	Site Tech 1s	Visual Inspection	Daily	Daily scada checks, visual site checks by tech's	Timescales are dependant on nature of issue	Low
CHP, Boilers & Waste Gas Burner Linked tasks specified in section 8 & 9 of appendix 6	Residual sulphur compounds (L)	Follow process control and ensure swift repair in any failure.	Site Tech 1s	Visual Inspection	As required	Daily scada checks, visual site checks by tech's	Timescales are dependant on nature of issue	Low/medium
		Burner design to ensure low NOx and VOC emissions, with odours removed by passage through the biogas system, with biogas contained in line.	N/A	N/A	N/A	N/A	N/A	Low/medium

Sludge Blending Tank and Imported Sludge Holding Tank OCU A Linked tasks specified in section 9 of appendix 5 and appendix 7	Residual odours (L) and Earthly odours (L)	All routine site checks as per SOM.	Site Tech 1s	As Described in SOM	Weekly	Daily scada checks, visual site checks by tech's	Timescales are dependant on nature of issue	Low
		Odour control units are subject to regular preventative maintenance, checked on a monthly basis monthly by specialist Framework contractors who Monitor performance, through pH and H2S measurements and report to TL.	Contractor	As Described	Monthly	Reporting by contractor	Timescales are dependant on nature of issue	Low
		Units are monitored by the SCADA system for failures	N/A	SCADA	Contiguous	Daily scada monitoring by site tech's – responses to relevant alarms	Timescales are dependant on nature of issue	Low
		Media is replaced in line with the TW asset standards and recommendation from monitoring contractor to asset standard.	Contractor	As Described in Asset Standard	As Required	Reporting by contractor	Timescales will be influenced by costs and approval of capital spend	Low
High Level Pumping Station OCU C Linked tasks specified in section 9 of appendix 5 and appendix 7	Residual odours (L) and Earthly odours (L)	All routine site checks as per SOM.	Site Tech 1s	As Described in SOM	Weekly	Daily scada checks, visual site checks by tech's	Timescales are dependant on nature of issue	Low
		Odour control units are subject to regular preventative maintenance, checked on a monthly basis monthly by specialist Framework contractors who Monitor performance, through pH and	Contractor	As Described	Monthly	Reporting by contractor	Timescales are dependant on nature of issue	Low

		H2S measurements and report to TL.						
		Units are monitored by the SCADA system for failures	N/A	SCADA	Contiguous	Daily scada monitoring by site tech's – responses to relevant alarms	Timescales are dependant on nature of issue	Low
		Media is replaced in line with the TW asset standards and recommendation from monitoring contractor to asset standard.	Contractor	As Described in Asset Standard	As Required	Reporting by contractor	Timescales will be influenced by costs and approval of capital spend	Low
Digested Sludge Holding Tank OCU E Linked tasks specified in section 9 of appendix 5 and appendix 7	Residual odours (L) and Earthly odours (L)	All routine site checks as per SOM.	Site Tech 1s	As Described in SOM	Weekly			Low
		Odour control units are subject to regular preventative maintenance, checked on a monthly basis monthly by specialist Framework contractors who Monitor performance, through pH and H2S measurements and report to TL.	Contractor	As Described	Monthly	Reporting by contractor	Timescales will be influenced by costs and approval of capital spend	Low
		Units are monitored by the SCADA system for failures	N/A	SCADA	Contiguous	monitoring by site tech's – responses to relevant alarms	Timescales are dependant on nature of issue	Low
		Media is replaced in line with the TW asset standards and recommendation from monitoring contractor to asset standard.	contractor	As Described in Asset Standard	As Required	Reporting by contractor	Timescales will be influenced by costs and approval of capital spend	Low

Picket Fence Thickeners & SAS Belts OCU F Linked tasks specified in section 9 of appendix 5 and appendix 7	Residual odours (L) and Earthly odours (L)	All routine site checks as per SOM.	Site Tech 1s	As Described in SOM	Weekly			Low
		Odour control units are subject to regular preventative maintenance, checked on a monthly basis monthly by specialist Framework contractors who Monitor performance, through pH and H2S measurements and report to TL.	Contractor	As Described	Monthly	Reporting by contractor	Timescales will be influenced by costs and approval of capital spend	Low
		Units are monitored by the SCADA system for failures	N/A	SCADA	Contiguous	monitoring by site tech's – responses to relevant alarms	Timescales are dependant on nature of issue	Low
		Media is replaced in line with the TW asset standards and recommendation from monitoring contractor to asset standard.	Contractor	As Described in Asset Standard	As Required	Reporting by contractor	Timescales will be influenced by costs and approval of capital spend	Low

Table 4.5: Intermittent(Int), abnormal (Ab), and emergency events (E) 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
Incoming Sewers & Reception Wet Well	Inlet uncovered.	P	Restore covers as soon as possible.	Consider use of temporary tarpaulins and odour extraction equipment	Medium

Cess Reception	Spills	Ab	Cleaned up by Site Tech 1s ASAP	Additional tankering service dependant on size and nature of spill	Low
Storm & Balancing Tanks	Poor drainage / Residual Sludge	Int	Tank cleaning	Carried out by specialist contractors once funding approved by Level C area manager	High
Screens	Failure of compactor, resulting in wet screenings.	Int	Repair and act to ensure no build up; filled skips must be removed from site. Remove skips more often.	Raise APS risk case and progress to funding via DMC review	Medium
Grit Removal Equipment, Drainage & Grit Skip Management	Skips over fill, missing	Ab	Replace skips	Performance manager to order additional skip service as required	Low
Western Area Pumping Station OCU B	OCU Failure	Ab	Repair equipment at earliest opportunity. ERG carry out regular monthly inspections. OSIL make recommendations on remedial actions to take.	Raise APS risk case and progress to funding via DMC review	Medium
Primary Settlement Tanks	Hopper blockage and plant failure	Ab	Repair, unblock, drain. Jet wash down to clean the exterior walls of tank.	Additional tankering , jetting and washdown service as required	Medium
Primary Settlement Tanks	Planned maintenance	P	Complete work ASAP	Request specialist contractor to undertake work if TWUL resource not available	Medium
Fats, Oil & Grease Scum Removal System	Hopper blockage, pollution, plant failure	Ab	Repair, unblock and drain.	Additional tankering , jetting and washdown service as required	Low
Activated Sludge Plant Lanes & Zones	Filamentous, Pollution, High ML, Blower failure	Ab	Process control, repair.	Additional temporary chemical dosing , hire of temporary blower if required	Low

Inlet Works OCU D	Failure of unit or fan	Ab	Repair equipment at earliest opportunity. ERG carry out regular monthly inspections. OSIL make recommendations on remedial actions to take. Standby fan.	Raise APS risk case and progress to funding via DMC review	Low
Final Settlement Tanks	Failure of a component of the tank	Ab	Drain and clean as soon as possible	Additional tankering , jetting and washdown service as required	Low
Scum Removal System	Scum pump failure	Ab	Drain and clean as soon as possible	Additional tankering , jetting and washdown service as required , Raise APS risk case and progress to funding via DMC review	Low
Final Effluent	Blanket spill from final tank	Ab	Process control and corrective action	Stop flow to tank(s) that are spilling, adjust feed flows to other units in group to balance out feeds, advise pollution team to report issue and or raise an event	Low

Table 4.6: Intermittent (Int), abnormal (Ab), and emergency events (E) for assets under Sludge Treatment Centre Permit

Process stage	Event	Status	Ops mitigation	Expansion of TWUL operational response to odour	Odour risk after mitigation

				under Int/Ab//E events	
Sludge Imports, Sludge Reception	Spills	Ab	Spillages are cleaned up by the driver/site staff promptly	Additional tankering , jetting and washdown service as required	High
Cess Reception	Spills	Ab	Cleaned up by Site Tech 1s ASAP	Additional tankering , jetting and washdown service as required	Low
Skip Management	Overfilled	Ab	Skip management. Waste removal at the earliest opportunity.	Performance manager to order additional skip service as required	Low
Primary Raw Sludge Thickening and Pumping	Inversion, blockages, Plant failure	Ab	Process control, repair, tanks emptied.	Additional tankering , jetting and washdown service as required	High
SAS Thickening & Pumping	Plant failure, blockages	Ab	Process control, monitor and repair at earliest opportunity	Raise APS risk case and progress to funding via DMC review	Low
Sludge Blending & Mixing	Planned maintenance	P	Complete work ASAP	Request specialist contractor to undertake work if TWUL resource not available	Medium
Sludge Blending & Mixing	OCU failure (During Sludge event, plant failure, blockages, Digester inhibition)	Ab	Tanker cleaning. Stop imports. Event procedure.	Additional tankering , jetting and washdown service as required	High
Return Liquors	Plant failure, blockages	Ab	Process control, repair at earliest opportunity.	Request specialist contractor to undertake work if TWUL resource not available	Low

Digester Feeding, Mixing & Discharge	Spills / foaming around skirt	Ab	Spillages are cleaned up ASAP. Tanker cleaning.	Additional tankering , jetting and washdown service as required	Medium
	Blowing Whesso	Ab	Stop imports. Event procedure.	Request specialist contractor to undertake work if TWUL resource not available	Medium
Secondary Digestion, Mixing & Discharge	Sludge event, plant failure, blockages, failure of dewatering plant, failure of pumping equipment	Ab	Process control, repair.	Request specialist contractor to undertake work if TWUL resource not available	Low
Centrifuge	Plant failure	Ab	Stop imports, Process recovery. Liquid export, hire temporary equipment.	Request specialist contractor to undertake work if TWUL resource not available	Low
Cake Pad & Drainage (including cake imports)	Poor DS, adverse weather.	Ab	Stop imports. Process control. Should any odorous digested sludge cake be produced, this will be subject to process checks undertaken to identify root cause of production and removed from site expediently.	Dewatered cake is not particularly odorous and is sited well away from sensitive receptors	Low
Biogas Storage	Whessoe venting due to blockage, Plant failure	Ab	Follow process control and repair	Request specialist contractor to undertake work if TWUL resource not available	Low
CHP	Plant failure	Ab	Follow process control and repair. Use waste gas burner.	Ensure Boilers 1&2 are set to run on gas to reduce levels held in biogas holder	Low

Boilers	Plant failure	Ab	Follow process control and repair	Request specialist contractor to undertake work	Low
Waste Gas Burner	Failure of CHP and Waste Gas Burner	Ab	Repair at the earliest opportunity.	Request specialist contractor to undertake work	Medium
Standby Generators	Operating	Ab	N/A	Request specialist contractor to undertake work	Low
OCU A, C, E & F	Plant failure, power failure, washwater failure, ductwork or cover failure.	Ab	Repair equipment at earliest opportunity. ERG carry out regular monthly inspections. OSIL make recommendations on remedial actions to take.	Consider use of temporary odour suppressants	Medium

Table 4.7: General Intermittent (Int), abnormal (Ab), and emergency (E) events

Incidents and emergencies	Event	Status	Ops mitigation	Expansion of TWUL operational response to odour under Int/Ab/E events	Odour risk after mitigation
Incidents and emergencies				**For all entries TWUL's incident management response process would be followed including use of Site Incident (SIC) cards.**	

Fire	Potential loss of power leading to loss of odour control	E	Emergency power generation for critical activities until power restored. Within Thames Water's incident response planning, arrangements are already in place with a supplier for temporary generators. This agreement has a Service Level Agreement for provision within 24 hours.		Low
Severe weather	High flows coming into works	E	No mitigation when once flow exceeds sites capability with persistent severe weather		Medium
Flooding	Flooding causing process or equipment problems	E	Event unlikely. 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. Within Thames Water's incident response planning, arrangements are already in place with a supplier for temporary generators. This agreement has a Service Level Agreement for provision within 24 hours.		Low
Other incidents	Transport of sludge/cake to land inhibited for other reasons leading to in additional potential odour release	E	Provision for 60days storage on site plus additional storage at other Thames Water sites if necessary		Low

4.3.3 Spillages

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

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

4.4 Routine Monitoring

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

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

Where remedial actions are identified from any source these are listed in Tables 4.3 & 4.4 with expected durations accompanying rectification. The timescales given are indicative or illustrative but are informed directly by operational experience. Repairs requiring capital funding will take longer as they are directly informed by complexity and will be bespoke to the issue(s) identified.

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 conventional digestion site such as Slough the processes is maintained around pH 7 but within the range 6.72 – 7.6 (this is % dry solids and digester

load dependant) for healthy operation.

- alkalinity: Levels dependant on feedstock characteristics (primary sludge: surplus activated sludge (SAS) ratio). Conventional digestion typically, 3,500 - 5,000mg/litre range.
- temperature: minimum target of 38°C. This is maintained within the range 36-40°C.
- 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. Slough fits into the first row of the table.
- Dry solids feed: see table below, Slough has a target of 6%DS, but this can vary between 3-8%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 based but not based on single parameter.

To ensure steady state monitoring is carried out and confirm that odour is under control Thames Water propose to develop a sniff testing procedure that will be put in place within 3 months of the permit being issued. This will allow time to carry out staff training and ensure that our systems are updated to include the monitoring requirement within site tasks and an ability to record the information obtained. An outline of the proposed procedure is below:

- Undertake a regular monthly sniff test off-site at locations both upwind and downwind of the site (locations would be subject to further assessment including location of receptors,

patterns of complaints and weather conditions/wind direction). This will ideally be carried out by a member of staff who is not routinely based on site.
- Investigate whether it is possible to include sniff testing as part of our monthly OCU contractor visits if required.
- The content of the EA Odour Monitoring Form within the H4 guidance and the H4 methodology will be used to inform the procedure and the information shown in the form gathered as part of each monitoring round.
- Carry out additional sniff testing in between monthly checks, following the same methodology, if complaints are received or if there are events on site which mean there may be an increased odour risk off-site. This would again be carried out by a member of staff who is not routinely based on site.
- Information will be recorded via our electronic systems.
- Any off-site odour suspected to be from our site will be investigated and actioned accordingly.

We aim to ensure a robust process is in place for investigation of complaints involving non-site based staff (see Section 6 of the OMP). We also ensure regular routine maintenance is undertaken involving site walks to ensure more odorous activity is identified, captured, resolved and logged in the site log book. Odour monitoring is carried out following receipt of an odour complaint. See section 6.3 Investigation a complaint for full details.

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

4.5 Record Keeping

Records of routine monitoring, site and sludge inspection rounds and sludge blanket checks are kept on SAP . Records of skip management, which collect wastes generated from UWWTD activities, and any spillages and remedial actions are held in the Waste Transfer Notes. Sludge blanket levels are recorded on ELogbook 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 and stored on SharePoint.

- PST Sludge Blanket Depths - records of PST sludge blanket levels are held within Site Cockpit and ELogBook.
- Performance of OCU - records of OCU testing will be kept by the site manager
- Gas Flare Check – records kept on the Site Cockpit
- Sludge Cake Movement – Records maintained by Thames Water Bio Recycling.
- Cockpit – Site operational data is stored on the Site Cockpit. This was introduced in 2009 and is stored electronically on the Portal.

4.6 Emergency Response and Incident Response Procedures

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

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

In the event of power failure, there are backup generators on site, this covers OCUs.

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

Tables 4.3 to 4.7 respond to the identification of relevant triggers and actions to minimize odour. OCU monitoring is also included. Monitoring of odour release to atmosphere for wider sludge treatment assets is constrained by sludge containment (say versus an open composting operation), the lack of a confined emission point and the episodic nature of odour release and exposure.

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 (already present in Section 6.2 of OMP to investigate customer complaints).
(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 (for example, where use is recommended in Table 4.6)and continued access to process critical spares (odour minimisation by early intervention).
(e) Further expansion of odour risk within site incident planning (this is already referenced in Tables 4.5, 4.6 & 4.7 under relevant Intermittent; Abnormal Operation & Emergency scenarios)
(f) Temperature assessment in secondary digestion tanks on the basis that increased temperatures give greater potential for volatilisation of odours
(g) For PSTs, asset condition (wear/damage) would consider odour risks where assets are taken offline
(h) Telemetry/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 have a schedule to ensure routine maintenance for key mechanical items. In addition, a dedicated maintenance team provide additional support for more specialised equipment, e.g. regular calibration of Dissolved Oxygen probes.

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

All maintenance 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

The introduction of new OCUs is informed by a bespoke design brief informed by calculations of the system's capacity, principally flow rate measured in Am3/hr. OCUs can either be direct installs or commissioned under joint venture arrangements where a component part of wider UWWTD/EPR asset replacement and/or refurbishment

OCU A – A12

Serves the Sludge Blending Tank and Imported Sludge Holding Tank

Height x Width x Length	Ø2,800 mm x 2,600 mm
Construction Type	Cylindrical
Materials of Construction	HDPE
Media Type	Carbon
Design Air Flowrate	1,131 m^3/hr
Design H_2S Inlet Load	500 ppm (maximum), 150 ppm (average)
Design Inlet Temperature	20°C
Design Removal Efficiency	99%
Duty/Standby Fan	2 x Duty/Standby Fans
Fan Flow and Pressure	1,131 m^3/hr
Fan Materials of Construction	PVC
Fan Manufacturer	Finna Fans (serial number 11414)
Stack Dimensions	Ø200 x 4,000 mm (efflux cone estimated Ø160)
Stack Materials of Construction	PVC/GRP
Stack Discharge Velocity	16 m/s
Stack Instrumentation/outlet monitoring	None
Trace Heating	None (not required)

Duty/Standby Extraction	Yes
Local panel and alarms	Remote

Design basis was back calculated by ERG using monthly inspection reports and a site audit

Continuous operational monitoring :

- Low air flow alarm connected to SCADA

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 'R.A.G.' recommendation section of their inspection report, for example media replacement.
- System integrity checked during daily site rounds, weekly OCU checks and monthly inspections to confirm extraction points and routes undamaged.

OCU B

Serves Western Area Pumping

For continuous operational monitoring

- Low air flow alarm connected to SCADA

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 'R.A.G.' recommendation section of their inspection report, for example media replacement.
- System integrity checked during daily site rounds, weekly OCU checks and monthly inspections to confirm extraction points and routes undamaged.

Media in OCU B was replaced in 2022.

OCU C – A13

Serves High level pumping station

Height x Width x Length	Ø3,500 mm x 3,000 mm
Construction Type	Cylindrical
Materials of Construction	HDPE
Media Type	Carbon
Design Air Flowrate	2,545 m^3/hr
Design H_2S Inlet Load	500 ppm (maximum), 150 ppm (average)
Design Inlet Temperature	20°C
Design Removal Efficiency	99%
Duty/Standby Fan	2 x Duty/Standby Fans

Fan Flow and Pressure	2,545 m^3/hr
Fan Materials of Construction	PVC
Fan Manufacturer	Finna Fans
Stack Dimensions	Ø300 x 4,000 mm (efflux cone estimated Ø250)
Stack Materials of Construction	PVC/GRP
Stack Discharge Velocity	14 m/s
Stack Instrumentation/outlet monitoring	None
Trace Heating	None (not required)
Duty/Standby Extraction	Yes
Local panel and alarms	Remote

Design basis was back calculated by ERG using monthly inspection reports and a site audit

For continuous operational monitoring

- Low air flow alarm connected to SCADA

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 'R.A.G.' recommendation section of their inspection report, for example media replacement.
- System integrity checked during daily site rounds, weekly OCU checks and monthly inspections to confirm extraction points and routes undamaged.

OCU D

Serves the inlet works built in 2013

Parameter	Value	Units
Inlet channels	579	Nm^3/hr
Inlet and oulet screens	2,348	Nm^3/hr
Storm water overflow	360	Nm^3/hr
Detritors 1 and 2	452	Nm^3/hr
Detritor inlet channels	333	Nm^3/hr
Detritor outlet channels	161	Nm^3/hr
Outlet drop box	68	Nm^3/hr
Total gas flowrate	4,300	Nm^3/hr
Inlet H_2S - average	65	ppm
Inlet H_2S - maximum	500	ppm
System H_2S removal efficiency	99.9	%
Outlet H_2S	<1,000	ppb
Inlet mercaptan - average	2	mg/m^3
Inlet mercaptan - maximum	10	mg/m^3
Inlet ammonia - average	0.65	ppm
Inlet ammonia - maximum	5.0	ppm
Inlet VOCs - average	10	mg/m^3
Inlet VOCs - maximum	50	mg/m^3
Inlet odour - average	520,000	ou_e/m^3
Inlet odour – maximum	4,000,000	ou_e/m^3
Outlet odour	<1,000	ou_e/m^3
Area classification inside the duct	Zone 1	
Area classification outside within 1m of duct	Zone 2	

The extraction from the inlet works is based on 3 air changes per hour.

For continuous operational monitoring

- Low air flow alarm connected to SCADA
- Continuous H2S monitoring at the stack outlet
- Identification of Fans running on SCADA

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 'R.A.G.' recommendation section of their inspection report, for example media replacement.
- System integrity checked during daily site rounds, weekly OCU checks and monthly inspections to confirm extraction points and routes undamaged.

OCU E – A14

Serves the Digested Sludge Holding Tank built in 2013

Parameter	Value	Units
Design total gas flow rate	686	Nm^3/hr
Design temperature	0 to 20	°C
Design average inlet H_2S concentration	0.1	ppm
Design maximum inlet H_2S concentration	1.2	ppm
Design average inlet mercaptan / (VOC) concentration	0.25	mg/m^3
Design inlet humidity	70	%RH
Design inlet odour (Max)	20,000	ou_E/m^3
Design inlet odour (Average)	800	ou_E/m^3
Design system H_2S removal efficiency	99.95	%
Required outlet odour	<1000	ou_E/m^3
Area classification inside duct	Zone 1	
Area classification outside duct (local to Fan)	Zone 2	

Extraction from the digested sludge tank is based on 1 air change per hour

The mixture of air and malodorous compounds is drawn from Sludge Tank number 1 into the Bio-trickling Filter where most of the H_2S and some VOC and mercaptans are removed by passing the gas through a packed bed of pumice stones against a downward flow of FFE. After leaving the Bio-trickling Filter, the gas passes through the duty/standby Fans, then the Droplet Eliminator and Heater to reduce its relative humidity before being treated in the Carbon Filters to remove the remaining contaminants. The treated gas leaves the Carbon Filter and is discharged to atmosphere via the floor-mounted Stack.

For continuous operational monitoring

- Low air flow alarm
- H2S monitoring
- Identification of fans on SCADA

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 'R.A.G.' recommendation section of their inspection report, for example media replacement.
- System integrity checked during daily site rounds, weekly OCU checks and monthly inspections to confirm extraction points and routes undamaged.

OCU F – A15

Serves PFT and SAS belts

Original Manufacturer	OSIL
Height x Width x Length	3 x 2,400 mm x 2,400 mm x 1,800 mm
Construction Type	Rectangular sectional tank with 3 cells
Materials of Construction	Dewey Waters – Fibreglass
Media Type	Calcified Seaweed
Media Wetting Liquor Rate	1.2 m^3/hr
Instrumentation	1 x actuated valve associated with the irrigation line

Design Air Flowrate	1,047 m^3/hr
Design H_2S Inlet Load	500 ppm (maximum), 150 ppm (average)
Design Inlet Temperature	20°C
Design Removal Efficiency	98%
Duty/Standby Fan	2 x Duty/Standby Fans
Fan Flow and Pressure	1,047 m^3/hr (1.1 kW)
Fan Materials of Construction	PP
Fan Manufacturer	Finna Fans B1200G
Stack Dimensions	Stub Stack above each vessel (1m length)
Stack Materials of Construction	PVC
Trace Heating	Present
Duty/Standby Extraction	Yes

Design basis was back calculated by ERG using monthly inspection reports and a site audit

For continuous operational monitoring

- Odour system flow to treatment high pressure and low pressure alarms
- Odour system air flow to treatment low alarm
- Identification of fans on SCADA

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 'R.A.G.' recommendation section of their inspection report, for example media replacement.
- System integrity checked during daily site rounds, weekly OCU checks 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 and Monitoring of Odour Control Units

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 contractor. 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 Slough.

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% Carbon units <70%)	Hygrometer	Check any preheaters fitted to system before carbon, or check irrigation is working on biofilter.	Monthly	X	X	-
Back pressure (to assess media thatching or media compaction) Typically systems work around 0.5 kPA	Calibrated digital pressure meters	Values above threshold would be 'RAG' banded in the OCU contractor inspection reports. If pressure gauges are over-pressurised to the extent fouling is or has occurred to be treated as high priority. Check for blockages, poor FFE quality/check if media is of a type susceptible to biodegradation.	Monthly	X	X	X

pH of discharge irrigation water (2-3pH)	pH paper	Less than 2 increase irrigation.	Monthly	X	-	-
pH of scrubber liquor (9.2 pH)	Calibrated pH probe (calibrated with standard solutions)	Recalibrate pH probe and check dosing and chemical availability	Continuous	-	-	X
Redox potential of scrubber liquor (700-730 mV)	Calibrated redox probe (calibrated with standard solutions)	Recalibrate redox probe and check dosing and chemical availability	Continuous	-	-	X
Gas inlet/outlet concentrations for hydrogen sulphide (50ppb used for media change out)	Drager Tubes/CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	Check functionality of odour control unit. If repair or replacement media required raise a job on SAP or APS risk and arrange for contractor repair. Timescale Bespoke to root cause/see later entries. Arrange re-test post remedial work. Major repairs up to 6 months depending on complexity	Monthly/ 6 monthly	X	X	X
Gas inlet/outlet concentrations for ammonia (20mg/m3)	Drager Tubes/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	Quarterly/ 6 monthly	X	X	X
Gas inlet/outlet concentrations VOCs and RSH	RSH – Drager tubes VOC – PID as isobutylene		Quarterly	x	x	x
Outlet gas streams TVOCs HCl	 EN 12619 EN 1911	6 monthly IF identified as relevant in wastes gas stream characterisation				
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	Monthly	X	X	X

	durations of 1 to 2 months typical depending on complexity (time of order to mobilisation)				
Check H_2S meter is functioning and calibrated (if installed)	Check calibration is still in date during monthly contractor inspection.	Monthly	X	X	X

Condition of the media in the OCU is monitored by performance checks and by additional testing as required. Air quality is assessed to ensure that the units are working correctly.

The OCUs at Slough STW are covered by a service and maintenance contract with a specialist Contractor. They are inspected on a monthly basis and reports are sent to site management. Figure 5.1 below highlights the scope of work required from our OCU Maintenance Contractors through their monthly visits. Monitoring during the visits is as follows:

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

>50ppb hydrogen sulphide will be used as a threshold value for media change out.

The OCU biofilters, carbon filters and chemical scrubbers 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 all OCUs are 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, minimum 2-3 seconds retention time for Carbon filters and 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 1 part per million is equivalent to 2,000 odour units. A "red action" would be raised for any value 5 parts per million on the discharge from a biofilter, before the carbon filter and 1parts per millions or greater from the subsequent carbon filter. There is a relationship between increases in discharge efficiency from the biofilter since if this rises it will start to exhaust the carbon filter defining the red action. Contextual knowledge must inform any triggers for action; rather than focusing on a single value. A "red action" would be raised for any value 1 parts per million or greater on the discharge from a biofilter, chemical scrubber or carbon filter. Where there is a combination of biofilter and carbon filter the red action would be 5ppm off the biofilter and 1ppm off the subsequent carbon filter.

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/carbon units - 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 mentioned in section 5.1.2
- Daily site rounds and weekly OCU checks by Thames Water technicians. These are Psion based checks using SAP Plus for escalations including, for example, internal MANDAT tickets or identifying a need for contractor support. The tasks in the daily checks mirror the numbered tasks in the contractor 'Monthly Health Checks'. See Figure 5.1 and section G in Appendix 5 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 F, 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).

Figure 5.1 – Monthly OCU Health Checks

Monthly Health Checks

Biofilter

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

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

Chemical Scrubber

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

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

Carbon Adsorber

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

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

5.1.4 Records

Maintenance history records are kept electronically on TW SharePoint system. Records from the monthly inspections are held by the Performance Manager.

5.2 Fault Reporting

Faults identified during routine inspections are reported to the Performance Manager, 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. Temporary solutions are implemented where possible, to keep OCUs in service.

5.3 Emergency Repairs

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

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

6 Customer Communications

6.1 Customer Odour Complaints Process

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

Customers / residents are encouraged to communicate with local Thames Water Operations via the Customer Centre to report if they are noticing odour from Slough 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 'Slough Sewage Treatment Works'

3. Telephone - Thames Water Customer Services 0800 316 9800

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

Slough BC – Environmental Services
Telephone: 01753 475111 option 4

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

Customer contacts regarding Slough 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 at 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 Slough STW site management will investigate and respond the next working day.

6.2 Customer Communication Plan

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

6.3 Investigating a complaint

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

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

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

The root cause investigation may include site walkaround checks, which look for irregularities such as spillages / open doors and hatches, ensuring appropriate measures such as detailed in table 4.5 and 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 Environmental Health Officer of Slough BC (01753 475111), will be contacted directly if there are risks of odour generation from UWWTD activities. 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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Appendix 2. Odour Improvement Plan

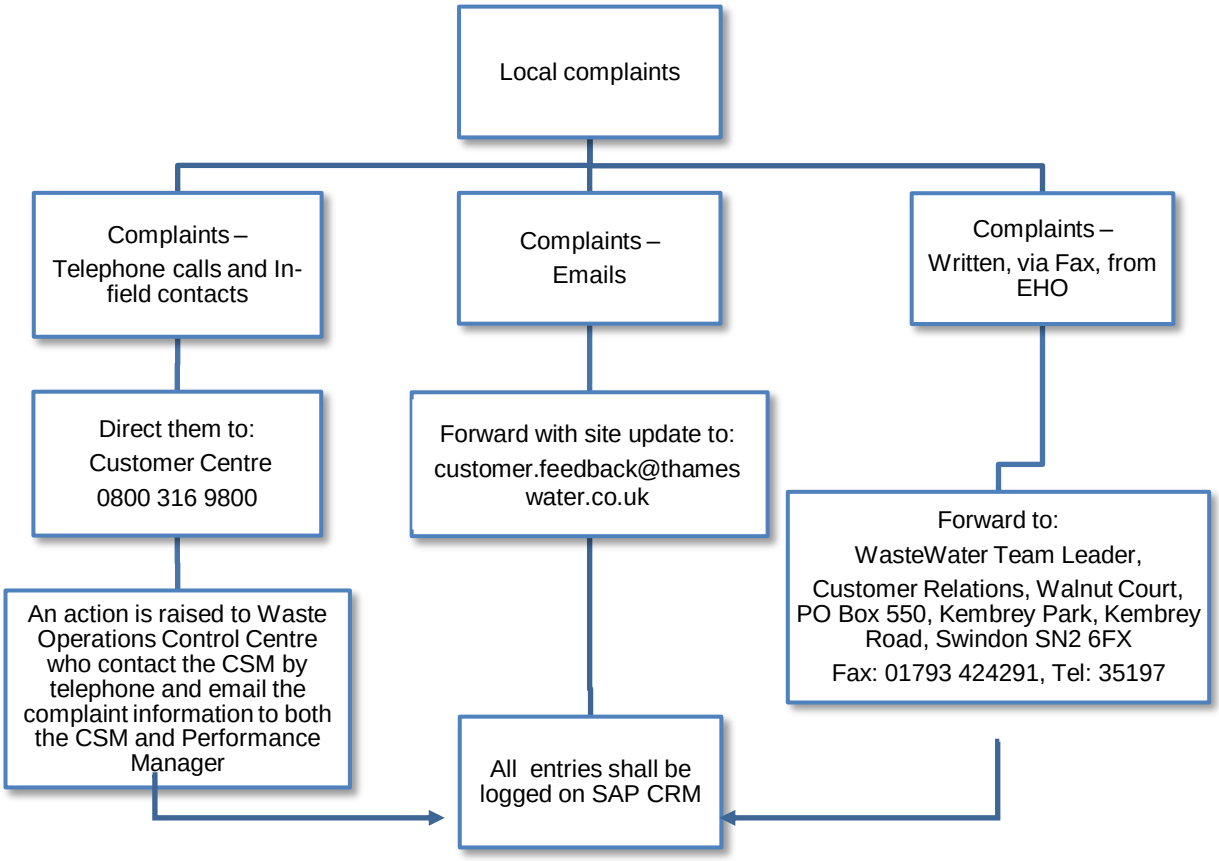
Odour Improvement Plan Slough STW

Review Date		1/6/2023				
Process Stage	**Owner**	**Plan**	**Action**	**Expected difficulties**	**Measures to mitigate**	**Timeframe**
Odour Control Packages	Andy Moore	Long term improvements and temporary solutions to current OCUs	Monthly visits from Framework agreed Contractor will continue to highlight areas of improvement for the OCUs, which in turn will generate risks to be resolved. All subject to financial approval.	Lack of funding	Assessment will continue as to whether or not some of the jobs can be combined with existing work to get completed faster.	ongoing

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:	[redacted]
Telephone:	

Communications

Level 1	Stable operations: Compliant with Operational Asset Standards.			
Communications Approach	Standard contact with key stakeholders.			
Stakeholders External	**Frequency of Contact**	**Method of Contact**	**Aim of Contact**	**TW Contact/Level**
Local council(s) Environmental Health Department	As required but at least quarterly	Telephone / email / meeting	Update on operational activity on site	Performance Manager and Customer & Stakeholder Manager
Environment Agency	As required	Telephone / email / meeting	Update on operational activity on site	Performance Manager and environmental permitting team
Local residents associations *(if applicable)*	As required but at least annually	Telephone / email / meeting	Update on operational activity on site	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
Customer Engagement Manager	As required	Telephone / email / meeting	To keep External Communication team updated	Operations Manager
Odour Working Group	Monthly	Feedback odour report / email / telephone / meeting.	To monitor the level of complaints, highlight any odour issues (present and future)	Area Progress Manager
Area Process Manager	Weekly	Email / phone / meeting	To keep Manager up to date of odour issues at Slough	Team 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 in conjunction with the Customer and Stakeholder Manager			
Stakeholders External	**Frequency of Contact**	**Method & Level of Contact**	**Aim of Contact**	**TW Contact/Level**
Local council(s) Environmental Health Department	Immediately then monthly	Telephone / email / meeting	Report unstable operation with action plan	Performance Manager and Customer & Stakeholder Manager
Local residents associations *(if applicable)*	Immediately then monthly	Telephone / email / meeting	Report unstable operation with action plan	Performance Manager and Customer & Stakeholder Manager
Environment Agency	Potential for notification procedure	As required as per notification procedure	As required as per notification procedure	Pollution desk
Stakeholders Internal	**Frequency of Contact**	**Method of Contact**	**Aim of Contact**	**TW Contact/Level**
Press Office	Immediately	Q&A prepared for press office by Operations	To enable the press office to deal with queries from the press (reactive only).	Duty Manager
Customer Centre (Swindon)	Immediately	Telephone / email	To enable the Customer Centre to deal with queries from the press (reactive only).	Duty Manager
Other areas/stakeholders outside Slough STW potentially impacted				
Stakeholder	**Frequency of Contact**	**Method of Contact**	**Aim of Contact**	**TW Contact/Level**
Local businesses	Immediately then monthly	Telephone / email / meeting	Report unstable operation with action plan	Performance Manager and Customer & Stakeholder Manager

Level 3	Emergency • 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 (Kemble Court)). • Weekly discussions with EHO. • Monthly Stakeholder meetings, (internal and external – include MPs, Councillors, schools, businesses etc.). • Press release may be required.			
Stakeholder External	**Frequency of Contact**	**Method of Contact**	**Aim of Contact**	**TW Contact/Level**
Local residents associations (if applicable)	Immediately then monthly	Telephone / email / meeting	Report emergency event with action plan and update with progress	Performance Manager and Customer & Stakeholder Manager
Councillors / MPs for local areas	Immediately then monthly	Telephone / email / meeting	Report emergency event with action plan and update with progress	Level 5 Manager (Operations Manager) / Level 4 Manager (Regional Operations Manager)
Local council(s) Environmental Health Department	Immediately then weekly	Telephone / email / meeting	Report emergency event with action plan and update with progress	Level 5 Manager (Operations Manager) / Level 4 Manager (Regional Operations Manager)
Environment Agency	As required as per notification procedure	As required as per notification procedure	As required as per notification procedure	Pollution desk
Stakeholders Internal	**Frequency of Contact**	**Method of Contact**	**Aim of Contact**	**TW Contact/Level**
Press Office	Immediately then daily	Q&A and press release prepared by press office	To enable the press office to deal with reactive queries from the press and prepare a media strategy if required.	Duty Manager
Customer Centre (Swindon)	Immediately then daily	Telephone / email	To enable the Customer	Duty Manager

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

Appendix 4. Site Drawings

Figure A - Site Location Map

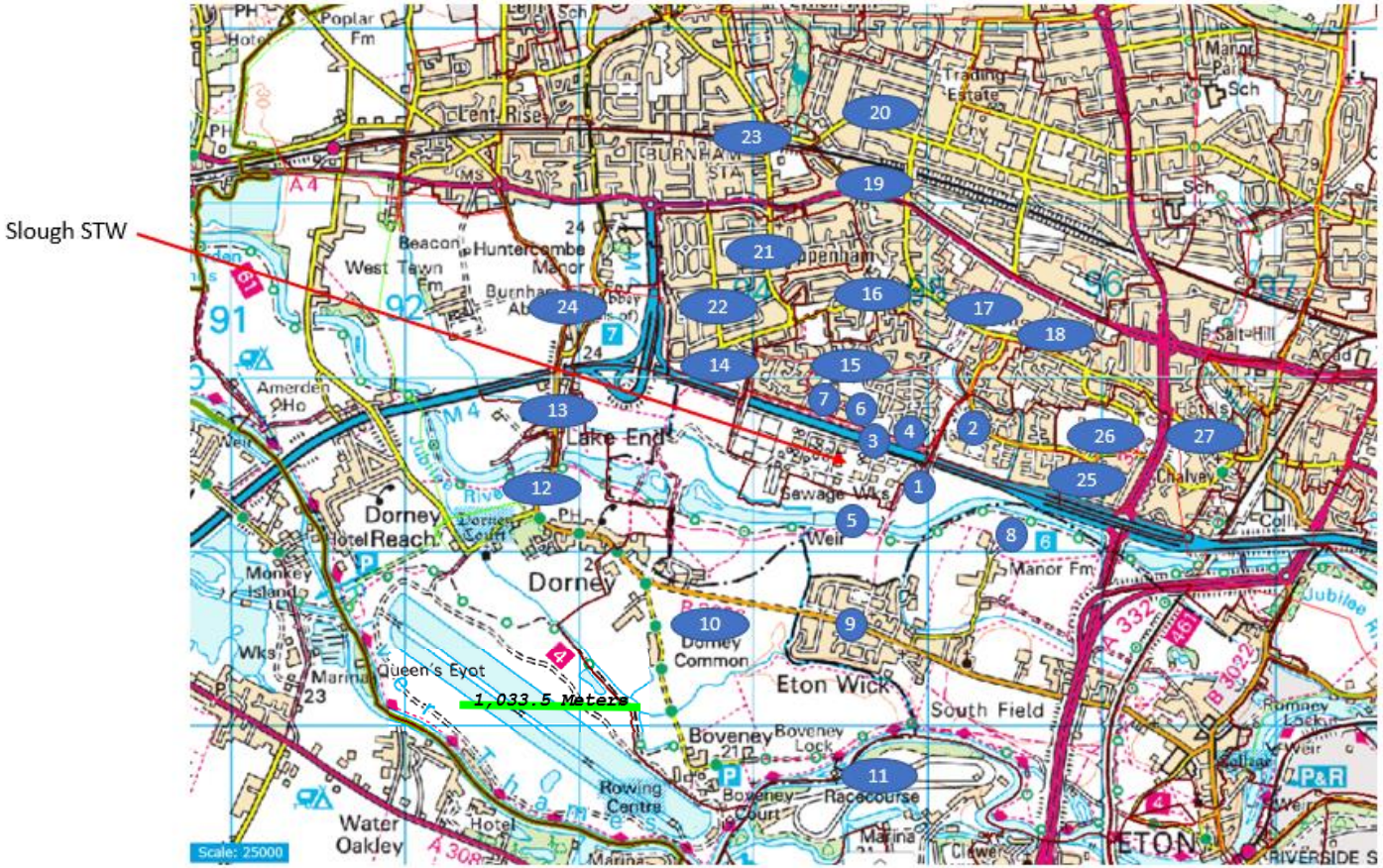


Figure B - Site Plan

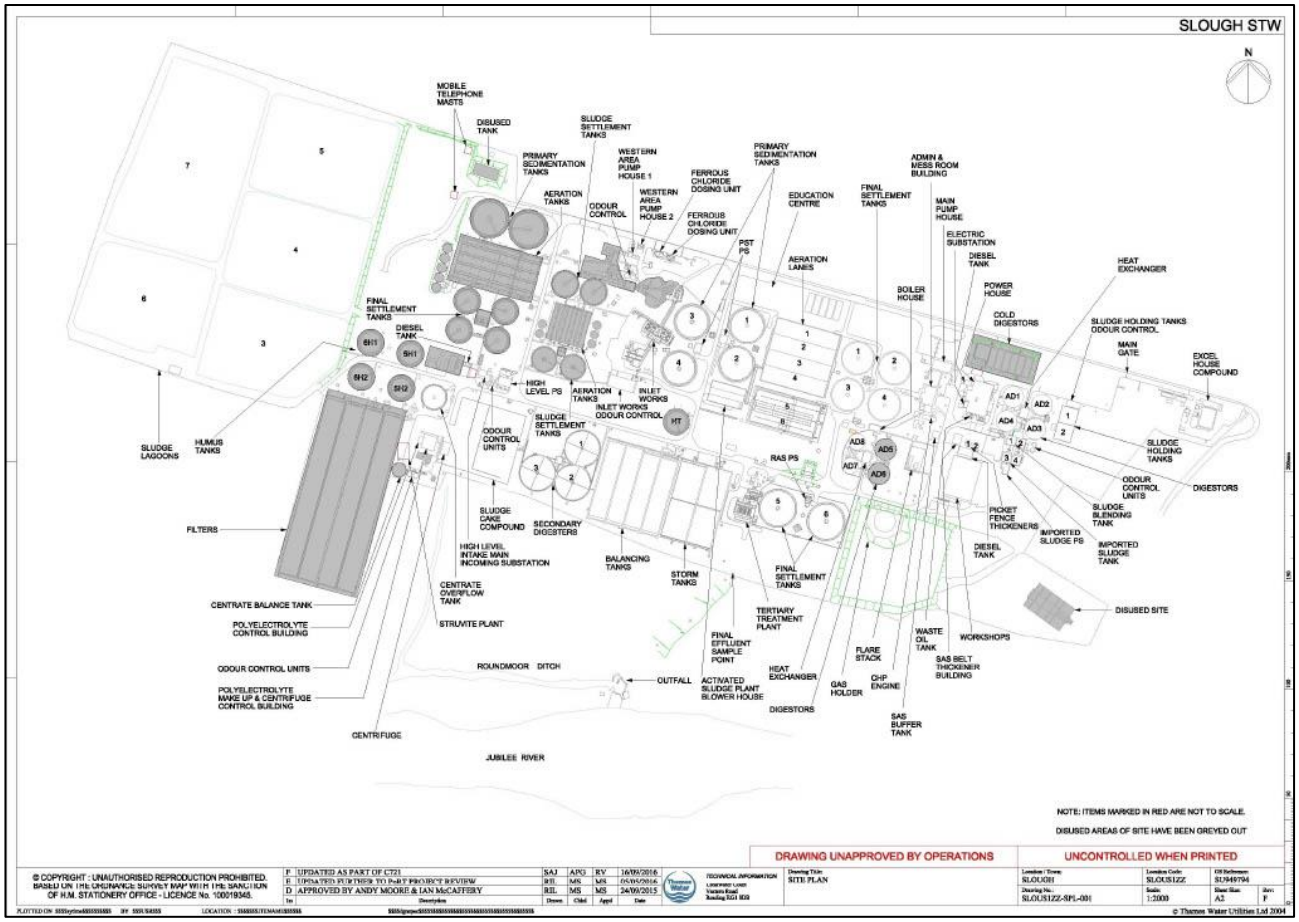


Figure C - Area permitted under Sludge Treatment Centre Permit (reference number to be added with issued permit)

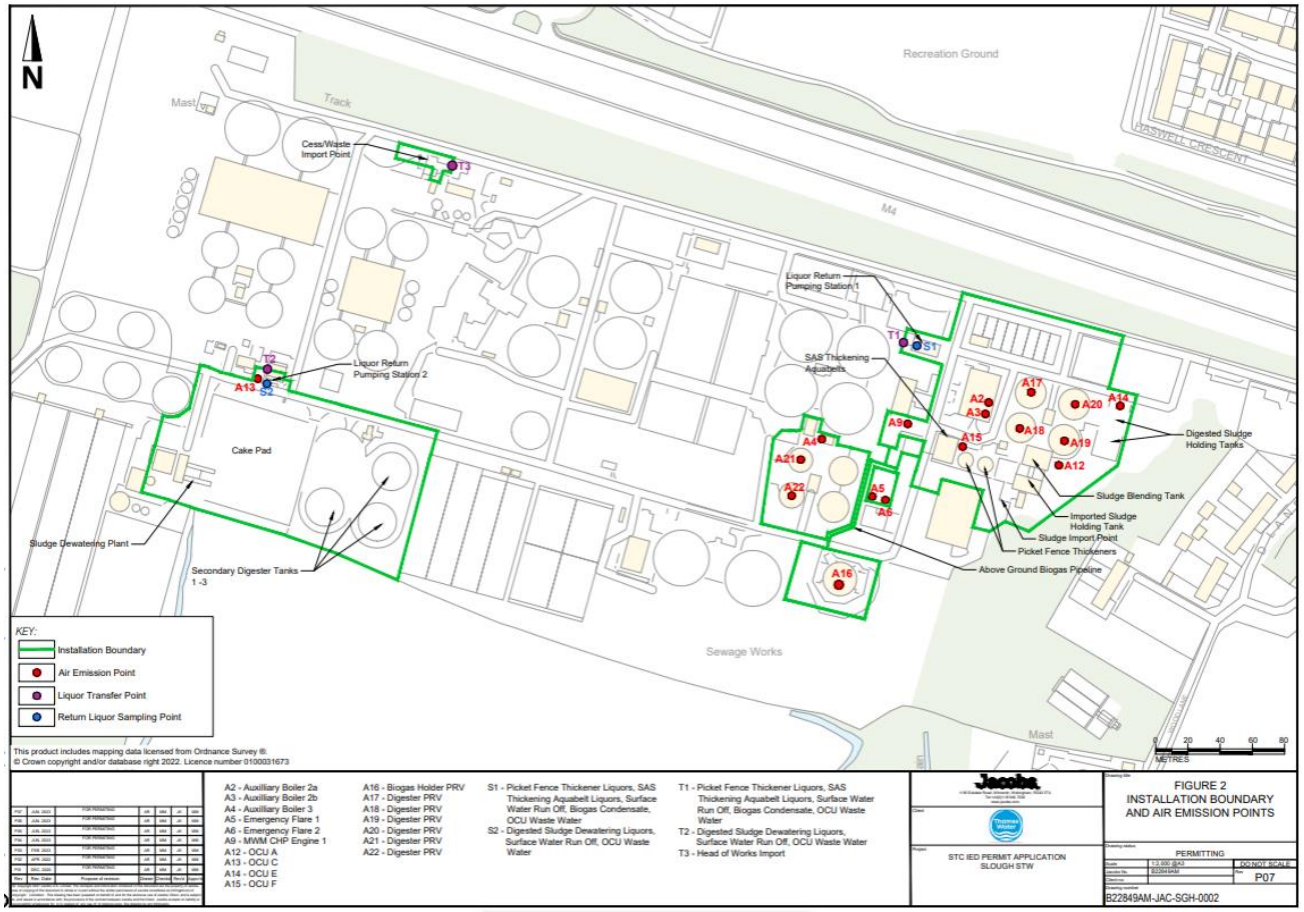


Figure D1 - Process Block Diagram for full site

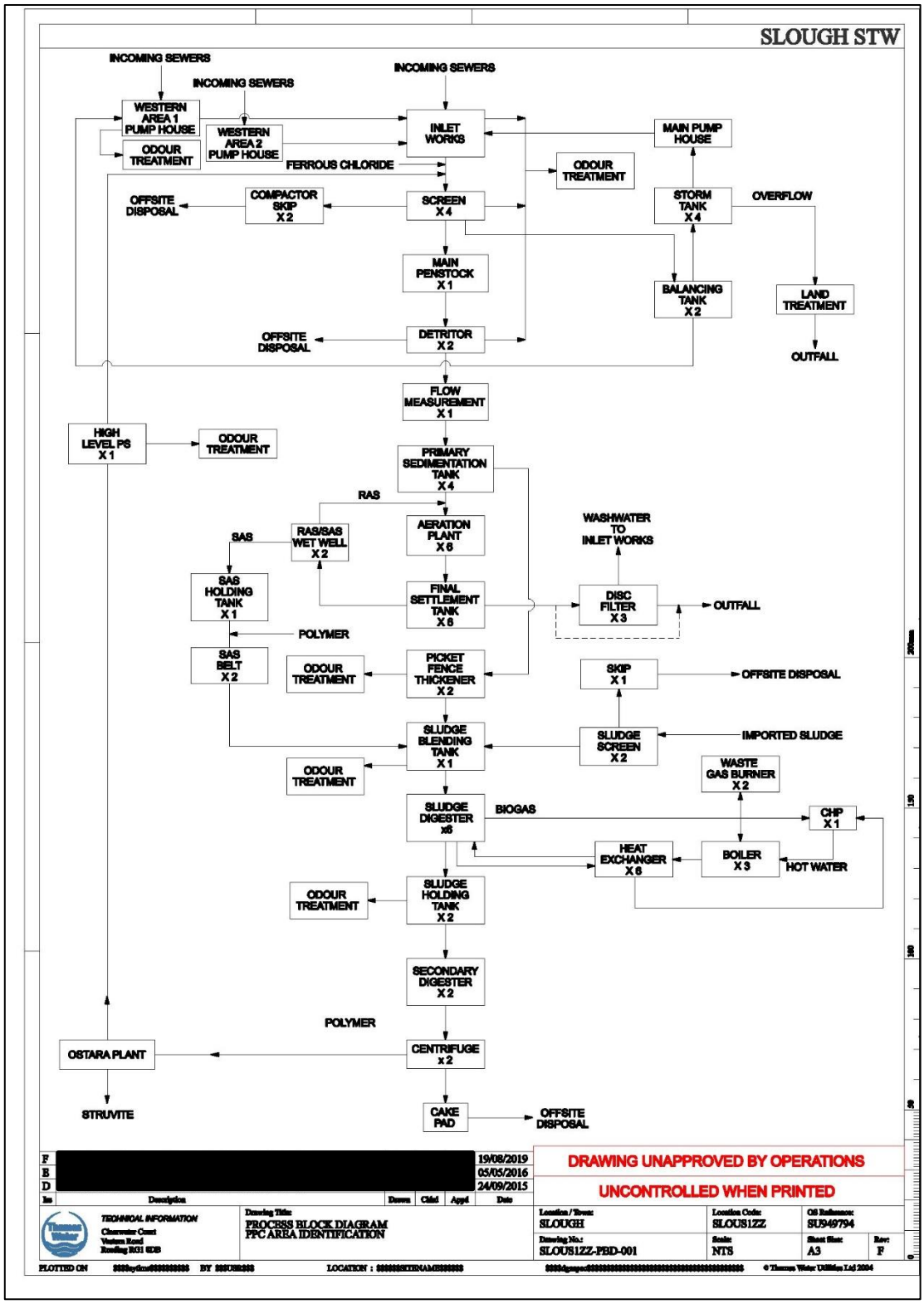
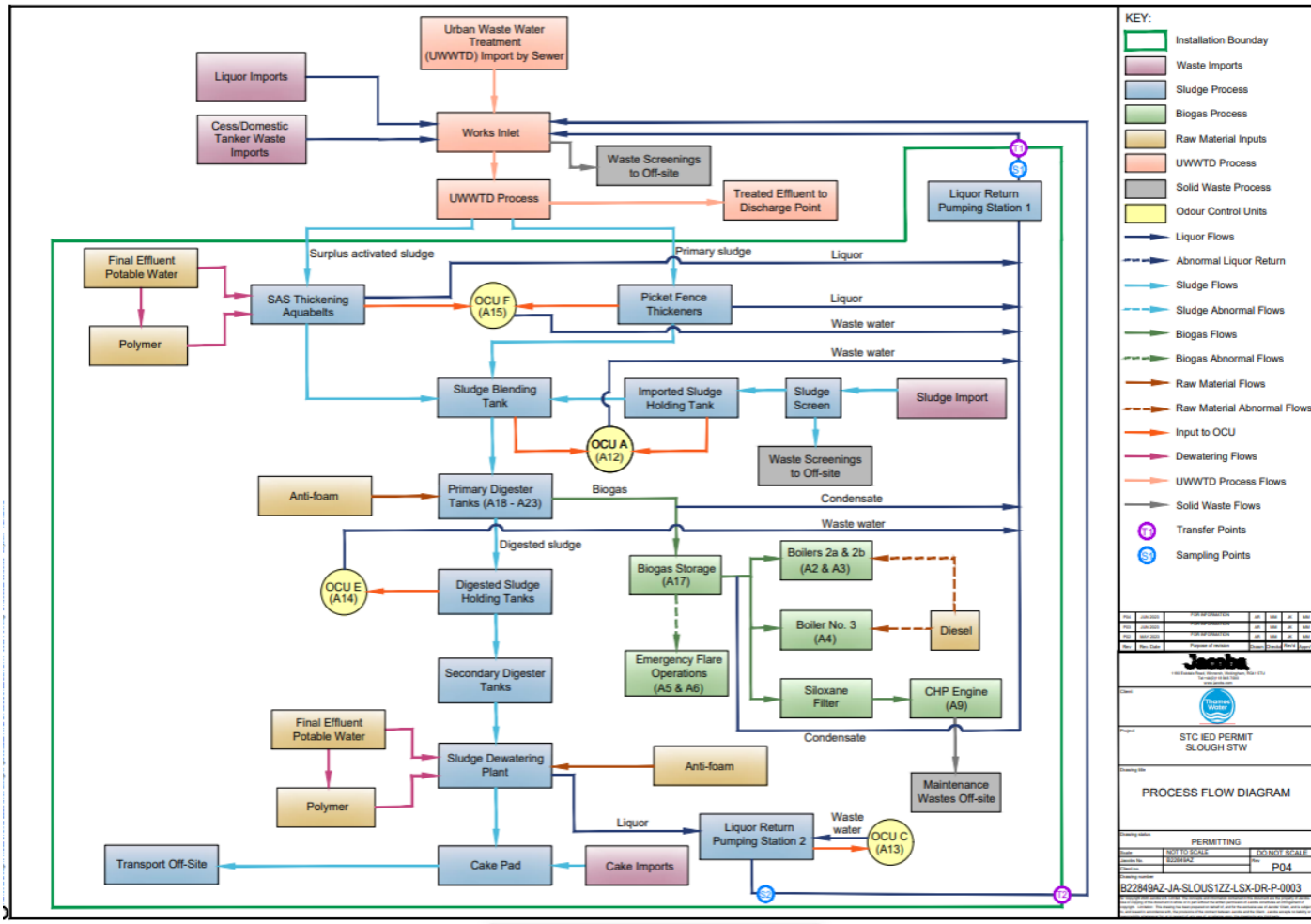


Figure D2 - Process Block Diagram for permitted activities



Appendix 5. Site Rounds

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

ID	Instruction	Daily	Weekly
2.1	**Cess Waste Reception Point**		
a)	Note any suspicious activity or discharges as required	X	
b)	Check logger system is operating correctly	X	
c)	Check all pipework is in good condition	X	
d)	Where a macerator is fitted, check operation and oil reservoir	X	
e)	Where a manual stone trap is fitted, clear of accumulated material	X	
f)	Check grit bins are available and stocked with grit for winter	X	
g)	Carry out general housekeeping, remove litter, clear debris, washdown any spillages, empty bins	X	
h)	Ensure all signage is in good condition, clean and legible	X	
i)	Check washdown equipment is operating correctly	X	
2.2	**Inlet / storm pumping station**	Daily	Weekly
a)	Check Ammeter reading, Too high could indicate a blockage. Too low could indicate an air lock or impeller damage. Where reading is unusual ensure appropriate action is taken.	**X**	
b)	Check the well level is within the normal operating limits taking into account the flow conditions at the time (such as storm conditions & peak flow to site). If level is too low or high, this could indicate control issues or pumping issues.	**X**	
c)	Check condition of the wet well. Does it have more than the usual scum or debris floating on top that will indicate the need for a wet well clean?	**X**	
d)	Check fault light(s) are not on, take appropriate action as required.	**X**	

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

ID	Instruction	Daily	Weekly
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**	
k)	Visual check on the screenings removal brushes for blinding and wear.	**X**	

ID	Instruction	Daily	Weekly
	Clean the brushes as required. Ensure the brushes are in correct contact with the screen and that screenings are being removed.		
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**

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

ID	Instruction	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**
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**	

ID	Instruction	Daily	Weekly
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**	
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**	

ID	Instruction	Daily	Weekly
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**	

ID	Instruction	Daily	Weekly
5	**Secondary Settlement – Humus Tanks / Final Settlement Tanks**	Daily	Weekly
a)	Check correct operation of desludging pump(s) or valve(s)	**X**	
b)	Check scraper/bridge operation where installed	**X**	
c)	Check and log blanket level with portable blanket meter where detectors not fitted. (Monday, Wednesday, Friday)	**X**	
d)	Check tank surface for buildup of floating debris. Visually check effluent quality over the weir for solids carry over	**X**	
e)	Check RAS pump(s) are operating correctly (FSTs only)	**X**	
f)	Check Bellmouth and de-rag where required	**X**	
g)	Check effectiveness of weir brushes, chains, “other systems” where fitted	**X**	
h)	Check scum boards for breaks or carry under	**X**	
i)	Check scum removal system for correct operation, clear any fouling where necessary	**X**	
j)	Check flow of recirculation bleed back/constant draw off where used	**X**	
k)	Check operation of fixed blanket detectors and alarms		**X**
l)	Check operation of Mallard pump by test running in hand, where installed		**X**
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**

ID	Instruction	Daily	Weekly
e)	Visual check for leaks on tanks and visible chemical lines		**2 days a week**
f)	Check the trace heating system		**2 days a week**
g)	Check external storage tank bund for rainwater and/or chemical. Empty as appropriate.		**X**
7	**Tertiary Treatment**		
7.1	**Low Head Sand Filter**	Daily	Weekly
a)	Check smooth movement of bridge, unusual sounds and vibrations, and abnormal flow patterns	**X**	
b)	Check water level in each filter, compare with other units and relate to flow rate, and last backwash	**X**	
c)	Check unit isn't in bypass	**X**	
d)	Check for evidence of chemical leaks	**X**	
e)	Check cleanliness of carriage & filter area	**X**	
f)	Check sodium hypochlorite level in the bridge tanks where fitted and fill from bulk tank	**X**	
g)	Check sodium hypochlorite bulk tank level	**X**	
h)	Check the amount of sand in the wash water	**X**	
i)	Check the colour of the backwash water	**X**	
j)	Check the correct amount of hypochlorite is being dosed	**X**	
k)	Check water level in each filter, compare with other units and relate to flow rate, and last backwash	**X**	
l)	Log backwash timer settings and head loss	**X**	
m)	Log flows and flow rate, where meters are fitted	**X**	
n)	Clean the level sensor head		**X**
o)	Log clarity of feed (compare with final effluent)	**X**	

ID	Instruction	Daily	Weekly
7.2	**Disc Filter**	Daily	Weekly
a)	Log backwash pressure	**X**	
b)	Check frequency of backwash is within correct range		**X**
c)	Check bypass is not working during normal operations	**X**	
d)	Check depth in and out of the drum for normal operation	**X**	
e)	Check drum is rotating in correct mode and sounds normal	**X**	
f)	Check all ancillaries are operating normally	**X**	
g)	Log flows and flow rate where meters are fitted	**X**	
h)	Sample and record turbidity on feed (compare with final effluent)	**X**	
i)	Inspect inside filter for large pieces of debris		**X**
j)	Check for accumulation of weed in backwash trough		**X**
k)	Check and clean backwash water strainer.		**X**
l)	Check for soundness of mesh panels by lifting inspection panels		**X**
m)	Check wash water pressure and nozzles for normal operation		**X**
8	**Raw Sludge Holding & Thickening**		
8.1	**Sludge Holding Tanks**	Daily	Weekly
a)	Check mixing regime is correct	**X**	
b)	Log levels in tank(s)	**X**	
c)	Decant liquors	**X**	

ID	Instruction	Daily	Weekly
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**	

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

ID	Instruction	Daily	Weekly
b)	Visually check auto lubrication systems (grease pot) are functioning correctly, take appropriate action.	**X**	
c)	Sample for % dry solids analysis and record (Monday, Wednesday, Friday)	**X**	
d)	Check spray bar nozzles to ensure they are clear and spraying correctly. Check spray bar wash water pressure	**X**	
e)	Clean probes in discharge hopper, hose down and carry out cleaning duties	**X**	
f)	Log polyelectrolyte used – each drum/bag change	**X**	
g)	Log sludge inlet flow meter, monitor throughput	**X**	
h)	Check & clean flocculator tanks		**X**
i)	Check appearance of mesh, adjust cleaning and cleaning pause intervals if necessary.	**X**	
j)	Clean dry solids monitors sensors		**X**
k)	Clean foot valves on washwater suction lines		**X**
l)	Clean mechanical filter on washwater booster set		**X**
m)	Clean washwater booster secondary screen in channel		**X**
n)	Jet/remove fat deposits from thickened sludge discharge pipework		**X**
o)	Log hours run		**X**
9	**Odour Control**	**Daily**	**Weekly**
	Tasks for all Odour Control Units		
a)	Check covers, hatches and doors are closed	**X**	
b)	Confirm duty fan running and standby fan availability	**X**	
c)	Check damper position to ensure they have not been tampered with	**X**	

ID	Instruction	Daily	Weekly
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**	
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**	

ID	Instruction	Daily	Weekly
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 6. Sludge Rounds

	Instruction	Daily	Weekly
1	**Liquid Sludge Import Facilities**	Daily	Weekly
a)	Check sludge logger device is fully operational	**X**	
b)	Check that the pattern of imports is in line with site requirements/agreement with tanker operators.	**X**	
c)	Check general area is clean and tidy	**X**	
d)	Check reception tank for rag/grit build up		**X**
2	**Sludge Screen**	Daily	Weekly
a)	Check sludge screen operation	**X**	
b)	Check screened sludge quality	**X**	
c)	Check / clean moisture sensor	**X**	
d)	Visually check unit and its associated equipment for the following: Safety & security with all panels locked & guards secure and in good condition. Excessive noise or vibration Overheating External damage, leaks, missing fixings	**X**	
e)	Visually check auto lubrication systems (grease pot) are functioning correctly, take appropriate action to replace them if needed. Inspect grease pots and fill them when level is below the standard. Use grease nipples to lubricate required parts of screen.	**X**	
f)	Carry out checks on cold weather operation systems before frost sets in	**X**	

	Instruction	Daily	Weekly
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**
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

	Instruction	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. 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**	
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**	

	Instruction	Daily	Weekly
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)	**X**	

	Instruction	Daily	Weekly
	Log inlet and outlet temperatures of each boiler Log inlet and outlet temperatures of sludge and water in heat exchangers		
f)	Log sludge feed volumes into each digester and establish the retention time (HACCP)	**X**	
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**	

	Instruction	Daily	Weekly
d)	Record number of day's storage	**X**	
8	**Biogas Handling, Storage, & Utilisation.**	Daily	Weekly
a)	Check all condensate traps manually and drain or top up if necessary. This check is required **twice daily** in prolonged periods of warm weather. Check automatic u-tubes visually, to ensure that there are no gas leaks or freezing Check automatic drain traps working correctly. Use manual drains if automatic drains not working, report defects	**X**	
b)	Check glycol pressure relief valve and ensure liquid level visible in sight glass	**X**	
c)	Check pressure/vacuum relief (whessoe) valves are not passing biogas. Listen for gas passing, note any unusual smell, visual check of valve.	**X**	
d)	Check for genuine operation of flare stack / waste gas burner, e.g. chp is at full power and there is excessive gas make	**X**	
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**	

	Instruction	Daily	Weekly
d)	Check & log hours run	**X**	
e)	Check & log kwh exported (where relevant)	**X**	
f)	Check & log kwh generated	**X**	
g)	Check & log kwh used on site	**X**	
h)	Check & log use of secondary fuel	**X**	
i)	Check & log gas used	**X**	
j)	Check & log heat liberated from engine, heat dumped, heat liberated from boilers	**X**	
k)	Check & log engine temperatures and pressures, by exception	**X**	
l)	Check & log gas stream for methane composition		**X**
m)	Check automatic u-tubes to ensure that there are no gas leaks or freezing		**X**
n)	Check pressure/vacuum relief (whessoe) valves are not passing biogas. Listen for gas passing, note any unusual smell, visual check of valve.	**X**	
10	**Liquor Treatment**	Daily	Weekly
a)	Check return liquors and return rate	**X**	
11	**Chemical Dosing**	Daily	Weekly
a)	Check that chemical is discharging, not just dosing pump running (any nozzles blocked?)	**X**	
b)	Check chemical storage tank level - reorder as required	**X**	
c)	Check for excessive vibration in the dosing pump	**X**	
d)	Check the level in the internal bund and empty as required	**X**	

	Instruction	Daily	Weekly
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**	

	Instruction	Daily	Weekly
k)	Log volume of cake produced	**X**	
l)	Make adjustments to get optimum throughput, product quality and poly dosing	**X**	
m)	Sample, analyse & record % dry solids on feed and cake (Monday, Wednesday, Friday)	**X**	
14	**Poly Make Up, Storage, & Dosing – Liquid**	Daily	Weekly
a)	Poly make up storage & dosing – liquid - check supply of polymer held in IBC; Top up, replace, order as appropriate	**X**	
b)	Liquid - check dosing pumps & settings	**X**	
c)	Liquid - check dilution water is available	**X**	
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**	

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

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

Appendix 7. Weekly OCU checklist

OCU Round – Slough STW **Date:**

Odour Control Unit Routine Checks. PLEASE MAKE A RECORD FOR EVERY CHECK

F - PFT Bio-trickling Filters OCU	Checked Ok?	Not Ok? (Make Comment)	Comments: Feedback to Performance Manager
Check that the fans are running			
Check that there is water draining from all the working units (3)			
Check that the hatches on the PFT's are closed secured			
Visually check that all the green covers and ducting are undamaged			
Check the wind sock – what is the odour down wind of the stacks?			

A - Digester Feed Tank OCU	Ok?	Not Ok? (Make Comment)	Comments
Check that fans are running			
Visually check that all the green covers and ducting are undamaged			
Is the differential pressure gauge reading high – record it & check			
Check the wind sock – what is the odour down wind of the stacks?			

E - Digested Sludge Buffer Tank OCU	Ok?	Not Ok? (Make Comment)	Comments
Is there water draining from the water tower cascade?			
Is the trace heating for the water supply operating?			
Are the fans running?			
Is the in line moisture "pre heater" working?			
Open the two drain valves to allow water out from the two filters			
Visually check that all the green covers and ducting are undamaged			
Check the wind sock – what is the odour down wind of the stacks?			

OCU Round – Slough STW **Date:**

Odour Control Unit Routine Checks. PLEASE MAKE A RECORD FOR EVERY CHECK

C - Centrate & Liquors Return Pumping Station OCU	Checked Ok?	Not Ok? (Make Comment)	Comments: Feedback to Performance Manager
Check that the fans are running			
Visually check that all the green covers and ducting are undamaged			
Check the wind sock – what is the odour down wind of the stacks?			

D - Inlet Works OCU	Ok?	Not Ok?	Comments
Is there water draining from the water tower cascade?			
Is the trace heating for the water supply operating?			
Are the chemical dosing pumps running?			
Are the chemical scrubber recirculating pumps running?			
Is there water draining from the chemical srubber tower?			
Is there adequate hypo and caustic in the storage tanks?			
Are the fans running?			
Is the in line moisture "pre heater" working?			
Open the two drain valves to allow water out from the two filters			
Visually check that all the green covers and ducting are undamaged			
Check the wind sock – what is the odour down wind from the stacks?			

B - Inlet Pumping Station Wet Well OCU (WASPS)	Ok?	Not Ok?	Comments
Check the fans are running			
Visually check that all the green covers and ducting are undamaged			
Check the wind sock – what is the odour down wind of the stacks?			

---- End of OMP----