A. DOCUMENT CONTROL

1.1. Document Control

Document Control Ref:	Version 2
Document Location:	Stantec SWW External SharePoint – Hayle
Document Custodian:	Antony Saunders (Stantec)
Review Period:	This OMP will be reviewed every year or as defined using a risk-based approach as detailed below.

1.2. Review Process

The Odour Management Plan shall be reviewed after any one of the following trigger points are reached:

- Operating practices changed substantially during the year
- Inclusion of new assets and redundancy of old assets, including capital works which have a material impact on odour risk

Plans will otherwise be reviewed annually from the date of issue, and an odour report shall be produced.

Version	Date	Revised By	Reviewed By	Amendment Details
1	15/09/2022	JP (Stantec)	PD (Stantec)	Version 1
2	12/12/2023	AS (Stantec)	PD (Stantec)	Minor updates, inclusion of OIP

1.3. Responsibilities

The Asset Management Wastewater Process Team is responsible for writing and reviewing the Odour Management Plans and ensuring that they remain up to date and relevant. They are also responsible for business reporting of the number of odour contacts received.

Wastewater Services (Operations) are responsible for managing the site in accordance with the requirements of the Odour Management Plan. They are also responsible for investigating the causes of odour related customer contacts.

Customer Services are responsible for receiving and recording contacts from customers regarding odour and passing to Operations for investigation.

B. CONTENTS

C. INTRODUCTION

This Odour Management Plan (OMP) for Hayle Waste Water Treatment Works (WWTW) has been developed by Stantec on behalf of South West Water (SWW). This OMP is a live working document that forms part of the operational management system of the site. The OMP demonstrates how odours shall be managed and controlled to prevent odour impacts from activities during normal operation and also during abnormal events.

The OMP has been developed to meet the Environment Agency's (EA) H4 Odour Management Guidance.

The OMP has been prepared in support of the permit variation application for Hayle WWTW to incorporate an IED installation activity into the existing waste activity permit.

The OMP provides sufficient detail to allow operators and maintenance staff to understand clearly the operational procedures for both normal and abnormal conditions. It is intended to be used as a reference document by operational staff on a day-to-day basis. The OMP includes the following:

- A description of the site and catchment, including sources of odour on the site, and location of sensitive receptors;
- A brief history of received complaints and measures taken to date;
- SWW Operation and Management (O and M) procedures for the site, including Good Housekeeping measures to minimise odour generation and release;
- The mitigation procedures which should be implemented when foreseeable situations that may compromise the ability to prevent and minimise odorous releases occur. These can include both breakdowns and external conditions such as extreme weather;
- An Action Procedure for complaints;
- An odour risk assessment identifying any odorous or potentially odorous areas of the works and immediate and longer-term actions required to eliminate odour complaints; and
- The management and operator training requirements and records with respect to odour.

1.1. South West Water Odour Management

In general, the purpose of the Odour Management Plan is to ensure that the site is managed to minimise the risk of odour nuisance to the local amenity as far as practicable. It shall detail operational and control measures appropriate for the management and control of odour on site.

Specifically, waste handling at Hayle Sewage Treatment Works (STW) and Waste Water Treatment Works (WWTW) operates under the Environmental Permitting (England & Wales) Regulations 2016 and is regulated by the Environment Agency under permit EPR/NP3696HH.

This document is therefore an essential part of the Management System for the site and all relevant staff shall be made aware of it as part of their training in order to understand the implications it has on their day-to-day work.

This procedure should be used in conjunction with the ***QWW-401 - Odour Management Plan - Standard Arrangements*** procedure, which details the company's standard Odour Control arrangements.

1.2. Environmental Permitting

The environmental waste codes (EWC) for the installation are provided in Table 1 below.

Table 1: EWC Codes

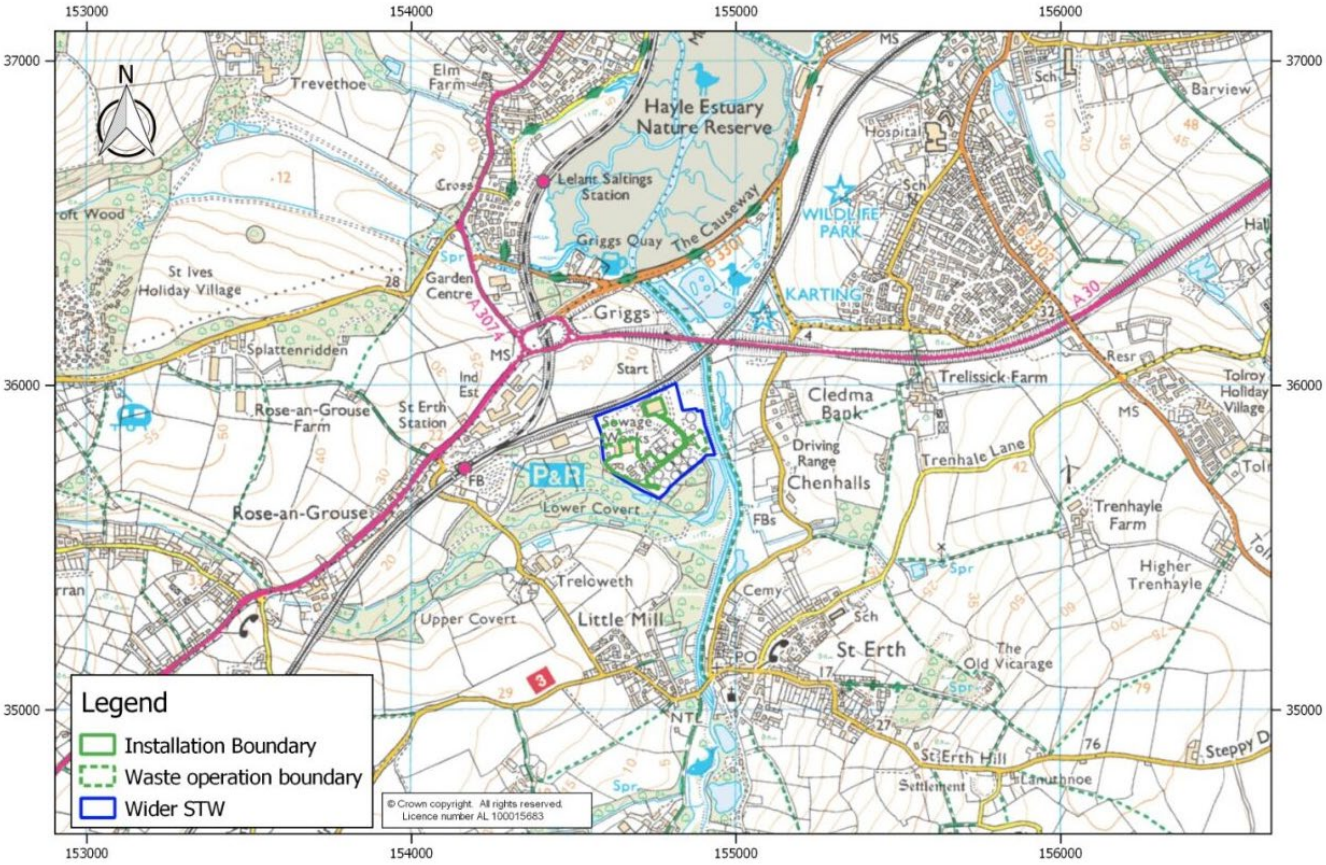
Waste Code	Description
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF SITE WASTE WATER TREATMENT PLANTS AND PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION/INDUSTRIAL USE
19 02	Physio/chemical treatments of waste (including de-chromatation, de-cyanidation, neutralization)
19 02 06	sludges from physio/chemical treatment other than those mentioned in 19 02 05 (sewage sludge only)
19 06	Anaerobic treatment of waste
19 06 06	digestate from anaerobic treatment of animal and vegetable waste (sewage sludge only)
19 08	wastes from waste water treatment plants not otherwise specified
19 08 05	sludges from treatment of urban waste water (sewage sludge only)
19 12	Mechanical treatment of waste not otherwise specified
19 12 12	wastes from mechanical treatment of wastes other than those mentioned in 19 12 11 (sewage sludge only)
20	MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS
20 03	other municipal wastes
20 03 04	septic tank sludge
20 03 06	waste from sewage cleaning (sewage sludge only)

D. SITE INFORMATION

2.1. Site Location

Hayle Sewage Treatment Works (STW) is located at NGR: 154679, 035721. The STW covers an area of 7 ha which includes the assets that comprise the Waste Water Treatment Works (WWTW) and where the wastewater is treated. The WWTW assets ("Installation boundary") occupies approximately 1.67 ha of this. Figure 1 shows the regional setting of the Site. Both the WWTW and STW are operated by SWW (the Operator).

Figure 1: Hayle STW Site Location



2.2. Site Receptors

The Site is located in a mixed urban / rural area close to the residential areas of St Erth c. 1 km to the south-east and Hayle c. 2.5 km to the north-east. A railway line is situated close to the northern boundary of the Site with St Erth station located approximately 400 m to the west; the river Hayle lies adjacent to the eastern boundary and a woodland plantation (Lower Covert) is located to the south / west of the Site.

The A30 road lies 200 m north of the Site at its closest approach. The river Hayle is situated immediately to the east of the Site where it flows northwards into the Hayle Estuary c. 400 m to the north of the Site which then discharges into the Celtic Sea c. 3 km further to the north.

A summary of the areas of interest and receptors local to the site are highlighted in Figure 2, complete with receptor description and sensitivity in Table 2.

Figure 2: Location of Sensitive Receptors (Residential)

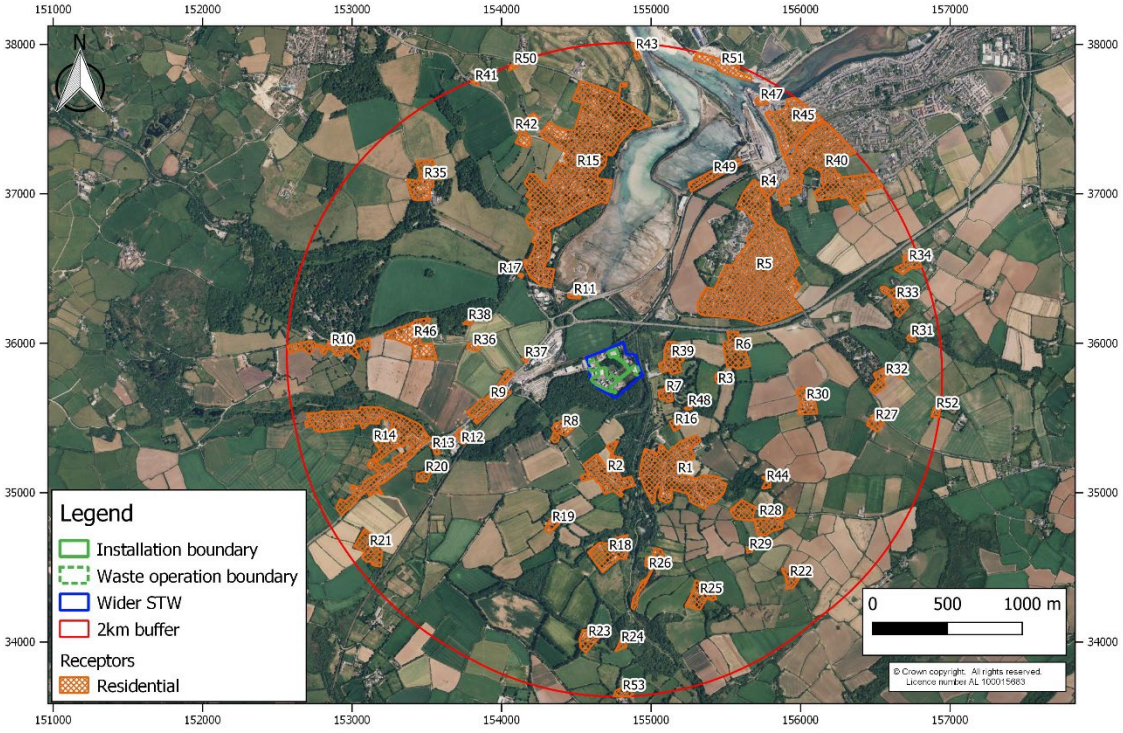


Figure 3: Location of Sensitive Receptors (Commercial / Industrial)

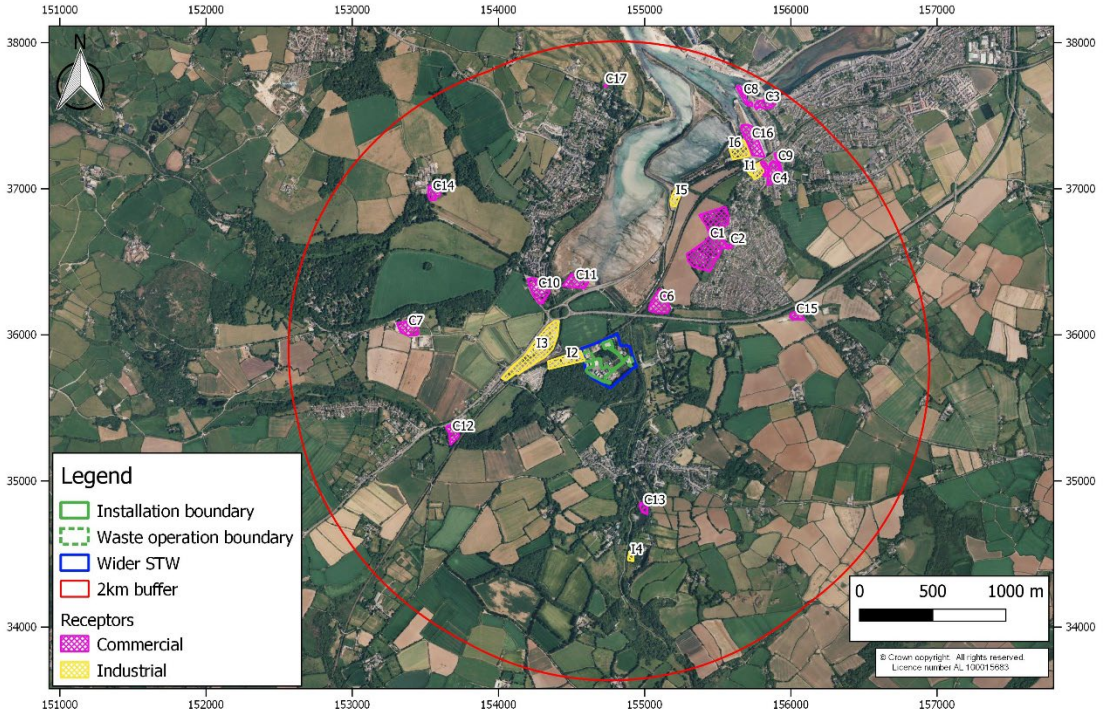


Figure 4: Location of Sensitive Receptors (Educational / Healthcare / Leisure)

Table 2: Hayle WWTW Local Receptors

Receptor Name	Receptor Map Reference	Distance from Site (m)	Receptor Type	Receptor Sensitivity
Residential properties to south-east	R1	430	Residential	High
Residential properties to south	R2	330	Residential	High
Residential properties to east	R3	575	Residential	High
Residential properties to north-east	R4	1,445	Residential	High
Residential properties to north-east	R5	590	Residential	High
Residential properties to east	R6	655	Residential	High
Residential properties to south-east	R7	288	Residential	High
Residential properties to south-west	R8	260	Residential	High
Residential properties to west	R9	520	Residential	High
Residential properties to west	R10	1,510	Residential	High
Residential properties to north	R11	405	Residential	High
Residential properties to south-west	R12	900	Residential	High
Residential properties to south-west	R13	1,120	Residential	High
Residential properties to south-west	R14	1,145	Residential	High
Residential properties to north	R15	580	Residential	High
Residential properties to south-east	R16	420	Residential	High
Residential properties to north-west	R17	765	Residential	High
Residential properties to south	R18	965	Residential	High
Residential properties to south-west	R19	920	Residential	High
Residential properties to south-west	R20	1,195	Residential	High
Residential properties to south-west	R21	1,760	Residential	High
Residential properties to south-east	R22	1,630	Residential	High
Residential properties to south	R23	1,580	Residential	High
Residential properties to south	R24	1,640	Residential	High
Residential properties to south	R25	1,380	Residential	High
Residential properties to south	R26	1,085	Residential	High
Residential properties to east	R27	1,625	Residential	High
Residential properties to south-east	R28	1,095	Residential	High
Residential properties to south-east	R29	1,380	Residential	High
Residential properties to east	R30	1,118	Residential	High
Residential properties to east	R31	1,860	Residential	High
Residential properties to east	R32	1,605	Residential	High
Residential properties to east	R33	1,780	Residential	High
Residential properties to north-east	R34	1,900	Residential	High
Residential properties to north-west	R35	1,565	Residential	High
Residential properties to west	R36	765	Residential	High
Residential properties to west	R37	440	Residential	High
Residential properties to west	R38	875	Residential	High
Residential properties to east	R39	200	Residential	High
Residential properties to north-east	R40	1,470	Residential	High
Residential properties to north	R41	1,995	Residential	High
Residential properties to north	R42	1,470	Residential	High
Residential properties to north	R43	1,950	Residential	High
Residential properties to south-east	R44	1,135	Residential	High
Residential properties to north-east	R45	1,705	Residential	High
Residential properties to west	R46	1,045	Residential	High
Residential properties to north-east	R47	1,900	Residential	High
Residential properties to south-east	R48	475	Residential	High

Receptor Name	Receptor Map Reference	Distance from Site (m)	Receptor Type	Receptor Sensitivity
Residential properties to north-east	R49	1,170	Residential	High
Commercial businesses to north-east	C1	755	Commercial	Medium
Commercial businesses to north-east	C2	1,035	Commercial	Medium
Commercial businesses to north-east	C3	1,870	Commercial	Medium
Commercial businesses to north-east	C4	1,510	Commercial	Medium
Commercial businesses to north-east	C5	1,545	Commercial	Medium
Commercial businesses to north-east	C6	335	Commercial	Medium
Commercial businesses to west	C7	1,170	Commercial	Medium
Commercial businesses to north-east	C8	1,875	Commercial	Medium
Commercial businesses to north-east	C9	1,630	Commercial	Medium
Commercial businesses to north-west	C10	495	Commercial	Medium
Commercial businesses to north	C11	390	Commercial	Medium
Commercial businesses to south-west	C12	975	Commercial	Medium
Commercial businesses to south	C13	850	Commercial	Medium
Commercial businesses to north-west	C14	1500	Commercial	Medium
Commercial businesses to east	C15	1,225	Commercial	Medium
Commercial businesses to north-east	C16	1,590	Commercial	Medium
Commercial businesses to north	C17	1,730	Commercial	Medium
Industry to north-east	I1	1,470	Industrial	Low
Industry to west	I2	50	Industrial	Low
Industry to west	I3	280	Industrial	Low
Industry to south	I4	1,165	Industrial	Low
Industry to north-east	I5	1,010	Industrial	Low
Industry to north-east	I6	1,490	Industrial	Low
Schools to the south-east	E1	635	Education	Medium
Schools to the north-east	E2	975	Education	Medium
Schools to the north-east	E3	1,515	Education	Medium
Leisure/recreation to the east	L1	1,350	Leisure/recreation	Medium
Leisure/recreation to the west	L2	1,550	Leisure/recreation	Medium
Leisure/recreation to the north	L3	1,840	Leisure/recreation	Medium
Leisure/recreation to the west	L4	1,875	Leisure/recreation	Medium
Leisure/recreation to the north-east	L5	1,450	Leisure/recreation	Medium
Leisure/recreation to the north-west	L6	795	Leisure/recreation	Medium
Healthcare to the north-east	H1	1,060	Healthcare	Medium

2.3. Meteorological Conditions

In the UK, the prevailing wind directions are commonly from the west and south-west. The wind direction and speed will impact the dispersion of odour emissions from site. Wind speed and direction are measured on site and monitored on site SCADA.

Camborne meteorological station is 11km to the north-east of the site. The meteorological data for Camborne is adopted for odour dispersion modelling for the site or any odour risk assessments that

incorporates metrological conditions whereby wind direction and frequency are used to determine the ”pathway effectiveness” from source to receptor. The wind rose plot for Camborne is included in Figure 5.

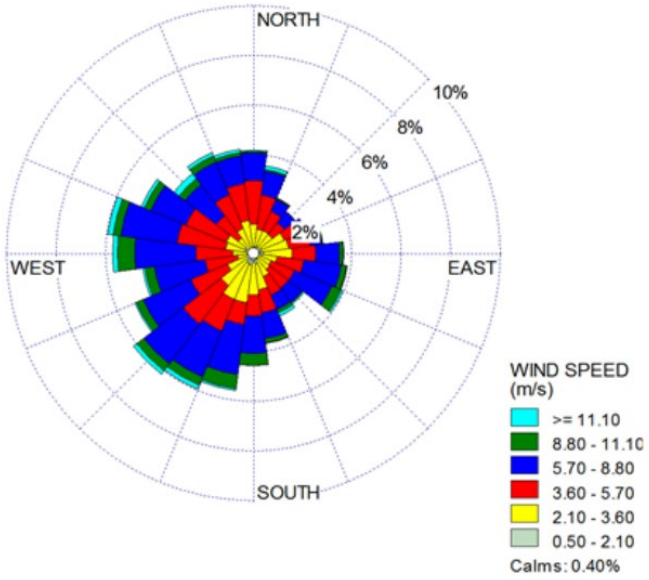


Figure 5: Camborne Wind Rose Plot

2.4. Process Description

Imported sludges are received from SWW sites across the local area on a pre-planned basis.

Sludge from Hayle STW arrives at Hayle WWTW at the sludge balancing tank. Commercial tankers containing liquid waste are discharged at the inlet works. The sludge from the commercial tankers settles with the influent sewage in the PST. Sludge from Hayle STW arrives at Hayle WWTW at the Sludge Balancing Tank.

Interworks sludge (from satellite sites) is imported to Hayle WWTW via the CDE screen and then passed to the screened sludge tank. Alternatively, interworks sludge can be imported to Hayle via the chopper pumps and stored in the imported sludge balancing tank before being pumped via the screen transfer sump to the screened sludge tank. However, this option is currently not used for interworks sludge imports.

Sludge from the balancing tank, is pumped via a macerator pump to the thickener feed pumps and then to two drum thickeners. The drum thickeners receive poly dosing from the powder poly dosing system. The return liquor from the thickeners is collected in the thickener return PS (H) before being pumped to the return liquor balancing tank. After the drum thickeners the sludge is pumped by the thickened sludge pumps to the thickened sludge tank.

The thickened sludge from the thickened sludge tank is fed to the two primary digesters by the digester feed PS. The two primary digesters are equipped with a recirculation line with digester recirculation pumps.

Digested sludge from the primary digesters gravitates to two secondary digesters. From the two secondary digesters, the sludge is pumped by the centrifuge PS to the centrifuge. The centrifuge receives polymer from a polymer dosing system. The return liquor from the centrifuge is discharged to the centrifuge return liquor pumping station and pumped back to the return liquor balancing tank.

The flow from the return liquor balancing tank is discharged via to the old inlet works to the PST influent.

The dewatered cake is discharged to the centrifuge cake storage area before being transported by trailer to the cake barn. In the cake barn the cake is stored for 21 days before being exported off site.

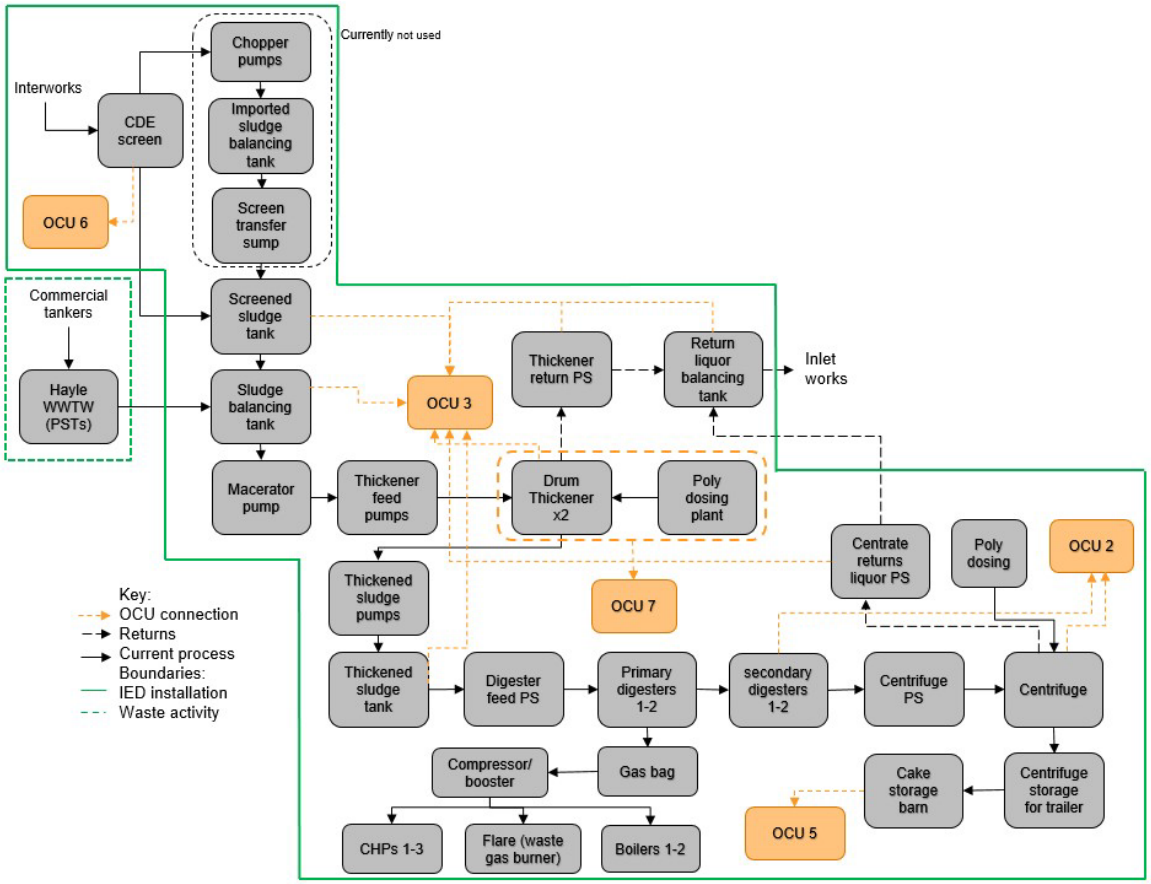
Gas produced by the primary digesters are stored in a gas bag before being passed via the booster to the three CHPs, the two boilers or the flare.

The CHP process is designed to optimise the use of biogas and minimise the potential for releases to air. When biogas is available it is preferentially used to power the CHP engines and provide energy to be used by the site.

Under normal operating conditions, biogas is burned in either the CHP engines or boilers. When biogas volumes are in excess of operational requirements and cannot be reduced sufficiently by operation of the engine and boilers, it is abated by the flare stack.

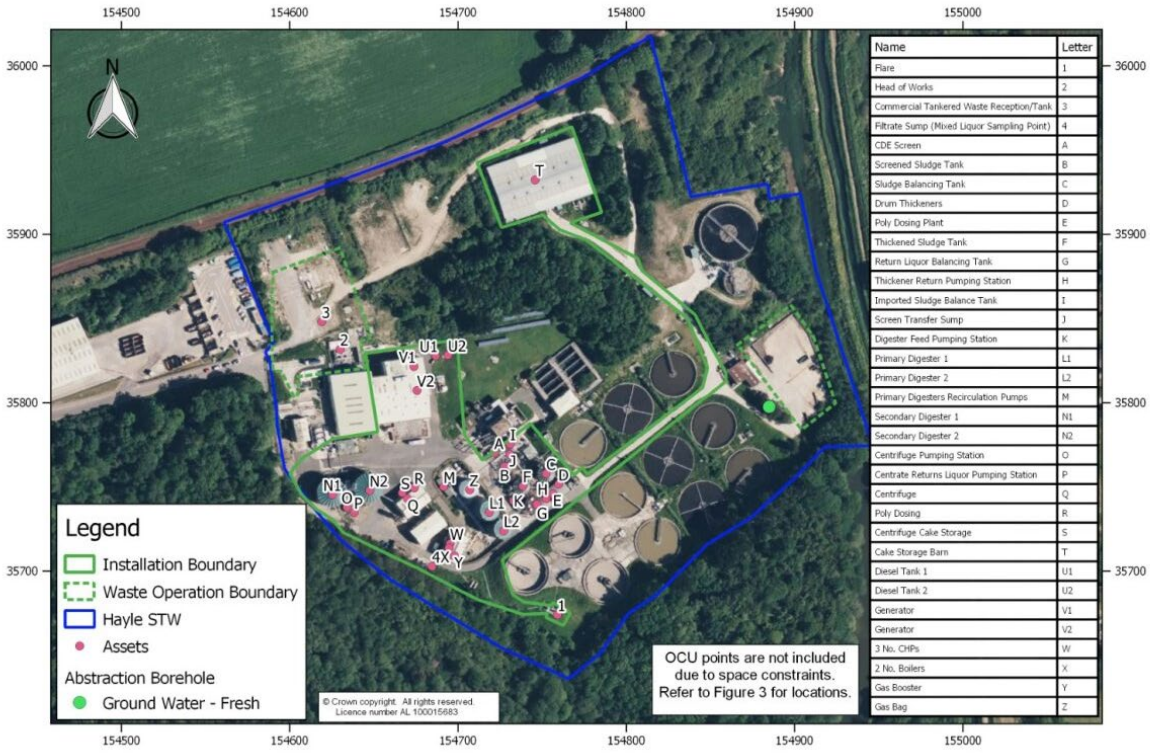
A proprietary oxidising chemical (e.g. TT-Ox or similar) is dosed at various points in the process. The chemical typically contains stabilised chlorine dioxide which oxidises dissolved sulphide compounds in the liquid phase, effectively preventing release to the atmosphere. Dosing at the STW inlet and drum thickener feed is controlled by feedback from a hydrogen sulphide monitor. Dosing into the sludge screen feed is controlled by the screen feed pump operation to ensure rapid dosing response during tanker off-loading operations.

Figure 6: Hayle WWTW Process Flow



Note – Chopper pumps, imported sludge balancing tank and screen transfer sump not in use.

Figure 7: Hayle WWTW Source Location



2.5. Process Odour Sources

Table 2 displays the site sludge odour sources, with an inventory of material, quality, and storage capacity. The odour potential of a source can be broken down into three key considerations:

- How inherently odorous the compounds present are.
- The unpleasantness of the odour.
- The magnitude of the odour release.

When trying to determine the offensiveness of an odour source, site-specific odour sampling should be considered in the first instance. In the absence of source odour emission data, the assessment criteria will consider the Environment Agency's Horizontal Guidance Note (H4). H4 looks to categorise how offensive odours are with sources/processes/activities that are considered 'most offensive' odours include septic effluent or sludge and biological landfill odours. All raw sludge treatment processes would be considered to have a high odour offensiveness unless source-specific odour sampling is undertaken demonstrating a low level of odorous compounds. Processes containing the below material are considered to represent a high odour offensiveness:

- Indigenous sludge
- Sludge imports (liquid and solid)

- Sludge liquors

Processes containing the below material are considered to represent a medium odour offensiveness:

- Rags and screenings
- Digested sludge
- Digested sludge liquors
- Digested sludge cake (stored)

No processes on an WWTW are considered to store material that represents a low odour offensiveness unless supported by source-specific odour sampling.

The unpleasantness of an odour can be used in defining the source odour offensiveness. This is typically achieved through source material hedonic tone assessments, however; these types of assessments are not typically available for a site without source-specific sampling.

The risk source odour potential critical risk scoring for odour offensiveness and mitigation / control adopted is summarised in Table 3.

Table 3: Source Odour Potential Risk Scoring

Source	Risk Rating		
	Low	Medium	High
Odour Offensiveness	Compounds involved are only mildly offensive.	Compounds involved are moderately odorous.	Very odorous compounds (H_2S, Mercaptans) with low odour threshold.
Mitigation / Control	Unpleasantness - process classed in H4 as "Less Offensive".	Unpleasantness - process classed in H4 as "Moderately Offensive" or where odours have neutral or slightly unpleasant hedonic tone.	Unpleasant odour - "Most Offensive".

Table 4 displays the site sludge odour sources, with an inventory of material, quality, and storage capacity and goes on to explore the odour offensiveness and emission risk. The location of each odour source (asset ID) is show on Figure 5 above.

Table 4: Hayle WWTW Sludge Inventory of Odorous Material

Source	Asset ID	Source Type	Maximum Volume of Stored Sludge (m^3)	Average Retention Time	Frequency of Operation	Odour Description	Hedonic Tone	Odour Offensiveness	Mitigation Measures	Emission Release Type	Emission Risk
Sludge Screens (CDE)	A	Imports	N/A	20 l/s	Continuous	Septic sludge, sulphide	Unpleasant	High	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low
Sludge Screens Skip	A	Screenings	N/A	N/A	Continuous	Septic sludge, sulphide	Unpleasant	Medium	Open to atmosphere	Diffuse	Medium
Screened Sludge Tank	B	Screenings	320 m^3		Continuous	Septic sludge, sulphide	Unpleasant	High	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low
Sludge Balancing Tank	C	Indigenous, Imports	610 m^3		Continuous	Septic sludge, sulphide	Unpleasant	High	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low

Source	Asset ID	Source Type	Maximum Volume of Stored Sludge (m^3)	Average Retention Time	Frequency of Operation	Odour Description	Hedonic Tone	Odour Offensiveness	Mitigation Measures	Emission Release Type	Emission Risk
Drum Thickeners	D	Indigenous, Imports	N/A	20 m^3/hr	Continuous	Septic sludge, sulphide	Unpleasant	High	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low
Thickener Return Liquor PS	H		N/A		Continuous	Septic sludge, sulphide	Unpleasant	High	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low
Imported Sludge Balance Tank	I	Imports	160 m^3		Continuous	Septic sludge, sulphide	Unpleasant	High	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low
Screen Transfer Sump	J		20m^3		Continuous	Septic sludge, sulphide	Unpleasant	High	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low

Source	Asset ID	Source Type	Maximum Volume of Stored Sludge (m^3)	Average Retention Time	Frequency of Operation	Odour Description	Hedonic Tone	Odour Offensiveness	Mitigation Measures	Emission Release Type	Emission Risk
Thickened Sludge Tank		Indigenous, Imports	600 m^3		Continuous	Septic sludge, sulphide	Unpleasant	High	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low
Digester Feed PS	K		N/A		Continuous	Septic sludge, sulphide	Unpleasant	High	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low
Primary Digesters	L1, L2	Indigenous, Imports	3,875 m^3 (1,937 m^3 per digester)		Continuous	Biogas, Methane/ sulphide	Unpleasant	High	Covered and extracted to biogas storage Full containment of biogas is a critical safety consideration	Abnormal - fugitive only as biogas is collected for use on site.	Low

Source	Asset ID	Source Type	Maximum Volume of Stored Sludge (m^3)	Average Retention Time	Frequency of Operation	Odour Description	Hedonic Tone	Odour Offensiveness	Mitigation Measures	Emission Release Type	Emission Risk
Biogas Relief Valves	L1, L2, Z		N/A		Continuous	Biogas, Methane/ sulphide	Unpleasant	High	Critical process safety requirement. Operates only as required under abnormal process conditions	Point	Low
Biogas Holder	Z	Biogas			Continuous	Biogas, Methane/ sulphide	Unpleasant	High	Enclosed vessel. Full containment of biogas is a critical safety consideration	Abnormal - fugitive only as biogas is collected for use on site.	Low
Flare	1	Combusted biogas	N/A	N/A	Emergency Operation	Combustion	Acceptable	Low	Biogas is combusted	Point	Low
Secondary Digesters	N1, N2	Digested	3,400 m^3 (1,700 m^3 per digester)		Continuous	Digested sludge / Earthy	Moderately Unpleasant	Medium	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low

Source	Asset ID	Source Type	Maximum Volume of Stored Sludge (m^3)	Average Retention Time	Frequency of Operation	Odour Description	Hedonic Tone	Odour Offensiveness	Mitigation Measures	Emission Release Type	Emission Risk
Centrifuge PS	O		N/A		Continuous	Digested sludge / Earthy	Moderately Unpleasant	Medium	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low
Dewatering Centrifuge	Q	Digested	N/A	40 m^3/hr	Continuous	Digested sludge / Earthy	Moderately Unpleasant	Medium	Covered and within a building	Diffuse	Medium
Centrifuge Return Liquor PS	P		N/A		Continuous	Digested sludge / Earthy	Moderately Unpleasant	Medium	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low
Return Liquor Balancing Tank	G		150 m^3		Continuous	Digested sludge / Earthy	Unpleasant	High	Covered and extracted to OCU	Abnormal - fugitive only as off-gases ducted to OCU in normal operation	Low
Cake Barn	T	Digested	<1000 m^3		Continuous	Digested sludge / Earthy	Moderately Unpleasant	Medium	Partially covered within a barn	Diffuse	Medium

2.6. Odour Control Units

Peacemakers are a form of dry chemical scrubber. These are package units consisting of two stages. The first stage consists of pellets impregnated with stabilised chlorine dioxide which oxidise hydrogen sulphide, mercaptans and other odorous compounds. The second polishing stage serves to remove ammonia and other compounds not oxidised by chlorine dioxide.

There are 5 odour control units on site that treat odorous emissions from the WWTW. The odour control units are summarised as:

- OCU 2 Serving Fine screens, grit plant, secondary digesters and centrifuge (shared between the STW and the WWTW)
- OCU 3 is a 2-stage biofilter and Peace Maker polishing filter that treats odorous air from the sludge treatment area,
- OCU 5 is a single stage Peace Maker polishing unit that treats odorous air from the sludge thickening building,
- OCU 6 is a single stage Peace Maker polishing unit that treats odorous air from the sludge screen (CDE).
- OCU 7 is a single stage activated carbon adsorption unit that treats odorous air from the sludge thickening building.

The OCUs were all designed and sized by specialist contractors. Any changes to the process areas which are served shall be checked and approved by odour and ventilation specialists to ensure that the OCUs remain fit for purpose.

Biofilters are an established odour control technology comprising a container filled with media, typically cockle shells or a pumice-based media such as bio rock. Odorous air is drawn through the media by the fans while the media surface is sprayed with water provided by irrigation pumps. The irrigated media provides the surface area and environmental conditions for bacteria to thrive which biologically treat the odorous compounds present in the air stream. Over time (typically 3 to 5 years for shell media) the media degrades. Media degradation is monitored by visual inspection and replacement is planned accordingly. The biofilters on site have access platforms and inspection hatches to enable weekly visual checks of the media condition and the irrigation system.

The key process performance parameters for the OCUs are highlighted in Table 5-9 below. OCU emissions monitoring is provided in Section 5.4 and OCU performance checklist is provided in Appendix 2:

Table 5: Hayle WWTW OCU 2 Performance Parameters

Parameter	Polishing Filter
Media Type	Cockle Shell
Media Volume (m^3)	100
Media Life (Yrs)	3 – 5
Design Inlet Parameters	
Airflow (m^3/hr)	
Hydrogen Sulphide (ppm)	0.5
Di-methyl Sulphide (ppm)	
Mercaptans (ppm)	
VOCs (ppm)	
Ammonia (ppm)	
Humidity (RH%)	Ambient
Gas Temperature (°C)	Ambient
Stack Outlet Performance	
Stack Height	
Stack Efflux Velocity (m/s)	
Odour Concentration (ou_E/m^3)	1,000
Measured Hydrogen Sulphide (ppm)	0.001

* Direct air samples were collected by lung method in accordance with BS EN 13725:2003
** Sampling methodology using Jerome Hydrogen Sulphide analyser

Table 6: Hayle WWTW OCU 3 Performance Parameters

Parameter	Biological Filter	Polishing Filter
Media Type	Lavarock pumice stone	Peace Maker P8000 (dry Triox media bottom layer & dry Diox media top layer)
Media Volume (m^3)	50	8.8
Media Life (Yrs)	3 – 5	5
Design Inlet Parameters		
Airflow (m^3/hr)	2,000	2,500
Hydrogen Sulphide	30 / 250 (average / peak)	
Di-methyl Sulphide (ppm)		
Mercaptans (ppm)		
VOCs (ppm)		
Ammonia (ppm)		
Humidity (RH%)	Ambient	
Gas Temperature (°C)	Ambient	
Stack Outlet Performance		
Stack Height	3	
Stack Efflux Velocity (m/s)	15	
Odour Concentration (ou_E/m^3)	1000	
Measured Hydrogen Sulphide (ppm)	0.51	

* Direct air samples were collected by lung method in accordance with BS EN 13725:2003
** Sampling methodology using Jerome Hydrogen Sulphide analyser

Table 7: Hayle WWTW OCU 5 Performance Parameters

Parameter	Polishing Filter
Media Type	Peace Maker P8000 (dry Triox media bottom layer & dry Diox media top layer)
Media Volume (m^3)	3.3
Media Life (Yrs)	5
Design Inlet Parameters	
Airflow (m^3/hr)	1,800 / 2,000
Hydrogen Sulphide	3 / 10 (average / peak)
Di-methyl Sulphide (ppm)	
Mercaptans (ppm)	
VOCs (ppm)	
Ammonia (ppm)	
Humidity (RH%)	Ambient
Gas Temperature (°C)	Ambient
Stack Outlet Performance	
Stack Height	3
Stack Efflux Velocity (m/s)	15
Odour Concentration (ou_E/m^3)	1,000
Measured Hydrogen Sulphide (ppm)	0.001

* Direct air samples were collected by lung method in accordance with BS EN 13725:2003
** Sampling methodology using Jerome Hydrogen Sulphide analyser

Table 8: Hayle WWTW OCU 6 Performance Parameters

Parameter	Polishing Filter
Media Type	Peace Maker P8000 (dry Triox media bottom layer & dry Diox media top layer)
Media Volume (m^3)	0.9
Media Life (Yrs)	5
Design Inlet Parameters	
Airflow (m^3/hr)	150 / 180
Hydrogen Sulphide	30 / 300 (average / peak)
Di-methyl Sulphide (ppm)	
Mercaptans (ppm)	
VOCs (ppm)	
Ammonia (ppm)	
Humidity (RH%)	Ambient
Gas Temperature (°C)	Ambient
Stack Outlet Performance	
Stack Height	3
Stack Efflux Velocity (m/s)	15
Odour Concentration (ou_E/m^3)	1,000
Measured Hydrogen Sulphide (ppm)	0.001

* Direct air samples were collected by lung method in accordance with BS EN 13725:2003
** Sampling methodology using Jerome Hydrogen Sulphide analyser

Table 9: Hayle WWTW OCU 7 Performance Parameters

Parameter	Polishing Filter
Media Type	Activated Carbon
Media Volume (m^3)	
Media Life (Yrs)	
Design Inlet Parameters	
Airflow (m^3/hr)	
Hydrogen Sulphide	
Di-methyl Sulphide (ppm)	
Mercaptans (ppm)	
VOCs (ppm)	
Ammonia (ppm)	
Humidity (RH%)	Ambient
Gas Temperature (°C)	Ambient
Stack Outlet Performance	
Stack Height	
Stack Efflux Velocity (m/s)	
Odour Concentration (ou_E/m^3)	1,000
Measured Hydrogen Sulphide (ppm)	

E. ODOUR CRITICAL PLANT

3.1. Odour Critical Sources

Management of releases includes reducing turbulence, containment and abatement. Where odorous gasses are finally released, design of the extraction system can influence dilution and dispersion of odours before there is an impact on people. Potential onsite odour releases associated with Hayle WWTW are given in Table 10 below.

Table 10: Hayle WWTW Odour Critical Sources

Asset	Asset ID	Potential Odour Source	Odour Control Measure	Odour Risk	Mitigation Trigger	Mitigation Measures	Timescale	Responsible Person
General Covered Sludge Tanks		Liquid Sludge	Tank covered and odour controlled. Inspection hatches kept closed. Sludge is mixed and regular throughput is maintained	Unlikely given control measures in place	Inspection hatch damaged / unable to close.	Repair / replace tank inspection hatch. Cover opening with tarpaulin	Same day as damage observed	Site Operator
					Tank cover damaged with section missing / open to atmosphere.	Repair / replace tank cover. Cover opening with tarpaulin	Same day as damage observed	Site Operator
					Tank cover collapse.	Arrange removal of tank cover to prevent damage to other assets. Dose sludge with odour control chemical. Increase sniff testing to daily	Within 5 working days of incident	Site Operator

Asset	Asset ID	Potential Odour Source	Odour Control Measure	Odour Risk	Mitigation Trigger	Mitigation Measures	Timescale	Responsible Person
Sludge Import Tank		Liquid sludge	Tank covered and odour controlled. Inspection hatches kept closed. Sludge is mixed and regular throughput is maintained	Unlikely given control measures in place	Failure of OCU extraction fans & increase in complaint frequency / odour sniff test identifies sludge odours off-site	Dose sludge with odour control chemical	Within 5 working days of incident	Site Operator
Sludge Screens (CDE)	A	Liquid sludge	Tank covered and odour controlled. Inspection hatches kept closed. Regular throughput is maintained	Unlikely given control measures in place	Screenings spill local to skip. Increase in complaint frequency / odour sniff test identifies sludge screenings off-site.	Standby screen to be in service. Investigate cause of limited containment / extraction. Consider dosing sludge with odour control chemical Early removal / replacement of skips	Within 5 working days of incident	Site Operator

Asset	Asset ID	Potential Odour Source	Odour Control Measure	Odour Risk	Mitigation Trigger	Mitigation Measures	Timescale	Responsible Person
Screened Sludge Tank	B	Liquid sludge	Tank covered and odour controlled. Inspection hatches kept closed. Sludge is mixed and regular throughput is maintained	Unlikely given control measures in place	Failure of OCU extraction fans & increase in complaint frequency / odour sniff test identifies sludge odours off-site	Dose sludge with odour control chemical	Within 5 working days of incident	Site Operator
Sludge Balancing Tank	C	Liquid sludge	Tank covered and odour controlled. Inspection hatches kept closed. Sludge is mixed and regular throughput is maintained	Unlikely given control measures in place	Failure of OCU extraction fans & increase in complaint frequency / odour sniff test identifies sludge odours off-site	Dose sludge with odour control chemical	Within 5 working days of incident	Site Operator
Drum Thickener	D	Liquid sludge	Thickener covered and odour controlled. Inspection hatches kept closed. Regular throughput is maintained	Unlikely given control measures in place	Failure of OCU extraction fans & increase in complaint frequency / odour sniff test identifies sludge odours off-site.	Standby thickener to be in service. Investigate cause of limited containment / extraction. Dose sludge with odour control chemical	Within 5 working days of incident	Site Operator

Asset	Asset ID	Potential Odour Source	Odour Control Measure	Odour Risk	Mitigation Trigger	Mitigation Measures	Timescale	Responsible Person
Thickener Return Liquor PS	H	Liquid sludge liquors	PS covered and odour controlled. Inspection hatches kept closed. Regular throughput is maintained	Unlikely given control measures in place	Failure of OCU extraction fans & increase in complaint frequency / odour sniff test identifies sludge odours off-site	Dose sludge with odour control chemical	Within 5 working days of incident	Site Operator
Imported Sludge Balance Tank	II	Liquid sludge imports	Tank covered and odour controlled. Inspection hatches kept closed. Sludge is mixed and regular throughput is maintained	Unlikely given control measures in place	Failure of OCU extraction fans & increase in complaint frequency / odour sniff test identifies sludge odours off-site	Dose sludge with odour control chemical	Within 5 working days of incident	Site Operator
Thickened Sludge Tank		Liquid sludge	Tank covered and odour controlled. Inspection hatches kept closed. Sludge is mixed and regular throughput is maintained	Unlikely given control measures in place	Failure of OCU extraction fans & increase in complaint frequency / odour sniff test identifies sludge odours off-site	Dose sludge with odour control chemical	Within 5 working days of incident	Site Operator

Asset	Asset ID	Potential Odour Source	Odour Control Measure	Odour Risk	Mitigation Trigger	Mitigation Measures	Timescale	Responsible Person
Digester Feed PS	K	Liquid sludge	PS covered and odour controlled. Inspection hatches kept closed. Regular throughput is maintained	Unlikely given control measures in place	Failure of OCU extraction fans & increase in complaint frequency / odour sniff test identifies sludge odours off-site	Dose sludge with odour control chemical	Within 5 working days of incident	Site Operator
Primary Digesters	L1, L2	Liquid sludge / biogas	Tank is covered and biogas extracted. Risk assessment and odour plan in place before cleaning of any tank.	Unlikely given control measures in place	Loss of digester performance (see Table 16 for monitor parameters)	Investigate digester performance and schedule reactive maintenance.	Same day as incident	Site Operator
Biogas Relief Valves	L1, L2, Z	Biogas	Planned maintenance on equipment. Monitoring of digester pressures. Flare available to burn excess gas.	Unlikely given the control measures in place. Critical safety system.	Prolonged / frequent use of safety valve.	Failures are investigated and reactive maintenance undertaken.	Same day as incident	Site Operator

Asset	Asset ID	Potential Odour Source	Odour Control Measure	Odour Risk	Mitigation Trigger	Mitigation Measures	Timescale	Responsible Person
Biogas Holder	Z	Biogas	Planned maintenance on equipment. Monitoring of digester pressures. Flare available to burn excess gas.	Unlikely given the control measures in place. Critical safety system.	Prolonged / frequent use of safety valves.	Failures are investigated and reactive maintenance undertaken.	Same day as incident	Site Operator
Flare	1	Biogas	Planned maintenance on equipment.	Unlikely given the control measures in place. Critical safety system.	Prolonged / frequent use of flare.	Failures are investigated and reactive	Same day as incident	Site Operator
OCU Stack (mechanical extraction)		Liquid sludge	Duty / Standby extraction fan to be available. Prevent increase of fugitive emissions risk from covered processes.	Unlikely given control measures in place	Standby Fan Failure	Standby extraction fan to be in service. Investigate cause of limited extraction.	Support from OCU supplier to be arranged next availability	Site Operator
OCU Stack (treatability)		Liquid sludge	2-stage process to prevent early exhaustion of carbon media. OCU performance is monitored.	Unlikely given control measures in place emissions from OCU outlet	0.5 ppm Hydrogen Sulphide at outlet	Performance monitoring of OCU. Investigate cause of reduced performance	Support from OCU supplier to be arranged next availability	Site Operator

Asset	Asset ID	Potential Odour Source	Odour Control Measure	Odour Risk	Mitigation Trigger	Mitigation Measures	Timescale	Responsible Person
Secondary Digesters	N1, N2	Liquid digested sludge	Risk assessment and odour plan in place before cleaning of any tank.	Reduced risk due to lower odour potential from digested sludge		Review the digester performance		Site Operator
Centrifuge PS	O	Liquid digested sludge	PS covered and odour controlled. Inspection hatches kept closed. Regular throughput is maintained	Unlikely given control measures in place	Failure of OCU extraction fans & increase in complaint frequency / odour sniff test identifies sludge odours off-site	Dose sludge with odour control chemical	Within 5 working days of incident	Site Operator
Dewatering Centrifuge	Q	Sludge cake	Centrifuges are contained asset	Unlikely given control measures in place	Increase in complaint frequency / odour sniff test identifies sludge cake storage odours off-site.	Check digester performance.	Same week as incident	Site Operator
Centrifuge Return Liquor PS	P	Digested sludge liquors	Odour management techniques in use rather than specific containment measures	Unlikely given size of source and location	Increase in complaint frequency / odour sniff test identifies digested liquor odours off-site.	Investigate centrifuge performance and schedule reactive maintenance	Same day as incident	Site Operator
						Dose sludge with odour control chemical	Within 5 working days of incident	Site Operator

Asset	Asset ID	Potential Odour Source	Odour Control Measure	Odour Risk	Mitigation Trigger	Mitigation Measures	Timescale	Responsible Person
Return Liquor Balancing Tank	G	Digested sludge liquors	Tank covered and odour controlled. Inspection hatches kept closed. Sludge is mixed and regular throughput is maintained	Unlikely given control measures in place	Failure of OCU extraction fans & increase in complaint frequency / odour sniff test identifies sludge odours off-site	Dose sludge with odour control chemical	Within 5 working days of incident	Site Operator
Cake Barn	T	Sludge cake	Cake barn is partially contained	Reduced risk due to lower odour potential from digested sludge cake	Increase in complaint frequency / odour sniff test identifies sludge cake storage odours off-site.	Restrict process and reduce storage volumes.	Same week as incident	Site Operator
						Ensure cake is removed from site for disposal at the earliest opportunity.	Arrange for compliant cake to be removed from site same week	Site Operator
						Root cause analysis and resolution.	Same day as incident	Site Operator

F. ODOUR IMPACT

4.1. Odour Dispersion Model

Odour dispersion modelling assessment has been undertaken for Hayle WwTW, including the WWTW, in September 2017. Odour monitoring was undertaken as part of the assessment with samples from open sources and stack emissions. The assessment predicted that it would be unlikely that modelled WwTW emissions would be sufficient for an established odour annoyance to occur at any receptor location.

Odour dispersion modelling including site specific olfactometric surveys shall be revised in the event of increased frequency of odour complaints or operational changes with a perceived increase in odour impact risk.

4.2. Odour Survey

An odour survey for the site has not been undertaken to assess the odour potential of the site. Any odour sampling shall be undertaken in accordance with EN standards (e.g., dynamic olfactometry according to EN 13725 in order to determine the odour concentration or EN 16841-1 or -2 in order to determine the odour exposure).

4.3. BAT Conclusions

As part of the IED permit application there are several BAT conclusions that are specifically associated with emissions to air. Whilst the outcome of this odour risk assessment is not directly influenced by the site's performance against the BAT conclusions, consideration is required if the site is not adopting specific BAT measures and is at risk of adverse odour effects on surround receptors.

4.3.1. BAT Conclusion 14d

BAT Conclusion 14 is associated with the appropriate combination of techniques to prevent or reduce diffuse emissions to air. BAT Section 14d is associated with the "containment, collection and treatment of diffuse emissions" and includes techniques such as:

- Storing, treating, and handling waste and materials that may generate diffuse emissions in enclosed buildings and/or enclosed equipment (e.g., conveyor belts);
- Maintaining the enclosed equipment or buildings under adequate negative pressure;
- Collecting and directing emissions to an appropriate abatement system via an air extraction system and/or air suction systems close to the emission sources.

In terms of the applicability of this technique it is noted that: "The use of enclosed equipment or buildings may be restricted by safety considerations such as the risk of explosion or oxygen

depletion. The use of enclosed equipment or buildings may also be constrained by the volume of waste."

An assessment of WWTW processes has been undertaken against BAT 14d in Table 11 to review current site measures and compliance.

Table 11: BAT 14d Containment, Collection and Treatment of Diffused Emissions

Source	Source ID	Containment, collection and diffuse emissions	BAT Compliant	Compliance Restrictions
Sludge Screens (CDE)	A	Screen covered with foul air mechanically extracted. Odour emissions treated by odour control unit and dispersed to atmosphere. No negative pressure measurements on screens. Assumed good containment of emissions with limited risk of fugitive emissions under current operation.	Yes – covered and extracted.	N/A
Screening Skips	A	Skips open to atmosphere with no containment or treatment of emissions.	Area subject to regular inspection and management, source not considered to contribute to off-site odour nuisance potential. Adequate measures considered to be in operation.	Risk of creating a corrosive atmosphere if covered without extraction.

Source	Source ID	Containment, collection and diffuse emissions	BAT Compliant	Compliance Restrictions
Screened Sludge Tank	B	Tanks covered with foul air mechanically extracted. Odour emissions treated by odour control unit and dispersed to atmosphere. No negative pressure measurements on Tanks. Assumed good containment of emissions with limited risk of fugitive emissions under current operation.	Yes – covered and extracted.	N/A
Sludge Balancing Tank	C	Tanks covered with foul air mechanically extracted. Odour emissions treated by odour control unit and dispersed to atmosphere. No negative pressure measurements on Tanks. Assumed good containment of emissions with limited risk of fugitive emissions under current operation.	Yes – covered and extracted.	N/A

Source	Source ID	Containment, collection and diffuse emissions	BAT Compliant	Compliance Restrictions
Drum Thickener	D	Thickeners covered with foul air mechanically extracted. Odour emissions treated by odour control unit and dispersed to atmosphere. No negative pressure measurements on Thickeners. Assumed good containment of emissions with limited risk of fugitive emissions under current operation.	Yes – covered and extracted.	N/A
Thickened Sludge Tanks		Tanks covered with foul air mechanically extracted. Odour emissions treated by odour control unit and dispersed to atmosphere. No negative pressure measurements on Tanks. Assumed good containment of emissions with limited risk of fugitive emissions under current operation.	Yes – covered and extracted.	N/A

Source	Source ID	Containment, collection and diffuse emissions	BAT Compliant	Compliance Restrictions
Secondary Digesters	N1, N2	Tanks covered with foul air mechanically extracted. Odour emissions treated by odour control unit and dispersed to atmosphere. No negative pressure measurements on Tanks. Assumed good containment of emissions with limited risk of fugitive emissions under current operation.	Yes – covered and extracted.	If covered without extraction, risk of oxygen depletion leading to methane generation and creation of an explosive atmosphere.
Dewatering Centrifuge	Q	Centrifuges contained processes without foul air extraction. Centrifuges will not hold a negative pressure.	Area subject to regular inspection and management, source not considered to contribute to off-site odour nuisance potential. Adequate measures considered to be in operation.	None
Return Liquor Balancing Tank	G	Tanks covered with foul air mechanically extracted. Odour emissions treated by odour control unit and dispersed to atmosphere. No negative pressure measurements on Tanks. Assumed good containment of emissions with limited risk of fugitive emissions under current operation.	Yes – covered and extracted.	None
Cake Barn	T	Cake is located within a covered barn. Gap between the roof and walls.	Partial cover	None

Of the sources on site, the screening skip do not adopt the specific conclusions outlined in BAT 14d. There is a risk that covering pre-digestion assets, in this instance the skips and sludge dewatering feed tank, without foul air extraction could create a corrosive atmosphere under the cover. The screening skips are a small area source and would not typically be considered to be a significant source of site odours.

The sludge cake is located in a barn which is partially open to atmosphere and does not fully utilise the specific measures outlined in BAT 14d. The cake pad odour emissions are more akin to secondary treated wastewater than indigenous sludge emissions. Fully enclosing the cake barn would require a large building with air extraction / ventilation, odour treatment and dispersion to atmosphere. The ongoing operation of this building would be associated with significant electrical consumption and use of consumable carbon media. Given that the cake storage is low risk and the large volume of waste being handled, it is considered reasonable that the applicability guidance previously mentioned justifies the partially covered storage of cake.

Given the lack / infrequency of odour complaints, as long as the site adheres to the odour management plant and limits activities such as cake double handling, the risk of odour impact from the WWTW is limited and does not require additional mitigation measures. It would be considered that additional odour mitigation would be warranted if complaint frequency increase and was attributed to WWTW emissions, or if there was a process change and significant increase in cake odour emissions.

G. MONITORING AND CONTROL OF ODOURS

5.1. Monitoring

All monitoring should clearly relate to the assessment of odour control and complete records must be kept in an auditable format. The only way to determine whether the processes on site are under control, and to keep them under control, is to do appropriate monitoring.

As far as possible, Hayle WWTW is operated to minimise odour generation and release. As long as the treatment process satisfies the normal design criteria, odour should be minimal. To minimise odour nuisance, it is important to ensure that Hayle WWTW is operating at its optimum. Covers and hatches should always be replaced to maintain the integrity of enclosures provided to collect odorous air.

5.2. Sniff Testing

Sniff testing is recognised by South West Water as a useful technique to build up a picture of the impact the odour has on the surrounding environment over time. Sniff testing shall be used to support profiling site odour impact, investigate odour complaints and to introduce temporary odour mitigation measures.

Sniff testing shall be undertaken on site on a weekly basis by site operational staff. It is accepted that operational staff may not be ideal for sniff testing of site odours as they have adapted to odours from the site. However, this will provide a baseline for routine observations. The sniff test shall assess the site boundary and locations adjacent to potential odorous sources and focus on the detection of any odours that could be generated and potentially leaving the site.

Monthly sniff tests shall be carried out by non-site-based staff, this is normally a SWW TCM (Technically Competent Manager) who are not adapted to site odours. The monthly sniff tests shall assess the same locations as the weekly sniff test but look to compare the odour offensiveness. For Hayle STF, due to a lack of odour complaints and the majority of assets having odour mitigation, the routine sniff-testing shall be site based only.

In the event of odour complaints being received, site operators shall undertake a sniff test including off-site sniff testing local to the complaint location(s). In the occurrence of a significant odour event or repeated complaints, a third-party shall be engaged for an additional odour investigation including on and off-site sniff testing.

A third-party odour sniff test is undertaken twice a year for comparison with South West Water (operator and monthly tester) observations. The third-party sniff test shall include both on and off-site locations based on surrounding sensitive receptors and complaint locations. The off-site locations shall be reviewed prior to any third-party testing to ensure any recent changes to sensitive receptors are considered.

The location of weekly and monthly on-site sniff testing locations has been included in Figures 8. Routine off-site locations have not been included due to a lack of odour contacts. In the event that odour complaint frequency increase, off-site locations shall be incorporated into the routine sniff testing.

Figure 8: Hayle STF Weekly Sniff Testing Locations

5.3. Source Odour Monitoring

Odour Emissions can be monitored using:

- EN standards (e.g., dynamic olfactometry according to EN 13725 in order to determine the odour concentration or EN 16841-1 or -2 in order to determine the odour exposure).
- When applying alternative methods for which no EN standards are available (e.g., estimation of odour impact), ISO, national or other international standards that ensure the provision of data of an equivalent scientific duality.

The applicability of BAT10, that is, to periodically monitor odour emissions, is restricted to cases where odour nuisance at sensitive receptors is expected and/or has been substantiated. Due to the lack/ infrequency of odour complaints received associated with sludge treatment and handling activities, no routine diffuse odour monitoring is undertaken.

An olfactometry sampling survey may be completed if there is an increase in number of odour complaints being received for the site and this would be triggered by the customer complaint

procedure if no reason for the increase in odour complaints can be referred from other monitoring assessments.

5.4. Channel Emissions

BAT 8 is to monitor channelled emissions to air with at least the frequency given below, and in accordance with EN standards.

Table 12: BAT 8 Channelled Emissions Parameters

Substance / Parameter	Standards	Minimum Monitoring Frequency	Monitoring in association with
Ammonia	No EN standard available	Once every six months	BAT 34
Hydrogen Sulphide	No EN standard available	Once every six months	BAT 34
Odour Concentration	EN 13725	Once every six months	BAT 34
Hydrogen Chloride	No EN standard available	Once every six months	BAT 8
TVOC	No EN standard available	Once every six months	BAT 34

The odour control unit outlet emissions shall be monitored once every six months for odour, H_2S, NH_3, HCl, and TVOC. The sampling shall be undertaken by a third-party Assessor. The stack outlet emissions shall comply with the BAT-AELs as outlined in BAT 34.

Table 13: BAT 34 BAT-AELs for Channelled Emissions to Air

Parameter	Units	BAT-AEL (Average over the sampling period)
Ammonia [(1)]	mg/Nm^3	0.3 - 20
Odour Concentration	ou_E/m^3	200 – 1,000
TVOC	mg/Nm^3	5 – 40

(1) Either the BAT-AEL for NH3 or the BAT-AEL for the odour concentration applies

5.5. Imports/Exports

The Site Operating Procedures include instructions how sludge must be imported.

5.6. Sludge Treatment and Disposal

Raw or co-settled sludges always smell objectionable, but the odour becomes stronger during storage, as anaerobic decomposition occurs, leading to high concentrations of malodorous compounds in sludges and sludge liquors. Digested sludges are less odorous, particularly after they have cooled. To minimise the generation of odours, where possible, fresh sludge shall be processed and sent to digestion as quickly as possible before further treatment and removal from site. Raw sludges stored upstream of digestion would never be stored for more than 5 days in normal plant operation.

5.7. Sludge Thickening/Dewatering and Storage

Accumulation of sludge in the system can cause increased odour release in storage tanks, as well as from sludges and liquors when thickening and dewatering takes place. To minimise odours from the Hayle WWTW, the works should be operated as follows:

- Minimise retention prior to thickening, dewatering or digestion;
- Prevention of sludge accumulation in off-line tanks;
- Proactive identification of potential problems; and
- In exceptional circumstances, tankering of sludges to other sites with odour abatement.

5.8. Anaerobic Digestion

The digestion process breaks down a wide range of odorous compounds, which may be released if care is not taken to avoid turbulence of the sludge after digestion. Odour problems may be caused by:

- Saline intrusion (or industrial wastes) leading to elevated sulphate concentrations of raw sludge, giving a greater sulphide potential;
- Emissions of biogas resulting in significant odour problems; and
- Incomplete digestion leading to odour release from post digestion tanks.

Suggested remedial measures include:

- Check seals and valves to prevent the release of biogas;
- Ensure gas handling system is balanced and that pressure relief valves do not operate prematurely;
- Ensure all excess gas is flared and that flare stack ignition is immediate and reliable;
- Addition of iron salts or other chemicals to precipitate or inhibit the formation of sulphide.

There are odour checklists for both SWW Operators and Team Leaders in Appendix 2.

5.9. Site Operation and Management Procedures

All operating practices should be compliant with the site O&M manuals. The site operates within SWW environmental management system (EMS).

The EMS identifies the environmental aspects and impacts of all SWW plants, including the facility at Hayle. The facility will operate under the EMS which shall include:

- Quality management procedures for operational aspects, for example: preventative electrical and mechanical maintenance, safe working procedures, accident / incident response and emergencies;

- Use of specialist contractors shall be employed by SWW to undertake any non-routine or specialised maintenance tasks;
- Use of only SWW approved contractors. SWW maintain an approved contractors list which is used for appointment of all SWW contractors. This requires contractors to achieve a high level of environmental competence / performance. SWW Framework Contractors are required to operate an EMS in accordance with ISO 14001;
- Preparation/issue of risk assessments and method statements by all contractors before starting work. These risk assessments and method statements will include consideration of odour and measures in place to control odour releases. These are prepared as part of the 'hand - over' and 'hand – back' certificate or 'permit to work'; and
- Regular environmental and quality audits to be carried out. These shall include a review of potential odour and identify any additional control measures which may be required.

5.9.1. Procedures for Operation Plant

All operating practices should be compliant with the site O&M manuals, SWW company practice and the OMP.

5.9.2. Routine Inspection and Recording

Visual inspection of facility processes will be carried out on regular basis as part of staff duties. In addition, regular checks of the OCU performance as described in Appendix 2 shall be carried out. If abnormal odour is witnessed, SWW staff shall record details in the Odour Log Spreadsheet of the observation and immediately investigate. During any such recording carried out as part of this OMP, it is important to document any potential contribution from other off-site sources of potential odour nuisance located outside of the facility boundary.

5.9.3. Maintenance by Engineering Reliability Staff

Engineering Reliability staff (Mechanical Fitters, Electricians and ICA Technicians) carry out routine maintenance of plant and equipment. There is also proactive maintenance of the OCU. This includes odour abatement equipment.

Routine maintenance requirements are included within SWW's Work Management System (WMS) task lists for the site and are forwarded to members of this team via their Toughbook. Feedback on planned maintenance carried out is recorded in WMS by the Operator via their Toughbook, and transfers to SAP for storage.

An OCU performance survey was completed in August 2023 with results pending as of December 2023. Scope of OCU upgrade recommendations will be identified by the results of the survey. When replacement of any OCU's takes place, consideration will be given to connecting to other assets to improve performance or for any additional assets as part of the sludge strategy. Further details are provided in ODOUR IMPROVEMENT PLAN

5.9.4. Reporting Faults and Identifying Maintenance Needs

Plant breakdowns are responded to on the basis of a risk assessment matrix (RAM) and prioritised according to consequence of failure and likely time to failure occurring. Amongst other attributes, the RAM takes into account impact to environment, health and safety, cost and flooding.

Site operational staff are responsible for requesting breakdown maintenance and repairs. Any reactive work that achieves a high priority on the RAM is called through to the Engineering Service Desk for progression. These jobs are treated as schedule busters and are progressed accordingly.

Records of all maintenance (planned and reactive) and calibration are retained on the SAP work management system.

5.9.5. Initiating OCU Media Replacement

OCU performance is monitored monthly during the summer months and quarterly during the winter, through manual testing which assesses the contaminant removal across each process unit. Media replacement is scheduled when the OCU outlet concentration has started to deteriorate or exceeds the design outlet concentration.

5.10. Changing Dispersion Conditions

Site activities that could lead to increased site emissions will be avoided when there are poor dispersion conditions or during sensitive periods (hot days, when people are more around). If not possible to be avoided, additional monitoring in the form of sniff testing and monitoring of site performance shall be undertaken. In the event that site activities are resulting in increased off-site odours or customer complaints, the activity shall be rescheduled / undertaken during low-risk times / weather conditions.

Table 14: Hayle STF Changing Dispersion Conditions

Asset	Changing Dispersion Condition	Mitigation Trigger	Mitigation Action	Timescale	Responsible Person
Screening skip	Hot Days, School Holidays (summer)	Temperature - >25°C and significant odour complaints	Increase frequency of skip export from site	Forecast in advance – 5-day weather forecast	Product and Process Engineer
Sludge cake import	Hot Days, School Holidays (summer)	Temperature - >27°C and significant odour complaints	Cake imports facility in operation between 8am to 6pm	Forecast in advance – 5-day weather forecast	Product and Process Engineer

Asset	Changing Dispersion Condition	Mitigation Trigger	Mitigation Action	Timescale	Responsible Person
Sludge cake export	Hot Days, School Holidays (summer)	Temperature - >27°C and significant odour complaints	Cake export between 7am to 6pm only	Forecast in advance – 5-day weather forecast	Product and Process Engineer

H. EMERGENCY AND INCIDENT RESPONSE

These emergency procedures include the: All environmental incidents and emergency situations are dealt with in accordance with ***QSM-021 Emergency Preparedness and Response*** and ***QEP-001 Incident Management Procedure***, to minimise any adverse environmental impacts.

Site-specific contingency plans provide guidance in managing incidents at sewage treatment works, including what to do in the event of discovering an oil, diesel, petrol or other toxic discharge at a sewage treatment works. Site-specific contingency plans have the document name in the format ***QWW-XXXX-0700 Contingency Plan***, where XXXX is the site-specific code.

QWW-750 Pollution Reporting describes the responsibilities and actions required by waste water treatment operatives when a pollution occurs. ***QWW-751 Potential Pollution Reporting*** describes the responsibilities and actions required by waste water treatment operatives when a potential pollution event is discovered.

This section addresses the issue of appropriate response to odour incidents caused by process failure or equipment breakdown. These emergency procedures include the:

- Foreseeable situation that may compromise the ability to prevent and minimise odorous releases from the process;
- Actions to be taken to minimise the impact; and
- Person responsible for initiating the action.

The SWW odour emergency contact details for Hayle WWTW are available in Appendix 1.

Table 15: Hayle WWTW Incident/Emergency Control Measures

Failure / Incident	Potential Odour Source	Potential Odour Impact	Mitigation Measures	Action to be Taken	Timescale for Rectification	Responsible Person
Failure of the odour control unit (mechanical / structure / treatability)	Untreated air	High – OCUs provide treatment for odorous air from the Permitted site. Failure of OCU would result in release of abnormal operational fugitive odours direct to atmosphere	Routine maintenance. Regular monitoring of equipment performance. Standby capacity in the media beds.	For plant failure - investigate and repair.	Site operator to investigate on same working day. Support from OCU supplier to be arranged for next availability	Site Operator
Liquid sludge spillage	Liquid sludge	Medium – low volume spillage likely to go directly to drain which returns to the WRC for treatment.	Pipework and tanks undergo regular inspections. Planned maintenance on equipment	Stop source of spill and immediately wash down area.	Immediate	Site Operator
				Arrange repair.	Job to be raised and promoted on same working day or next	Site Operator
				Record spillage and actions taken in site diary.	Same day as incident	Site Operator
Sludge cake spillage	Sludge Cake	Medium to High depending on volume of spill	Regular inspection and planned maintenance	Stop source of spill and immediately wash down area.	Immediate	Tanker Driver
				Arrange repair.	Job to be raised and promoted on same working day or next	Site Operator
				Record spillage and actions taken in site diary.	Same day as incident	Site Operator
				If there is likely to be any offsite impact inform site manager and <3rd Party	Same day as incident	Site Operator

Failure / Incident	Potential Odour Source	Potential Odour Impact	Mitigation Measures	Action to be Taken	Timescale for Rectification	Responsible Person
				odour specialist / customer complaints team> immediately.		
Failure of digestion process (treatment)	Partially treated sludge odours Increased odours from post-digestion sources	Medium	Performance monitoring of key parameters on SCADA Laboratory sampling of <insert parameters & frequency>	Inform Catchment Pilot – job raised Inform HACCP team Inform Scientific Team	Immediate	Site Manager
High pressure conditions in digesters	Release from Pressure Relief Valve	Medium - Biogas would be vented at high pressure to aid dispersion	Gas pressure is regulated and monitored on SCADA with high limit alarms	Diversion of biogas to Waste Gas Burner	Immediate	Site Operator
				Investigate likely sources of high pressure in the digester and resolve (e.g. blocked outlet)	Immediate	Site Operator
Loss of Biogas containment	Leaks From gas holder membrane	Medium	Double gas holder membrane system with gas pressure between the membranes regulated and monitored. Methane detectors operated with alarms to alert operators of any leakage between membranes.	Diversion of biogas to CHP plant or Waste Gas Burner. Inspection maintenance and repairs of gas holder as appropriate	Immediate	Site Operator
				Record details and Actions taken in site diary	Immediate	Site Operator
Staff unavailability	Risk of increase to site odours due to limited operational resources	Low	Staff replacement	Operator replacement from another site	Same day / For next working day	Site Manager

Failure / Incident	Potential Odour Source	Potential Odour Impact	Mitigation Measures	Action to be Taken	Timescale for Rectification	Responsible Person
				Reduce site activities to only critical jobs Remote monitoring from Control Room / off-site / another site		
Asset Fire	Risk of increase to site odours due to limited access and inability to operate assets	Medium	Regular inspection and planned maintenance	Remote monitoring from Control Room / off-site / another site	Immediate	Site Operator
Power Failure	Risk of increase to site odours due to inability to operate assets	Medium	Standby generator on site	Pilot passes alarm out	Immediate	Site Operator / OOH standby /MEICA
Very high rainfall	Flooding	Low	Increased monitoring of media and sludge storage	Check the performance of the Odour Control Unit when water levels drop and replace media as required (if media has been flooded it may need replacing)	Site operator to investigate on same working day. Support from OCU supplier to be arranged for next availability	Site Operator or OOH standby

I. INSPECTION / MONITORING / MAINTENANCE SCHEDULES

6.1. Inspection/Monitoring/Maintenance Schedules for Odour Abatement Equipment

A list of routine monitoring and maintenance tasks for the odour abatement equipment is included in Table 16. Reference should also be made to the OCU specific O&M manuals.

Proactive maintenance tasks are included within SAP task lists for each site and are forwarded to the Operator via their Toughbook for completion.

Monitoring results from the inlet and outlet of the odour control units will be recorded as appropriate. Refer to Appendix 2 monitoring schedule.

Feedback on maintenance of odour abatement equipment and pipework is recorded in SAP by the Operator via their Toughbook. SWW maintenance staff also provide feedback on work carried out by them.

Table 16: Odour Abatement Monitoring Provisions

Parameter	Frequency	Action	Monitoring
Oxidising Chemical level	Daily	Automatic re-ordering	Monitored by supplier
Routine operational OCU checks	Weekly	Rectify any faults found (e.g. fan belt replacement; irrigation problems etc)	Ops record sheet
Visual check for integrity of covers and duct work	Weekly	Repair/replace as required	Ops record sheet
OCU media checks	Annual	Media replacement as necessary	Asset planning records

6.2. Key Process Monitoring

The site is operated under a full PLC SCADA control with data logging and interrogation of key parameters to maintain safe, efficient and low emissions operation. Table 17 includes the key process monitoring provisions for processes associated with emissions to air.

Table 17: Key Process Monitoring Provisions

Emission point / description	Parameter	Monitoring approach	Monitoring frequency
Occasional sludge intake direct to WWTW (not currently in normal use)	Intake volume	SCADA	Continuous during unloading operations
	% dry solids	SCADA	Continuous during unloading operations
CHP	Operating hours	SCADA	Continuous data logging

Emission point / description	Parameter	Monitoring approach	Monitoring frequency
	Electricity generated	SCADA	Continuous data logging
	Load required / actual (%)	SCADA	Continuous data logging
	Biogas flow / pressure to CHP	SCADA	Continuous data logging
	Heat circuit temperatures (deg. C)	SCADA	Continuous data logging
Boilers	Load required / actual (%)	SCADA	Continuous data logging
	Biogas / natural gas flow / pressure to boiler	SCADA	Continuous data logging
	Heat circuit temperatures (deg. C)	SCADA	Continuous data logging
	Heat circuit flow	SCADA	Continuous data logging
Flare compound	Biogas to flare (m^3)	SCADA	Continuous data logging
	Run hours	SCADA	Continuous data logging
Odour control unit stack	Operational status	SCADA	Indication
Biogas storage	Gas level (%)	SCADA	Continuous data logging
	Gas pressure (mb)	SCADA	Continuous data logging
	Methane %	SCADA	Continuous data logging
Digesters	Volume	SCADA	Continuous data logging
	Alkalinity	Manual	Periodic
	Process temperature	SCADA	Continuous data logging
	% solids (intake)	SCADA	Continuous data logging
	Retention (hours)	SCADA	Continuous data logging
	Temperature	SCADA	Continuous data logging
	H_2S (ppm)	SCADA	Continuous data logging
Centrifuges	Dry solids (%)	SCADA	Continuous data logging
	Flow	SCADA	Continuous data logging

6.3. Records of Consumables / Deliverables and Media Replacement

Records of site deliveries for the odour control system are stored on site.

J. CUSTOMER COMMUNICATIONS

7.1. Communication Plan

There is regular liaison between the Company, the Environment Agency and the Environmental Health Department of Exeter City Council. Meetings take place at a frequency dependent on the level of odour contacts being received.

If any of the following occur:

- Operational failure resulting in odour issues
- Operational activity that could result in odour issues
- Abnormal H_2S levels measured on site
- More than three separate complaints received by SWW in a 48-hour period

The following actions shall be considered:

- Affected area and operational details to be highlighted by polygon on the SWW internal mapping system to enable customer call handlers to be able to respond effectively to any telephone complaints received
- Deploy a member of staff to the affected area(s) to assess the level of impact on potential receptors
- Contact the Environment Agency (and, if appropriate, Exeter City Council Lead EHO) with an indication of the cause for the exceedance and advice of action taken to correct the problem and prevent re-occurrence

In the event of a further escalation in the situation, the following actions shall be considered:

- Increased frequency of Odour Liaison Group (OLG) meetings with key stakeholders
- Communication to residents in the area immediately affected by the odour. The communication should include an indication of the cause for the exceedance and advice of action taken to correct the problem and prevent re-occurrence
- Setting up of a dedicated text service for the use of a limited number of strategically located receptors to report complaints directly to the local operations Field Support Centre
- Review and audit of this OMP document against current site operation for reporting back to OLG meetings
- Setting up a Site Improvement Plan to identify remedial actions and monitor progress for reporting back to OLG meetings
- Statement to local media
- Contact local MP if situation escalates/if SWW Press and PR become involved.

7.2. Complaints

The procedure for receiving and dealing with complaints is set out in ***QWW-401 - Odour Management Plan Standard Arrangements***.

During periods when high levels of complaints are being received, a dedicated text service may be set up as detailed in Section 7.1 above. Complaints received by this route shall be investigated in a similar manner to that set out in the Standard Arrangements document.

In general, an initial assessment is made regarding the prevailing wind direction in relation to the location of the complaint. If this indicates that the STW is a possible source of the odour, the investigation shall be passed to site operations to look into possible issues on site and to rectify any problems found. The findings of the investigation shall be reported back to the complainant.

K. TRAINING

8.1. Training Requirements

All staff receive training to cover operation of the site, assessment of odour and monitoring and maintenance of the OCU's on the site. The training requirements for key staff at Hayle WWTW are displayed in Table 18 below.

Table 18: Hayle WWTW Training Requirements

Post	Training Requirements
Site Operative	In-house operational training
Recovery & Treatment Manager	WAMITAB waste management training including Anaerobic Digestion units, and in-house operational training
Works Performance Team	Formal science qualifications
Asset Engineering Team	Formal engineering qualifications
Recovery & Treatment Operations Manager	WAMITAB waste management training and in-house operational training

8.2. Training Received

Specific training on odour management, good housekeeping, and Odour Management Plans is included in the in-house operational training for all Wastewater Operators and Recovery and Treatment Managers.

The Operator Skilling Programme for all wastewater operatives includes first line maintenance of odour control units as part of the training modules.

All training records are held on the HeRMeS Company HR database.

L. RESPONSIBILITIES

The Asset Management Wastewater Process Team is responsible for writing and reviewing the Odour Management Plans and ensuring that they remain up to date and relevant. They are also responsible for business reporting of the number of odour contacts received.

Wastewater Services (Operations) are responsible for managing the site in accordance with the requirements of the Odour Management Plan. They are also responsible for investigating the causes of odour related customer contacts.

Customer Services are responsible for receiving and recording contacts from customers regarding odour and passing to Operations for investigation.

M. ODOUR IMPROVEMENT PLAN

The Odour Improvement Plan (OIP) is to be completed by the Asset Management Wastewater Process Team if improvements are required to meet BAT, or customer odour complaints are received, and further process and investment solutions are required to prevent further complaints.

The OIP will be updated including any expected completion dates as schemes are designed, developed and progressed. It is the relevant schemes project manager responsibility to update the Site Manager and Asset Management Wastewater Process Team so the OIP can be updated.

Table 19: Hayle WWTW Odour Improvement Plan

Requirement No.	Requirement	Delivery Timescale
1	Survey to asset condition and performance of OCUs on site to determine if BAT compliant	End of 2023
2	Refurbishment or Replacement of OCUs that are not BAT compliant	AMP8
3	Odour emission characterisation at inlet of odour control units to confirm suite of determinants for monitoring in accordance with BAT 8 and BAT 34	End of 2024
4		
5		

APPENDIX 1 EMERGENCY CONTACTS

Table 20: Hayle WWTW Contacts

Area	Contact
Cornwall Council Environmental Health	0300 123 4100
Environment Agency emergency hotline	0800 807060
Environment Agency local officer	Mark Pilcher 02084 746291, mobile 07747 006521
OCU Maintenance Provider	SWW MEICA team 01392 442980 Out of hours: SCC 0800 7811403
Hayle WWTW Odour Related SWW Contacts	Area 1 FSC 01392 442980 opt 1 Out of hours: SCC 0800 7811403 Danni Licheri 01392 443782

APPENDIX 2 OCU PERFORMANCE CHECKLIST

South West Water: Form FM-QWW-HAYLE-0400

HAYLE WWTW – ODOUR CONTROL LOG

Week Beginning:.....

OPERATOR'S INITIAL										
INLET WORKS (INTERNAL)	Mon	Tue	Wed	Thu	Fri	Sat	Sun	ACTION VALUE	ACTION	Comments
Fan Running (Y/N)								N	INFORM SUPERVISOR	
Pump Running (Y/N)								N	INFORM SUPERVISOR	
Drain pH								< 5.0	INFORM SUPERVISOR	
H_2S								>10ppm	INFORM SUPERVISOR	
INLET WORKS (EXTERNAL)	Mon	Tue	Wed	Thu	Fri	Sat	Sun	ACTION VALUE	ACTION	
Fan Running (Y/N)								N	INFORM SUPERVISOR	
Pump Running (Y/N)								N	INFORM SUPERVISOR	
Drain pH								< 5.0	INFORM SUPERVISOR	
H_2S								>10ppm	INFORM SUPERVISOR	
SLUDGE SYSTEM	Mon	Tue	Wed	Thu	Fri	Sat	Sun	ACTION VALUE	ACTION	
Fan Running (Y/N)								N	INFORM SUPERVISOR	
Pump Running (Y/N)								N	INFORM SUPERVISOR	
Drain pH								< 5.0	INFORM SUPERVISOR	
H_2S								>10ppm	INFORM SUPERVISOR	
START PUMPS	Mon	Tue	Wed	Thu	Fri	Sat	Sun	ACTION VALUE	ACTION	
Fan Running (Y/N)								N	INFORM SUPERVISOR	
Pump Running (Y/N)								N	INFORM SUPERVISOR	
Drain pH								< 5.0	INFORM SUPERVISOR	
H_2S								>10ppm	INFORM SUPERVISOR	
CAKE BARN	Mon	Tue	Wed	Thu	Fri	Sat	Sun	ACTION VALUE	ACTION	
Fan Running (Y/N)								N	INFORM SUPERVISOR	
H_2S								>10ppm	INFORM SUPERVISOR	
INLET CONDUCTIVITY	Mon	Tue	Wed	Thu	Fri	Sat	Sun	ACTION VALUE		
Conductivity Result (M/S)								5m/s	INFORM SUPERVISOR	
Penzance Tide Height (m)										

FILL ALL UNSHADED BOXES: (✓) tasks carried out, (X) task not completed, (D) defect / query - record details of problems in comments box and inform supervisor

v5.0 06/04/09 Page 1 of 1

APPENDIX 3 SNIFF TESTING RECORD SHEET

Test by		**Start Time**	
Date		**End Time**	
Weather Condition		**Temperature**	
Wind Strength		**Wind Direction**	

Location No.	Location Name	Nearest Receptor Sensitivity	Intensity	What does it smell like?	Frequency of odour?	Is the source evident?	Other comments / observations
1	North West Site Boundary	Low / Medium / High	0 No odour 1 Very faint 2 Faint odour 3 Distinct odour 4 Strong odour 5 Very strong odour 6 Extremely strong odour.		Constant / Intermittent	Yes / No Source area / name to be provide. Might be that maintenance work is occurring and you can detect increased odours due to that activity or call smell temporary activities such as sludge imports. Also identify is wastewater / sewage smells are evident	Are there odours detected from other sources? Farm / Landfill / Recycling Centre / other industry etc.

Location No.	Location Name	Nearest Receptor Sensitivity	Intensity	What does it smell like?	Frequency of odour?	Is the source evident?	Other comments / observations
2	North of Generator Building						
3	Site Boundary adjacent to Secondary Digester Area						
4	Sludge Screen Area						
5	Site Boundary adjacent to CHP Building						
6	Thickener / Return Liquor Area						
7	Storm Tanks						
8	East Side Site Boundary						
9	Cake Barn						

APPENDIX 4 ODOUR COMPLAINT FORM

Odour Complaint Report Form	
Time	
Date	
Name of Complainant	
Address	
Telephone Number	

Complainant Response:	
Date of odour:	
Time of odour:	
Location of odour, if not at above address:	
Weather conditions (i.e., dry, rain, fog, snow)	
Wind strength (none, light, steady, strong, gusting):	
Wind direction:	
Complainant's description of odour:	
What does it smell like?	
Intensity (see below):	
Duration (time):	
Constant or intermittent in this period:	
Does the complainant have any other comments about the odours?	
Are there any other complaints relating to the installation, or to this location? (either previously or relating to the same exposure):	
Any other relevant information:	

Intensity:

0 No odour
1 Very faint odour
2 Faint odour
3 Distinct odour
4 Strong odour
5 Very Strong Odour
6 Extremely strong odour

APPENDIX 5 ODOUR INVESTIGATION FORM

The following investigation form will be used by Operational staff in the event of an odour complaint being received.

Date of odour complaint	
Time of odour (if known)	
Name of SWW colleague investigating issue	
Postcode where the issue was identified (if known)	
Weather at the time of odour complaint (including temperature)	
Wind Direction (from onsite wind monitor) and strength (no wind, light, gusty, heavy)	
Description of smell from Complainant (if known)	
Is this linked with other complaints	
Do you know what asset is causing the issue	
Can the asset be identified through sniff testing (follow sniff testing monitoring programme in the odour management plan)	
Can the issue be resolved immediately	
If no, what actions are needed to resolve the issue	
If the issue is going to take >2 days to resolve, can the issue be mitigated to reduce the odour effect	
Does the odour management plan need updating to discuss the cause/action/mitigation	
Date when resolved	