MOTT MACDONALD

Afan Sludge Treatment Centre EPR Permitted Installation

Odour Management Plan

September 2024

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Odour Management Plan

September 2024

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	May 2024	D Vargas	N Cunningham	A. Manns	First version for client comment

Document reference: 100123523_MSD_OdourMP_AFA_September 2024 |

Information class: Standard

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1 Odour Management Plan

1.1 Introduction

The Odour Management Plan (OMP) for Afan Sludge Treatment Centre (STC) ('the Site') has been developed with assistance of Mott MacDonald on behalf of Dŵr Cymru Welsh Water (DCWW) ('the Operator'). The OMP is the responsibility of DCWW as the OMP may assume a legal status if it forms part of the planning conditions or other legal agreements with local authorities or other third parties.

The OMP has been designed to be a live working document that forms part of the operational management system of the Site. It is a mitigation and control measure document that operations shall comply with. It demonstrates how odours shall be managed and controlled to prevent odour impacts from activities during normal operation and during abnormal events.

The OMP has been produced in accordance with the NRW's How to Comply with your Environmental Permit guidance[1], the Environment Agency's H4 Odour Management guidance[2], Best Available Techniques (BAT) Reference Document for Waste Treatment[3] and Appropriate measures for the biological treatment of waste[4].

1.2 Objectives

The OMP identifies potential odour emissions from site operations and identifies procedures to manage, control and minimise odour impacts. It is based on a plan prepared by DCWW and provides information about the measures currently implemented to control odour emissions from the Site. It provides sufficient detail to allow operators and maintenance teams to understand the operational conditions.

It is intended to be used as a reference document by operational staff on a day-today basis. The OMP includes, where applicable, the following:

- A description of the Site and catchment, including sources of odour on the Site, and location of sensitive receptors.
- The Site's individual process operation descriptions in order to minimise, manage and control odour.
- Characterisation of odours at different points in the treatment process and assessment of risk, particularly during abnormal operating conditions.
- DCWW Operation and Maintenance (O&M) procedures for the Site, including housekeeping measures to minimise odour generation and release.

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[1] Natural Resources Wales (2014) How to comply with your environmental permit [online]. Available at: https://naturalresources.wales/media/2110/how-to-comply-with-your-environmental-permit.pdf. Accessed March 2024.

[2] Environment Agency (2011) Environmental permitting: H4 odour management [online]. Available at: https://www.gov.uk/government/publications/environmental-permitting-h4-odour-management. Accessed March 2024.

[3] Joint Research Centre (2018) Best Available Techniques (BAT) Reference Document for Waste Treatment [online]. Available at: https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/JRC113018_WT_Bref.pdf. Accessed May 2024.

[4] Environment Agency (2020) Appropriate measures for the biological treatment of waste - Consultation draft July 2020 [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/898966/Appropriate_measures_for_the_biological_treatment_of_waste_-_consultation_document.pdf Accessed May 2024.

- 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 odour risk assessment identifying any odorous or potentially odorous areas of the works and immediate and longer-term actions required to eliminate odour complaints.
- Containment, enclosure, ventilation, abatement of odours and emission standards.
- Monitoring of odorous emissions and action plans for investigation, remedial measures and procedural changes in the event of abnormal emissions.
- Management of the sludge reception, dewatering and treatment processes.
- Odour control and management procedures during emergencies and maintenance.
- Routine care and maintenance of critical equipment (extraction and odour abatement plant).
- Monitoring, recording and reporting arrangements.
- The management and operator training requirements and records with respect to odour.
- Staffing, responsibilities, training and procedures.
- Communication strategy and complaint management/resolution procedures.
- OMP updating, review and development procedures.
- An action procedure for complaints.

The primary responsibility for implementation of the OMP lies with the operational site management. Other business functions support the implementation of the OMP across their areas of responsibility.

The OMP outlines the sources of odours and the risks to receptors. It outlines the measures DCWW will employ on a frequent basis and how DCWW will respond to prevent or minimise odour releases and impacts. The routine assessment of odour and the monitoring and maintenance of plant and equipment at the Site will be carried out according to the schedules given in the O&M manual and Environmental Management System (EMS) to ensure that performance is optimised.

The OMP is incorporated into the Site's EMS. The Site manager is responsible for implementation of the OMP and its regular review at least once per annum or as required on the basis of any operational changes or experiences, as well as changes to location or nature of nearby sensitive receptors or as requested by the Natural Resources Wales (NRW).

1.3 Site location

Afan STC is located within the Port Talbot Steelworks area to the south of the Port Talbot urban area. The Site sits within the Afan WwTW and is bounded to the north and east by Port Talbot Steelworks, with Magam Sands and Swansea Bay to the south and west. The WwTW serves a catchment of approximately 12,500 and treats a combination of domestic and trade sewage flows from the Port Talbot catchment area.

Site address: Afan Wastewater Treatment Works, Phoenix Wharf, Harbour Road, Port Talbot, SA13 1RA

National grid reference: SS 76061 87329

The Site location and layout is shown in

Figure 1..

Figure 1.1: Location and layout of the Site

Emissions Ref	Emissions Points	Assets Ref	Assets	X	Y
A10	Whessoe Valve (Gas Holder)			276099	187297
A1	CHP Unit 1	1	CHP Unit 1	276139	187358
A2	CHP Unit 2	2	CHP Unit 2 (not in use)	276136	187364
A3	Boiler Unit 1	3	Boiler Unit 1	276141	187356
A4	Boiler Unit 2	4	Boiler Unit 2	276137	187362
A5	Flare Stack	5	Biogas Flare Stack	276069	187311
A6	Digester Unit 1	6	Digester Unit 1	276099	187275
A7	Digester Unit 2	7	Digester Unit 2	276118	187286
A8	OCU Carbon Filter	8	OCU Carbon Filter	276161	187353
A9	OCU Sulphuric Acid Scrubber	9	OCU Sulphuric Acid Scrubber	276172	187358
S1	Liquor Return Well to Sewer	10	Liquor Return Well	276163	187347
M1	Liquor Monitoring Point				
		11	Raw Sludge Import Hoppers	276134	187333
		11	Raw Sludge Import Hoppers	276135	187322
		12	THP Feed Silo	276150	187336
		13	Thermal Hydrolysis Plant (THP)	276150	187306
		14	Belt Presses x 3	276173	187319
		15	Indigenous Sludge Silo	276145	187345
		16	Gas Holding Tank	276088	187294
		17	Digested Sludge Holding Tank	276135	187304
		18	2 x Centrifuges	276157	187362
		19	Cake Storage Bays	276194	187328
		20	Biogas Carbon Filter	276101	187301
		21	2 x Condensate Traps	276098	187297
		22	1 x Condensate Trap	276136	187332

Title
Afan IED
Site Layout Plan

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Date	Drawn	Checked	Approved	Scale at A4	Drawing Number	Status	Rev
24/09/2024	G Timms	W J Goh	A Manns	1:1,000	100123423-MMD-00-XX-DR-Y-0001	INF	02

1.4 Best available techniques

This document reflects the existing arrangement at the Site and any commitments DCWW has already made during the ongoing application process. It is acknowledged that it does not fully meet BAT in some instances. Changes to the Site will be undertaken and completed to meet BAT, where applicable. Those proposed changes will be submitted to Natural Resources Wales, in the form of plans, as part of Improvement Conditions within the permit, for their agreement and DCWW's subsequent implementation.

As the changes are implemented the documentation will be updated to reflect the changes made to meet BAT.

The OMP addresses the following BAT:

- BAT 1: EMS to include the Odour Management Plan
- BAT 10: Periodically monitor odour emissions
  - Section 5 addresses monitoring
- BAT 12: Implement and regularly review an odour management plan, as part of the environmental management system, including protocols for:
  - Actions and timelines (addressed in Section 4.2 and 5)
  - Conducting monitoring (Section 5)
  - Response to identified odour incidents (Section 7.4)
  - Odour prevention and reduction (Section 4, 5 and 6)
- BAT 13: Reducing odour emissions through the use of techniques: addressed in Section 4
- BAT 14: Reducing diffuse emissions to air, addressed in Section 3.2
- BAT 33: Control of odour emissions through pre-acceptance, acceptance and sorting the waste addressed in document reference 100123523_WasteAcceptance_AFA September 2024
- BAT 34: Reducing channelled emissions, addressed in Section 4.1
- BAT 53: Reducing emission of hydrochloric acid (HCl), ammonia (NH_3) and organic compounds to air in Section 4.1

The OMP is applicable to the STC operations only and any mention of the wider WwTW is for context only.

2 Site operation

2.1 Overview of Site operations

The WwTW is operated under the Urban Wastewater Treatment Regulations (England and Wales) Regulations 1994 and has a standalone Water Discharge Activity Environmental Permit, this will remain an independent permitted activity. The STC operation is a non-hazardous waste activity which is currently carried out under a waste operation permit EPR/ZP3032KQ. The application is to vary existing EPR/ZP3032KQ.

The waste activity comprises imports, physio-chemical and anaerobic digestion (AD) treatment and the storage of waste, all for recovery purposes. The STC solely handles waste derived from the wastewater treatment process, either indigenously produced on-site or imported from other DCWW owned assets in South Wales. The Site undertakes AD of sewage sludge from the on-site WwTW and imported sludge.

The primary permitted installation activity will be the AD treatment facility. The AD facility will treat indigenously produced sludges and imported sludge cake. Permitted Directly Associated Activities will be:

- Import of sludge cake from other DCWW assets in South Wales.
- Physico-chemical treatment of indigenously produced sludges and imported sludge cake.
- Storage of indigenously produced sludges, imported sludge cake and the sludge cake from the AD facility.
- Storage of biogas derived from the AD treatment of waste.
- Combustion of biogas in an on-site Combined Heat and Power plant (CHP).
- Combustion of biogas in an on-site flare stack (in the event the CHP cannot run in an emergency or due to operational issues).

The site is manned 24 hours per day and seven days per week. Sludge and septic tanker imports and material exports are conducted during the following hours:

- 0700 to 1800 Monday to Friday.
- 0700 to 1630 Saturdays.
- 0800 to 1630 Sundays and Bank holidays as required.

2.2 Summary of the STC components

Currently, the Site treats a combination of domestic and trade sewage flows from the Port Talbot catchment, and receives imports of sludge cake from other DCWW sites in South Wales.

Below is a brief summary of the components for the permitted Site.

2.2.1 Sludge import area

Imported sludge cake is delivered to the Site by road and is received into the cake import area, which comprises two 40m^3 enclosed hoppers. These hoppers are extracted to Odour Control Unit 1 (OCU1).

Indigenous secondary sludge (SAS) is transferred from one 400m^3 SAS tank (not included in the permitted activities as it is part of the WTW process) into two centrifuges (pre-digestion),

where the first dose of polymer is added. The thickened sludge is then pumped into one 100m^3 indigenous cake silo. The indigenous cake silo is extracted to OCU 1.

2.2.2 Thermal Hydrolysis Plant

Sludge is pumped from the indigenous cake silo into to the Thermal Hydrolysis Plant (THP) feed silo (600m^3). The THP feed silo also receives thickened sludge cake from the two imported cake hoppers.

From the THP feed silo, sludge is pumped into one THP, which is a sealed process consisting of one pulper (42m^3), four reactor tanks (13m^3) and one flash tank (42m^3). Sludge is heated to 100ºC with steam in the pulper. The sludge is then fed to one of four 13m^3 reactors, where steam is injected to increase pressure and temperature to approximately 6 barG and 165ºC, the steam pressure in the reactor is maintained for 20-30 minutes.

The sludge then enters one 42m^3 flash tank, where the temperature is decreased to 100ºC. Steam condensate and gases are either recaptured back into the THP process or captured in the foul gas drum and discharged into the digester. Treated sludge from the flash tank is diluted to 10%DS using disinfected final effluent at ambient temperature and pumped through two coolers, where it is cooled to approximately 40ºC.

2.2.3 Digesters

After thermal hydrolysis, the sludge is pumped into two (4,250m^3 each) digesters and digested for a period of 10 to 14 days. The two digesters operate between 33 to 38ºC, the temperature is automatically maintained by heat exchangers.

Biogas generated from the wet AD process is stored in one double membrane gas storage bags (2,000m^3). The biogas is then transferred to the Combined Heat and Power (CHP) Engines where it is combusted.

The AD process provides a controlled environment where micro-organisms (including bacteria and fungi) can grow, multiply and break-down organic material, releasing water, carbon dioxide and methane (biogas). Gas production, gas pressure and digester temperature are monitored and logged on the SCADA system. A biogas flare is provided for periods when, for example, the CHP are unavailable during maintenance or downtime, to control and manage excess gas during these periods.

In instances where the gas pressure is too high the pressure relief valve system de-pressurises the system. These pressure relief valves are located at the connection point with the biogas distribution system pipework at the top of each digester. Opening of the pressure relief valves is an emergency response of the system to maintain safety and would be rare, short-lived events. Pressure levels are monitored in the gas system and linked to the SCADA system. This is provided with an alarm which can alert operators to increased pressure. The performance of the digesters is monitored daily, through the sampling of inlet and outlet sludge quality.

2.2.4 Combined Heat and Power Units

The Site has two CHP units installed designed to use biogas. The biogas produced in the digestion process is fed to the CHP units where it is combusted in two spark ignition engines with a rated thermal input of 3.745MW each (1.56MW$_e$ output). The CHP units are used to generate electricity via an alternator and heat via the engine exhaust and cooling jacket. Electricity produced is used by both the DTC and WwTW with any surplus transferred to the distribution network.

High grade heat is recovered from the CHP unit exhaust and used to generate low pressure steam, whilst low grade heat from the cooling jacket is used to generate hot water for reuse in

the AD process. Additional heat demand is met by two supplementary fired waste heat boilers (3.9MW_{th} each), which are fuelled by natural gas.

The biogas is treated prior to combustion by a dedicated Siloxane removal unit which regenerates daily for four hours starting at midnight. Emissions from the filter are discharged via a stack.

A high temperature waste gas burner is also available to flare off excess biogas.

2.2.5 Digested sludge holding tank

Digested sludge is stored in one post digested sludge storage tank (500m^3) prior to being dewatered by the belt presses.

2.2.6 Dewatering

Dewatering, post digestion, takes place in three belt presses housed within the post THP belt press building. Liquor from the dewatering plant is returned to the WwTW for further treatment.

Two centrifuges on site are used to dewater indigenous SAS pre-digestion to be fed into the AD process.

2.2.7 Cake storage

Dewatered digested sludge cake is stored in the form of a cake in four cake bays prior to transfer to the main cake pad. The cake is then periodically exported off site by road trailer. Each of the belt presses and the cake bays are extracted to an odour control system. The cake storage pad is also enclosed.

Dewatered, digested cake is also imported to be added to the THP process.

2.2.8 Odour control unit

All sludge treatment processes are covered or enclosed, with the exception of the SAS tank and post digestion tank. The Site has two OCUs. OCU 1 extracts and treats air from the cake import hoppers, the THP feed silo and THP plant. OCU 2 (not in use) extracts and treats air from belt press building, which also houses the cake bays.

OCU 1 is a two-stage odour treatment system comprising a Euro Environment John Cockerill Biomod 6.15 4m biofilter as the first stage and TCA2200 1.4 m carbon filter as the second stage. OCU 1 has design flow of 3,030m^3/h. The biofilter is continuously irrigated using final effluent which is recirculated through the media with a partial bleed off to waste. The system is fitted with duty and standby fans which draw air through the biofilter and the push air through the carbon filter. By-pass provisions are in place to enable both stages to be isolated for maintenance. Following treatment, the treated air is discharged through a 2m height stack.

The biofilter system removes odorous components from the airstream by a process of absorption and microbial breakdown. The carbon filter then removes residual odorous components by a process of adsorption onto the activated carbon media.

Although not currently in use, OCU 2 is a single stage Euro Environment John Cockerill LRV1600 packed acid scrubber which is designed to remove ammonia. The system comprises a single tower which contains the reagent sump at the bottom, packed media and spray bars in the midsection and a droplet eliminator just prior to the 7m stack. OCU 2 has design flow of 1,080m^3/h.

When it was in use acid (H_2SO_4) was dosed from a separate acid tank into the reagent sump and then recirculated through the media by spray bars. The system is fitted with duty and

standby extract fans which draw air from the sludge belt press building and push it through the scrubber. Duty and standby acid dosing pumps and recalculation pumps are provided. Make up water is supplied by final effluent Bypass provision is provided to enable process maintenance.

2.2.9 Other relevant STC components

- 2 No. Digesters (4,250m^3 each)
- 1 No. Post digested sludge storage tank (PDST) (500m^3)
- 1 No. Gas bag holder (2,000m^3)
- 1 No. Indigenous sludge silo (100m^3)
- 1 No. THP feed silo (600m^3)
- 1 No. THP (comprising 1 No. flash tank 42m^3, 1 No. pulper 42m^3 and 4 No. reactors 13m^3 each)
- 2 No. Imported cake silo (40m^3 each)
- 1 No. Indigenous Secondary Sludge (SAS) tank (400m^3)
- 2 No. Centrifuges
- 3 No. Sludge thickeners (belt presses)
- 2 No. Odour Control Units (1 No OCU (1) for the raw sludge silos in the import area, THP feed silo and THP plant and centrifuges(pre-digestion) and 1 No. OCU (2) for the belt press room, including cake barn (currently not in use))
- 1 No. Cake barn (with 3 No. cake bays, 4-day retention time, approx. 450m^3 total cake bay storage capacity, covered by barn)
- 2 No. Boilers (input of 3.9MWth each)
- 2 No. CHP (input of 3.745MWth each)
- 1 No. Biogas flare stack (1,500m^3/h max)

A schematic for the odour control units can be found in Appendix 0.

3 Potential odour sources

3.1 Overview of the mechanisms for odour generation

The generation of odour from the processing of sewage is primarily associated with the release of odorous Volatile Organic Compounds (VOCs) that are generated as a result of the anaerobic breakdown of organic matter by micro-organisms.

Since the main source of odour and VOCs is the solid organic matter, the most intense and offensive odours tend to be generated from the operations involving the handling of sludge i.e. the processes applied to dewater, treat and store raw sludge. These processes are generally considered to present the greatest risk of odour impact off-site unless adequate controls are put in place. Depending on the quality of the sewage presented to the works, aspects of the treatment process involved in the handling of raw sewage (e.g. preliminary and primary treatment stages) may also contribute to offensive odours.

Odours generated from the sewage treatment processes downstream of the primary sludge removal stage (e.g. the WwTW processes) present a significantly reduced risk of odour impact. This is due to the fact that the majority of odorous biogenic material has been removed from the flow at this point, and the treatment processes applied to remove any remaining contaminants in the sewage are aerobic, which inhibits the formation of the majority of the reduced sulphur compounds which are responsible for offensive sewage odours.

The rate of odour release from sewage and sludge sources is primarily dependent on the temperature of the material, and the surface area exposed to the atmosphere. As a result, odorous emissions from sewage treatment operations tend to be highest during the summer months. Furthermore, activities that lead to increases in the surface area of odorous material exposed to the atmosphere (e.g. due to turbulence generated by sewage handling processes and agitation of sludge) will inevitably lead to an increase in the magnitude of odour released.

DCWW acknowledges that high levels of odour arising from wastewater and sludge treatment are not acceptable and that reasonable and practicable measures must be taken to minimise any nuisance caused to the general public. Site specific factors such as site history with regard to odour complaints, potential future encroachment by residential or business developments, and the presence of particularly odour sensitive receptors within the vicinity of the Site are also taken into consideration.

3.2 Potential odour sources

Table 3. identifies the plant, equipment and activities which have the potential to generate odours under normal operational conditions. Odour sources under emergencies and abnormal operating conditions are addressed in section 4.2.3.

Wastes accepted to the STC, under the Environmental Permit, are listed in Appendix A.

Due to the nature of the site activities, the hedonic tone of odours is neutral at best, whereas most odours generated on site will have a negative hedonic score (therefore deemed offensive). As the local population has already become sensitised to this, it is prudent to reduce the benchmark of the rating associated with sludge treatment. The hedonic score of the material will improve through the sludge treatment process as organic material is digested.

The permitted area of the site treats surplus activated sludge from the wastewater treatment, works and imported sludge cake which is conveyed by road from other Welsh Water sites.

The odorous material which leaves the permitted area is digested sludge which exported by road from the cake pad.

Details of the type, odour potential and quantity of odorous materials stored on site are provided in Table 3.1 below:

Table 3.1: Identified potential odour sources

Process or activity	Plant or equipment	Potential odour source	Odour controls in place	Potential for odour emissions during normal conditions	Potential emission route
Sludge reception	Sludge import hoppers SS 7613 8733 Indigenous sludge silo SS 7615 8734	Sludge cake	The silo is maintained under negative pressure and odours extracted for treatment in OCU 1 Indigenous sludge silo (activated sludge) Maximum storage: 100m^3 Maximum retention time: 4 days Sludge cake is imported in sealed or covered containers and is discharged into the enclosed import hoppers from which air is extracted to the OCU 1. Imported cake silo Maximum storage: 40m^3 each Maximum retention time: 24 hrs	Moderate	Fugitive Diffuse
Sludge treatment	THP feed silo SS 7616 8734	Sewage sludge	The THP feed silo is fully enclosed and maintained under negative pressure and odours extracted for treatment for OCU 2 (not in use). With regular monitoring and is therefore unlikely to generate odour. Maximum storage: 600m^3 Maximum retention time: 3 days	Low	Fugitive
	THP plant SS 7615 8731	Sewage sludge	The THP is fully enclosed and sealed with off-gas directed to the digester biogas system, regular monitoring is undertaken and the process is therefore unlikely to generate odour. Pulper Maximum quantity: 5m^3 Maximum retention time: continuous filling / emptying Reactor Maximum quantity: 7m^3 Maximum retention time: 30 min, then fills again. Flash tank Maximum quantity: 6m^3 each	Low	Fugitive

Process or activity	Plant or equipment	Potential odour source	Odour controls in place	Potential for odour emissions during normal conditions	Potential emission route
			Maximum retention time: continuous filling / emptying		
	Anaerobic digesters pressure release valve SS 76098 87280 SS 76120 87291	Biogas	The digesters are covered and any biogas and odorous emissions are collected into the sealed biogas system, prior to incineration in the CHP plant, boilers or high temperature flare. Digester gas pressure and CHP/boiler/flare operation is continually monitored to ensure pressure release via the Whessoe valves are minimised as far as possible. Whessoe valves are located at the top of the digestors (~ 26 m) to maximum dispersion in the event of a release. Maximum storage: 4,250m^3 each Maximum retention time: 31 days	Low	Fugitive
	Digested sludge holding tank SS 76135 87304	Liquid sludge	The digested sludge holding tank is not covered. The tank is mixed to prevent settlement of solids, and retention time in the tank is kept to a minimum. The process is monitored and regularly maintained. Maximum storage: 500m^3 Maximum retention time: 3 days	Moderate	Diffuse
	Centrifuges SS 7616 8737	Sludge cake	Each centrifuge is a sealed unit, enclosed within a building for SAS thickening (pre-digestion). Planned preventative maintenance is regularly undertaken on equipment.	Low	Fugitive
	Belt presses SS 7618 8732	Sludge cake	Belt presses are located in an enclosed dedicated double skin steel frame building. Access doors are kept shut and personal doors are fitted with self-closing mechanisms. The belt presses are enclosed and air is extracted to the OCU 2. Small amounts of gas released from liquors at the centrate discharge point, this is collected through extraction to the central OCU 2. OCU 2 is currently not in use.	Low	Fugitive
	OCU SS 76161 87353 (OCU1) SS 76172 87358 (OCU2)	Untreated air	There are two Odour control units at the Site to treat air and remove odorous compounds. These are process monitored and planned preventative maintenance is regularly undertaken on equipment.	Low	Channelled
	Cake storage bays SS 7620 8733	Sludge cake	Cake bays are located within the cake barn and is away from sensitive receptors on the east of the site, which is an enclosed area. Quantity of cake is kept to a	Low	Diffuse

Process or activity	Plant or equipment	Potential odour source	Odour controls in place	Potential for odour emissions during normal conditions	Potential emission route
			minimum. Air is extracted and treated through OCU 2. OCU 2 is currently not in use Maximum storage: 450m^3 Maximum retention time: 7 days		
Biogas combustion	Gas holder SS 7609 8729	Biogas	This is a sealed system. Maximum storage: 2,000m^3	Low	N/A
	CHP units SS 7612 8734 SS 7612 8735	Biogas	The CHPs are operated to ensure effective incineration of biogas Planned preventative maintenance undertaken on equipment. If CHP unit is down, gas is burnt in flare	Low	Channelled
	Boilers SS 7612 8734 SS 7612 8735	Biogas	The boilers are operated to ensure effective incineration of biogas. Planned preventative maintenance undertaken on equipment	Low	Channelled
	Flare SS 7607 8730	Biogas	To ensure effective incineration of excess biogas,, Planned preventative maintenance undertaken on equipment	Low	Channelled
Cake export	Cake export	Sludge cake	Lorries/trailers are covered before leaving or sealed skips are used. Covers only removed when inside building and loading of cake is taking place. Cake is exported to farms which occurs outside.	Medium	Diffuse

3.3 Odour impact

3.3.1 Adjoining land use

The Site is surrounded by industrial premises to the north and east, by sea to the west and south. The Associated British Ports Port Talbot land is located to the northwest of the Site, with closest industrial being Port Talbot Steelworks area, located approximately 350m east. Due to the nature of the activities conducted in these areas, their sensitivity to odour emissions from the STC is likely to be low.

The nearest residential area to the Site is located approximately 2km to the east.

3.3.2 Sensitive receptors

Receptors sensitive to odour include users of the adjacent land, which may vary in their sensitivity to odour. The level of sensitivity will be defined using the Institute of Air Quality Management guidance[5].

- High sensitivity receptors e.g. residential dwellings, hospitals, schools/education and tourist/cultural.
  - users can reasonably expect enjoyment of a high level of amenity; and
  - people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.
- Medium sensitivity receptor e.g. places of work, commercial/retail premises and playing/recreation fields.
  - users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or
  - people wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.
- Low sensitivity receptor e.g. industrial use, farms, footpaths and roads.
  - the enjoyment of amenity would not reasonably be expected; or
  - there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.

The magnitude of risk relates to[5]:

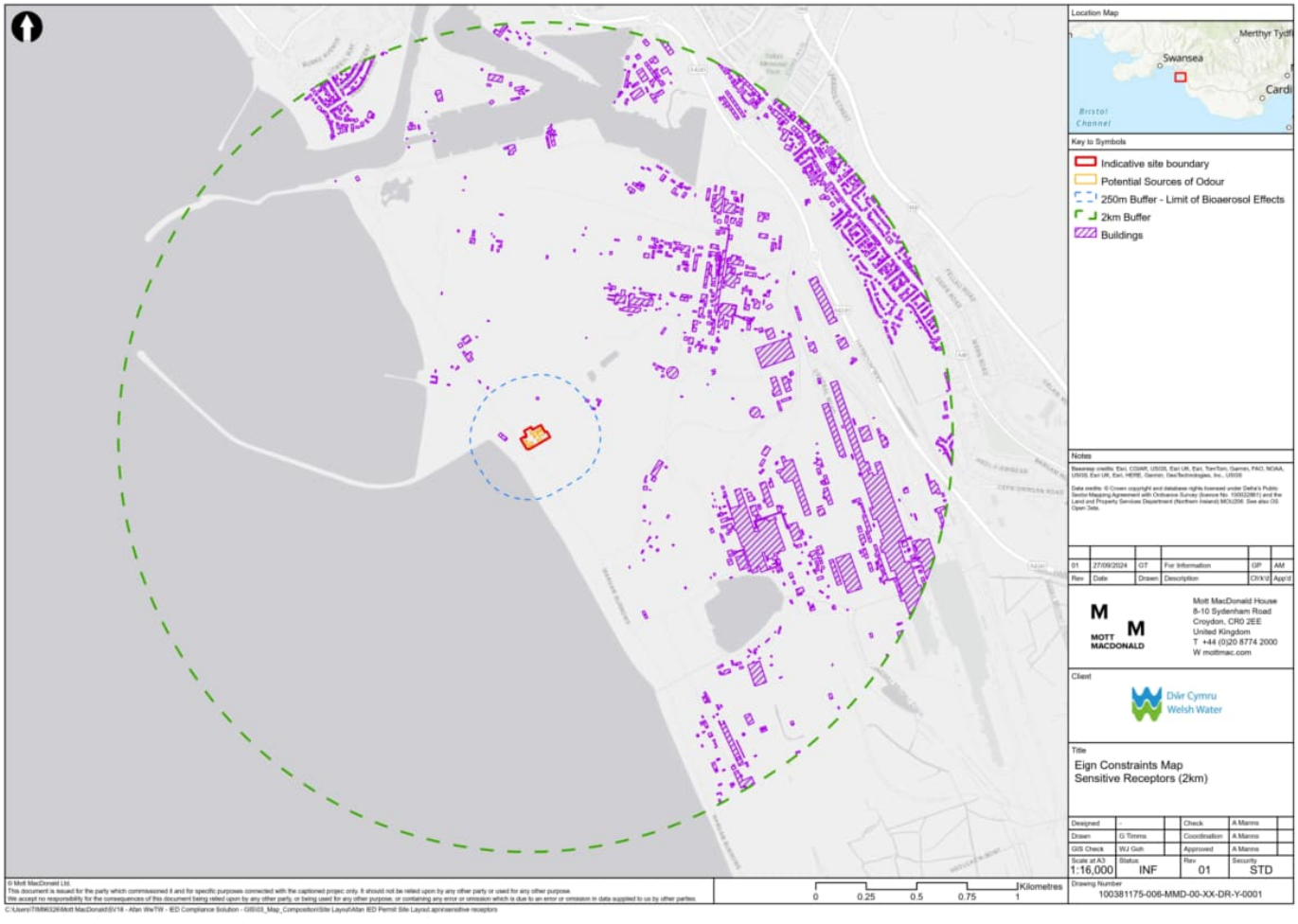
- Frequency: How often an individual is exposed to odour
- Intensity: The individual's perception of the strength of the odour
- Duration: The overall duration that individuals are exposed to an odour over time
- Odour unpleasantness: Odour unpleasantness describes the character of an odour as it relates to the 'hedonic tone' (which may be pleasant, neutral or unpleasant) at a given odour concentration/ intensity. This can be measured in the laboratory as the hedonic tone, and when measured by the standard method and expressed on a standard nine-point scale it is termed the hedonic score.
- Location/Receptor sensitivity: The type of land use and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor. The 'Location' factor can be considered to encompass the receptor characteristics, receptor sensitivity, and socio-economic factors.

There are four sensitive receptors located within 500m of the potential emission sources at the Site. These are:

[5] Institute of Air Quality Management (2018) Guidance on the assessment of odour for planning V1.1. Available online at: https://iaqm.co.uk/text/guidance/odour-guidance-2014.pdf

- Receptor 1 – Recreational area at Margam Sands approximately 30m southwest of the Site
- Receptor 2 – Industrial facilities approximately 260m northeast of the Site
- Receptor 3 and 4 – Commercial facilities approximately 450m northwest of the Site
- As shown in

- Figure 3.1: Sensitive receptors within 2km of the Site



the receptor closest to a potential emission source is a recreational area, which is located approximately 30m southwest of the anaerobic digesters.

Table 3. identifies the sensitive receptors within 500m of the Site.

Figure 3.1: Sensitive receptors within 2km of the Site

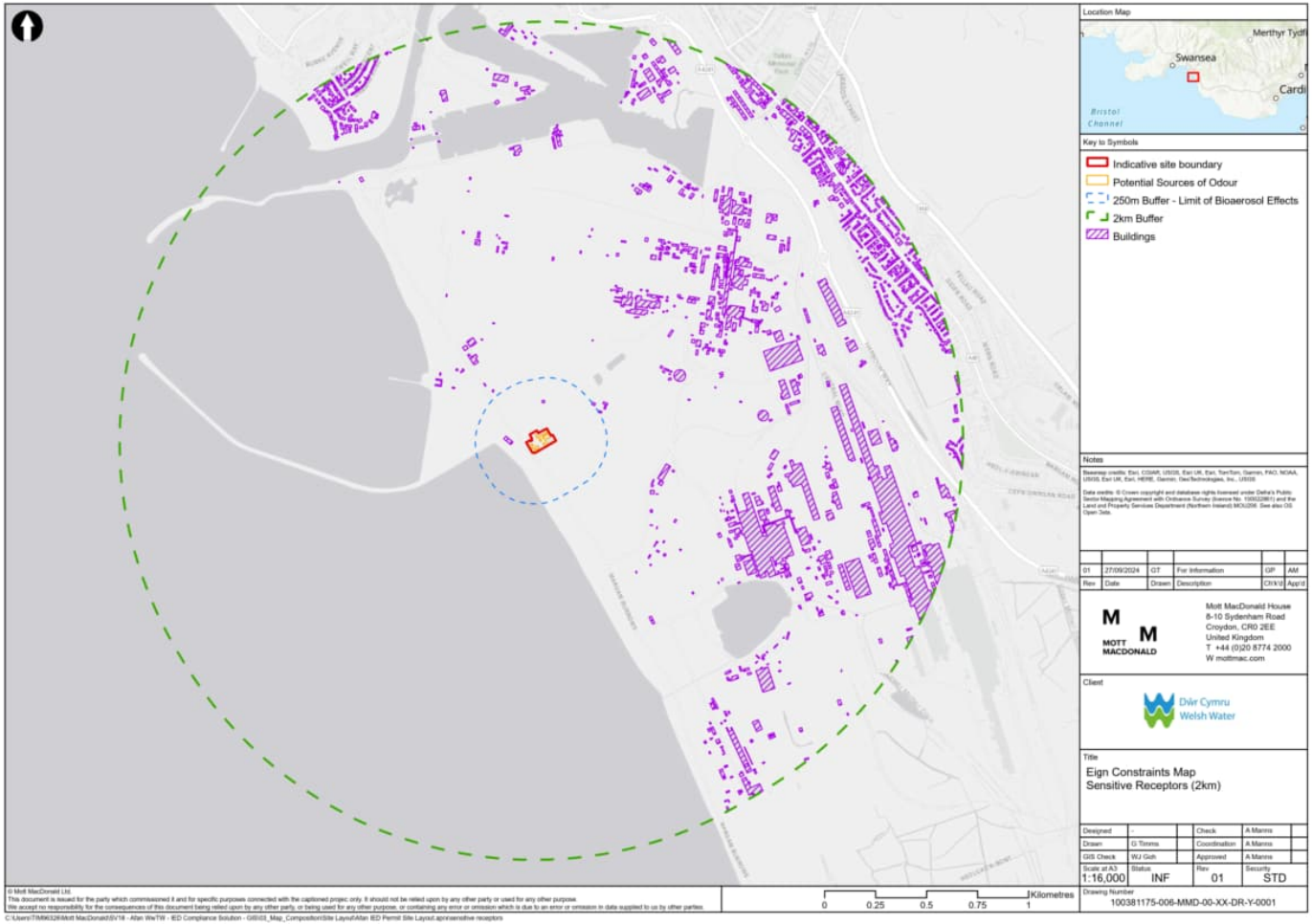


Table 3.2: Receptors within 500m of potential emission sources at the Site

Receptor	Nearest emission source to receptor	Process	Distance (m) from nearest potential emission source	Direction of receptor from closest emission source
Receptor 1- Recreational area at Margam Sands to the southwest of the Site	Imported sludge tank	Sludge reception	95	Southwest
	Indigenous sludge silo	Sludge treatment	115	Southwest
	THP feed silo	Sludge treatment	110	Southwest
	THP	Sludge treatment	90	Southwest
	Anaerobic digesters	Sludge treatment	30	Southwest
	Digested sludge holding tank	Sludge treatment	80	Southwest
	Cake bays	Sludge treatment	110	Southwest
	CHP and boiler building	Biogas combustion	90	Southwest
	Gas holder	Biogas combustion	30	Southwest
	Flare	Biogas combustion	35	Southwest
Receptor 2 – Industrial facilities to the northeast of the Site	Imported sludge tank	Sludge reception	270	Northeast
	Indigenous sludge silo	Sludge treatment	260	Northeast
	THP feed silo	Sludge treatment	260	Northeast
	THP	Sludge treatment	275	Northeast
	Anaerobic digesters	Sludge treatment	310	Northeast
	Digested sludge holding tank	Sludge treatment	290	Northeast
	Cake bays	Sludge treatment	240	Northeast
	CHP and boiler building	Biogas combustion	250	Northeast
	Gas holder	Biogas combustion	330	Northeast
	Flare	Biogas combustion	340	Northeast
Receptor 3 – Commercial facilities to the northwest of the Site	Imported sludge tank	Sludge reception	490	Northwest
	Indigenous sludge silo	Sludge treatment	500	Northwest
	THP feed silo	Sludge treatment	505	Northwest
	THP	Sludge treatment	515	Northwest

Receptor	Nearest emission source to receptor	Process	Distance (m) from nearest potential emission source	Direction of receptor from closest emission source
	Anaerobic digesters	Sludge treatment	505	Northwest
	Digested sludge holding tank	Sludge treatment	515	Northwest
	Cake bays	Sludge treatment	520	Northwest
	CHP and boiler building	Biogas combustion	470	Northwest
	Gas holder	Biogas combustion	485	Northwest
	Flare	Biogas combustion	465	Northwest
Receptor 4 – Commercial facilities to the northwest of the Site	Imported sludge tank	Sludge reception	465	Northwest
	Indigenous sludge silo	Sludge treatment	475	Northwest
	THP feed silo	Sludge treatment	480	Northwest
	THP	Sludge treatment	495	Northwest
	Anaerobic digesters	Sludge treatment	495	Northwest
	Digested sludge holding tank	Sludge treatment	495	Northwest
	Cake bays	Sludge treatment	495	Northwest
	CHP and boiler building	Biogas combustion	445	Northwest
	Gas holder	Biogas combustion	475	Northwest
	Flare	Biogas combustion	455	Northwest

Note: Distance from source to receptor is rounded to the nearest 5m.
Value in bold represents the nearest potential emission source for each process which is closest to a sensitive receptor.

3.4 Odour modelling

This qualitative review of odour follows a Source-Pathway-Receptor concept as endorsed by England's Environment Agency and Institute of Air Quality Management (IAQM) [6,7]. For odour exposure to occur and cause an effect, all three links in the Source-Pathway-Receptor model must be present. There must be a means for the odour to be released into the air (source), a

[6] Environment Agency (2011) H4 Odour Management – how to comply with your environmental permit [online]. Available at: https://www.gov.uk/government/publications/environmental-permitting-h4-odour-management. Accessed March 2024.

[7] Institute of Air Quality Management (2018) Guidance on the assessment of odour for planning V1.1 [online]. Available at: https://iaqm.co.uk/text/guidance/odour-guidance-2014.pdf. Accessed March 2024.

way for the odour to travel through the air (pathway) and people (receptor) must be present at the locations where the odour is present.

The scale of exposure is determined using factors referred to as the Frequency, Intensity, Duration, Offensiveness and Location (FIDOL) factors.

- **Frequency** – How often an individual is exposed to odour
- **Intensity** – individual's perception of strength of odour
- **Duration** – Duration that individuals are exposed to an odour over time
- **Odour unpleasantness** – the character of an odour (pleasant, neutral, unpleasant) at a given intensity.
- **Location** - The type of and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor. The 'Location' factor can be considered to encompass the receptor characteristics, receptor sensitivity, and socio-economic factors.

The odour potential generated by the Site is expected to be moderate at worst based on the small size of the site coupled with its potential to release odours with an unpleasant character.

The nearest land uses to the Site are all classified as low to medium sensitivity. The frequency, duration and expectation of good amenity at all receptors is low given the land use and transient nature of exposure. Nearby receptors include:

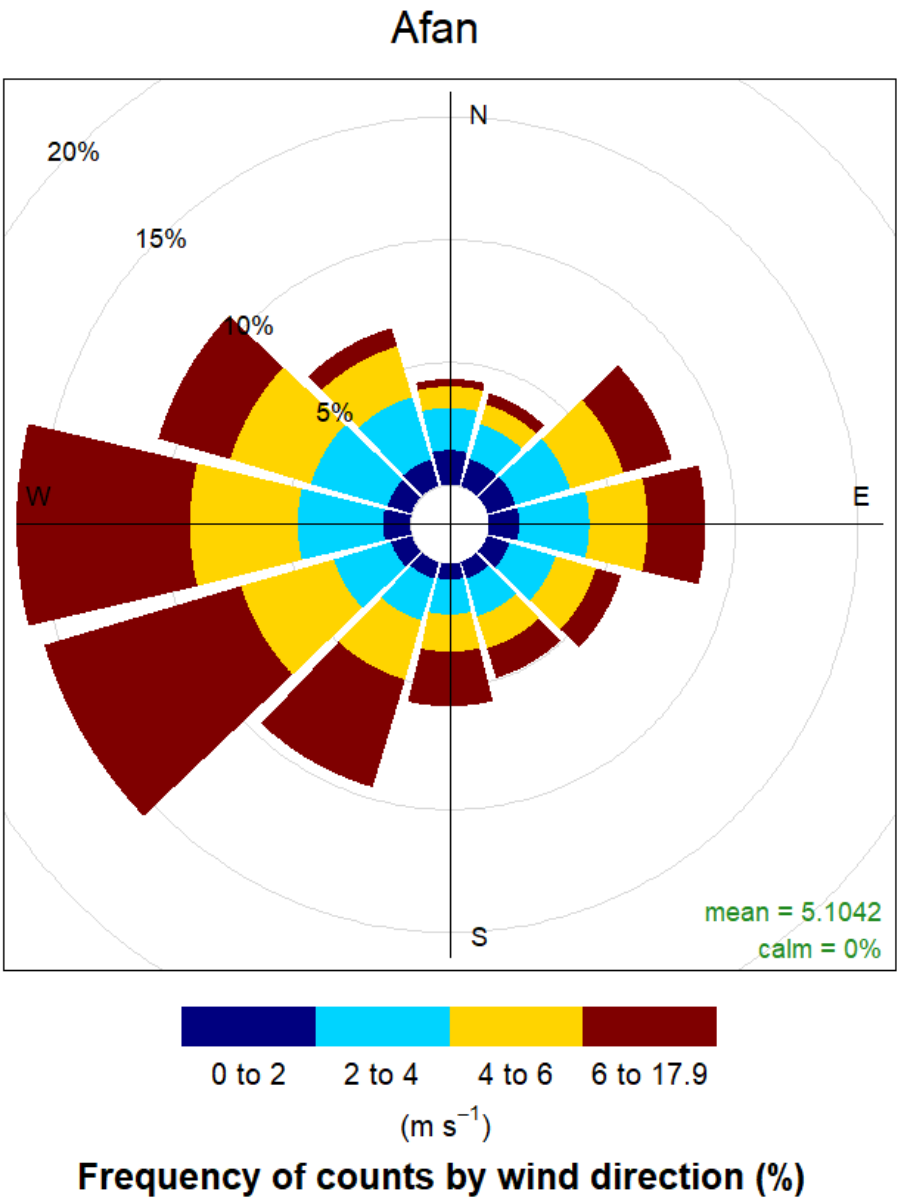
- Low sensitivity recreational receptors located at Margam Sands approximately 30m to the southwest where there is transient exposure and people may be expected to be present but for limited periods of time.
- Low sensitivity industrial land use at Margam Works approximately 260m to the northeast where enjoyment of amenity would not reasonably be expected and exposure is transient.
- Two medium sensitivity areas containing commercial premises at Margam Moors approximately 450m northwest where people could expected to enjoy a reasonable level of amenity but not the same level of amenity as in their own home.

The effectiveness of the pathway for odour impacts associated with the Site has been assessed using wind data and the locations of the nearest sensitive receptors relative to the Site. Modelled wind data for the years 2019-2023 were derived for the Site from an atmospheric hindcast model (Vortex), as shown in Figure 3..

During 2019-2023, these receptors were downwind from the site approximately 28% (recreational receptor), 15% (industrial receptor), and 3% (commercial receptors) of the time. Based on the distance between these receptors and the Site and the frequencies of winds to disperse odours towards these receptors, the pathway for odour impacts from the Site to the industrial and commercial receptors is considered to be slightly effective. The pathway for odour impacts from the site to the recreational receptors at Margam Sands is considered to be moderately effective.

When considering the Source-Pathway-Receptor concept along with the FIDOL factors, the likely magnitude of effect from odour exposure is negligible and no further assessment is required.

Figure 3.2: Average wind rose for the Site from the Vortex model, 2019-2023



Source: Vortex Model for the Site, 2019-2023

4 Odour management and control

4.1 Odour control system

All sources of odour identified at the Site have been either covered or are enclosed within buildings and the air is extracted continuously to the odour control units.

There are two OCUs on site which only one is currently operating. OCU 1 treats odours from the STC import area, centrifuges (pre-digestion), the THP feed silo and THP plant. This OCU is a dual stage unit, with a biofilter followed by carbon filter. OCU 2, which is currently not in use, is in place to treat odorous air from the belt presses (dewatering post digestion) and cake barn and comprises a single stage treatment with an acid scrubber for ammonia removal.

Treated air is then released to the atmosphere. The key parameters of the odour control systems are described in Table 4..

Table 4.1: OCU details

Specification	OCU 1	OCU 2 (not in use)
Model type	Dual stage with biofilter followed by carbon filter	Single stage acid scrubber for ammonia removal
Stack height (m)	2	7
Flow (m^3/h)	3,030	1,080

The removal of biosolids off-site will be undertaken as soon a practically possible whilst considering prevailing weather conditions.

Leak detection by means of a methane gas analyser is installed on biogas holder/s to ensure any leaks from the inner bag are detected. Any leaks detected on the biogas system would always be fixed immediately by DCWW due to the process safety risk posed by biogas.

A process flow diagram showing which assets are covered by the OCU can be found in Appendix 0.

Odour control checklists can be found in Appendix C.

4.2 Odour control in normal and abnormal conditions

All operating practices must be compliant with the Site's O&M manuals, DDCW company practices and management systems and the OMP.

In order to achieve overall odour containment and thus to minimise unplanned releases of odour to atmosphere, it is essential that:

- The integrity of all covers over process units is maintained continuously, other than during periods of essential maintenance.
- All doors in buildings ventilated to the odour control system remain closed except when access is required and that the integrity of the buildings fabric is ensured.
- Imports of pre-digested cake are to be offloaded into enclosed hoppers and OCU extraction operating.
- Any imports to the STC import centre to be undertaken as quickly as possible to limit odour emissions.
- Where routine, planned and emergency maintenance of plant items must be carried out and there is a high risk of odour being released to atmosphere in quantities sufficient to

result in detection off-site, a detailed risk assessment of the activity is conducted, as part of which issues of odour generation, release and control are considered.

4.2.1 Normal conditions

There will be regular occasions throughout the year when routine, planned and reactive maintenance are carried out in order to ensure continued optimum operation of wastewater treatment and sludge recycling. Routine and planned maintenance tasks are divided into different classifications according to the level of complexity, speciality and frequency. The classifications are:

- Routine Operations: the daily and weekly routine operations are schedule centrally in DDCW using the DDCWW's System Application and Products (SAP) system. These are considered through weekly and quarterly programmes of work. Site operators are responsible for carrying out the tasks and the Operations Supervisor for checking completion and quality.
- Planned Maintenance: the programmes for planned maintenance are generated centrally in DCWW, using the SAP system. The system allocates a criticality for each asset and a defined maintenance frequency which ranges from quarterly to every two years. Jobs are sent direct to qualified mechanical or electrical technicians via electronic communication. Start and completion of tasks, including work done, are logged direct to DCWW SAP system, which produces records of plant performance. Site and regional mechanical and electrical staff, in conjunction with specialist contractors, are responsible for carrying out the tasks and the Operations Supervisor for checking completion and quality.
- Contractor Maintenance (CM): the programmes for planned maintenance of some categories of specialist equipment (odour control equipment, odour control monitoring equipment, etc.) are generated regionally. Paper records of work carried out, completion and approval are kept on-site and by the Supply Agreement Leader.
- Local Plant Monitoring (LPS): critical electrical and mechanical elements of the process are also continuously monitored via the Site's SCADA system and/or telemetry to Smart Hub and are allocated priority levels ranging from one to six, with one being the lowest criticality and six being the highest (e.g. immediate repair). Smart Hub is DCWW's alarm management centre, based in South Wales. The team are in place to specifically monitor the thousands of assets owned by Welsh Water around the clock, 365 days a year. The team of dedicated analysts work shifts to monitor our alarm systems, receiving early warning alerts of any problems at our sites or in our water and sewerage network. In the event of a failure, an alarm is sent to SCADA and/or Smart hub and a ticket will be raised in SAP for remedial action based on the priority level. Remedial actions are undertaken by the operations maintenance team during working hours, or the standby team out of hours.
- Contractors Records (CR): Records of sludge deliveries are recorded electronically and reported monthly. Records are available via online database.
- Material Delivery and Removal: Records of sludge deliveries are recorded electronically. Chemical delivery records are maintained on site logs. Bulk chemical deliveries and consumption are recorded on SAP.

Minor repairs and routine maintenance work are carried out continuously throughout the year during the working day, avoiding evenings and weekends, except in emergencies. Where possible, more major maintenance tasks are carried out in a planned manner according to priority and resources. Odour sensitive major maintenance tasks will be aimed to be undertaken during the winter period (between October and April), where appropriate. The emphasis in planning this maintenance is to minimise the time required to carry out the work, ensuring as far

as possible, that odours are contained or abated during the work and to deploy alternative odour suppression systems, if required.

Where a maintenance operation is likely to release quantities of odour likely to be detectable off-site, the relevant authorities and the DDCW Call Centre would be informed in advance.

Table 4. highlights the typical maintenance activities for sludge treatment processes.

Table 4.2: Typical maintenance for sludge treatment activities

Process	Period	Typical maintenance activities
Sludge import	Ad-hoc	Regular checks on deliveries and operation of exhaust extraction and ventilation, removal of skips from sludge
	Weekly	Routine checks on equipment. Tasks carried out and records maintained under the Site operating and monitoring plan
	Monthly	Checks by M&E. Tasks carried out and records maintained under regional maintenance schedules
	Annually	Checks by M&E. Tasks carried out and records maintained under regional maintenance schedules
Sludge storage	Daily	Monitoring of levels. Tasks carried out and records maintained under the Site operating and monitoring plan.
	Weekly	Visual inspection of plant and equipment. Tasks carried out and records maintained under the Site operating and monitoring plan
	Dictated by operational performance	As required drain down and clean tank, inspect structure. Tasks carried out and records maintained under regional maintenance schedules
Thermal hydrolysis	Daily	Routine daily checks
	Weekly	Routine weekly checks and maintenance
	Monthly	Maintain and adjust plant to maintain efficiency
	Annually	Checks by M&E as per regional maintenance schedules
Digesters and degassing tanks	Daily	Feed Volume, temperature, dry solids test, and visual inspections (levels and equipment) monitoring
	Monthly	Checks of pressure relief valves and plant. Routine maintenance of systems
	Annually	Checks and service of gas systems
Centrifuges	Daily	Routine check as advised by supplier
	Weekly	Routine check as advised by supplier
	Monthly	Checked in line with routine service agreement by appointed service provider
	Annually	Serviced and checked by appointed service provider
OCUs	Daily	Routine daily checks
	Weekly	Inspection and maintenance routines in accordance with both the frequency and task specified in the regional maintenance schedules
	Monthly	Inspection and maintenance routines in accordance with both the frequency and task specified in the maintenance schedules (including monitoring of pressure, flow rate for both gas and liquid, the pH of scrubbing liquid, inlet gas temperature, pressure differential, inlet gas moisture content, and leak check monitoring)
	Annually	Annual service by the odour control service provider in line with contracted maintenance requirements, including checks on the gas pipes of the scrubber and cleaning of the nozzle of liquid feeding system and demisters

Diffuse emissions from open storage areas, are minimised by:

- Minimising the volume of sludge cake being stored to eliminate the risk of cake overspilling.
- The sludge cake not being handled once in the cake bay, (unless liming is required, however this requires minimal handling) until it is being removed from site.
- All sludge cake being exported is transported in covered lorries.
- Ensuring optimisation of the digestion process to limit the bioaerosol potential of post-digested sludge.

To minimise odour nuisance, it is important to ensure that the Site is operating as designed. Covers and hatches are replaced to maintain the integrity of enclosures provided to collect odorous air.

4.2.2 Odour risk assessment

Unless it is in an emergency situation, an odour risk assessment will be undertaken before carrying out maintenance tasks with high odour risk and high odour sensitivity. Examples of such activities are:

- Shutdown of odour control systems for an extended period for maintenance.
- Non-routine draining down of large open process tanks with potential to generate odour.
- Lifting of odour control covers, opening of hatches or keeping doors of odour-controlled building open for an extended period.
- Commissioning of new odour sensitive processes or equipment where odour risk may not be adequately mitigated.
- Significant flow diversion outside odour-controlled processes for an extended period.

An odour risk assessment matrix will be used to determine the odour risk for planned and unplanned maintenance work commonly performed. Where an unusual activity, not contained in the matrix is planned, a site-specific risk assessment will be carried out according to a standard procedure. The matrix also includes foreseeable situations for emergency breakdown and situations arising as a result of dealing with an emergency where the ability to improve control of or minimise odorous release is compromised. The advice given by the odour risk assessment matrix will be followed, as appropriate, taking into account site conditions.

Table 4.3 provides an example of a risk assessment for routine maintenance operations, which are reviewed and updated at least annually.

Natural Resources Wales will be informed in advance of the nature and duration of maintenance work and measures to be undertaken when a significant odour risk is identified from the Odour Risk Assessment.

Table 4.3: Example of risk assessment for routine maintenance operations

Event	Implications	Odour risk	Proactive actions	Responsive actions
Maintenance of process within the STC	Opening of hatches, and exposure of process units to building	Low	Processes contained within the STC which itself is odour controlled	Minimise number of hatches open at any one time
Maintenance on sludge treatment process (not biogas system)	Potential for odour release if any sludge exposed to atmosphere	High	Divert or minimise sludge throughput in process area	Carry out during winter months where possible, if required during summer use portable odour reduction sprays
Maintenance of odour control system	Reduced capacity for period of maintenance risk of odour release if input peaks received	Medium	Control processes to minimise risk of high peaks of H_2S reaching odour control unit	Carry out during winter months where possible, if required during summer assess need to use portable odour reduction sprays

4.2.3 Abnormal conditions

There will also be unanticipated breakdowns of equipment which require unplanned and emergency maintenance. During periods of abnormal conditions, the normal odour standard and emission standards may not be able to be fully complied with, and/or there may be fugitive emissions of odour from parts of the Site where there are normally none. Exemption would be required for these operations.

In the event of plant failures or emergency situations, this would raise an alarm on the Site's SCADA and/or Smart hub and a ticket will be raised in the SAP system for remedial action based on the priority level. Remedial actions are undertaken by the operations maintenance team during working hours, or the standby team out of hours.

Depending upon the nature of the fault or emergency, a mechanical or electrical technician, both of whom are on-call 24-hours, would be contacted and will attend the Site as soon as practicable if required. All faults, breakdowns and emergencies are logged electronically in the SAP system together with records of the action taken and the solutions reached.

Waste arriving at Site is quarantined in any of the following circumstances:

- Hazard Analysis Critical Control Point (HACCP) critical limit breach
- Maximum Acceptable Concentration (MAC) sample failure
- Measured cake DS% onsite has dropped below 20% (the 20% has to be confirmed by 2nd sample)

If any of these situations take place, then material will need to be quarantined in line with the procedure for contingency for non-compliant biosolids.

1. The biosolid will be reclassified from holding phase to quarantine status. The quarantined biosolid will not leave site. The Agricultural Scientist must be informed immediately in order to re-classify the 'holding' stockpile to 'quarantined' stockpile. If there is insufficient storage to hold the biosolids on site, with permission from the Bioresources Operations Manager, the biosolid will be held off site. The Bioresources Operations Manager is responsible for ensuring that adequate controls are in place to prevent application of potential non-compliant biosolids.
2. A second sample may be taken to ascertain if there is a laboratory error. If the result is compliant, the biosolid can be removed from quarantine status.
3. A sample of any stockpiles deemed potentially non-compliant may be taken to confirm biosolid status. If the results are of an enhanced standard, the biosolids in the stockpile may be recycled to land as normal.
4. If biosolid does not meet enhanced standard, the biosolid may be retreated at another AD sludge treatment facility, limed, or taken to landfill for disposal. This will be decided by the Biosolids Operations Manager at the time of the 'incident'.
5. If a sample result identifies that the biosolids meets conventional standard and all other contingency options are unavailable, consideration will be made to spread to agricultural land as a conventional biosolid. This must be approved by the Head of Bioresources due to implications on Welsh Waters Measures of Success.
6. Imports may be diverted during this period of non- conformance and indigenous sludge may be transferred to another AD treatment facility until compliance is restored.

If non-compliant material cannot be held at the Site, then the Site Manager should liaise with the Bioresources Operations Manager to arrange alternative storage.

Table 4.4 provides an example of a risk assessment for abnormal and emergency operations, which are reviewed and updated as required.

Natural Resources Wales will be informed when a significant odour risk is identified from the Odour Risk Assessment.

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Table 4.4: Example of risk assessment for emergencies and abnormal operating conditions

Event	Potential source of odour	Potential impacts	Odour risk	Measure to prevent or minimise risk	Actions to be taken
Breach of odour-controlled area (excluding sludge containing structures)	Untreated air	Effectiveness of foul air extract system compromised, risk of odour release until repairs completed.	Medium	Minimise odour generating activities in area.	Temporary containment pending full repair. Ensure any interconnecting doors etc secure. Minimise odour generating activities in area. Assess odour impact with local survey, use portable odour reduction sprays if requirement identified.
Breach of odour-controlled area sludge containing structure	Untreated air	Effectiveness of foul air extract system compromised, risk of odour release until repairs completed.	High	Review sludge handling operations divert or minimise for duration of breach.	Minimise area exposed to atmosphere and surround with portable odour sprays as appropriate.
Breach of biogas system/loss of biogas containment	Leaks from membrane	Uncontrolled release of biogas, risk of odour release until repairs completed.	High	Double membrane system with gas pressure between the membranes regulated and monitored. Methane detectors operated with alarms to alert operators of any leakage. Minimise activities for duration of containment loss.	Minimise sludge processing, divert to controlled release point via the combined vacuum and pressure release valve. Surround with portable odour sprays as appropriate. Diversion of biogas to CHP plant or flare. Inspection maintenance and repairs as appropriate. Record details and actions taken in site diary. Report to Natural Resources Wales. Emergency response from gas maintenance contractor.
Failure of odour control plant	Untreated air	High risk of release of abnormal operational odours direct to atmosphere until repaired.	High	Routine maintenance. Regular monitoring of equipment performance. Duty standby functionality. Standby capacity in the media beds. Emergency call to odour system maintenance contractor. Control processes to minimise risk of high peaks of H_2S reaching odour control unit.	Assess need to use portable odour reduction sprays. Investigate and repair.

Event	Potential source of odour	Potential impacts	Odour risk	Measure to prevent or minimise risk	Actions to be taken
				Design provides for degree of redundancy.	
Spillage of sludge on site	Liquid sludge	High risk of odour until cleaned up. Low volume spillage likely to go directly to drain which returns to the WwTW for treatment.	High	Regular site inspections and monitoring the system through SCADA to detect any spills. Priority to clean up as and when detected. Pipe work and tanks undergo regular inspections. Planned maintenance on equipment.	Stop source of spill and immediately wash down area. Repair or bypass if possible. If incident prolonged use portable odour sprays until cleared. Record spillage and actions taken in site diary.
Centrifuges	SAS sludge	Centrifuges are enclosed and air extracted to OCU.	Medium	Sludge dosed with polymer as required	
High pressure conditions in digesters	Release from pressure relief valve	Biogas would be vented at high pressure to aid dispersion.	Medium	Gas pressure is regulated and monitored	Diversion of biogas to flare. Record details and actions taken in site diary.
High pressure conditions in biogas holder	Release from pressure relief valve	Biogas would be vented at high pressure to aid dispersion.	Medium	Gas pressure is regulated and monitored	Diversion of biogas to flare. Record details and actions taken in site diary.
Sludge reception unit roller shutter door failure	Release from behind the shutter door in sludge reception	Effectiveness of odour control measures compromised, risk of odour release until repairs completed.	Medium	Minimise sludge reception activities until repairs have been completed	Record details and actions taken in site diary.
Failure of treatment process	Release from untreated sludge	Risk of odour from incomplete biological treatment until plant recovery achieved.	Medium	Process monitoring and having closed covers. Immediate involvement of process support team to identify cause of process failure and aid recovery. All mechanical and electrical equipment is connected to the DCWW Smart HUB by telemetry which enables breakdowns to be quickly identified and resolved with minimal impact on the process and odour generation.	Assess need to use portable odour sprays spread around process unit. All mechanical and electrical equipment is connected to the DCWW If an element of the process cannot be brought back online in a timely manner, temporary/mobile equipment will be utilised for the task required. Use of this equipment would be agreed with the NRW where relevant prior to use and risk assessments and plans for operation would be agreed beforehand.

Event	Potential source of odour	Potential impacts	Odour risk	Measure to prevent or minimise risk	Actions to be taken
Prolonged hot and dry period	High strength / septic sludge	Potential for septicity to develop throughout the works. Issues with temperature sensitive components	High	Increased monitoring. Planned maintenance on equipment.	Record details and actions taken in site diary.
Very high rainfall	Flooding causing failure of odour control equipment	Flooding on site causing failure of equipment	Low	Increased monitoring. Installing new equipment above water levels, if known to be an issue on site. Planned maintenance on equipment.	Check the performance of the OCU when water levels drop and replace media as required (if media has been flooded it may need replacing).

5 Monitoring

5.1 Routine monitoring

Routine checks and maintenance are defined within the DCWW SAP system, which is a centralised data management system that collects and processes data from across DCWW and is used by DCWW staff to define work schedules and record work related information amongst other applications.

The system allocates a criticality for each asset and a defined maintenance frequency which ranges from quarterly to every two years. Maintenance is undertaken in accordance with the relevant plant operation and maintenance manuals.

Critical electrical and mechanical elements of the process are also continuously monitored via the site SCADA system and/or telemetry to Smart Hub and are allocated priority levels ranging from 1 -6, with 1 being the lowest criticality and 6 being the highest e.g. immediate repair. Smart Hub is DCWW's alarm management centre, based in South Wales. The team are in place to specifically monitor the thousands of assets owned by Welsh Water around the clock, 365 days a year. The team of dedicated analysts work shifts to monitor our alarm systems, receiving early warning alerts of any problems at our sites or in our water and sewerage network.

In the event of a failure, an alarm is sent to SCADA and/or Smart hub and a ticket will be raised in SAP for remedial action based on the priority level. Remedial actions are undertaken by the operations maintenance team during working hours, or the standby team out of hours. For specialist tasks, action will be allocated to a suitably qualified contractor e.g. Marches look after the biogas system.

Remedial action for any faults identified as part of routine operation inspections are also raised through the SAP system.

In the event of an out-of-specification plant item is operating beyond normal operating ranges, the process parameters are outside optimum or an any other alarm being initiated, appropriate remedial actions would be instigated. Further measures are dealt with in subsequent sub-sections.

Any odour detected on-site during normal operation will be rectified using measures described in Table 4. to implement actions and prevention protocol. Routine sniff tests at the potential odour sources listed in Table 3. are in place to proactively mitigate odour reaching and exceeding the site boundary. If detected, investigation into odour source is undertaken and contingency measures listed in Table 4.5.1 are implemented.

Spares for critical equipment are either held on site or on short notice order, as defined in the SAP.

5.1.1 General duties

Operators shall carry out routine duties, as appropriate, according to the relevant operational and maintenance schedules and procedures to ensure effective operation of plants. Specific tasks include:

- Perform daily, weekly and monthly maintenance tasks as scheduled.
- Make regular observation of critical processes and equipment including odour sensitive and odour control systems.
- Carry out routine performance tests and recording.
- Order and take deliveries of chemicals and other consumables.

- Report performance issues or equipment problems promptly to Process Scientists, Mechanical and Electrical (M&E) technicians, Instrumentation, Control and Automation (ICA) technicians or Specialist Contractors, as appropriate.

5.1.2 Duties for odour control

Operators shall carry out the following tasks:

- Undertake and record any inspections in the site diary, along with any actions undertaken.
- Investigate odour complaints following the Complaints Procedure as shown in Appendix D.
- Record actions taken in respect of odour investigations.
- Conduct weekly sniff tests.
- Record and report incidents that caused significant odorous emission,
- Produce other records as required by the OMP.
- Undertake the Site odour monitoring and controls listed in Table 5..

Drivers delivering odours loads shall carry put the following tasks:

- Ensure loads are sealed and covered when arriving the Site and approaching the sludge reception.
- Covers to only be removed within the sludge reception building with the doors closed.
- Follow the spillage management procedures set out in Section 5.1.6 if odour materials are spilled.
- Any wastes that are not authorised to be accepted must not enter the Site (as referred to in the Duty of Care).

Table 5.1: Site odour monitoring and detection processes

Potential odour source	Routine actions required	Risk pre-control measures	Monitoring frequency	Attention level	Action level	Prevention action	Risk post-control measures
Raw sludge reception	Avoid excessive turbulence (open tanks). Ensure doors are closed before discharging or unloading. Connect foul air exhaust to hose before loading. Ensure vehicles cleaned after loading/unloading. Hose down any spillage after each load/unload. Clean contaminated wheels before leaving Site. Doors closed after unloading/discharging.	Medium	Daily	Increased odour and/or complaint raised		Stringent loading and unloading procedures. Extracted air from the tanker loading area is treated by odour control unit. If necessary, implement special odour mitigation measures to reduce the risk of odour nuisance. Make contractor aware of requirements in OMP.	Low
Transportation	Ensure only sealed or covered skips/trailers used. No removal of covers whilst parked waiting to load/unload. Monitor odours during cake loading.	Medium	Daily	Increased odour and/or complaint raised		If necessary, implement special odour mitigation measures to reduce the risk of odour nuisance. Make contractor aware of requirements in OMP.	Low
Sludge holding tanks	Minimising retention time Monitor odour levels around tank	Medium	Daily	Increased odour and/or complaint raised	Noticeable odour from tank.	Increase sludge treatment rate to reduce retention. Hose spillage's. Increase de-sludge ops up stream. Run odour masking system (Short term).	Low
Sludge blending	Minimise retention prior to thickening, dewatering or digestion. Discharge sludges and liquors, including imported sludges, to	Medium	Daily	Increased odours from areas	Noticeable odour from areas and/or complaint received.	Process is undertaken in an enclosed building with appropriate odour abatement.	Low

Potential odour source	Routine actions required	Risk pre-control measures	Monitoring frequency	Attention level	Action level	Prevention action	Risk post-control measures
	covered tanks, with displaced air passed through an OCU. Prevention of sludge accumulation in off-line tanks. Proactive identification of potential problems and tankering of sludges to other sites with odour abatement.						
Belt presses	Check for strong and uncharacteristic odours.	Low	Daily	Investigate unusual odours	Investigate and report strong/unusual odours to Operations Supervisor and Scientist.	Regular checks and investigative action.	Low
Gas flare stack	Complete biogas combustion should give clean emissions with blue or non-visible flame	Low	Daily	Occasional orange flame or black smoke visible	Constant orange flame or black smoke visible.	Routine M&E checks or maintenance to clean nozzles of carbon build-up.	Low
Whessoe valves on digesters	Check they are clear from foam residue.	Low	Daily		Not seating correctly.	Engage service contractor to resolve any problems.	Low
OCUs	Check pH. Check media condition.	Medium	Daily	pH>3	pH >3. Sudden drop in performance.	Ensure media is damp. Change media as per schedule	Low
Whole site	Doors to operational buildings will remain closed and hatches will be closed.	Medium	Daily	Increased odours	Noticeable odour from areas and/or complaint received.	Doors and hatches will only be opened for minimum periods while access is required for planned operational and maintenance activities.	Low

5.1.3 Visual and olfactory inspections

During the daily walkover a “sniff-test” in the vicinity of the STC assets will be carried out. Sniff testing will be undertaken at the security fence boundary, starting at an upwind location. Where possible, the sniff testing will be carried out by a person who is not accustomed to the odour generated by on site activities ie a person who has recently entered the Site boundary such as an Operations Supervisor.

During each walkover, the person undertaking the “sniff-test” must stand nearby to each potential source of odour identified in Table 3. and at least one location for the north, south, east and west of the site boundary (as close to the perimeter as practicable) and note on a map the location of the perimeter checks. Checks in each location should be undertaken for at least 20 seconds and the monitoring form completed, see Appendix C.

During the walkover, over a period of approximately 30 minutes, perceptive “sniff-testing” of the ambient atmosphere is conducted and observations are recorded on a daily check sheet (Appendix E). If odour is likely to exceed the Site’s boundary and, therefore, has potential to cause a complaint, then further measures will need to be undertaken.

The results of the sniff test will be recorded in the site diary or an appropriate form (Appendix E). Sniff testing is designed to detect any abnormal plant odour emissions, before it becomes an issue. In addition, it is important to document any potential contribution from other off-site sources of potential odour nuisance located outside of the facility boundary.

In the event that abnormal odour is detected, the source of the odour will be investigated, as appropriate, and remedial action taken, as necessary, following measures addressed in the OMP. The approximate extent of the downwind odour will be established to determine whether this reaches the downwind post and rail fence boundary. During maintenance and/or emergency conditions, which are likely to result in release of odours, the frequency of “sniff-testing” will be increased to twice daily, or more frequently as appropriate.

Actions for remediation will be assigned by the Operations Supervisor following the issue of an odour record. Once actions are completed, additional sniff tests at least once a day for minimum three days at the source of the odour will be carried out to determine whether further actions are required. Whereby odour is no longer detected the record will be closed. If odour remains the OMP and maintenance records will be reviewed to determine alternative actions to be taken, this process will continue until the odour issue is no longer on-going.

5.1.4 Housekeeping

The Site is operated in a manner to minimise odour release during general day-to-day operations. The site is monitored for spillages as part of routine inspections. If a spillage occurs, it is washed into site drainage as soon as possible or removed to an appropriate disposal location as soon as possible. If spillages are a recurring incident, investigations into the cause of such occurrences are undertaken, and action taken to minimise these occurrences.

Good housekeeping improves efficiency, creates a pleasant environment to work within and makes the Site less likely to cause odour nuisance. Operators have a responsibility to keep sites clean and tidy. The following steps will be followed by the Site operators and visitors to maintain good housekeeping:

1. Maintain the odour system so it is always operating.
2. Sludge to be stored for no longer than seven days to minimise odour nuisances.

Additional reminder signs will be displayed in prominent positions at the Site where open-doors, covers and skips present an odour risk and include:

- Keep all doors shut

- Keep all covers / lids latch closed
- Clean up spills immediately using disinfectant if required
- Monitor odour control systems
- All rubbish / waste to be disposed of immediately to relevant skip

5.1.5 Meteorological observations

DCWW will record daily in the Site's diary or appropriate form (Appendix E) the following meteorological data:

- Air temperature
- Wind Direction
- Wind Speed

Meteorological data will be reviewed in advance of activities that may present an odour concern, such non-routine activities like movement emptying of sludge cake, to consider suitable measure to limit odour. For example, timing of such activities to occur when wind speed is low (if possible).

Meteorological data will also be available to complete odour records to establish potential trends. Wind direction, wind speed and temperature will be sourced online from the Met office or onsite weather station.

5.1.6 Spillage management

All staff on-site have a responsibility to maintain good housekeeping and clear spillages at the earliest opportunity to prevent odour. The Site is monitored for spillages as part of routine inspections. If a spillage occurs from a process, operators will carry out clean up as soon as possible (using disinfectant, where necessary). If a spillage is caused by a lorry or tanker, the driver is responsible to clean up before leaving the Site. If a lorry or tanker left a spillage behind, operators will log and report any incident observed. The driver or company involved will be asked to return to the Site immediately to clean up. Significant spillage incidents will be recorded in the site diary.

Key areas at risk from spillage (and the control measures):

STC reception area

- Tanker drivers are responsible for cleaning up spillages after every load. A hose is supplied.

Cake barn

- Drivers are responsible for cleaning up spillages after every load.

Digester

- Anti-foam to be used, if appropriate, to suppress foaming of sludge within the digester or dewatering process.

Entire site

- Routine site inspections by Operations Supervisor and site manager – a minimum of once per month

If spillages are a recurring incident, investigations into the cause of such occurrences are undertaken, and action taken to minimise these occurrences.

5.1.7 Accident management

The Site operates under a set of site-specific Emergency Procedures which is incorporated into DCWW's Environmental Management System (where applicable) to prevent and manage environmental related accidents. The Emergency Procedures includes an inventory of substances stored at the site, details on storage facilities, inventory of pollution prevention equipment (spill kits and fire extinguishers), inventory of waste and storage capacities, contact details of internal contacts, national and regional (where appropriate) contact details of emergency services and environmental regulators. The Emergency Procedures are distributed to key staff, to supervise the implementation of the Plan, and shared with external contacts (emergency services and the NRW). The Emergency Procedures are accompanied by a site plan that identifies the locations of designated storage areas (and their maximum storage capacity), location of spill kits and fire extinguisher and storage locations and hazards posed by chemical substances.

The site-specific AMP (100123523_AMP_AFA September 2024) is reviewed annually and is the responsibility of the Site Manager. Master copies of the AMP are made available to all staff as part of their induction package and available on Sharepoint (DCWW Document system) for staff to review.

The Emergency Procedures reference procedures to comply with environmental legislation and protect the environment and human health in regard to potential accidents:

- Spill prevention and management, and operation of safety valves
- Procedure for recovering spilled product
- Procedures for the prevention of overfilling vessels, management of plant and equipment failures
- Fire prevention and responses to fires, including fire water containment procedures
- Security measures to prevent unauthorised access, arson and vandalism
- Competence, training and awareness requirements
- Monitoring and measurement requirements
- Record keeping procedures for the recording of incidents, accidents and near misses

5.2 Monitoring of the odour abatement system

The following monitoring checks, as shown in Table 5.2, are conducted on OCU1 and OCU2, when in operation. If faults are identified or trigger levels exceeded, an investigation will be launched and remedial action conducted without delay.

Table 5.2: OCU specific monitoring controls

OCU	Parameter	Monitoring frequency	Trigger level	Responsibility
OCU 1	Fan operation	Continuous -		Operator
	Irrigation pump operation	Continuous - Operator		Operator
	Outlet hydrogen sulphide conc.	Monthly	>1 ppm	Operator
	OCU checks	Monthly -		- Operator
	Outlet air flow	6 Monthly	<3,030 m3/hr	Specialist
	Odour (olfactometry) inlet & outlet	6 Monthly	>1,000 ouE/m	Contractor
	Flow balancing	Annual	As per design	Odour control contractor

OCU	Parameter	Monitoring frequency	Trigger level	Responsibility
	Replace media (biofilter) -	5 years -		Odour control contractor
	Replace media (carbon filter)	As required1 -		Odour control contractor
OCU 2	Fan operation	Continuous -		Operator
	Irrigation pump operation	Continuous - Operator		Operator
	Outlet ammonia conc.	Monthly	>1 ppm	Operator
	OCU checks	Monthly -		- Operator
	Air flow	6 Monthly	<1,080 m3/hr	Specialist
	Odour (olfactometry) inlet & outlet	6 Monthly	>1,000 ouE/m	Contractor
	Flow balancing	Annual	As per design	Odour control contractor
	Replace media (Scrubber) -	5 years -		Odour control contractor

Table 5.3 identifies the parameters and monitoring requirements to meet the permit conditions and BAT that needs to be undertaken at the Site.

Table 5.3: Parameters and monitoring requirements to meet the permit conditions and BAT

Emission point type	Parameter	Monitoring frequency	Monitoring standard or method
Channelled emissions to air (OCUs)	Hydrogen chloride	Once every 6 months	DCWW are to initially undertake characterisation of emissions from the odour control units, in line with BAT 3, to demonstrate if TVOC and HCI are present in the waste gas stream. If TVOC and HCI are identified as relevant in the waste gas streams Southern Water will monitor these emissions in line with BAT requirements and the Environmental Permit.
	TVOC		
	Ammonia	Monthly	As per design and manufacturer's specifications
	H_2S	Monthly	Maintenance undertaken by service provider, or otherwise as specified in the Environmental Permit
	Efficiency checks	Annual	Maintenance undertaken by service provider, or otherwise as specified in the Environmental Permit
	Gas stream flow	Continuous	As per design and manufacturer's specifications and SCADA, or otherwise as specified in the Environmental Permit
	Media replacement	Every 5 years or as required	Maintenance undertaken by service provider, which will determine when media is required to be replaced
	Overall operation, including air circulation	Daily	Visual assessment or otherwise as specified in the Environmental Permit

Service visits for the OCU's are undertaken by a contractor. A service visit report is issued after each visit which identifies priority actions required, other faults and comments as well as condition monitoring and observations.

6 Training

All Operations and Maintenance Staff (including sub-contractors) involved in the operation and maintenance of the works are trained in the relevant systems and processes employed under DCWW's Competent Operator Training program and Competency Management System.

All relevant staff are also trained out in the procedures relating to odour control and implementation of the site Odour Management Plan.

Staff training records are on Source.

DCWW has developed its own Competent Operator Training program, which identifies the training required for different roles on site.

Training on the following technical subjects relevant to odour control will be provided to operational staff according to needs and site requirements:

- Wastewater treatment processes.
- Sludge treatment processes.
- Checks for odour control equipment.
- Risk assessment of odour sensitive maintenance activities.
- Deployment of temporary odour control measures, for sites where these are present.
- Site requirements in relation to the Odour Management Plan.

The training needs of each individual are assessed during personal performance appraisal and reviews.

Formalised training for all grades of staff on the Site is undertaken relevant to job role. All staff are made fully aware of the need to be constantly vigilant with regard to site odour control and management procedures.

Records for training received by all staff are held electronically. Records of environmental training are kept in DCWW's EMS.

Relevant components of the OMP should form part of the induction process for all site staff and contractors, to ensure they are aware of the procedures and responsibilities in relation to odour.

7 Communication

The objective of communication in odour management is to raise the profile and awareness of the importance of odour control and to keep stakeholders informed of odour incidents, and management practices.

7.1 Internal communication

Odour control will be regularly included by Operations Supervisor as an agenda item for team meetings.

Statistics of odour complaints and progress of actions to address odour issues will be updated monthly and communicated to Wastewater and Network Area Managers and other key personnel with odour management responsibilities.

7.2 External communication

DCWW is committed to working closely with stakeholders to achieve sustainable reduction of odour nuisance. DCWW is committed to making available relevant records and information to regulatory and local stakeholders, where appropriate, and communicating and engaging, in advance, with stakeholders where appropriate, any relevant activities that may generate odours.

Should any planned, routine or abnormal operation and/or maintenance activities be required which could lead to an odour release that could impact local receptors, then the Local Environmental Health Officer (EHO) and/or Natural Resource Wales officer shall be advised by telephone.

7.3 Reporting

DCWW will send all reports and notifications required by Natural Resources Wales, or upon request by Natural Resources Eales, within the given timescales. Should any planned, routine or abnormal operation and/or maintenance activities be required which could lead to an odour release that could impact local receptors, then the Local Environmental Health Officer (EHO) and/or Natural Resource Wales shall be notified.

7.4 Complaints management and resolution process

All customer complaints about odour are entered on the DCWW Customer Care Centre. Complaints are logged from customers at DCWW Customers Care Centre in accordance with the Complaint Handling Procedure. These complaints are forwarded to Operations for investigation or customers can contact Operational staff directly. If the latter occurs, the operator will obtain customer details and forward them to the DCWW Customer Care Centre so they can be logged as a complaint in SAP.

On receipt of a complaint, the complainant will be contacted for more information if required and a site visit will be made as soon as practicable to investigate the cause of the complaint. Should the cause be found to be the result of malfunction of any process, then corrective action will be taken as soon as is practicable.

The results of any investigations will be recorded on SAP and the complainant will be contacted by DCWW Customers Care Centre to Inform them of the results and any mitigation action.

If the complaint is not resolved or there are repeat incidents, the Wastewater Assets team will be contacted to provide further support and investigation.

Further details are given in Appendix D.

8 Reviews and auditing

8.1 Reviews

8.1.1 Periodic reviews

The Odour Management Plan forms part of the ISO14001 Environment Management System (EMS). The Site manager is responsible for implementation of the OMP and it's regular review at least once per annum or as required on the basis of any operational changes or experiences, as well as changes to location or nature of nearby sensitive receptors.

8.1.2 Ad-hoc reviews

This OMP will be reviewed when any significant changes in operational practice are made and on completion of any significant capital scheme which could impact the OMP.

8.2 Auditing

The regulatory authorities, where required, will be provided with reasonable access, in order to audit the implementation of the OMP upon request.

8.3 Records

The following records will be maintained:

- Record of complaints are stored on SAP.
- Reports of investigations are held electronically.
- Odour issues which require a capital scheme to be raised to resolve them.

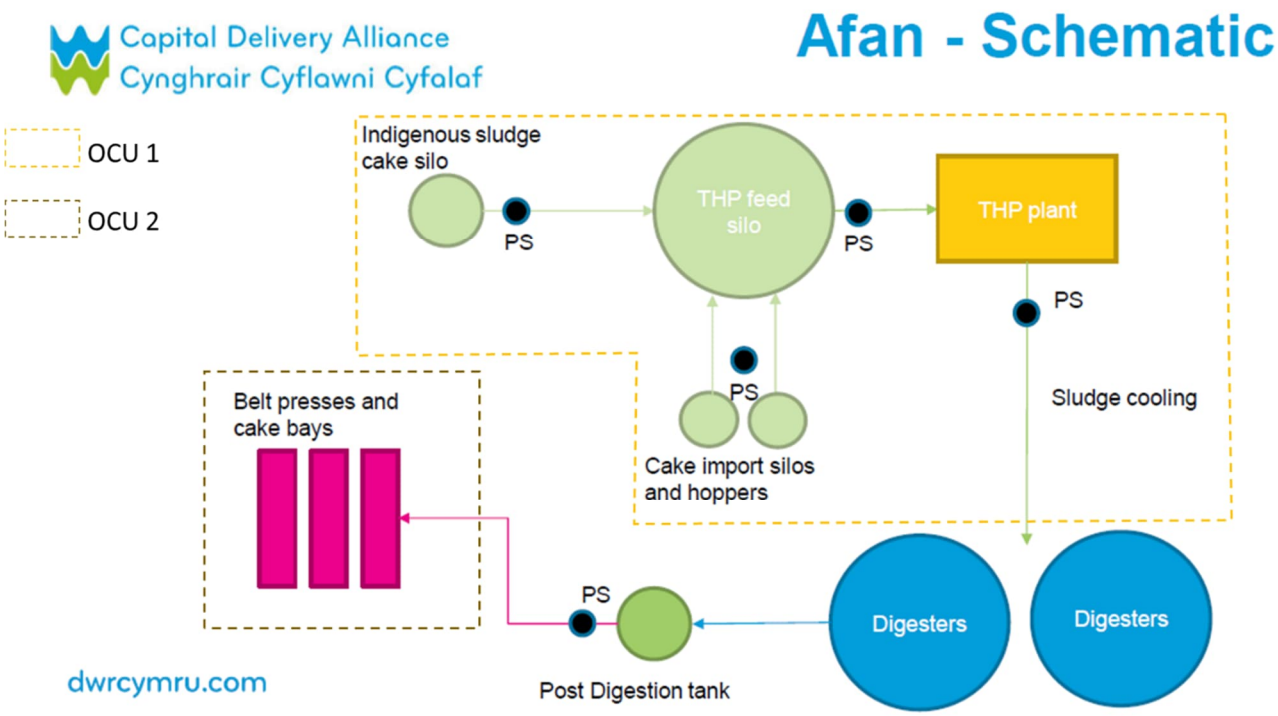
A. Waste codes

The annual throughout is 438,000 (wet) tonnes/annum (21,900 tds @ 5%) across two digesters.

Table A.1: EWC codes accepted at the Site

Waste Code	Description
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTEWATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE**
19 02	**wastes from physico/chemical treatments of waste (including dechromatation, decyanidation, neutralisation)**
19 02 06	sludges from physico-chemical treatment other than those mentioned in 19 02 05 (sewage sludge only)
19 06	**description digestate from anaerobic treatment of animal and vegetable waste**
19 06 06	digestate from anaerobic treatment of animal and vegetable waste (sewage sludge only).
19 08	**wastes from wastewater treatment plants not otherwise specified**
19 08 05	sludges from treatment of urban wastewater
19 12	**wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified**
19 12 12	wastes from mechanical treatment of wastes other than those mentioned in 19 12 11 (sewage sludge only)

B. Odour schematic



C. Odour checklist

Area of works	Potential issue		Follow up action
Odour management plan (OMP)	Is the Site operated according to the OMP?	YES / NO	Make changes to site operation to minimise odour production and release
Site - general	Are all covers in place?	YES / NO	Put back covers and close hatches as required
	Are all access hatches closed?	YES / NO	
Inlet works	Is the crude sewage black and/ or smelly?	YES / NO	Check incoming sewage for septicity (in communication with Operations Support Team)
			Check for potential septic discharges
Screening	Are there any spilled screenings?	YES / NO	Clean up spills
	Are the compacted screenings clean	YES / NO	Optimise operation of screenings handling equipment
Grit removal	Is there any spilled grit?	YES / NO	Clean up spills
	Is the grit clean	YES / NO	Optimise operation of grit handling equipment
Screening and Grit Skips	Do the screening skips smell?	YES / NO	Check that screenings are clean and free from organic material;
	Do the grit skips smell?	YES / NO	Check that grit is clean and free from organic material; optimise grit cleaning system if needed
	Are the screenings skips too full?	YES / NO	Empty skip(s)
	Are the grit skips too full?	YES / NO	Empty skips as needed
Storm tanks	Have the storm tanks been left full following a storm?	YES / NO	Empty and clean out tanks as needed
	Is there any sludge left in the bottom of the tanks?	YES / NO	
Primary tanks	Are the tanks black and / or smelly?	YES / NO	Check inlet for septicity
	Are the tanks gassing?	YES / NO	Check levels of sludge in the tank and increase de-sludge rate if needed.
	Is there excess scum on the surface	YES / NO	Remove excess scum
Biological filtration	Are the aeration vents blocked?	YES / NO	Unblock aeration vents
	Is there any ponding?	YES / NO	Consider increasing flushing rate and/or forking media
Activated sludge	Do the dissolved oxygen levels in the aeration lanes match the setpoint(s)?	YES / NO	Adjust dissolved oxygen levels as required
	Do the MLSS fall within the timelines for the Site?	YES / NO	Increase / decrease RAS rate as needed
Final settlement tanks	Are the tanks black and/or smelly	YES / NO	Check inlet of tanks for septicity

Area of works	Potential issue		Follow up action
	Are the tanks gassing?	YES / NO	Check levels of sludge in the tank and increase de-sludge rate if needed
	Is there excess scum on the surface	YES / NO	Remove excess scum
Tertiary treatment	Any there any site-specific issues?	YES / NO	Investigate and rectify
Sludge treatment	Are there any sludge spills?	YES / NO	Clean up spills
Imports and Exports	Does the tanker filling and emptying process cause significant release of odour?	YES / NO	Investigate whether the process can be modified to reduce odour emissions
			Consider changing timing of tanker operations to reduce nuisance potential
Sludge Thickening and Storage	Are all covers in place?	YES / NO	Put back covers and close hatches as required
	Are all access hatches closed?	YES / NO	
	Are the doors to sludge treatment buildings / sludge cake stores kept closed?	YES / NO	Close doors as required
Anaerobic Digestion	Is all excess gas flared?	YES / NO	Contact contractor to investigate
	Is flare stack ignition immediate and reliable?	YES / NO	
	Are the Whessoe valves / pressure relief valves operating prematurely?	YES / NO	
	Are the seals on the condensate traps intact?	YES / NO	
Odour abatement	Is there any detectable odour downwind of the stack?	YES / NO	Check OCU using additional checklist
	Is the fan(s) working?	YES / NO	Arrange for fan to be repaired
General	Are there any outstanding actions from a previous investigation?	YES / NO	Complete actions

Area of works	Operational check	Tick when checked
Odour management plan (OMP)	Check the Site is operating according to the OMP?	
Acid scrubber (OCU2)	Check acid dosing pumps, recirc and blow down pumps for leaks	
	Check fans for excessive noise or defects	
	Check acid levels and pH	
	Check dosing system spray bars and nozzles	
	Check general OCU condition & integrity	
	Check general duct condition & integrity	
	Check dampers are operational and in good condition	
	Inspect electrical control panel and check for faults	
	Simulate duty / standby changeover	
	Measure back pressure	
Biofilter (OCU1)	Check irrigation pumps for leaks	

Area of works	Operational check	Tick when checked
	Check fans for excessive noise or defects	
	Check irrigation water supply	
	Check irrigation system incl. nozzles	
	Check general OCU condition & integrity	
	Check general duct condition & integrity	
	Check dampers are operational and in good condition	
	Inspect electrical control panel and check for faults	
	Simulate duty / standby changeover	
	Measure back pressure	
Carbon filter (OCU 1)	Check fans for excessive noise or damage	
	Check general OCU condition & integrity	
	Check general duct condition & integrity	
	Check dampers are operational and in good condition	
	Measure back pressure	
Anaerobic digesters	Check that flare stack ignition is immediate and reliable	
	Check the whessoe valves/pressure relief valves adequately operating	
	Check that the seals on the condensate trap are intact	
Whole site	Check all covers are in place	
	Check all doors/hatches are closed	
	Check there are not sludge spills	
	Check if there is any noticeable odour downwind of the stacks	

D. Complaints handling procedure

D.1 General overview

DCWW have an obligation to manage and reduce odour nuisance caused by assets or operational activities. In the majority of instances, odour from DCWW assets is regulated by the Local Authority Environmental Health Officers, as per the statutory nuisance provisions of Part III of the Environmental Protection Act 1990. In the case of statutory nuisance from odour, it is the responsibility of DCWW to demonstrate that appropriate odour control measures have been identified and implemented.

The OFWAT expectation pertaining to odour management prescribes that DCWW follow the non-statutory code of practice for odour nuisance emanating from DCWW assets. There is also a requirement from NRW on IED sites to implement/review an odour management plan in the event of a substantiated complaint.

D.2 Process objective

The process objective is to manage and reduce odour nuisance being experienced by DCWW customers from emissions attributed to DCWW wastewater assets inclusive of WwTW, SPS and associated networks.

The challenge of odour management is captured within the remit of the above ground asset (AGA) Catchment and below ground asset (BGA) Sewerage Manager roles. Support structures include customer complaint officers, a data management team and a local asset management team including odour specialist engineer. Capital expenditure to implement enhanced service levels in reduction of odour nuisance is captured within the remit of the local asset management team. The overall coordination and governance is controlled by the Odour Management Steering Group.

D.3 Odour complaints

DCWW are required to respond to incidents where malodours are reported to have originating from a DCWW asset. These incidents are reported via a number of routes. These include:

- General public
- Local Authority
- Internally (i.e. a DCWW member of staff)
- Contractor
- Environment Agency/Natural Resources Wales
- DCWW Employees

All DCWW reported Odour incidents must be re-directed to and recorded by Operational Contact Centre (OCC) and logged on CRM.

D.4 Managing odour complaints

D.4.1 Customer complaint to Operational Contact Centre

D.4.1.1 Above ground asset odour incident

For AGA related odour incident, the Customer Resolution Officer (CRO) will populate a DCWW Odour Investigation Report (OIR)

The job is passed to the area Operations Supervisor by phone. The CRO then emails the OIR to the appropriate area supervisor (Bronze manager utilised out of hours).

The area Operations Supervisor allocates the job to a suitable operator who records the visit in SAP production.

The Operator investigates the odour and provides feedback to the Supervisor who then populates the OIR with the required information, the OIR is then returned to the Customer resolution Officer. The Supervisor must aim to provide an updated OIR to the CRO within 48 hours.

Once the CRO receives the feedback they will provide feedback to the customer when appropriate until the compliant is closed out.

D.4.1.2 Below ground asset odour incident

The CRO schedules the job to an appropriate Network Team Resource directly through SAP (in line with the Network Operations (NO) procedure series.

The Network Team Resource investigates the odour and provides feedback through their tough books directly into SAP. The Network Team Resource must aim to provide an update through their mobile device within 48 hours.

Once the CRO receives the feedback they will provide feedback to the customer when appropriate until the compliant is closed out.

D.4.2 Complaint direct to operational staff

Odour complaints may be made direct to Site. In these cases, the operator must refer to the customer back to the OCC. The operator takes details of the complaint and records this information in the WOF 007 – Works Diary (the entry must exclude any personal customer information). The operator must inform their supervisor.

Once the customer has been passed onto the OCC, steps detailed in Section D.4.1 are followed.

D.4.3 Odour process flow chart

The stages of odour investigation are provided below in, for a detailed view please refer to Section 5.

Table D.1: Stages of odour investigation

Stage	Level of investigation	Actions	Outputs	Customer
Stage 1	Reporting local investigation	Complaint recorded and assigned	Local investigations carried out, call closed or moved to Stage 2	Updates via CRO
Stage 2	Minor corrective works	Local investigations lead to local minor corrective work being carried out	Rectify issue and call closed or unable to rectify locally passed to Stage 3	Updates via CRO
Stage 3	Odour logger investigations	Waste Water Asset technician engaged for more detailed investigations. Odour Loggers strategically installed	Local improvement required, return to Stage 2. Further investigation passed to Stage 4	Updates via CRO
Stage 4	Further investigations or investments	DCWW source of odour and capital investment required	DCWW Investment and Gateway processes applied	Updates via CRO
Reviews		Monthly odour steering group		

Stage	Level of investigation	Actions	Outputs	Customer
Reporting		Asset performance co-ordinator		

D.5 Investigation

The initial steps of the investigation involve attending the location of the complaint. The purpose is to identify the root cause of the problem and undertake appropriate works to remove the problem where practicable; or identify where further work may be required if the source of odour is identified as a DCWW asset.

Assessing the source and impact of odour emissions on customers and determining our priorities for mitigation works. This is influenced by many parameters including: weather conditions, the type of discharges (including illegal ones) into our sewer network, asset performance and operational activities, together with varying customer tolerance/perception.

Odour emissions and their impacts can often be very transient in nature making root cause analysis difficult. In such cases this will be escalated for more in-depth monitoring and root cause analysis through the Waste Water Assets team (Above ground) Stage 2.

Once the investigation identifies DCWW is not the cause of the odour the investigation will be closed. However, in exceptional circumstances DCWW may still support regulators on request.

DCWW can utilise some or all of the measures below during odour investigations:

- Local operators/network Technicians
- Portable Odour loggers – these can be installed but not limited to DCWW assets, manhole chambers, customer properties and must be calibrated in line with manufacturers recommendations.
- Fixed longer term Odour logging (Odournet)
- Odour mapping services

D.6 Mitigation of odour complaint

D.6.1 Odour control

There are four main types of odour control processes implemented by DCWW:

- Good site management and house keeping
- Chemical treatment/dosing
- Re Cover, collect and treat – Odour Control Units/Systems.
- Addition of potable water to reduce Dry Weather flows.

Normal operation is defined as when any control processes used as part of odour control are operating effectively. All control systems are checked at a frequency defined in the SAP Work Manager PM schedule where checks are practicable to apply. If a fault is found with any of the control processes remedial action is carried out and all actions taken are recorded in SAP and/or local Works Diaries.

If the fault cannot be rectified immediately but the root cause is within the local team ability and control to correct DCWW planning and scheduling processes are to be followed.

The DCWW Business Plan recognises the issue of odour nuisance and the financial commitment required to achieve appropriate resolution. Where all operational management has been implemented and capital investment is required to further reduce odour nuisance the risk

must be captured and developed through the AMP Capital Investment Process. All investment must contribute to the Business Plan Measure of Success (MoS).

In some cases, it may be more prudent for the business to implement mitigation equipment to reduce the odours as opposed to removal. These cases will be identified utilising DCWW Waste Water Assets investment processes.

D.6.2 Monitoring and measuring

In order to monitor and track performance against the management and control of odour related incidents, DCWW undertakes a number of monitoring and measuring activities. These include:

- Odour Report – The Asset Performance Coordinator collates all odour complaints data and reports on a monthly basis.
- Odour Working Group – This group consists of key personnel from DCWW and convenes every other month. Information relating to odour performance is reviewed, along with investment plans and operational practices and procedures.
- Reviews of 'At Risk/Highest Impacted Customers' with action & improvement plans.

D.6.3 At risk/highest impacted customers

Through the nature of odours investigations can often identify no odours present or DCWW as not the root cause of the odour. Some examples could be but not exclusively: private pump stations/treatment works, agricultural activities, industrial emissions or other third party activities.

Where investigations have been carried out and found DCWW not to be the root cause of the odour these customers will be recorded as a contact but not be included in the 'Potentially at Risk/At risk/Highest Impacted' customer record as the odour would be deemed outside DCWW area of responsibility. If DCWW is shown to be the source of the odour nuisance the customer will included in the reports.

Where customers are identified as 'Potentially at Risk/At risk/Highest Impacted' (Table D.2) and DCWW deliver a solution or improvements to remove odours; the customer can be removed from 'Potentially at Risk/At risk/Highest Impacted' after 12 months if no further complaints are received.

Table D.23: Classification of potentially impacted customers

Classification	Description
Potentially at risk	>=3 contacts in 3 years
At risk	5 contacts in 3 years
Highest impacted	6 or more Contacts in 3 years

D.6.4 Odour management plan

If needed Odour Management Plans may be implemented as an additional control measure by the WWA Asset Engineer (Odour). These documents identify site specific processes impacting odour and measures required to manage odour at the asset.

Odour management plans are collated by Waste Water Asset Engineers and recorded on the 'OMP Status tracker'. However, these are the responsibility of local operational teams to implement. Odour management plans are to be reviewed by the Odour WWA Engineer either every five years or when a substantial change of design on site occurs or following receipt of odour complaints confirmed to be from the DCWW asset.

A review may also be required if the effectiveness of the existing plan fails to mitigate the odours.

Once odour management plans are completed, these will be rolled out to the local supervisor within two months of completion to provide formal training on what is required on the site/associated assets (i.e. pumping stations feeding in) to minimise the risk of odours. The supervisor will be responsible for implementing the plan and ensuring their wider team understand the requirements and that appropriate maintenance plans/tasks are implemented in SAP.

D.7 Records

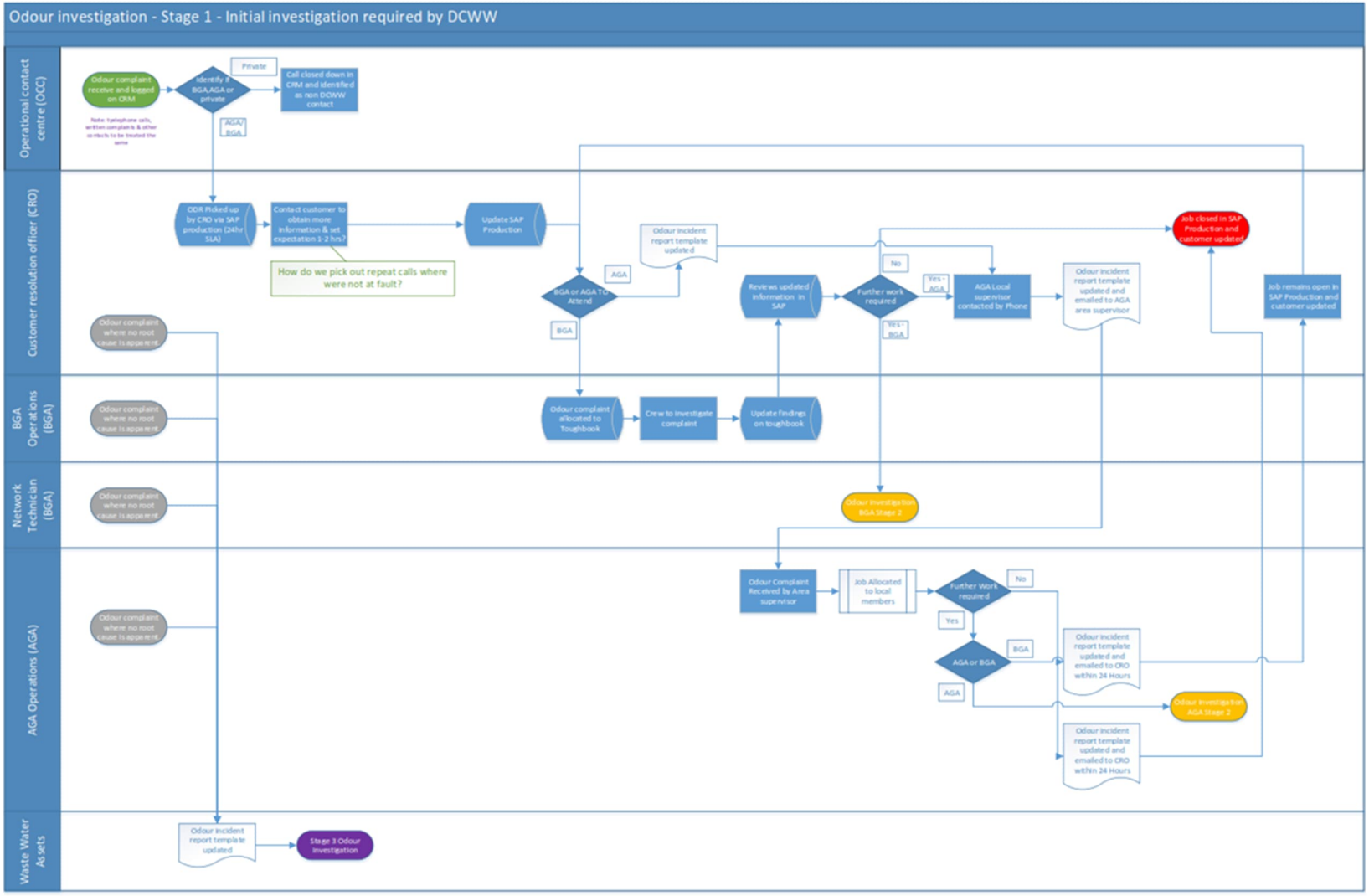
Details on different records related to odour complaint are described in Table D.

Table D.3: Details of records for odour complaints

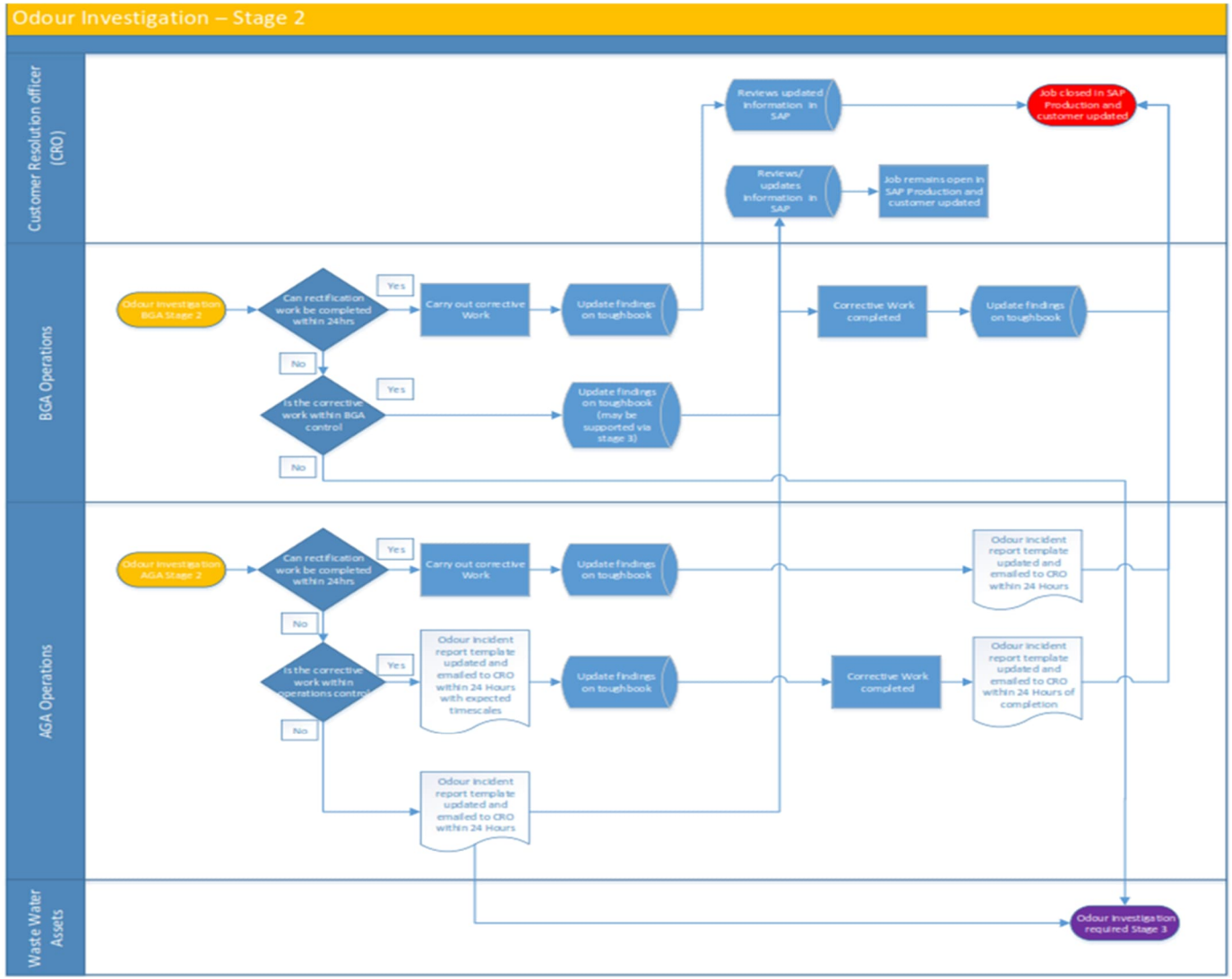
Record	Reference	Retained by	Retention
Works Diary	WOF 007	WwTW	5 years
Monthly Odour Report	Specific	Asset Data Manager	Indefinitely
SAP Task	Specific	SAP System	Indefinitely
Asset Records Updated	Specific	GIS System	Indefinitely
Odour Management Plan	Specific	Operational Supervisor & WWA	Indefinitely
OMP Status tracker	Specific	Asset Engineer (Odour)	Indefinitely

D.8 Schematics for odour investigations

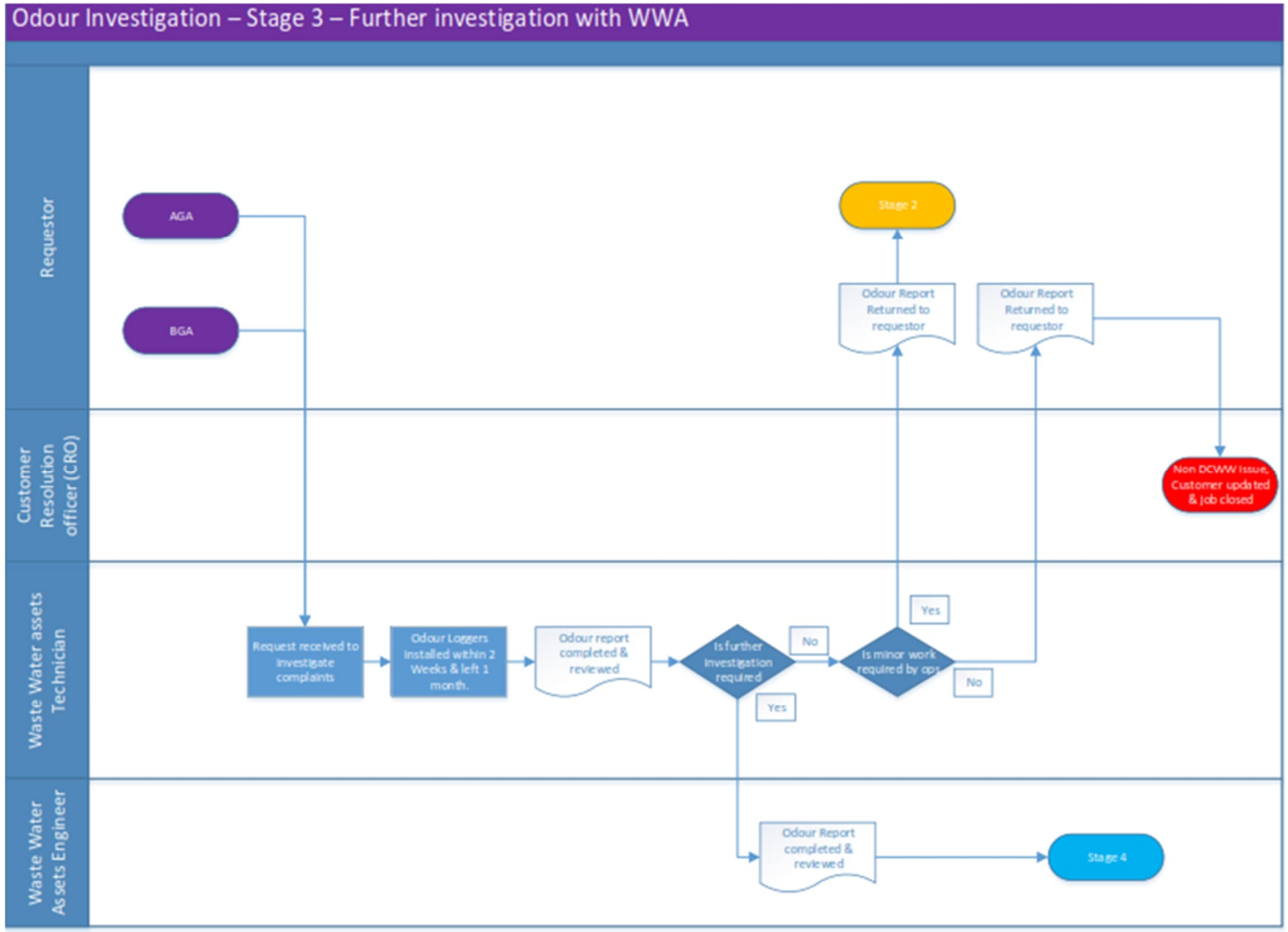
D.8.1 Stage 1


Odour investigation - Stage 1 - Initial investigation required by DCWW
Operational contact centre (OCC)
Customer resolution officer (CRO)
BGA Operations (BGA)
Network Technician (BGA)
AGA Operations (AGA)
Waste Water Assets
Odour complaint receive and logged on CRM
Identify if BGA,AGA or private
Private
Call closed down in CRM and identified as non DCWW contact
AGA/ BGA
Note: telephone calls, written complaints & other contacts to be treated the same
ODR Picked up by CRO via SAP production (24hr SLA)
Contact customer to obtain more information & set expectation 1-2 hrs?
How do we pick out repeat calls where were not at fault?
Update SAP Production
Odour incident report template updated
AGA
BGA or AGA To Attend
BGA
Reviews updated information in SAP
Further work required
No
Yes - AGA
Yes - BGA
AGA Local supervisor contacted by Phone
Odour incident report template updated and emailed to AGA area supervisor
Job closed in SAP Production and customer updated
Job remains open in SAP Production and customer updated
Odour complaint where no root cause is apparent
Odour complaint allocated to Toughbook
Crew to investigate complaint
Update findings on toughbook
Odour investigation BGA Stage 2
Odour Complaint Received by Area supervisor
Job Allocated to local members
Further Work required
No
Yes
AGA or BGA
BGA
AGA
Odour incident report template updated and emailed to CRO within 24 Hours
Odour investigation AGA Stage 2
Odour incident report template updated and emailed to CRO within 24 Hours
Odour incident report template updated
Stage 3 Odour investigation

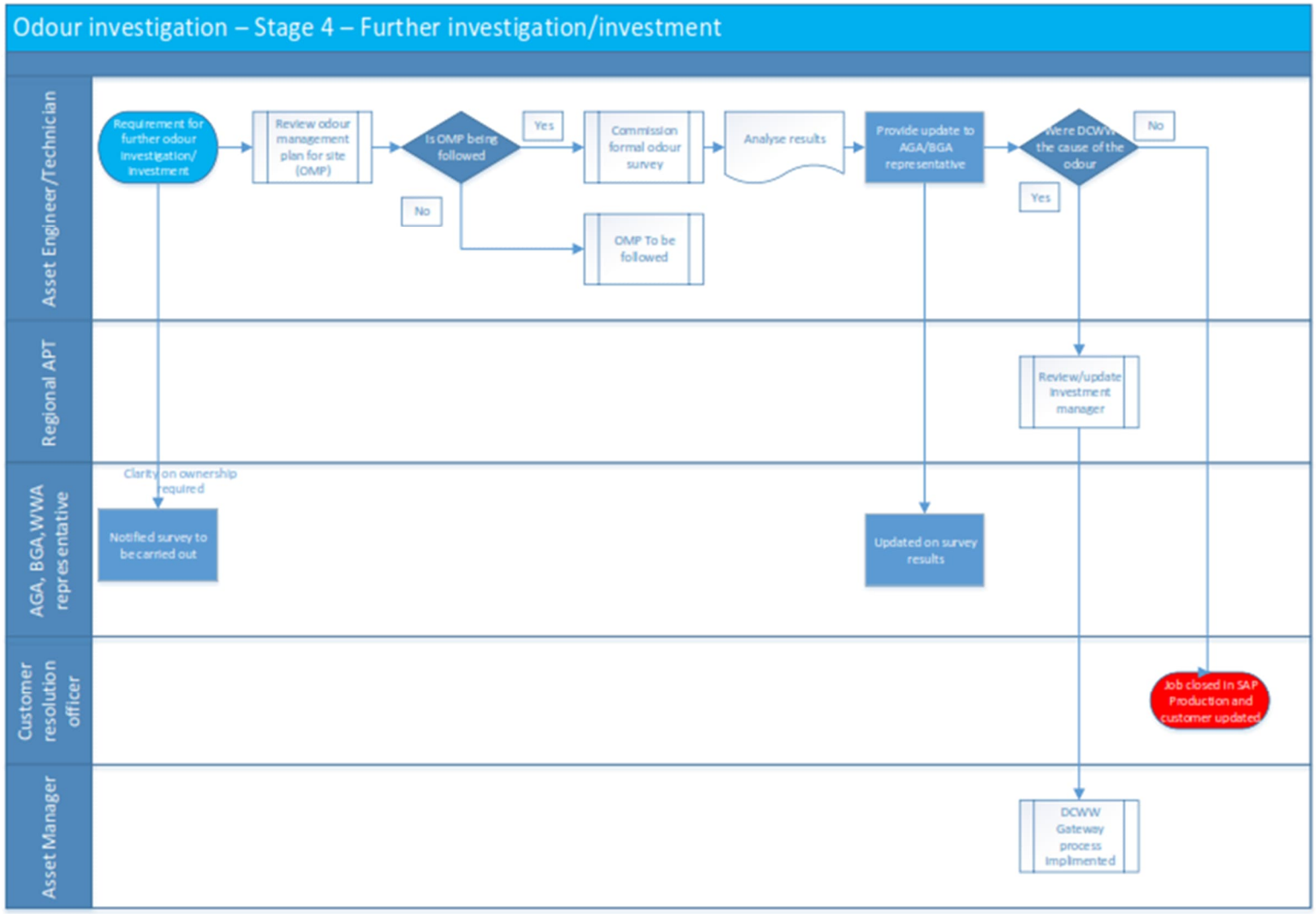
D.8.2 Stage 2


Odour Investigation – Stage 2
Customer Resolution officer (CRO)
BGA Operations
AGA Operations
Waste Water Assets
Reviews updated information in SAP
Job closed in SAP Production and customer updated
Reviews/ updates information in SAP
Job remains open in SAP Production and customer updated
Odour investigation BGA Stage 2
Can rectification work be completed within 24hrs
Yes
Carry out corrective Work
Update findings on toughbook
Corrective Work completed
Update findings on toughbook
No
Is the corrective work within BGA control
Yes
Update findings on toughbook (may be supported via stage 3)
No
Odour investigation AGA Stage 2
Can rectification work be completed within 24hrs
Yes
Carry out corrective Work
Update findings on toughbook
Odour incident report template updated and emailed to CRO within 24 Hours
No
Is the corrective work within operations control
Yes
Odour incident report template updated and emailed to CRO within 24 Hours with expected timescales
Update findings on toughbook
Corrective Work completed
Odour incident report template updated and emailed to CRO within 24 Hours of completion
No
Odour incident report template updated and emailed to CRO within 24 Hours
Odour investigation required Stage 3

D.8.3 Stage 3


Odour Investigation – Stage 3 – Further investigation with WWA
Requestor
Customer Resolution officer (CRO)
Waste Water assets Technician
Waste Water Assets Engineer
AGA
BGA
Stage 2
Odour Report Returned to requestor
Odour Report Returned to requestor
Non DCWW Issue, Customer updated & job closed
Request received to investigate complaints
Odour Loggers installed within 2 Weeks & left 1 month.
Odour report completed & reviewed
Is further investigation required
No
Yes
Is minor work required by ops
Yes
No
Odour Report completed & reviewed
Stage 4

D.8.4 Stage 4


Odour investigation – Stage 4 – Further investigation/investment
Asset Engineer/Technician
Regional APT
AGA, BGA,WWA representative
Customer resolution officer
Asset Manager
Requirement for further odour investigation/ investment
Review odour management plan for site (OMP)
Is OMP being followed
Yes
No
Commission formal odour survey
OMP To be followed
Analyse results
Provide update to AGA/BGA representative
Were DCWW the cause of the odour
No
Yes
Review/update investment manager
Clarity on ownership required
Notified survey to be carried out
Updated on survey results
Job closed in SAP Production and customer updated
DCWW Gateway process implimented

E. Odour monitoring form

Odour Monitoring Form

Date:	
Name:	**Visitor or staff:**

Intensity
0 – No odour
1 – Very faint odour
2 – Faint odour
3 – Distinct odour
4 – Strong odour
5 – Very strong odour

Receptor Sensitivity
Low (e.g. footpath, road)
Medium (e.g. Industrial or place of work)
High (e.g. housing)

Location	**Time**	**Weather conditions (dry, rain, snow etc)**	**Temperature (very warm, mild)** *Use degrees when known*	**Wind strength (light, strong)** *Use Beaufort scale if known*	**Wind direction (e.g. SE)**	**Intensity** *(See above)*	**Duration**	**Constant or intermittent in this period or persistence**	**Receptor sensitivity** *(See above)*	**Is source evident?**	**Any other comments or observations**