South West Water Limited

Hayle Waste Water Treatment Works (WWTW)

Application for Environmental Permit Variation

January 2024

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1 Context and scope

This application is for a variation to the current waste activity permit to an IED Installation Environmental Permit and is being made due to changes to the Environment Agency (EA) interpretation of the environmental permitting exclusion for Urban Wastewater Activities (under Environmental Permitting (England and Wales) Regulations 2016 (EPR) Schedule 1, Part 2, Chapter 5, Section 5.4). The EA interpretation now requires that anaerobic digestion (AD) plants with a capacity exceeding 100 tonnes per day (te/d) are classified as installations for the purposes of EPR. Furthermore, it has been determined that, in calculating digester capacity, there should be no distinction between imported or indigenous sludges.

This Environmental Permit (EP) application is to vary the existing EP (EPR/NP3969HH) which currently includes a waste activity, to a Multi-Activity EP which will cover the current authorised waste activities and a distinctly separate new Section 5.4 Installation Activity. The Installation Activity is proposed to cover a Section 5.4 A (1)(b)(i) activity for 'Anaerobic Digestion' and Directly Associated Activities (DAA's).

Biological sludge treatment at South West Water (SWW) Hayle Waste Water Treatment Works (Hayle WWTW) exceeds the 100te/d capacity threshold and it has therefore been agreed that an EP variation application be submitted for the AD activities.

Hayle WWTW is operated by South West Water Ltd. (the Operator) and it includes the following activities:

- Waste water treatment (referred to as 'Hayle STW' in this application to ensure differentiation between the sludge treatment and waste water treatment works): regulated by Discharge Consent No. NRA-SWW-0782;
- Biological treatment of sludge and Directly Associated Activities: currently permitted by waste permit no. EPR/NP3696HH and now to be varied according to this application (referred to as Hayle WWTW (the Site) in this application ensure differentiation between the sludge treatment and waste water treatment works); and
- Import of commercial tankered waste and the storage and transfer of grit and screenings, currently permitted under Environmental Permit Ref. EPR/NP3696HH.

For clarity, SWW request that the 'site name' on the Environmental Permit (EP) should read Hayle STW Hayle, as stated in form Part C2 although the Site (the installation) will be referred to as Hayle WWTW throughout this application.

Sludge within the installation is treated on the Site to a standard to allow for disposal or recovery and sludge liquors are returned to the head of works at Hayle STW. Currently sludge cake from the installation is sent for recovery. Within Hayle STW, the urban wastewater is effectively treated to required final effluent discharge standards (Discharge Consent No. NRA-SWW-0782).

This EP variation application provides the necessary documentation to confirm that the proposed operations at Hayle WWTW achieves the required Best Available Techniques (BAT) for the activities. Where this is not the case, a proposed Improvement Programme is provided in **Appendix 5**, detailing the necessary improvements required in order to achieve BAT or BAT equivalent compliance.

Currently Appropriate Measures have not been considered in detail due to the late inclusion to the permit requirements. This is to be investigated and it is planned that the required improvement actions are to be started within AMP8.

1.1 Site location

The Hayle WWTW is located at Station approach, St Erth, Hayle, TR27 6LA and is centred on National Grid Reference 154753, 035759. The Site is located at the north-westerly extent of Hayle town and to the north east of the village of St Erth. The location of the Site is shown on Figure 4 and Figure 12.

It should be noted that the 'Installation Boundary' on both Figure 1 and Figure 1-2 reflects the proposed EP variation boundary which encompasses all relevant assets on the Site that fall within the scope of this application.

1.2 Existing Authorisations

Details of the existing EP are included below:

Existing EP (EPR/NP3969HH)

The existing EP (EPR/NP3696HH) allows for the reception of interworks sludge (from SWW sites) and third party (commercial) sludge; biological treatment of waste and the transfer of grits and screenings. The EP has two extant variations which should be used in conjunction to determine extant Permit conditions for the Site, as follows:

- Consolidated EP (EPR/NP3696HH/V004, dated September 2009) containing all conditions, with the exception of extant List of Waste codes table (see below); and

- Variation to the EP (EPR/NP3696HH/V005, dated April 2013) which includes extant List of Waste codes table (Table 3.1 of the EP).

The original Waste Management License for the Site was issued in November 1997, before being consolidated into a modern EP as outlined above.

This variation application includes a proposal to vary this EP to include the IED Installation. It is noted that this application also includes a minor amendment to the area covering waste activities, to include a new stormwater tank.

Figure 1-1 Environmental Permit Boundary

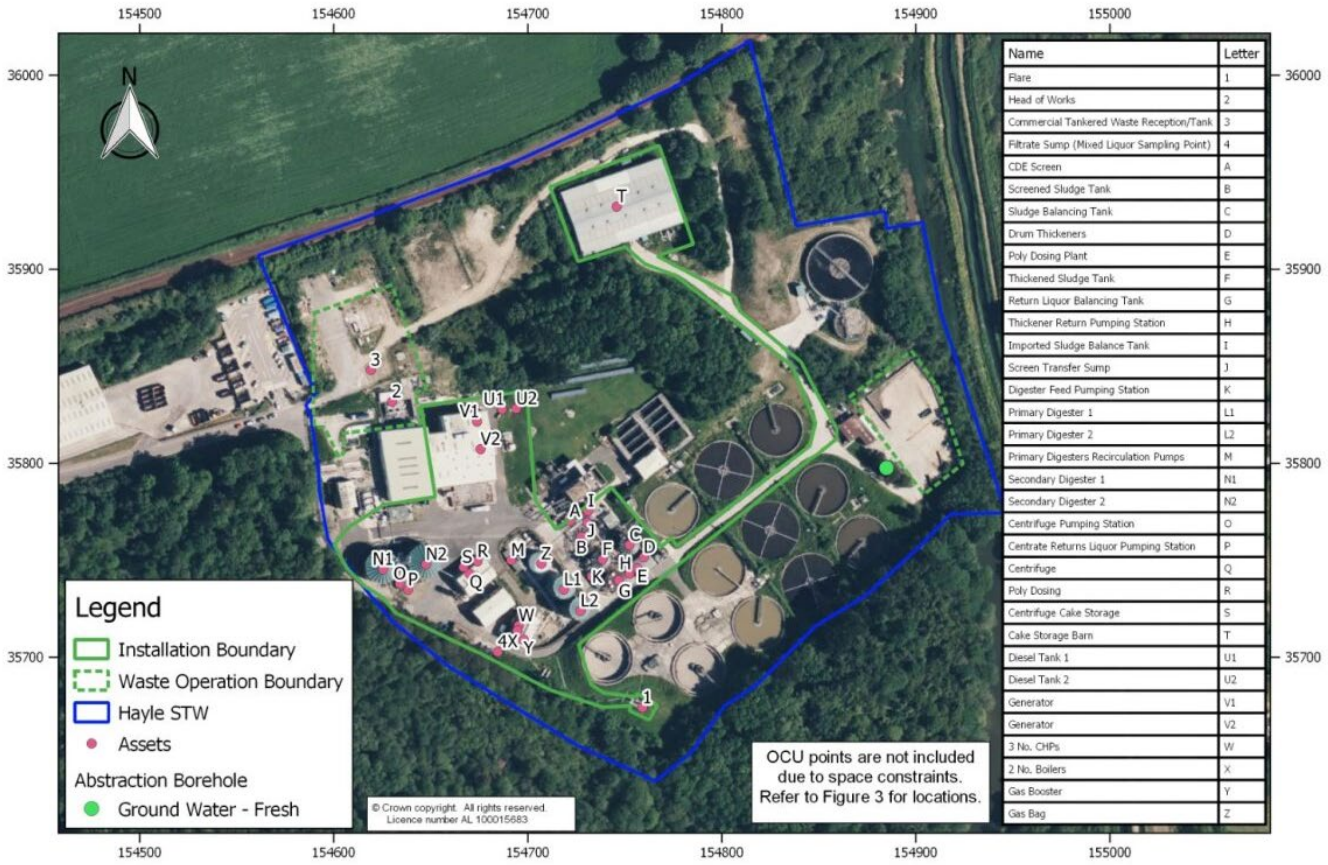
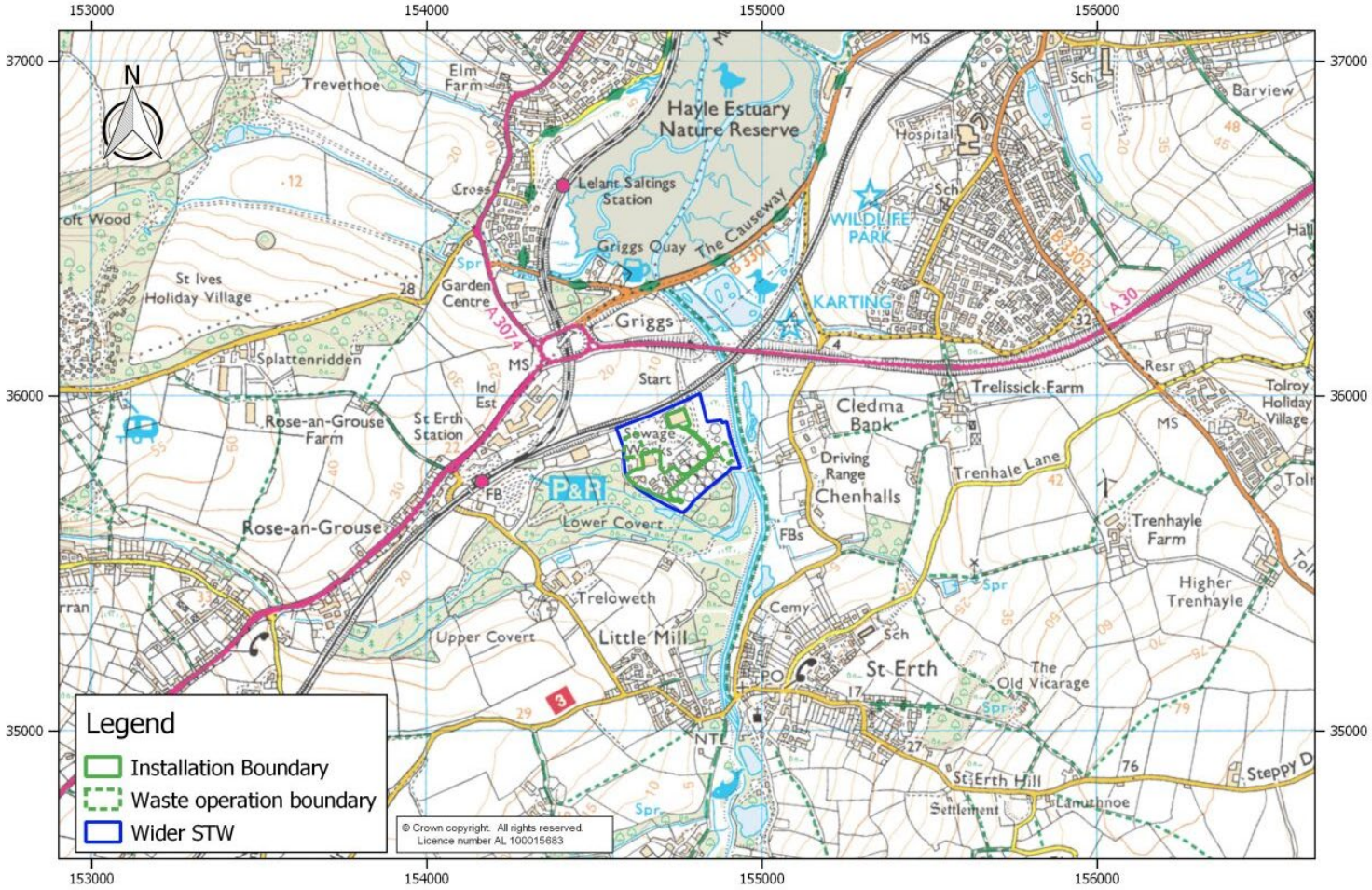


Figure 1-2 Site Location



1.3 Operator Details

The EP will be held by South West Water Ltd (Company Number 02366665) (the Operator). Link to Companies House is included below:

https://find-and-update.company-information.service.gov.uk/company/02366665

Director details, including dates of birth for all directors and secretaries, is included in Table 1-1.

SWW confirm that a letter of authorisation should be on record and held by the EA from Susan Davy (Director), to authorise Alan Burrows to complete the declaration in form Part F1 for this application.

Table 1-1 Director Details

Name	Position	Date of Birth
Paul Boote	Director	[redacted]
Dorothy Burwell	Director	
Jonathan Butterworth	Director	
Susan Davy	Director	
Iain Evans	Director	
John Halsall	Director	
Claire Ighodaro	Director	
Gill Rider	Director	
Loraine Woodhouse	Director	

1.4 Summary of Site Activities

A summary description of all activities carried out within the IED Installation at Hayle WWTW is provided below.

Stationary Technical Unit	Directly Associated Activities
Anaerobic digestion of indigenous and imported sludges >100te/day	Sludge import, storage and screening Sludge thickening

Stationary Technical Unit	Directly Associated Activities
	Dewatering and cake secondary treatment and storage Biogas storage, utilisation & flaring

1.5 Overview of activities

The Hayle WWTW treats indigenous sewage sludges arising from sewage treatment processes operated within the wider Hayle STW, as well as sewage sludges generated by smaller SWW 'satellite' sewage works. The principal activities undertaken within the installation include:

- Sludge reception and screening;
- Raw sludge thickening;
- Anaerobic digestion (including associated heat generation from Digester Boiler to support AD activities);
- Combined Heat and Power (CHP);
- Liquor balancing;
- Digested sludge dewatering;
- Storage and maturation of digested sludge prior to transfer off site for land spreading as an agricultural soil conditioning agent;
- Raw material storage and use;
- Surface water and process liquor collection and transfer to Hayle STW for treatment; and
- Waste storage and transfer off site.

The information below is a non-technical description of the sludge treatment process, including the key assets and associated infrastructure at Hayle STW for context. The process, including distinctions between waste and installation activities, is outlined in the Process Flow Diagram (PFD) in Figure 1-3. The location of the assets and infrastructure referred to are shown in Figure 2 and Figure 1-4. A Photolog of the assets is shown in **Appendix 14.**

It is proposed that the EP (EPR/NP3696HH) will continue to regulate the reception of the third party (commercial) sludge, which is received at the inlet works of Hayle STW. This reception is proposed to be regulated as a distinctly separate waste activity under the Multi-Activity Permit.

Following reception at Hayle STW, the third party (commercial) sludge waste stream is treated by the effluent treatment process and any solids captured by the PST are discharged to the sludge balancing tank where the sludge is treated. It is proposed that the sludge balancing

tank and onward assets involved in the anaerobic digestion treatment activities are regulated as a separate Installation activity under IED under the Multi-Activity Permit. (see Figure 1-3).

1.6 Sludge treatment process

The following provides a summary description of the sludge treatment process at the Hayle WWTW, which forms the Installation activity. Each asset in the summary description is provided with a corresponding letter which is referenced in Figure 1-4 in order to show its location within the installation.

- Interworks sludge (from SWW satellite sites) is imported to Hayle WWTW via the CDE screen and then passed to the screened sludge tank (B). Alternatively, interworks sludge can be imported to Hayle via the chopper pumps and stored in the imported sludge balancing tank before being pumped via the screen transfer sump to the screened sludge tank. However, this option is currently not used and there is no immediate plans to re-instate for interworks sludge imports.

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

- The thickened sludge from the thickened sludge tank (F) is fed to the two primary digesters (L1-2) by the digester feed PS (K). The two primary digesters are equipped with a recirculation line with digester recirculation pumps.

- Digested sludge from the primary digesters (L1 - L2) gravitates to two secondary digesters (N1 - N2). From the two secondary digesters, the sludge is pumped by the centrifuge PS (O) to the centrifuge (Q). The centrifuge receives polymer from a centrifuge polymer dosing system (R). The return liquor from the centrifuge is discharged to the centrifuge return liquor pumping station (P) and pumped back to the return liquor balancing tank (G).

- The flow from the return liquor balancing tank is discharged to the inlet of the Primary Settlement Tanks (off-installation).

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

- Gas produced by the primary digesters is stored in a gas bag (Z) before being passed via the booster to the three CHPs (W), the two boilers (X) or the flare (1), as required.

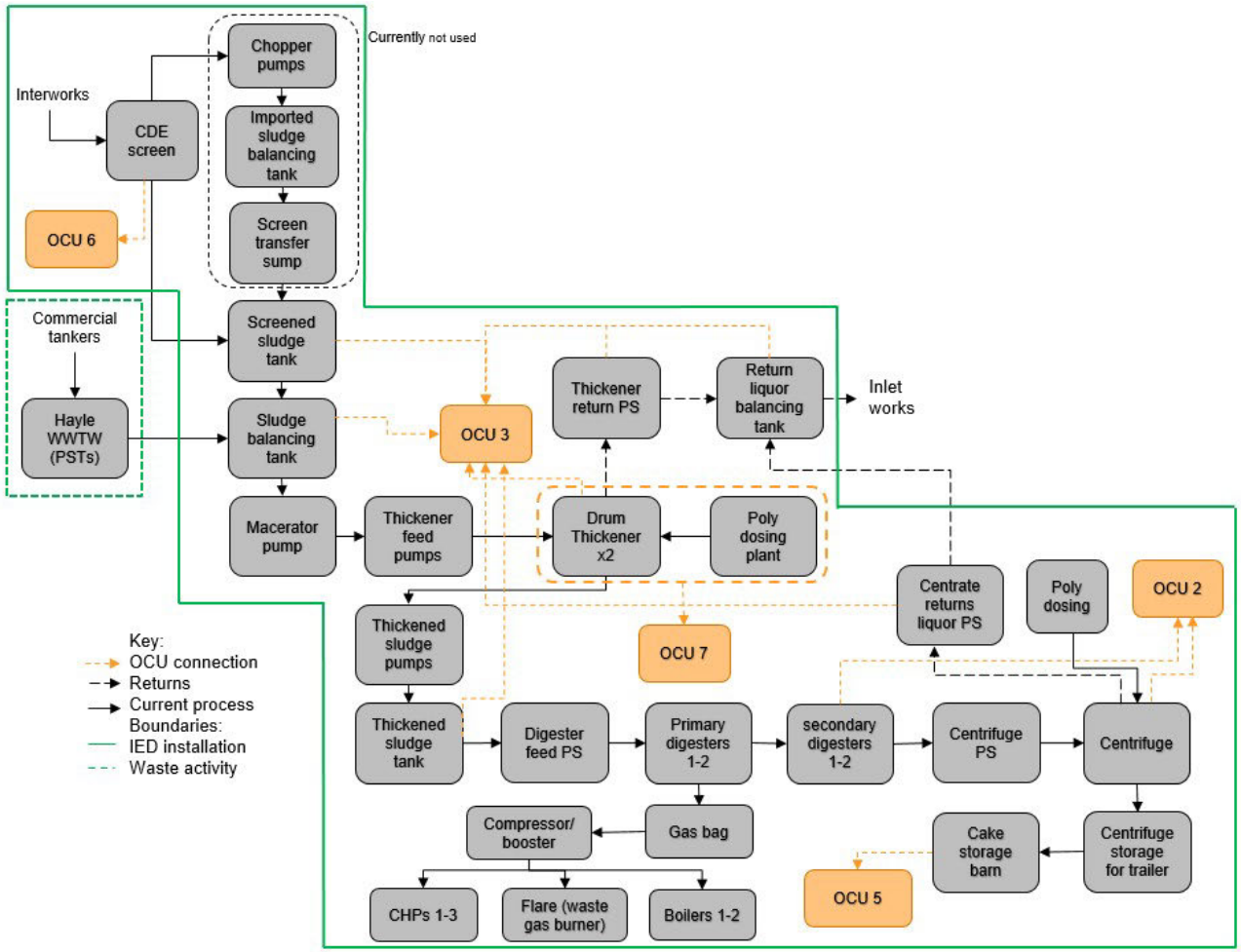
- The CHP process is designed to optimise the use of biogas and minimise the potential for releases to air. When biogas is available it is preferentially used to power the CHP engines and provide energy to be used by the site.

- Under normal operating conditions, biogas is burned in either the CHP engines or boilers. When biogas volumes are in excess of operational requirements and cannot be reduced sufficiently by operation of the engine and boilers, it is abated by the flare stack. The flare stack is designed and operated in accordance with Landfill Technical Guidance Note (LFTGN) 05. Records for the year 2021 show that the CHP flare (Y) has operated for between 1,792hrs and 2,668hrs, which equates to 20-30% of the

operational hours. These records indicate that emissions monitoring will be required (operational for more than 10% of a year (876 hours)). However, this reading was a result of reactive CHP engine failure. The CHP's have been subject to maintenance / renewal including the replacement of all three engine blocks minus ancillaries with nitrogen oxides. It is therefore anticipated that normal operations will ensue bringing the flare utilisation to less than 10%. Please see the Improvement Programme (within Appendix 5) for further details.

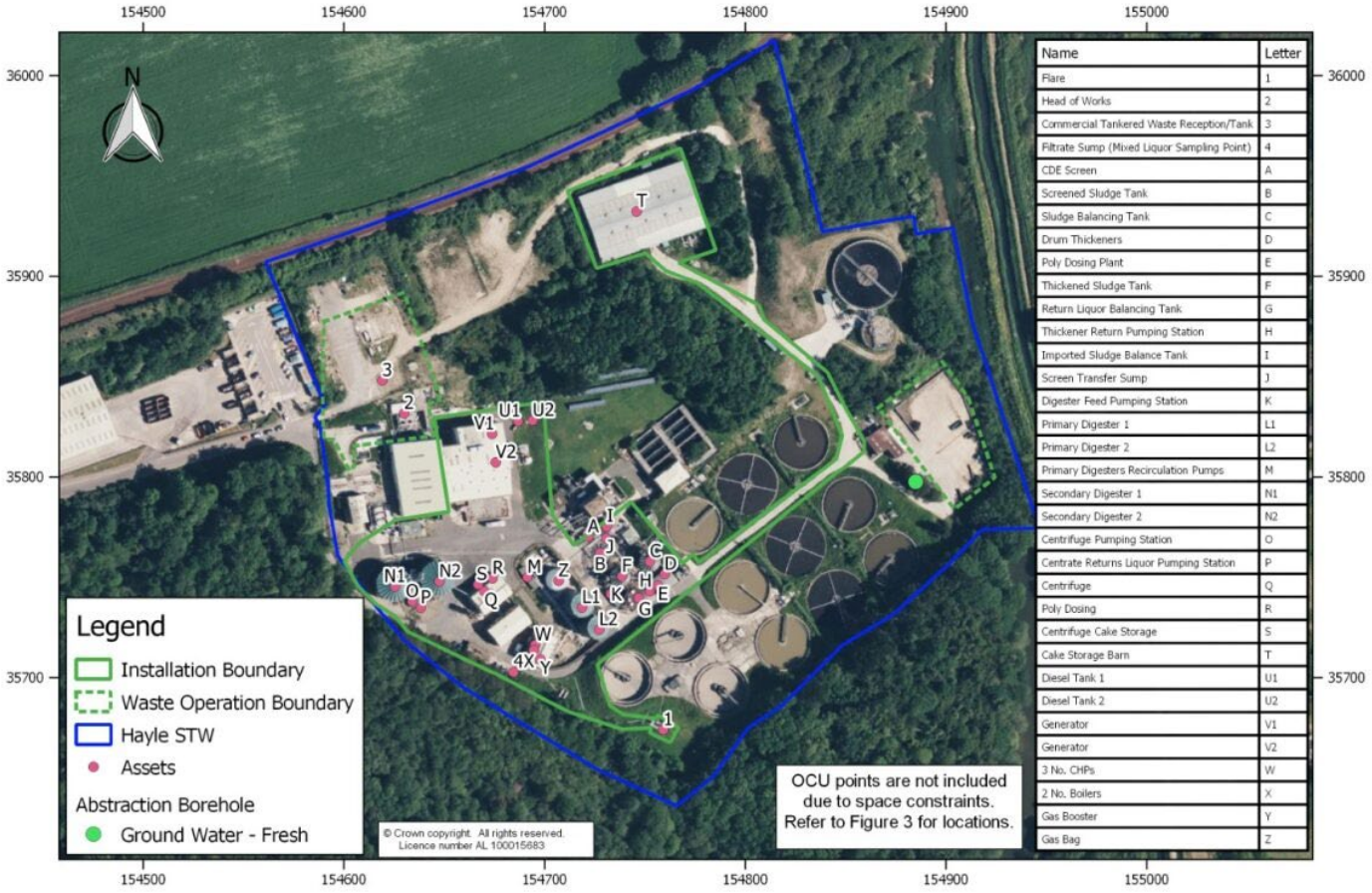
- In the unlikely event that there is still excess biogas in the gasholder it is vented to air via the pressure release valve (PRVs), however this situation is only anticipated in an emergency event when all planned combustion and abatement operations are unable to operate. There are, therefore, no planned emissions of biogas to the atmosphere under normal operations. The only potential for biogas releases to air could occur in an emergency situation, whereby emergency control and shutdown procedures would be put into action.

Figure 1-3 Installation: Process Flow Diagram



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

Figure 1-4 Installation Boundary and Site Layout



1.7 Point Source & Fugitive Emissions

Point Source Emissions to Air

Point source emissions to air are included in Table 1-2 below. The locations of point source emissions to air are shown on Figure 3.

The Environmental Risk Assessment (**Appendix 7**) includes further information relating to the risk posed to air from point source emissions on the Site and control measures adopted by the Operator to mitigate these risks.

A Leak Detection and Repair (LDAR) programme (**Appendix 21**) includes further information on how the risk of gaseous leaks are managed on site, by way of detection and repair.

Table 1-2 Point Source Emissions to Air

Asset	Emission Points	Notes
2 No. Primary Digester	Pressure release valve on each digester.	These valves are an essential safety mechanism and will release gas to atmosphere in the event of a build of pressure preventing damage to equipment e.g. the gas holder.
Gas Holder	Pressure release valve.	
2 No. Digester Boilers	2 No. stacks one from each digester boiler.	
3 No. CHPs	3 No. stacks; one from each CHP.	
Flare	Auxiliary flare.	Flare for emergency use e.g., in the event the CHP's are not available.
Fine screens, grit plant, secondary digesters and centrifuge (shared between the STW and the WWTW)	5 No. Odour Control Units (OCU).	OCU's serving secondary digesters, grit plant and centrifuge, the sludge thickening building, and the CDE are single staged Peace Maker polishing units. OCU's serving the sludge treatment area is a 2-stage biofilter and Peace Maker polishing unit. The OCU serving the sludge thickening building is a single stage activated carbon adsorption unit. Additional information included in **Appendix 9** Odour Management Plan.
Sludge treatment area (pre-thickening sludge assets e.g. sludge balancing tank)		
Sludge thickening building		
Sludge screen (CDE)		

Asset	Emission Points	Notes
2 No. Emergency generators	Generator stack for each emergency generator.	Two emergency containerised diesel generators used in the event of power failure at Hayle STW and/or Hayle WWTW.
	2 No. Diesel tank vents.	

Point Source Emissions to Surface Water, Groundwater and Sewer
The majority of process effluents, to include condensate and centrate are captured and are discharged to the sealed drainage system for discharge to the off-Installation Hayle STW for treatment. Final effluent from Hayle STW is discharged under Discharge Consent No. NRA-SWW-0782.

Please see the Improvement Programme (within **Appendix 5** BAT Assessment, Improvement Programme) for further details regarding progress against improvements to ensure all liquids are captured and discharged to the sealed drainage system. It is noted that an interim solution is in place to ensure condensate is captured in suitable receptacles before being periodically removed and returned to the drainage system. Please see **Appendix 5** BAT Assessment, Improvement Programme below which includes proposals to develop drainage routes to connect the drain discharge from condensate pots to the sealed drainage system.

The Environmental Risk Assessment (**Appendix 7**) includes further information relating to the risks that may arise through the operations and control measures adopted by SWW to mitigate these risks.

Fugitive Emissions to Surface Water, Groundwater and Sewer
Measures are in place to capture accidental spills which are directed to the drainage system, comprising gulley's that capture run-off and any spillages from areas of hard-standing and route them through the drainage system back to the head of works for treatment. Drainage infrastructure is shown on Figure 5.

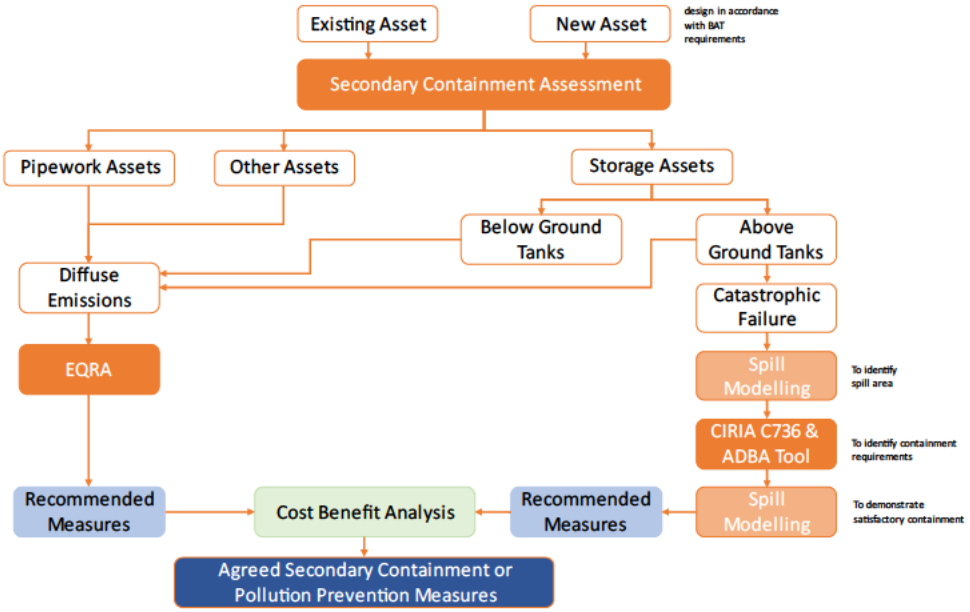
SWW has completed an initial drainage survey, which was completed In February 2023. An additional survey to capture areas that were not surveyed in this initial survey is scheduled for January 2024. Please see the Improvement Programme (within **Appendix 5** BAT Assessment, Improvement Programme) for further details regarding progress against improvements to the drainage system to ensure all surface water run-off is captured and discharged to the sealed drainage system.

In order to reduce fugitive emissions to soil and water, a robust risk assessment process, referred to as the Environmental Quantitative Risk Assessment (EQRA), is provided as shown in **Appendix 6** of this application. The EQRA is based on the source-pathway-receptor model as prescribed by CIRIA 736, and in accordance with sector guidance. The EQRA provides an indication of BAT or BAT equivalent measures for the containment of any fugitive emissions to ground/groundwater.

It is noted that the EQRA has not been updated as part of this resubmission. It is not considered that any minor changes e.g., changes to the boundary and additional OCU, would result in a significant change in the conclusions of this assessment. As such, and noting the timescales given for resubmission, the original report dated September 2022 is

provided in this application.

A separate Secondary Containment Risk Assessment, including spill modelling, has been completed in order to address the containment of any releases arising from a catastrophic failure of storage containment assets; this assessment is shown in **Appendix 16**. For clarity, the distinction between the EQRA (diffuse emissions) and CIRIA c736 (catastrophic failure) is as outlined in the diagram below.



EQRA and Secondary Containment Assessments

The Secondary Containment Risk Assessment **(Appendix 16)** has been revised since the original application to include a modelled solution to contain any releases arising from a catastrophic failure of storage containment assets. This assessment now includes a modelled solution for a combined containment system which specifically addresses (but is not limited to):

- Containment of catastrophic failures for all relevant assets on site, including imported sludge balancing tank, sludge balancing tank, thickened sludge tank, return liquor balancing tank, primary digesters, and secondary digesters;
- Containment solution consisting of impermeable surfacing in line with BAT 19 (also see Figure 7 for proposed impermeable surfacing); and
- Considerations for jetting.

Please see the Improvement Programme (within **Appendix 5** BAT Assessment, Improvement Programme) for further details regarding actions to progress improvements to implement the proposed containment solution.

Odour

An Odour Management Plan (**Appendix 9**) is implemented on Site.

There are 4 odour control units on site that treat odorous emissions from Hayle WWTW. The odour control units are summarised as follows:

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

It is noted that the Odour Management Plan has been updated as part of this resubmission to include the additional OCU. However, it is not considered that any minor changes e.g., changes to the boundary, would result in a significant change in the conclusions of this assessment.

OCU 5 is located in proximity to the Cake Barn and is noted to be inactive and disconnected from the treatment process. It is the intention that the Cake Barn is ventilated and not fitted with an OCU going forward. The Cake Barn will be subject to alternative odour mitigation measures in full, as detailed in the Odour Management Plan (**Appendix 9**).

Bioaerosols

A sampling and enumeration of Bioaerosols from the sludge treatment at Hayle WWTW was conducted in October 2022 to examine bioaerosol concentrations at locations around the boundary of the Site. Results of the monitoring showed that bioaerosol emissions were within the EA's threshold limits for mesophilic bacteria and aspergillus fumigatus and the process contribution was low or none.

A Bioaerosol Risk Assessment provides further details and is included in **Appendix 10.** It considers the risk of bioaerosol impact at sensitive locations using a conceptual model approach and concludes the residual risk from all sources on-site are very low or low and no additional control measures, other than those included in the assessment, were required.

It is noted that the Bioaerosols Risk Assessment does not fully reflect amendments to this application which were made as a result of EA comments in November 2023. It is not considered that these minor changes e.g., changes to the boundary, would result in a significant change in the conclusions of this assessment. As such, and noting the timescales given for resubmission, the report dated October 2022 is provided in this application.

Monitoring

SWW will conduct regular visual checks as part of their inspection regime, which will include observing and actioning any potential risks to the environment to include e.g., pests, vermin, litter, mud, dust, noise and odour. The Environmental Risk Assessment (**Appendix 7**) provides further information with regard to inspection regimes. Further information relating to odour is included in the Odour Management Plan **(Appendix 9)**.

1.8 Management

SWW will operate an Environmental Management System (EMS) in line with prevailing Environment Agency guidance – How to Develop a Management System: Environmental Permits (2020)[1] and BAT 1. A summary of the EMS is shown in **Appendix 3**.

The SWW EMS is a consolidated management system made up of around 5,000 documents, stored in an electronic library and easily accessed by all staff via the company intranet. Some of these documents are site-specific and others are generic.

The system is a combined Environmental Management and Quality Management System and is both ISO 14001 and 9001 accredited.

A Technically Competent Manager (TCM), either Dave Swiggs and/or Tom Veale, will be present on the Site. Further information for Dave and Tom is provided in **Appendix 2.**

1.9 Raw Materials

Raw materials used within the proposed installation include polyelectrolyte, diesel, antifoam, and oil. Details for these raw materials, including maximum amount stored on the Site and annual throughput are included in Section III Supporting Information. Volumes are used in place of tonnes where raw materials are liquids and any conversion factor used would result in an inaccurate figure.

Potable water and final effluent are used, as required. Details are not provided for these raw materials, as the amounts used vary.

1.10 Waste

Waste from the sludge screen is routinely collected from the Site by a registered waste carrier, for disposal. Details regarding sludge screenings are included in the Residues Management Plan **(Appendix 17)**. Sewage sludge is routinely treated to a standard that allows the sludge to be recovered for agricultural use.

1.11 Energy

SWW has a dedicated Energy Team within the business and strives to ensure their energy usage is as efficient as possible and that energy is managed on the Site. SWW is certified under ISO 50001, demonstrating the commitment to continual improvement in energy management. Further information is referenced in the Energy Management Plan (**Appendix 12**).

1 Develop a management system: environmental permits - GOV.UK (www.gov.uk)

Digester Boilers and CHP's are used to supply energy for the anaerobic digestion process. The CHP's are also used for activities on Hayle STW. In the event of failure, backup diesel generators will be used for activities on Hayle WWTW and/or Hayle STW, as required.

1.12 Environmental Accidents / Incidents

SWW will implement an Environmental Accident Management Plan (EAMP) (**Appendix 13**) which will form part of the EMS for the Site. The EAMP includes how SWW will identify and manage environmental accidents and incidents which may occur on the Site e.g., breakdown of equipment, spills / leaks, fires, flooding, and utility failure. The EAMP refers to the Environmental Risk Assessment **(Appendix 7)** which includes additional information on how SWW will manage environmental risk by way of mitigation measures.

1.13 Noise and Vibration

A Noise and Vibration Risk Assessment is included as **Appendix 11**.

The Noise and Vibration Risk Assessment concludes that the risk posed to nearby sensitive receptors arising from the proposed installation operations is low.

Noise is minimised by appropriate design and the planned reliability centered maintenance will ensure appropriate maintenance and servicing schedules are in place. Vehicle movements are screened from noise sensitive receptors by existing structures.

It is noted that the Noise & Vibration Risk Assessment has not been updated as part of this resubmission. It is not considered that any minor changes e.g., changes to the boundary and additional OCU, would result in a significant change in the conclusions of this assessment. As such, and noting the timescales given for resubmission, the original report dated November 2021 is provided in this application.

1.14 Site Closure

A Site Condition Report has been prepared as part of this EP variation. The Site Condition Report (**Appendix 4**) has been prepared in accordance with EA H5 'Site Condition Report' Guidance'. It is considered that the original report dated September 2022 remains valid and is provided in support of this application.

1.15 Emission Benchmarks

Assets located on site that serve the Anaerobic Digestion activities can be seen in Table 1-3.

Table 1-3 Thermal Capacity of Combustion Plant

Combustion Plant	Thermal Input Capacity	Operating Hours
CHP Engine 1	0.25 MW_{th}	24/7hrs per day, 365 days per year

Combustion Plant	Thermal Input Capacity	Operating Hours
CHP Engine 2	0.25 MW_{th}	24/7hrs per day, 365 days per year
CHP Engine 3	0.5 MW_{th}	24/7hrs per day, 365 days per year
Digester Boiler 1	0.24 MW_{th}	24/7hrs per day, 365 days per year
Digester Boiler 2	0.32 MW_{th}	24/7hrs per day, 365 days per year
2 x Back-up Diesel Generators	~0.38 MW_{th}	Used for back-up

As the Digester Boilers and CHP's are existing, having been put into operation before 20 December 2018, aggregation of the thermal input is not required. Therefore, the boilers and CHP's are not >1MWth and are therefore excluded from Medium Combustion Plant Directive and specified generator controls.

The Digester Boilers serve the anaerobic digestion activities and are considered to be a DAA. The CHP's serve the activities in Hayle STW, as well as the anaerobic digestion activities in Hayle WWTW. It is considered that the CHP's are a DAA to the anaerobic digestion activity, as such BAT has been considered for Digester Boilers and CHP's. Requirements of both MCP and Specified Generator Regulations (despite not being directly applicable) have therefore been considered as part of this application as they relate to BAT.

The diesel-powered backup generators are only used during an emergency and do not operate for more than 50 hours a year, this includes the time spent under testing. The generators are therefore excluded from Specified Generator regulations. As a note, the diesel-powered backup generators supply the wider WwTW, as well as the anaerobic digestion activities in Hayle STW . It is not considered that these generators are a DAA, as these assets are used for emergency purposes only.

This application presents a H1 assessment tool (**Appendix 8).** This assessment identified that the combustion activities associated with the Combined Heat and Power (CHP) units and the Digester Boilers exceeded EA H1 screening criteria. An Air Emissions Risk Assessment is therefore required, which is also shown in **Appendix 8**.

It is noted that the Air Emissions Risk Assessment has not been updated as part of this resubmission. It is not considered that any minor changes e.g., changes to the boundary and additional OCU, would result in a significant change in the conclusions of this assessment. As such, and noting the timescales given for resubmission, the original report dated January 2022 is provided in this application.
Emission Limit Values for Point Source Emissions (stacks) from Digester Boilers and CHP's are included in Section III, C3 Supporting Information, Q.2.

1.16 Impacts

Receptors were identified using local knowledge of the area and appropriate web-based searches and other existing information to assess the impact of the installation on the

surrounding environment. The Environmental Risk Assessment (**Appendix 7**) includes the potential impacts associated with the proposed variation and the mitigation measures to minimize the impact on the environment.

1.17 Habitats Regulations

A Nature and Heritage Conservation Screening Report has been completed by the Environment Agency for the Site (**Appendix 15**). The Nature and Heritage Conservation Screening Report identifies conservation sites, protected species and habitats in the vicinity of the Site and provides maps showing their locations and extent. The conservation sites, protected species and habitats identified by the Nature and Heritage Conservation Screening Report are listed below:

- Site of Special Scientific Interest (SSSI) within 2 km – St. Erth Sand Pits and Hayle Estuary & Carrack Gladden;
- Special Areas of Conservation (cSAC or SAC) within 10 km – Tregonning Hill and Bristol Channel Approaches / Dynesfeydd Mor Hafren;
- Special Protection Areas (pSPA or SPA) within 10 km – Marazion Marsh
- Local Wildlife Sites (LWS) within 2 k m – Trelowerth Woods; and
- Protected species within up to 2 km – European eel.

Section I: Application Forms

Part A

Part C2

Part C3

Part C6

Part F1 (including letter of authorisation)

Section II: Technical Description

The Information provided in this section should be viewed in parallel with:

- Section I: Application Forms
- Section III: Supporting Information

1. Introduction and overview

This application is for a variation to the current Environmental Permit (EPR/NP3696HH) to add an IED Section 5.4 A (1)(b)(i) activity for 'Anaerobic Digestion', and is being made due to changes to the Environment Agency (EA) interpretation of the environmental permitting exclusion for Urban Wastewater Activities (under Environmental Permitting (England and Wales) Regulations 2016 (EPR) Schedule 1, Part 2, Chapter 5, Section 5.4). The EA interpretation now requires that anaerobic digestion (AD) plants with a capacity exceeding 100 tonnes per day (te/d) are classified as installations for the purposes of EPR. Furthermore, it has been determined that, in calculating digester capacity, there should be no distinction between imported or indigenous sludges.

It is proposed that the EP (EPR/NP3696HH) will continue to regulate the reception of the third party (commercial) sludge, which is received at the inlet works of Hayle STW. This reception is proposed to be regulated as a distinctly separate waste activity under the Multi-Activity Permit.

Following reception at Hayle STW, the third party (commercial) sludge waste stream is treated by the effluent treatment process and any solids captured by the PST are discharged to the sludge balancing tank where the sludge is treated. It is proposed that the sludge balancing tank and onward assets involved in the anaerobic digestion treatment activities are regulated as a separate Installation activity under IED under the Multi-Activity Permit. (see Figure 1-3).

1.1 Existing EP and Permitted Area

The existing Environmental Permit includes the following activities:

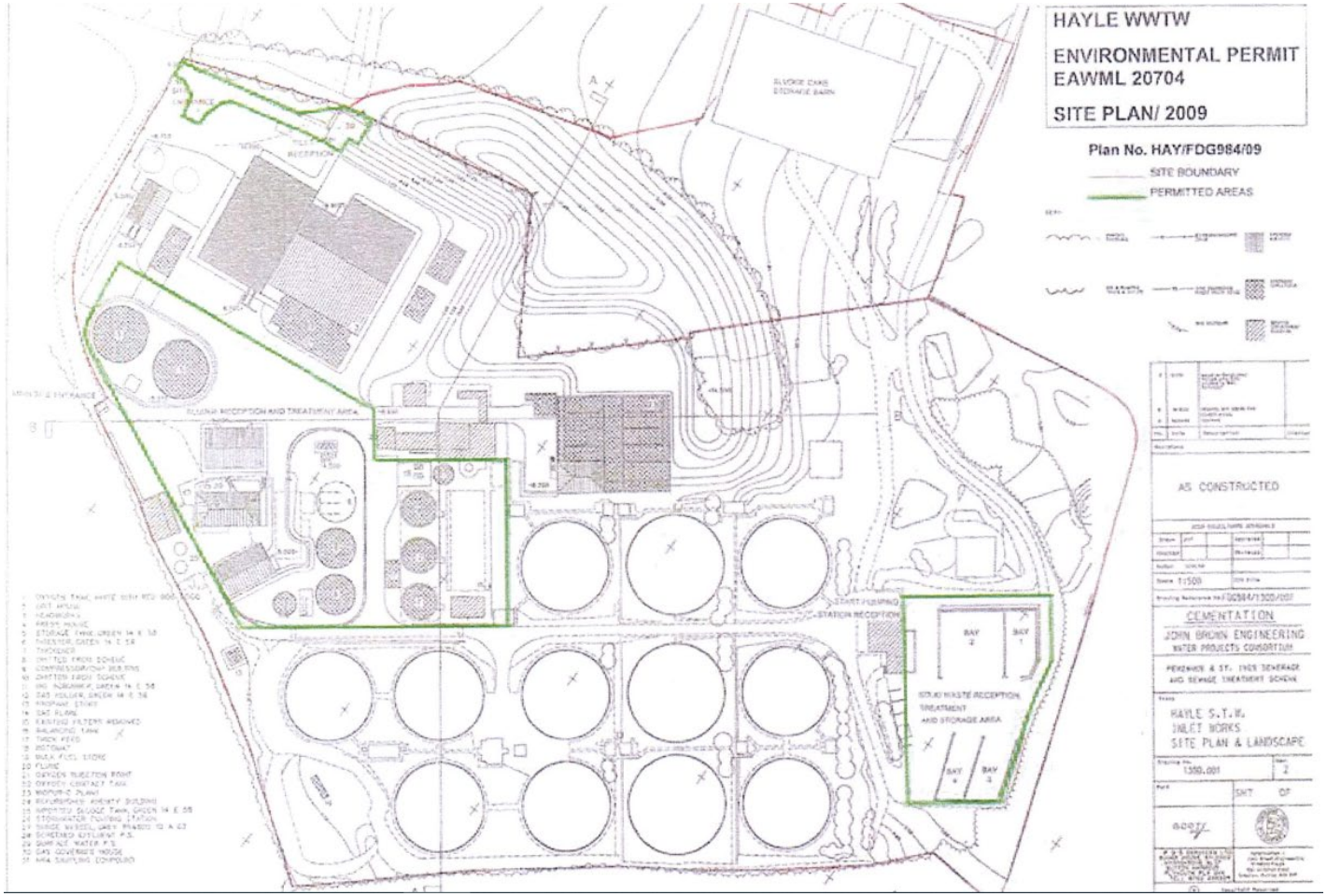
- Reception of third party (commercial) sludge which is carried out in the north western area; and
- The storage and transfer of grits and screenings which is carried out in the eastern area.

The existing permitted area, as shown on Figure 1-5, covers the above listed activities. The permitted area also covers other assets that are not relating to the above waste activities; with some of this area proposed for the installation activity. Figure 1 shows the proposed boundary for the Multi-Activity Permit, which includes:

- Reception of third party (commercial) sludge which is carried out in the north western area, and has been extended to encompass a new stormwater overflow tank (waste activity);
- Storage and transfer of grits and screenings which is carried out in the eastern area (waste activity); and

- New anaerobic digestion activity including biological treatment, which includes some of the existing permitted area in the western area. This area has been amended to fully reflect assets within the scope of IED (installation activity).

Figure 1-5 Existing EP Boundary (copy taken directly from permit)



1.2 Description of Installation Site Activities

A summary description of all activities carried out within the Hayle WWTW is provided below.

Stationary Technical Unit	Directly Associated Activities
Anaerobic digestion of indigenous and imported sludges >100te/day	Sludge import, storage and screening Sludge thickening Dewatering and cake secondary treatment and storage Biogas storage, utilisation & flaring

This section provides a summary of the sludge treatment process and associated infrastructure at Hayle WWTW. The process, including distinctions between waste and installation activities, is outlined in the Process Flow Diagram (PFD) as shown in Figure 1-6. The location of the assets and infrastructure are shown in Figure 1-7.

This information will be used to identify and assess the significance of the main sources of contamination (i.e., locations where sludges and liquors are stored / transferred) at the Hayle WWTW that would have the potential to cause pollution of the ground and / or the local water environment.

1.3 Sludge treatment process

The following provides a summary description of the sludge treatment process at the Hayle WWTW. Each asset in the summary description is provided with a corresponding reference (A, B etc.) which is referenced in Figure 1-7 Installation Boundary and Site Layout in order to show its location within the installation.

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

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

- The thickened sludge from the thickened sludge tank (F) is fed to the two primary digesters (L1-2) by the digester feed PS (K). The two primary digesters are equipped with a recirculation line with digester recirculation pumps.

- SWW follow HACCP (Hazard Analysis and Critical Control Points) to ensure compliant sludge treatment; plus, digester process controls that set the key digester operating parameters that include:

  - pH and alkalinity of the digester feed;
  - digester operating temperature (HACCP);
  - hydraulic and organic loading rates of the digester feed (HACCP);
  - hydrostatic pressure sensor to detect of the liquid level in the digester.

- Routine Daily HACCP recording from the Site includes Operational status and Critical Control Points (CCPs) for:
  - Digester feed rate;
  - Digester temperature; and,
- Final product %Dry Solids.

Implementation of the above systems will:

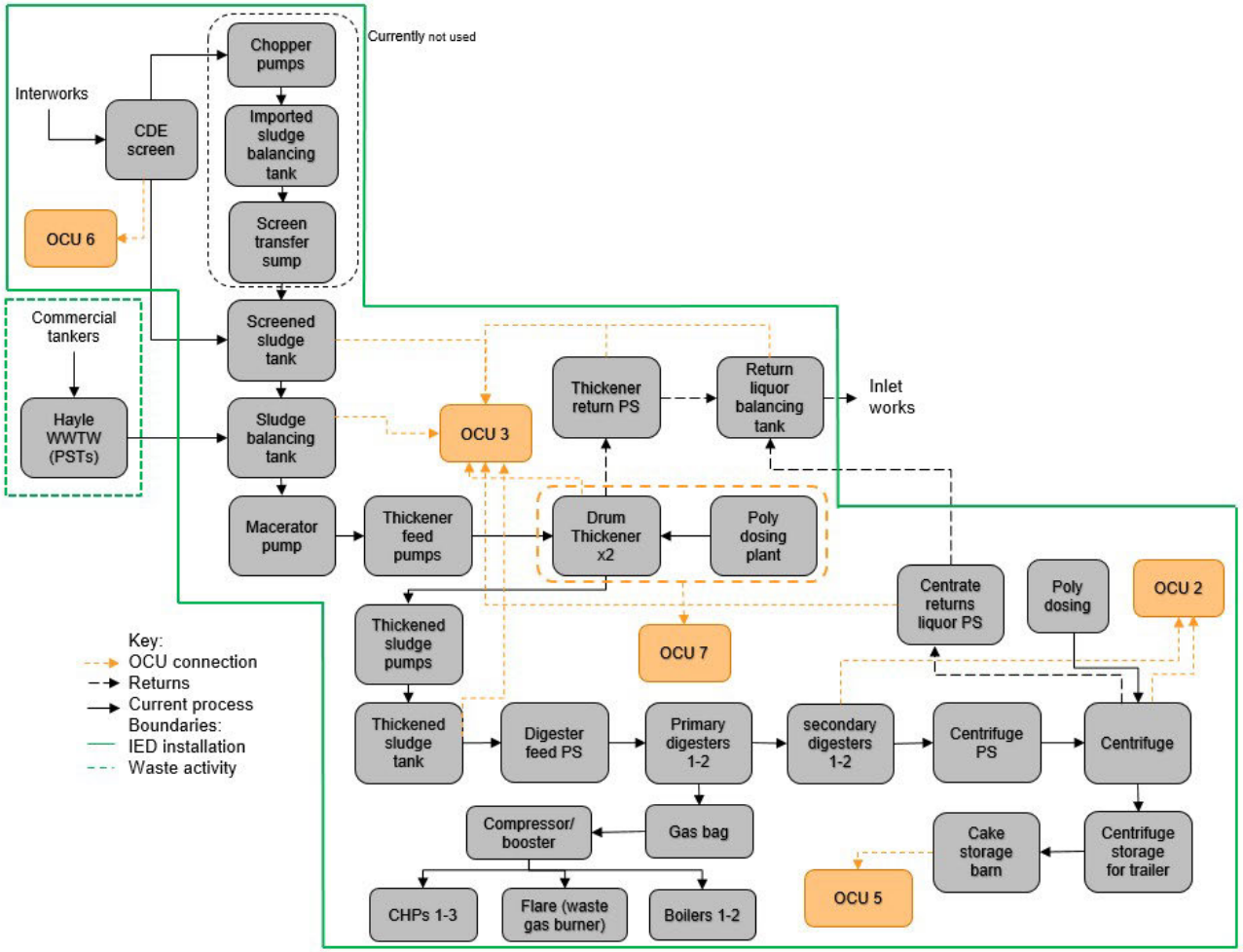
  - ensure a stable digester operation.
  - minimise operational difficulties, such as foaming, which may lead to odour emissions.
  - provide sufficient early warning of system failures which may lead to a loss of containment and explosions.

- Digested sludge from the primary digesters (L1 -L2) gravitates to two secondary digesters (N1 -N2). From the two secondary digesters, the sludge is pumped by the centrifuge PS (O) to the centrifuge (Q). The centrifuge receives polymer from a polymer dosing system (R). The return liquor from the centrifuge is discharged to the centrifuge return liquor pumping station (P) and pumped back to the return liquor balancing tank.
- The flow from the return liquor balancing tank is discharged via the filtrate sump to the old inlet works to the Primary Settlement Tanks influent.
- The dewatered cake is discharged to the centrifuge cake storage area (S) before being transported by trailer to the cake barn (T). In the cake barn the cake is stored for 21 days before being exported off site.
- Gas produced by the primary digesters are stored in a gas bag (Z) before being passed via the booster to the three CHPs (W), the two boilers (X) or the flare (1).
- The CHP process is designed to optimise the use of biogas and minimise the potential for releases to air. When biogas is available it is preferentially used to power the CHP engines and provide energy to be used by the site.
- Under normal operating conditions, biogas is burned in either the CHP engines or dual fuel boilers. When biogas volumes are in excess of operational requirements and cannot be reduced sufficiently by operation of the engine and boilers, it is abated by the flare stack. The CHP flare stack is designed and operated in accordance with

Landfill Technical Guidance Note (LFTGN) 05. Records for the year 2021 show that the CHP flare (Y) has operated for between 1,792hrs and 2,668hrs, which equates to 20-30% of the operational hours. These records result in emissions monitoring being required (operational for more than 10% of a year (876 hours)). However, this reading was a result of reactive CHP engine failure. The CHP's have been subject to improvements, it is therefore anticipated that normal operations will ensue bringing the flare utilisation to less than 10%. Please see the Improvement Programme (within Appendix 5 BAT Assessment, Improvement Programme) for further details.

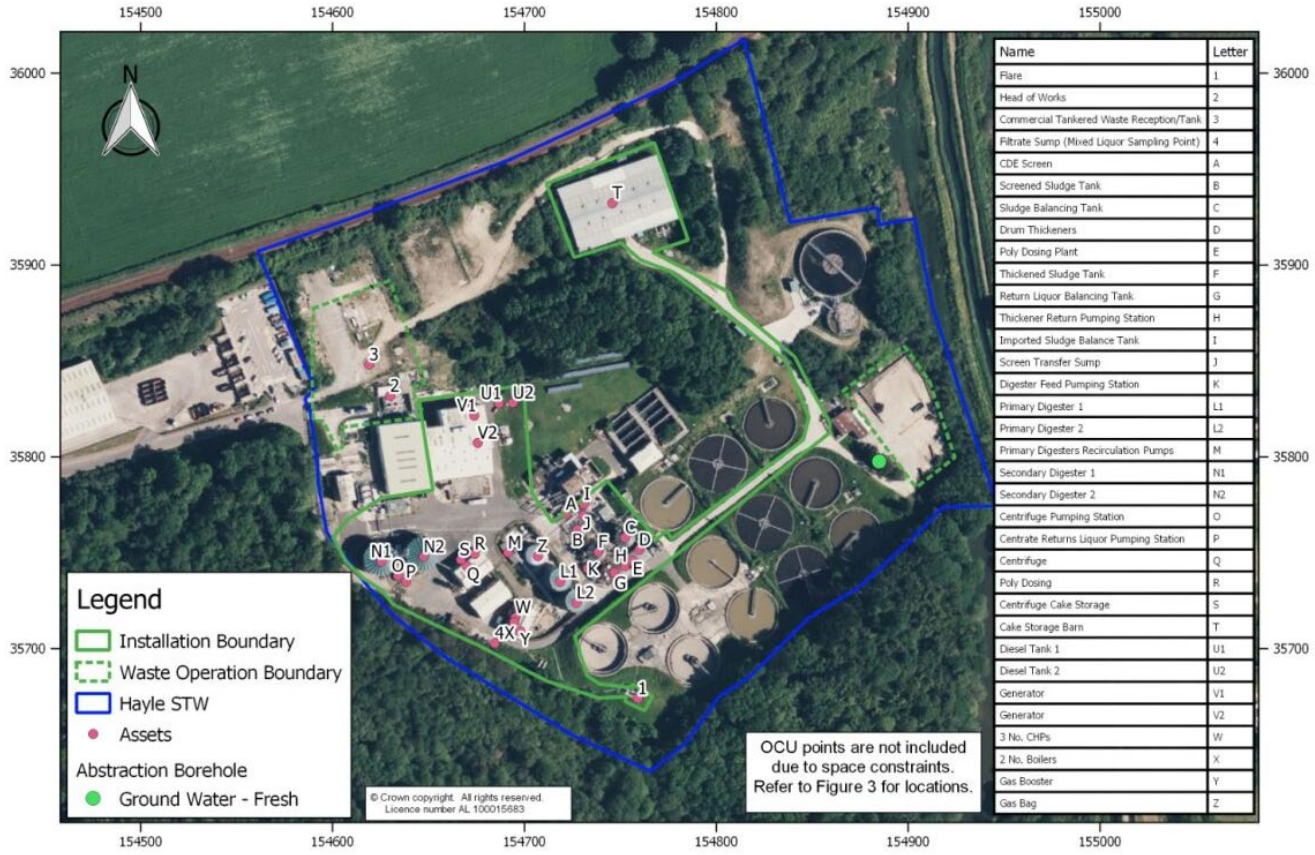
- In the unlikely event that there is still excess biogas in the system it is vented to air via the pressure release valves (PRVs) on the primary digesters, however this situation is only anticipated in an emergency event when all planned combustion and abatement operations are unable to operate. There are, therefore, no planned emissions of biogas to the atmosphere under normal operations. The only potential for biogas releases to air could occur in an emergency situation, whereby emergency control and shutdown procedures would be put into action.

Figure 1-6 Installation Process Flow Diagram



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

Figure 1-7 Installation Boundary and Site Layout



1.4 Best Available Techniques

A BAT Assessment is provided in **Appendix 5** which addresses each relevant BAT conclusion. The Environmental Quantitative Risk Assessment (EQRA) provides a detailed Source-Pathway-Receptor model in the evaluation of risks to controlled waters arising from storage, pipework and other assets with an associated determination of required BAT 19 compliance in terms of preventing or, where that is not practicable, reducing emissions to soil and water. The EQRA is shown in **Appendix 6**.

An Improvement Programme is provided as part of the BAT Assessment, which provides a number of improvement plans against relevant BAT conclusions. The programme includes progress completed to date and action plans to progress towards compliance.

Section III: Supporting Information

This section of the application provides detailed responses to questions within the application forms shown in Section I: Application Forms, as required.

Responses are provided only where further information is required, with the question numbers provided in italics and as stated in the application forms.

The information provided in this section should be viewed in parallel with:

- Section I: Application Forms
- Section II: Technical Description

Form C2 Supporting Information

3 Your ability as an operator

3a Relevant offences

Relevant offences are listed in **Appendix 1**.

3b Technical ability

SWW have relevant technically competent management to operate the activities at Hayle WWTW. Additional information for the TCM's, Dave Swiggs and Tom Veale, is included in **Appendix 2.**

3d Management systems

A summary of the Environmental Management System (EMS) is provided in **Appendix 3**. The EMS comprises approximately 5,000 documents that includes relevant documents and procedures that meet BAT 1. The EMS is ISO:14001 and ISO:9001 accredited. As referenced in the BAT Assessment shown in **Appendix 5**, the following documents are provided as part of the EMS:

SI Table 2 – BAT 1 Environmental Management System

BAT 1. In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features:	
Document	**Application Reference**
Fugitive Emissions Management Plan	Available on request
Leak Detection and Repair Programme	Section V: Appendix 21
Waste Management Plan	Available on request
Site Condition Report.	Section V: Appendix 4
Point source emissions to air, water and land.	Section III: Supporting Information, Form C3, Question 2
Describe how you avoid producing waste in line with Council Directive 2008/98/EC on waste	Section III: Supporting Information, Form C3, Question 6e
Environmental Accident Management Plan	Section V: Appendix 13
Odour Management Plan.	Section V: Appendix 9
Noise & Vibration Risk Assessment	Section V: Appendix 11
Residues Management Plan	Section V: Appendix 17

6 Environmental risk assessment

A review of environmental risks associated with activities covered by the scope of this variation application has been carried out. This review follows EA guidance on risk assessments for environmental permits[2]. It is noted that this guidance replaces previous EA H1 Guidance (Environment Agency, 2011), however, the H1 methodology is considered to remain appropriate.

A copy of the Environmental Risk Assessment is shown in **Appendix 7**. The Environmental Risk Assessment includes mitigation measures which SWW implement on the Site to minimise risk to the environment. In this way, the Environmental Risk Assessment covers the 'measures taken to avoid and minimise the impact of environmental incidents' aspect of the Environmental Accident Management Plan **(Appendix 13)**. The Environmental Accident Management Plan therefore cross-references the Environmental Risk Assessment.

A Bioaerosols Risk Assessment has been completed for the Site by Crestwood Environmental Limited. A copy of the Bioaerosols Risk Assessment is included as **Appendix 10**. The Bioaerosols Risk Assessment is quantitative in nature and includes monitoring alongside an interpretive report. The report indicates that the residual risk from all sources on Site were very low or low and that no additional control measures where required.

2 https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit (accessed September 2022)

Form C3 Supporting Information

1 What activities are you applying to vary?, continued

Activities to be varied are provided in Table SI Table 3 below.

SI Table 3 - Types of Activities

Installation name	Schedule 1 or other references	Description of the Activity	Activity Capacity	Annex I (D codes) and Annex II (R codes) and descriptions	Hazardous waste treatment capacity	Non-hazardous waste treatment capacity
Hayle WWTW	Section 5.4 A(1) (b)(i)	**Anaerobic digestion** of indigenous and imported UWWT-derived sludges: Recovery or a mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment	>100 tonnes per day	R 3: recycling/ reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes)	N/A	Form C3 refers to note 3: By capacity we mean the total sludge treatment capacity (tonnes each day) for waste treatment operations. 328 te/day
Directly Associated Activities (including description)						
Secondary treatment of digestate before being recycled to agriculture, including digestate produced on site			R3: recycling/ reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes)			
Treatment of sludges prior to digestion, including screening, mixing and thickening operations			R3: recycling/ reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes)			
Storage and transfer of waste			R13: Storage of wastes pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced)			

	D15: Storage pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where it is produced)
Steam and Electrical Power Supply From receipt of biogas produced from the anaerobic digestion process to combustion with the release of combustion gases. Combustion of biogas in CHP's and Digester Boilers.	R1: Use principally as a fuel to generate energy
Emergency flare operation Receipt of biogas produced from the anaerobic digestion process to incineration with the release of combustion gases. Use of flare only for emergencies e.g. during periods of breakdown or maintenance of other assets utilising biogas.	D10: Incineration on land
Gas Storage Storage of biogas produced from the anaerobic digestion process.	R13: Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage pending collection, on the site where it is produced)
Air Abatement Collection and treatment of air from the buildings or plant using abatement system.	No applicable waste codes
Raw material (non-waste) **storage**	No applicable waste codes
Surface water collection, including **temporary storage**	No applicable waste codes
Annual throughput (tonnes each year)	**120,000 tonnes**

Note – Waste activities to be included as a separate activity, as part of the proposed Multi-Activity Permit.

The List of Waste codes table below is provided in response to Environment Agency Form, Part C3, Question 1 Types of Waste Accepted.

SI Table 4 –List of Waste Codes

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

2 Point source emissions to air, water and land

The Point Source Emissions table is provided in answer to Environment Agency form Part C3, Q2, Table 2.

SI Table 5 - Point Source Emissions

Source	Parameter	Quantity (Limit)	Unit
Point source emissions to air			
Stack on CHP engine	Oxides of nitrogen	500	mg/m^3
	Carbon monoxide	1,400	mg/m^3
Stack on CHP engine	Oxides of nitrogen	500	mg/m3
	Carbon monoxide	1,400	mg/m3
Stack on CHP engine	Oxides of nitrogen	500	mg/m3
	Carbon monoxide	1,400	mg/m3
Stack on boiler burning biogas	Oxides of nitrogen	No Limit set	None specified
	Carbon monoxide	No Limit set	None specified
Stack on boiler burning biogas	Oxides of nitrogen	No Limit set	None specified
	Carbon monoxide	No Limit set	None specified
Exhaust Stack on Generator	No Limit Set		
Exhaust Stack on Generator	No Limit Set		
Auxiliary flare x 1	No Limit Set		
Stacks on OCU units 2, 3, 5, and 6 and 7	Odour concentration	1000	OU_E/Nm^3
	Ammonia	0.3 - 20	mg/Nm^3
	Hydrogen Sulphide	No Limit Set	mg/Nm^3
	Hydrogen Chloride	No Limit Set	mg/Nm^3
	TVOC	5 - 40	mg/Nm^3
Vent on diesel storage tanks x 1	No Limit Set		
Vent on diesel storage tanks x 1	No Limit Set		
Pressure Relief Valve (PRV) on Digesters x 1	No Limit Set		
Pressure Relief Valve (PRV) on Digesters x 1	No Limit Set		
Pressure Relief Valve (PRV) on Gas holder x 1	No Limit Set		
Point source emissions to water (other than sewer)			

Source	Parameter	Quantity (Limit)	Unit
All return liquors to the head of works downstream of the storm overflow for treatment[1]. Emissions Inventory for Water included as SI Table 7 and associated proposed monitoring suite included in SI Table 8.			
Point source emissions to sewers, effluent treatment plants or other transfers off site			
No emissions, other than to the head of works for treatment (see above).			
Point source emissions to land			
No point source emissions to land.			

[1] To be fully confirmed by CCTV drainage survey and proposed action plan included in the Improvement Programme (**Appendix 5**).

An Air Quality Risk Assessment (**Appendix 8**) has been completed using the H1 Tool, which shows that air dispersion modelling will be required for boilers and the CHP. An air dispersion model is included as part of an Air Emissions Risk Assessment (**Appendix 8**). To note, improvements made to the CHP's has not resulted in changes to the thermal input capacity or other input data used in this appendix. As such, it is considered that the Air Emissions Risk Assessment dated January 2022 remains accurate in terms of assessing risk from air emissions.

The rated thermal input of the two Digester Boilers are 0.24MW_{th} and 0.32MW_{th}. The rated thermal input of each of the three CHP engines are:

- 2 No. CHP with a thermal input capacity of 0.25 MW_{th} each; and
- 1 No. CHP with a thermal input capacity of 0.5 MW_{th}.

As the boilers are existing, having been put into operation before 20 December 2018, aggregation is not required. Therefore, the boilers and CHP's are not >1MWth and are therefore excluded from Medium Combustion Plant Directive and specified generator controls.

Emissions to on-site drainage system

It is the intention that all process liquors and surface water runoff will be collected and discharged via below ground drainage systems, which will be discharged to the Head of Works downstream of the storm overflow at Hayle STW for full treatment prior to discharge under Discharge Consent No.NRA-SW-0782. Flows from Hayle WWTW to the on-site drainage system are shown in Figure 5. An action plan to ensure BAT compliance for the drainage system, which details investigations and improvements to the drainage system is included in the Improvement Programme (**Appendix 5**).

Emissions Inventory to water, including emissions to head of works, is provided in SI Table 6. The liquor sampling point (filtrate sump) and liquor discharge from the installation (mixed liquor return) are shown on Figure 3. Associated Monitoring Programme for emissions to the head of works (liquor returns) is included in SI Table 7.

Process liquor emissions comprise liquor from raw sludge thickening and digested sludge dewatering processes, condensates and wash down waters. Liquors returned to the head of works at Hayle STW will be monitored for a period of 12 months to characterise these

emissions. The findings of the monitoring, analysis and impact assessment will be provided to the Environment Agency.

SI Table 6 – Emissions Inventory to Water

Emission Point Reference and Location	Emission Characteristic	Waste Type
Mixed Liquor Return	Liquor	Mixed Liquor
Mixed Liquor Sampling Point (Filtrate Sump, see Figure 3)	Liquor	Mixed Liquor
Commercial Tankered Waste Discharge Point (off-installation)	Liquor	Commercial tankered waste

SI Table 7 – Emissions to Water Monitoring Programme

Matrix	Parameter	Limit	Reference Period	Monitoring Frequency	Samples per year	Monitoring Standard
Liquor	pH by pH Electrode			Once every month	12	
	BOD 5 Day ATU as O2 by ISE				12	
	Solids Suspended at 105`C by Gravimetry				12	
	Solids Suspended at 500`C by Gravimetry				12	
	Nitrogen Total Oxidised as N by Colorimetry				12	
	Ammonia as N by Colorimetry				12	
	Chloride as Cl- by Colorimetry				12	
	PFOA and PFOS[1]			Once every 6 months	2	--
	Total nitrogen[1]			Once every month	12	EN 12260, EN ISO 11905-1
	Chemical Oxygen Demand (COD) [1]			Once every month	12	No EN standard available

Matrix	Parameter	Limit	Reference Period	Monitoring Frequency	Samples per year	Monitoring Standard
	Total Organic Carbon (TOC)[1]			Once every month	12	EN 1484
	Total Phosphorous[1]			Once every month	12	Various EN standards available (i.e. EN ISO 15681-1 and -2, EN ISO 6878, EN ISO 11885)
	Total Suspended Solids (TSS)[1]			Once every month	12	EN 872

Note 1- Determinands will require third-party testing. An action plan to confirm capacity and availability of accredited third-party laboratories is in progress, as detailed in the Improvement Programme (**Appendix 5)**.

You will also need to complete application form part C6 if your installation includes changing or adding a point source emission(s) to:

- **Water;**
- **Groundwater; or**
- **Sewer**

As requested, Part C6 has been completed, which acts as a commitment to BAT 3. Information to supplement the answers to questions within Part C6 is included in the relevant Part C6 Supporting Information below.

Information provided with respect to Part C6 is for the discharge of liquors from the installation to the (off-installation) Head of Works at Hayle STW.

3 Operating techniques

3b General requirements

The Environmental Risk Assessment (**Appendix 7**) concludes that the risk from fugitive emissions is low, therefore a fugitive emissions management plan has not been provided as part of this application. However, Hayle WWTW does operate in accordance with a Leak Detection and Repair (LDAR) programme (**Appendix 21**), which is conducted by an external contractor, B P Buswell Limited in line with BAT 14 below (SI Table 8). A maintenance schedule is provided below.

SWW Digester Site Maintenance Schedule
Month By Month

BUSWELL HEATING ENGINEERS

Site	Maintenance Item	April	May	June	July	August	September	October	November	December	January	February	March
Countess Wear	Boilers & Burners		✓						✓				
	Waste Gas Burners		✓						✓				
	Gas Holder Inspection		✓										
	Fire Valves		✓										
	Fire/Gas Alarm Integration		✓										
	Biogas Pipework Visual Inspection								✓				
	Biogas Pipework Test		✓										
	Secondary Fuel Inspection & Test		✓										
	Valve Exercising		✓						✓				
	Pressure Vac Valves		✓						✓				
	Compressor/Booster Inspection		✓			✓			✓			✓	
	Compressor/Booster Service		✓						✓				
	Autodrain Servicing		✓						✓				
Lodgehill	Boilers & Burners			✓						✓			
	Waste Gas Burners			✓						✓			
	Gas Holder Inspection			✓									
	Fire Valves			✓									
	Fire/Gas Alarm Integration			✓									
	Biogas Pipework Visual Inspection									✓			
	Biogas Pipework Test			✓									
	Secondary Fuel Inspection & Test			✓									
	Valve Exercising			✓						✓			
	Pressure Vac Valves			✓						✓			
	Compressor/Booster Inspection			✓			✓			✓			✓
	Compressor/Booster Service			✓						✓			
	Autodrain Servicing			✓						✓			
Kilmington	Boilers & Burners			✓						✓			
	Waste Gas Burners			✓						✓			
	Gas Holder Inspection			✓									
	Fire Valves			✓									
	Fire/Gas Alarm Integration			✓									
	Biogas Pipework Visual Inspection									✓			
	Biogas Pipework Test			✓									
	Secondary Fuel Inspection & Test			✓									
	Valve Exercising			✓						✓			
	Pressure Vac Valves			✓						✓			
	Compressor/Booster Inspection			✓			✓			✓			✓
	Compressor/Booster Service			✓						✓			
	Autodrain Servicing			✓						✓			
Hayle	Boilers & Burners				✓						✓		
	Waste Gas Burners				✓						✓		
	Gas Holder Inspection				✓								
	Fire Valves				✓								
	Fire/Gas Alarm Integration				✓								
	Biogas Pipework Visual Inspection										✓		
	Biogas Pipework Test				✓								
	Secondary Fuel Inspection & Test				✓								
	Valve Exercising				✓						✓		
	Pressure Vac Valves				✓						✓		
	Compressor/Booster Inspection	✓			✓			✓			✓		
	Compressor/Booster Service				✓						✓		
	Autodrain Servicing				✓						✓		

A DSEAR review of the site has been completed and installed equipment is appropriate for the zone in which it is installed.

SI Table 8 – BAT 14 Fugitive Emissions

BAT 14. In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour, BAT is to use an appropriate combination of the techniques.
The design and operation of Hayle WWTW ensures diffuse (fugitive) emissions to air are minimised. This includes the following measures:
• Raw sludge fully contained from waste reception through to sludge digestion. • The Primary Digesters and secondary digesters are covered. Refer to the Odour Management Plan (**Appendix 9**) for more details. • Sludge and sludge cake are wet at all times and therefore potential for generation of dust is very limited. This is not an issue of concern (see Bioaerosol Risk Assessment, **Appendix 10**). • All pipework design is subject to Water Industry Mechanical and Electrical Specifications (WIMES), which ensures correct material selection, corrosion prevention and valve type. Technical Standards are included as **Appendix 20**. • Regular inspections of tanks and pipework will be undertaken in line with the LDAR programme (**Appendix 21**) (see above maintenance schedule). • Biogas pipework largely above-ground, allowing easy inspection/leakage detection. • Traffic speed limits of 10 mph are enforced on site and a one-way system is in place.

*Note – Technical Standards (Appendix 20) are those currently implemented on the site. Please see action plan to amend updated Technical Standards to fully implement BAT compliance at an operational level, which is included in the Improvement Programme (**Appendix 5**).*

3c Types and amounts of raw materials

The raw materials table below is provided in answer to Environment Agency form Part C3, Q3c, Table 5.

Raw materials used in the installation include polyelectrolyte, diesel, antifoam, and oil. Details for these raw materials, including maximum amount stored on the Site and annual throughput are included in the table below. Where necessary, volumes and litres are used in place of tonnes as these raw materials are liquids and any conversion factor used would result in an inaccurate figure.

In the wider Site, potable water and final effluent are used. Details are not provided for these raw materials, as the amounts used vary.

SI Table 9 - Types and amounts of raw materials

Raw Material	Maximum amount stored at any one time	Annual throughput	Description of use of raw material
Diesel	80,000 litres (tank and associated infrastructure is below ground and is part of the Improvement Programme)	Variable. Minimal, generators no longer used for Triads so only in power cuts. A power cut would use roughly 1000 litres per day.	Diesel for site generators, also used for tractor and telehandler.
Stabilised Chlorine Dioxide (TT.OX) **TT-OG** **TT-OX**	Managed by an outside company "Taytech".	Variable.	Used for quelling H_2S. Only used if H_2S reaches a certain level on the WWTW inlet or in sludge treatment centre.
Polyelectrolyte (Poly) **FLOPAM™ EM 640 HIB** **FLOPAM™ FO 4650 VHM** **Polyaluminium Chloride Solution, 18%**	Up to 4,000kg (in 25kg Bags)	Approx. 27 t/a	Sludge thickener and sludge dewatering. To aid sludge thickening pre digesters and in dewatering post digested sludge into digestate cake for recycling.
Ferric Sulphate **Ferric Sulphate – 14% solution bulk (v19)**	30 tonnes	Variable. Mainly used in summer.	Coagulant. Aids sludge settlement in WWTW.
Propane **LPG**	9,200 litres	Topped up once a year, when down to 20% full	Used if process fails and cannot use methane / CHPs. Used in boilers which keep digesters warm.
Antifoam **FLOFOAM™ 380 F**	$1m^3$ (1 IBC)	Variable	Used for preventing foaming in centrifuge centrate.
Lubrication Oils	680 L	Variable	For CHP maintenance

The Material Safety Data Sheets (MSDS) for each raw material listed in the table above can be found in Section V: Appendix 19.

4 Monitoring

4a Describe the measures you use for monitoring emissions by referring to each emission point in Table 2 above

The site is operated under PLC SCADA system control with data logging and interrogation of key parameters to maintain safe, efficient and low emissions operation.

An odour monitoring programme is included in the Odour Management Plan (**Appendix 9**).

4b Point source emissions to air only

Sampling locations will be designed to meet BS EN:15259 '*Air quality. Measurement of stationary source emissions. Requirements for measurement sections and sites and for the measurement objective, plan and report*'.

6d Explain and justify the raw and other materials, other substances and water that you will use

Water minimisation

Water use within the proposed installation is not significant due to the nature of operations/activities undertaken within the proposed installation. Water is used in small quantities for domestic use within control buildings and is also used as make up fluid for chemicals (polymer) used for sludge thickening/dewatering processes, as boiler feed water and for some cleaning activities i.e. sludge intake screens, thickener drums, washdown in some areas.

Measures are in place to ensure that water is used only where necessary and preference is given to the use of final treated effluent rather than mains water.

6e Describe how you avoid producing waste in line with Council Directive 2008/98/EC on waste

Waste Minimisation

Other than sludge cake, generation of waste is generally minimal and largely limited to packaging or scrap materials associated with engineering projects.

A summary of waste generated as a result of activities undertaken within the Hayle WWTW is provided in Table SI-10 below. Further information is provided in the Residues Management Plan (**Appendix 17**). Reference to BAT 4 and 5 compliance measures in respect to waste are provided in Table SI-11.

Table SI-10 – Waste Streams

Waste Type	Nature of Material	Storage and Disposal Method
Sludge screenings	Non-hazardous	Stored within a dedicated skip prior to collection by approved waste contractor
Waste oil	Hazardous	Stored within double skinned bunded tank prior to collection by approved waste contractor
General waste	Non-hazardous	Stored within dedicated containers prior to collection by approved waste contractor
Metals	Non-hazardous	Stored within a dedicated scrap metal skip prior to collection by approved waste contractor
Mixed recycling	Non-hazardous	Stored within a dedicated container prior to collection by approved waste contractor

Waste Type	Nature of Material	Storage and Disposal Method
WEEE	Hazardous	Stored within a dedicated container prior to collection by approved waste contractor
Empty IBCs	Hazardous	Stored within a dedicated area prior to collection by approved waste contractor

Table SI-11 – BAT 4 & BAT 5 Waste

BAT 4. In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques. **BAT 5. In order to reduce the environmental risk associated with the handling and transfer of waste, BAT is to set up and implement handling and transfer procedures.**
• Waste materials are stored on site for the minimum period of time, in suitable, fit for purpose containers located on areas of hardstanding and away from sensitive receptors. Waste containers are clearly labelled with their intended contents and container storage capacities are not permitted to be exceeded. Site housekeeping inspections are undertaken to ensure these standards are maintained. • Very limited quantities of hazardous waste are generated by site activities. This is limited to items such as batteries, aerosols, waste oil and fluorescent tubes. Hazardous waste is always stored in secure containers and segregated from other waste types. • Procedures are in place to ensure waste 'duty of care' requirements are met including ensuring that waste is only removed from site by contractors properly licenced and approved for use and accompanied by a fully completed waste transfer or hazardous waste consignment note. Waste transfer and consignment note records are retained electronically or as paper copies on site. Effective implementation of these procedures is supported by training for SWW personnel as appropriate. • Controls are in place to prevent pollution as a result of sludge storage and handling. Following reception on site, sludge is fully contained within tanks and pipework until it is deposited, as digested sludge cake into the dedicated cake skips. Third party (Gregory) manages the transportation of waste on the Site and has procedures relating to the handling of waste (including use of correct documentation) and spill prevention and control. • Sludge storage and handling areas are located away from sensitive receptors.

Form C6 Supporting Information

3 How much do you want to discharge?

3b, What is the maximum volume of effluent you will discharge in a day?

3c, What is the maximum rate of discharge?

3d, What is the maximum volume of non-rainfall dependent effluent you will discharge in a day?

3f, For each answer in question 3, show how you worked out the figure on a separate sheet

With respect to Questions 3b-3f above, SWW are progressing investigations and associated improvement works to allow for monitoring of volumes and discharge rates at a suitable location to accurately record liquors leaving the installation. There is no existing infrastructure that fully reflects these figures, as flow is currently monitored at the Head of Works at Hayle STW as required by the existing Discharge Consent. Further information is provided in the Improvement Programme (Appendix 5).

5a, b2 Should your discharge be made to the foul sewer?

All liquors / effluent / contaminated water is returned to Hayle STW for full treatment prior to discharge under Discharge Consent No. NRA-SWW-0782.

It is not considered that the discharge should be made to foul sewer given the above.

6a, b, c How will the effluent be treated?

All liquor from raw and digested sludge thickening and dewatering processes, condensate (e.g., from biogas handling), cleaning / washdown effluent and all surface water runoff is collected and discharged via drainage systems to the co-located Hayle STW for full treatment prior to discharge under Discharge Consent No. NRA-SWW-0782. SWW do not undertake effluent treatment within the installation boundary.

There is no question 6c on the application form.

7b, c, d, e, f, g What will be in the effluent?

All liquor from raw and digested sludge thickening and dewatering processes, condensate (e.g. from biogas handling), cleaning / washdown effluent and all surface water runoff is collected and discharged via drainage systems to the co-located Hayle STW for full treatment prior to discharge under Discharge Consent No. NRA-SWW-0782. Hayle STW treats effluent from off site and from the installation and, has permit limits in place covering all outputs. Therefore, there has been no requirement to-date to separately characterise or assess the outputs from the Hayle STW, or any effects of these on receiving waters, separately from the wider STW. An investigation is in progress to characterise these liquors, with the initial sampling including determinands included in the previous application submission. SWW are currently exploring the capacity and availability of accredited third-party laboratories to support the expanding of the suite for characterisation, please see SI Table 12 below. The sampling programme and methodology document is currently under review until third-party laboratories have been

confirmed. Samples will be taken manually from a suitable location(s) upstream of the STW inlet, as seen in Figure 3 Point Source Emissions, and will be submitted to a laboratory facility that can test to the appropriate standard. It is proposed this sampling will be carried out for a period of 12 months. The data will be used to complete an environmental impact assessment in accordance with Environment Agency guidance. The findings of the monitoring, analysis and impact assessment will be made available to the Environment Agency. Further information and the full action plan is provided in the Improvement Programme (**Appendix 5**).

SI Table 12 – Emissions to Water Monitoring Programme

Matrix	Parameter	Limit	Reference Period	Monitoring Frequency	Samples per year	Monitoring Standard
Liquor	pH by pH Electrode			Once every month	12	
	BOD 5 Day ATU as O2 by ISE				12	
	Solids Suspended at 105`C by Gravimetry				12	
	Solids Suspended at 500`C by Gravimetry				12	
	Nitrogen Total Oxidised as N by Colorimetry				12	
	Ammonia as N by Colorimetry				12	
	Chloride as Cl- by Colorimetry				12	
	PFOA and PFOS[1]			Once every 6 months	2	--
	Total nitrogen[1]			Once every month	12	EN 12260, EN ISO 11905-1
	Chemical Oxygen Demand (COD)[1]			Once every month	12	No EN standard available
	Total Organic Carbon (TOC)[1]			Once every month	12	EN 1484
	Total Phosphorous[1]			Once every month	12	Various EN standards available (i.e. EN ISO 15681-1 and -2,

Matrix	Parameter	Limit	Reference Period	Monitoring Frequency	Samples per year	Monitoring Standard
						EN ISO 6878, EN ISO 11885)
	Total Suspended Solids (TSS)[1]			Once every month	12	EN 872

Note 1- Determinands will require third-party testing. An action plan to confirm capacity and availability of accredited third-party laboratories is in progress, as detailed in the Improvement Programme (**Appendix 5)**.

8 Environmental risk assessments and modelling

8d, Discharges to groundwater

Not applicable – the installation does not discharge to groundwater.

8e, Discharges to freshwater (non-tidal) rivers from an installation, including discharges via sewer

Not applicable – the installation discharges to a tidal river.

8f, Environmental Impact Assessment

Not applicable – an environmental impact assessment has not been undertaken as this is an existing facility/installation.

9 Monitoring arrangements

Question 9a, What is the national grid reference of the inlet sampling point?

Not applicable to this installation.

Question 9b, What is the national grid reference of the effluent sample point?

The sampling location proposed for liquors is located at the Filtrate Sump (as seen in Figure 3 Point Source Emissions) is located at National Grid Reference SW 54690 35699.

The sampling point is subject to change with further investigation and more detailed design, please see Improvement Programme (**Appendix 5**).

Question 9d, What is the national grid reference of the flow monitoring point?

No flow meter installed at the liquor effluent sampling point.

Question 9e, Does the flow monitor have an MCERTS certificate?

No flow meter installed at the liquor effluent sampling point.

Question 9f, Do you have a UV disinfection efficacy monitoring point?

No, this is not installed as part of this installation. The wider Hayle STW undertakes further treatment of effluent.

Question 9h, You should clearly mark on the plan the locations of any of the above that apply to this effluent

See Figure 3 Point Source Emissions

Question 9i, Do you intend to do your own effluent monitoring?

Yes

Sampling and analysis will be by accredited laboratory to MCERTS or equivalent e.g., UKAS where available. Where determinands are required but no accreditation is available, SWW will commit to the industry recognised standard within the UK.

10a, b, c Where will the effluent discharge to?

Appendix 4 – Discharges to tidal river, tidal stream, estuary or coastal waters

There are no direct discharges to water from the Installation. The wastewater streams from the Installation are returned to the Head of Works at Hayle STW for further treatment, before being discharged (indirectly) via the final effluent discharge under Discharge Consent No. NRA-SWW-0782 into St. Ives Bay.

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Figures

Figure 1: New Installation Boundary

Figure 2: Site Layout

Figure 3: Point Source Emissions

Figure 4: Site Location Plan

Figure 5: 910302 - Site Drainage Plan

Figure 6: Site Surfacing

Figure 7: Proposed Site Surfacing

Appendices

Appendix 1: Relevant Offences

Form C2 / Q3a1 Have you, or any other relevant person, been convicted of any relevant offence?

Relevant offences for South West Water Ltd in the last five years are included below:

Date of Conviction	Prosecutor	Sentence	Site Location
26/04/2023	EA	Fine £2,150,000	Crediton STW: 17-18/07/2017 Kilmington STW: 02/08/2018 Lostwithiel STW: 16-17/07/2016 & 27/04/2018 Torpoint STW: 04-05/12/2017 & 18-19/07/2020 Watergate Bay SPS: 03/08/2018
13/09/22	Drinking Water Inspectorate	Total financial penalty is £293,823.73 Broken down as follows: Fine £233,333 Victim surcharge of £170. DWI's Costs: legal fees at £14,120.83 counsel's fees at £22,999.90 and	Bratton Fleming and Horedown supply zones

Date of Conviction	Prosecutor	Sentence	Site Location
		Expert's fees £23,200	
21/05/19	EA	Fine £44,000 Costs £18,883.06	South Sands SPS, Salcombe
12/05/18	EA	Fine £35,000 (Salcombe STW) and £15,000 (Dartmouth STW) Costs £21,800	Salcombe STW and Dartmouth STW
22/11/17	EA	Fine £10,000 Costs £5,872.50	Landrake STW

Appendix 2: Technical Competence

The table below includes details for Technically Competent Managers at Hayle WWTW. Certificates are included on the following pages.

Site	WAMITAB qualified Technically Competent Manager	Date of birth	WAMITAB initial training certificate	Continuing Competence certificate	Phone	Email	Other sites covered as Technically Competent Manager
Hayle WWTW	Dave Swiggs	01/01/1986	Certificate no. tbc	Certificate no. tbc	07825 857097	dswiggs@southwestwater.co.uk	None
Hayle WWTW	Tom Veale	09/07/1998	To be provided upon completion	To be provided upon completion	07901 327948	tveale@southwestwater.co.uk	None

SWW are in the process of obtaining a copy of the WAMITAB certificate for Dave Swiggs directly from WAMITAB (Level 4 Medium Risk Operator Competence for Anaerobic Digestion). This will be forwarded to the EA immediately on receipt. Dave Swiggs is signed up for his Continuing Competence test on 11/01/2024, evidence of this is below.

SWW have registered Tom Veale for the relevant WAMITAB qualification. Evidence of this is included below. The intention is that Tom would be able to act as a TCM as soon as he passes the qualification.

WAMITAB Certificate – Dave Swiggs

Awaiting from WAMITAB, will be provided to the EA upon receipt

Evidence of Continuing Competence booking – Dave Swiggs

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This is an invoice for your order and should be kept as your receipt.

Pearson Professional Assessments Limited
80 Strand
London
WC2R 0RL
United Kingdom

UK Vat: GB 830 066 55

INVOICE

Invoice Number: 0069-9524-0291

Transaction Date: Wednesday, January 3, 2024

Ship To:

Dave Swiggs
South West Water
5 Higher Trewrong
Par
PL24 2TJ
United Kingdom

Bill To:

Dave Swiggs
5 Higher Trewrong
Par
PL24 2TJ
United Kingdom

Quantity	Item ID	Description	Shipped To	Unit Price	Amount	
1	467539996	CIWM/WAMITAB CIWM/WAMITAB Continuing Competence Test English-UK Appointment: Thursday, January 11, 2024 2:00:00 PM GMT Center: Pearson Professional Centres-UK Truro Truro	Candidate ID: WAMITAB012178 Candidate Name: Dave Swiggs	184.00	184.00	GBP

Subtotal	184.00	GBP
Shipping:	0.00	GBP
Tax	0.00	GBP
Total	184.00	GBP

Pearson VUE represents and warrants that Cardholder authorizes payment in the Total Amount shown (together with any other charges due thereon) subject to and in accordance with the agreement governing the use of Cardholder's card.

Pearson VUE is collecting tax on behalf of WAMITAB.

Taxpayer Name and Address:
WAMITAB
Peterbridge House
3 The Lakes
Northampton
NN4 7HE
United Kingdom

WAMITAB Registration – Tom Veale

LEPPITT ASSOCIATES: INFORMATION FOR LEARNERS

Dear Tom

Thank you for you registering with Leppitt Associates and this has now been processed by CIWM (WAMITAB). Please note CIWM (WAMITAB) now require all learners to complete their qualification within two years of registration, or it will be necessary to re-register.

Assessor & Contact Details
Glyn Leppitt (07771 901418) is the assessor for your award.
Sue Webb is the internal quality assurer (IQA) who checks assessment during and on completion of the award for quality and consistency.
Sue Dale is the centre coordinator and is responsible for administration of the awards at the centre.
All can be contacted at the centre by telephone (01208 821780) or via email (leppitt-associates@live.com). Please note that Sue Dale works part time in the office usually on a Tuesday. She may not be able to respond immediately to an enquiry but if you leave a message someone will reply as soon as possible.

Payment
Leppitt Associates has charged for the centre and CIWM (WAMITAB) registration fees. Refunds are not possible once these have been processed or if you make an error and register for the wrong award. CIWM (WAMITAB) charge a fee for the correction of errors made on the registration form.
An invoice will be sent after each assessment visit and payment is required prior to the next visit.
Internal quality assurance is required by CIWM (WAMITAB) at intervals during the award and on completion. A fee for the final IQA is levied by the centre and must be paid before your certificate can be released to you.

Booking Assessment Visits
It is your responsibility to arrange for assessment visits. Please contact Leppitt Associates to book the first assessment visit if this has not already been arranged. **Glyn is very booked up, at least 12 weeks in advance, so please take this into consideration. If you need to cancel and reschedule your visit it is unlikely that he will be able to do so within 8 weeks.**
Due to the number of short notice cancellations there will be a charge of £600 if this is less than 36 hours from the appointment, although this may be waived in certain circumstances. There is also a minimum charge of half a day (£240) per assessment visit at the discretion of the assessor.

Compliance with Permit and Health and Safety on Site and During Assessment Visits
The assessment process must demonstrate compliance with your permit conditions plus statutory environmental and Health & Safety legislation. If during an assessment the assessors considers operations observed are unsafe or non-compliant with the permit, the assessor will raise this/these with the learner and company, and the assessment process will be interrupted until rectified. If not resolved, the assessment process will not proceed as you cannot be deemed competent to the standard required. No monies (registration and previous assessments) can be refunded in this

WAMITAB Certificate – Tom Veale

WAMITAB Certificate to be provided upon completion, registration provided above

Appendix 3: EMS Summary

Appendix 4: Site Condition Report

Appendix 5: BAT Assessment (including Improvement Programme)

A review of Best Available Techniques (BAT) requirements contained in Best Available Techniques (BAT) Reference Document for Waste Treatment, 2018 has been undertaken. For those BAT requirements that are applicable to Hayle WWTW operations, an assessment of compliance has been undertaken. A description of how SWW meets each requirement, or proposes to meet the requirement, is provided below. Alternatively, reference is made to the location elsewhere in this application document where this detail is provided.

Where BAT is not met, details are provided in the Improvement Programme following the BAT Assessment.

Requirement	Relevant sections for reference / notes on applicability
Overall Environmental performance	
BAT 1. In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features:	
1. Commitment of the management, including senior management; 2. Definition, by the management, of an environmental policy that includes the continuous improvement of the environmental performance of the installation; 3. Planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment; 4. Implementation of procedures paying particular attention to: (a) structure and responsibility, (b) recruitment, training, awareness and competence, (c) communication, (d) employee involvement, (e) documentation, (f) effective process control, (g) maintenance programmes, (h) emergency preparedness and response, (i) safeguarding compliance with environmental legislation; 5. Checking performance and taking corrective action, paying particular attention to: (a) monitoring and measurement, (b) corrective and preventive action, (c) maintenance of records, (d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; 6. Review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness; 7. Following the development of cleaner technologies; 8. Consideration for the environmental impacts from the eventual decommissioning of the plant at the stage of designing a new plant, and throughout its operating life; 9. Application of sectoral benchmarking on a regular basis; 10. Waste stream management (see BAT 2); 11. An inventory of wastewater and waste gas streams (see BAT 3); 12. Residues management plan; 13. Accident management plan; 14. Odour management plan (see BAT 12); 15. Noise and vibration management plan (see BAT 17).	**BAT in place with respect to the following:** For all items, refer to Section III: Supporting Information, Form C2, Question 3d Management systems – Section V, Appendix 3 – EMS Summary. For item 8 see Section V: Appendix 4 - Site Condition Report. For item 10 see Section V: Appendix 18 IED Pre-Acceptance, Acceptance and Rejection Procedure. Also see Section III Supporting Information, C3, Question 6. For item 11 see Section III: Supporting Information, Form C3, Question 2 Point source emissions to air, water and land. Also see Section III: Supporting Information, Form C6. For item 12 see Appendix 17 – Residues Management Plan. Also see Section III: Supporting Information, Form C3, Question 6e Describe how you avoid producing waste in line with Council

Requirement	Relevant sections for reference / notes on applicability
	Directive 2008/98/EC on waste. For item 13 see Section III: Form C2, Q6-6 Accident Management Plan. See Section V: Appendix 13 – Environmental Accident Management Plan. For item 14 see Section V: Appendix 9 - Odour Management Plan. For item 15 see Section V: Appendix 11 - Noise and Vibration Risk Assessment.
BAT 2. In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques given below.	
a. Set up and implement waste characterisation and pre-acceptance procedures. These procedures aim to ensure the technical (and legal) suitability of waste treatment operations for a particular waste prior to the arrival of the waste at the plant. They include procedures to collect information about the waste input and may include waste sampling and characterisation to achieve sufficient knowledge of the waste composition. Waste pre-acceptance procedures are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s). **b.** Set up and implement waste acceptance procedures. Acceptance procedures aim to confirm the characteristics of the waste, as identified in the pre-acceptance stage. These procedures define the elements to be verified upon the arrival of the waste at the plant as well as the waste acceptance and rejection criteria. They may include waste sampling, inspection and analysis. Waste acceptance procedures are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s). **c.** Set up and implement a waste tracking system and inventory. A waste tracking system and inventory aim to track the location and quantity of waste in the plant. It holds all the information generated during waste pre-acceptance procedures (e.g. date of arrival at the plant and unique reference number of the waste, information on the previous waste holder(s), pre-acceptance and acceptance analysis results, intended treatment route, nature and quantity of the waste held on site including all identified hazards), acceptance, storage, treatment and/or transfer off site. The waste tracking system is risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s). **d.** Set up and implement an output quality management system. This technique involves setting up and implementing an output quality management system, so as to ensure that the output of the waste treatment is	**BAT in place in respect for requirements 2a, b, c and d.** Refer to Section II: Technical Description and Section III: Supporting Information, Form C2, Question 3d Management systems. For item 2a see Section V: Appendix 18 – IED Waste Pre-Acceptance, Acceptance and Rejection Procedure. Hayle WWTW also operates a Waste Management Plan (WMP) that covers waste acceptance, storage, treatment and the recycling process at Hayle Waste Water Treatment Works. The WMP can be made available on request. HACCP processes are in place to manage and maintain the quality of digested sludge to ensure its suitability for land spreading.

Requirement	Relevant sections for reference / notes on applicability
in line with the expectations, using for example existing EN standards. This management system also allows the performance of the waste treatment to be monitored and optimised, and for this purpose may include a material flow analysis of relevant components throughout the waste treatment. The use of a material flow analysis is risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s). **e.** Ensure waste segregation. Waste is kept separated depending on its properties in order to enable easier and environmentally safer storage and treatment. Waste segregation relies on the physical separation of waste and on procedures that identify when and where wastes are stored. **f.** Ensure waste compatibility prior to mixing or blending of waste. Compatibility is ensured by a set of verification measures and tests in order to detect any unwanted and/or potentially dangerous chemical reactions between wastes (e.g. polymerisation, gas evolution, exothermal reaction, decomposition, crystallisation, precipitation) when mixing, blending or carrying out other treatment operations. The compatibility tests are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s). **g.** Sort incoming solid waste. Sorting of incoming solid waste (1) aims to prevent unwanted material from entering subsequent waste treatment process(es). It may include: — manual separation by means of visual examinations; — ferrous metals, non-ferrous metals or all-metals separation; — optical separation, e.g. by near-infrared spectroscopy or X-ray systems; — density separation, e.g. by air classification, sink-float tanks, vibration tables; — size separation by screening/sieving.	**Requirements 2e, f and g not applicable**. Waste received on site comprises only sewage sludge. Waste segregation, sorting and waste compatibility considerations are not relevant. Refer to Section II: Technical Description for more details of sludge reception, treatment and handling processes.
BAT 3. In order to facilitate the reduction of emissions to water and air, BAT is to establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:	
1. Information about the characteristics of the waste to be treated and the waste treatment processes, including: (a) simplified process flow sheets that show the origin of the emissions; (b) descriptions of process integrated techniques and wastewater/waste gas treatment at source including their performances; 2. Information about the characteristics of the wastewater streams, such as: (a) average values and variability of flow, pH, temperature, and conductivity; (b) average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, priority substances/micropollutants); (c) data on bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge)) (see BAT 52); 3. Information about the characteristics of the waste gas streams, such as: (a) average values and variability of flow and temperature; (b) average concentration and load values of relevant substances and their variability (e.g. organic compounds, POPs such as PCBs); (c) flammability, lower and higher explosive limits, reactivity; (d) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, nitrogen, water vapour, dust).	**BAT not in place.** Refer to: Section II: Technical Description Section III: Supporting Information, Form C3, Question 2 Point source emissions to air, water and land. Emission points are also included on a drawing, see Section IV – Figure 4 – Point Source Emissions. As per EA Form Part C6, SWW are committed undertake a period of monitoring in order to

Requirement	Relevant sections for reference / notes on applicability
	characterise the liquors returned to Hayle STW. See Section III: Supporting Information, Form C6, Q7b. Following investigation, liquors returned to the head of works at Hayle STW will be monitored for a period of 12 months to characterise these emissions. The findings of the monitoring, analysis and impact assessment will be provided to the Environment Agency, see Improvement Programme.
BAT 4. In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques given below.	
a. Optimised storage location. This includes techniques such as: — the storage is located as far as technically and economically possible from sensitive receptors, watercourses, etc.; — the storage is located in such a way so as to eliminate or minimise the unnecessary handling of wastes within the plant (e.g. the same wastes are handled twice or more or the transport distances on site are unnecessarily long). b. Adequate storage capacity. Measures are taken to avoid accumulation of waste, such as: — the maximum waste storage capacity is clearly established and not exceeded taking into account the characteristics of the wastes (e.g. regarding the risk of fire) and the treatment capacity; — the quantity of waste stored is regularly monitored against the maximum allowed storage capacity; — the maximum residence time of waste is clearly established. c. Safe storage operation. This includes measures such as: — equipment used for loading, unloading and storing waste is clearly documented and labelled; — wastes known to be sensitive to heat, light, air, water, etc. are protected from such ambient conditions; — containers and drums are fit for purpose and stored securely. d. Separate area for storage and handling of packaged hazardous waste. When relevant, a dedicated area is used for storage and handling of packaged hazardous waste.	**BAT in place.** Refer to Section II: Technical Description and Section III: Supporting Information, Form C3, Question 6e Describe how you avoid producing waste in line with Council Directive 2008/98/EC on waste (waste minimisation and waste streams) for information relating to BAT 4 & BAT 5. Information includes waste minimisation, waste streams, storage facilities, handling and removal from Site. Storage capacities of assets at Hayle WWTW is provided in Section V: Appendix 6 – EQRA Storage within tanks is provided with an auto-shutoff facility to prevent overfilling. Improvements are being investigated to include an additional secondary digester to increase residence time and process efficiency. Additional information is provided in the Improvement Programme below.

Requirement	Relevant sections for reference / notes on applicability
BAT 5. In order to reduce the environmental risk associated with the handling and transfer of waste, BAT is to set up and implement handling and transfer procedures.	
Handling and transfer procedures aim to ensure that wastes are safely handled and transferred to the respective storage or treatment. They include the following elements: — handling and transfer of waste are carried out by competent staff; — handling and transfer of waste are duly documented, validated prior to execution and verified after execution; — measures are taken to prevent, detect and mitigate spills; — operation and design precautions are taken when mixing or blending wastes (e.g. vacuuming dusty/powdery wastes). Handling and transfer procedures are risk-based considering the likelihood of accidents and incidents and their environmental impact.	**BAT in place.** Refer to Section II: Technical Description and Section III: Supporting Information, Form C2, Question 3b – Technical Ability and Section III: Supporting Information, Form C3, Question 6e Describe how you avoid producing waste in line with Council Directive 2008/98/EC on waste (waste minimisation and waste streams) Third party (Gregory) manages the transportation of waste on the Site and has procedures relating to the handling of waste (including use of correct documentation) and spill prevention. Gregory also have an aspects and impacts table which considers accidents and incidents. SWW have an Accident Management Plan which includes details on preventing, detecting and mitigating spills, See Section III: Form C2, Q6-6 Accident Management Plan. See Section V: Appendix 13 – Environmental Accident Management Plan.
Monitoring	
BAT 6. For relevant emissions to water as identified by the inventory of waste water streams (see BAT 3), BAT is to monitor key process parameters (e.g. waste water flow, pH, temperature, conductivity, BOD) at key locations (e.g. at the inlet and/or outlet of the pre-treatment, at the inlet to the final treatment, at the point where the emission leaves the installation).	
As above	**BAT not in place** Monitoring suite proposed in Section III: Supporting Information, Form C3, Question 2 Point Source Emissions to Air, Water and Land for Emissions Inventory to Water.

Requirement	Relevant sections for reference / notes on applicability
	Liquors returned to the head of works at Hayle STW will be monitored for a period of 12 months to characterise these emissions. The findings of the monitoring, analysis and impact assessment will be provided to the Environment Agency, see Improvement Programme for additional information.
BAT 7. BAT is to monitor emissions to water with at least the frequency referenced in [EU 2018/1147], and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	
See EU 2018/1147	**BAT not in place** Monitoring programme proposed in Section III: Supporting Information, Form C3, Question 2 Point Source Emissions to Air, Water and Land for Emissions Inventory to Water. Effluent characterisation is answered in Section III: Supporting Information, Form C6, Question 7b, c, d, e, f, and g. Liquors returned to the head of works at Hayle STW will be monitored for a period of 12 months to characterise these emissions. The findings of the monitoring, analysis and impact assessment will be provided to the Environment Agency, see Improvement Programme for additional information.
BAT 8. BAT is to monitor channelled emissions to air with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	
Parameters as applicable: H_2S – once every 6 months NH_3 - once every 6 months Odour concentration - once every 6 months HCl – once every six months TVOC's - once every six months Further parameter details are provided in Table 5 – Point Source Emissions	**BAT not in place.** Of the parameters listed in BAT 8, only H_2S, NH_3 and odour emissions are applicable to the biological treatment activities carried out within this installation. HCl and TVOC's are also included in the suite of determinands and are subject to a monitoring investigation at the

Requirement	Relevant sections for reference / notes on applicability
	inlet to OCU's to confirm their presence, see Improvement Programme. Dust is not considered as a risk for this installation (See Section V: Appendix 7 - Environmental Risk Assessment). Odour monitoring programmes are established within the Odour Management Plan. See Section V: Appendix 9 Odour Management Plan. Investigation and OCU Performance Survey (including odour sampling) conducted in August 2023 to confirm 3 OCU's (using peacemaker media) achieve the 1,000 odour unit requirement. One OCU is a biofilter and one is an activated carbon adsorption unit and will require upgrading/replacement to meet the 1,000 odour unit requirement. See Improvement Programme below.
BAT 10. BAT is to periodically monitor odour emissions.	
Odour emissions can be monitored using: — EN standards (e.g. dynamic olfactometry according to EN 13725 in order to determine the odour concentration or EN 16841-1 or -2 in order to determine the odour exposure); — when applying alternative methods for which no EN standards are available (e.g. estimation of odour impact), ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality. The monitoring frequency is determined in the odour management plan (see BAT 12).	**BAT not in place.** Refer to Section V: Appendix 9: Odour Management Plan. Performance investigation (including odour sampling) conducted in August 2023 to confirm 3 OCU's (using peacemaker media) achieve the 1,000 odour unit requirement. One OCU is a biofilter and one is an activated carbon adsorption unit and will require upgrading/replacement to meet the 1,000 odour unit requirement. Results of performance investigation pending and scope of improvements to be

Requirement	Relevant sections for reference / notes on applicability
	confirmed. A detailed action plan and further information is provided in the Improvement Programme below.
BAT 11. BAT is to monitor the annual consumption of water, energy and raw materials as well as the annual generation of residues and wastewater, with a frequency of at least once per year.	
Monitoring includes direct measurements, calculation or recording, e.g. using suitable meters or invoices. The monitoring is broken down at the most appropriate level (e.g. at process or plant/installation level) and considers any significant changes in the plant/installation.	**BAT not in place** Mains water usage monitored via annual bills for the Site. For energy see Section V: Appendix 12: Energy Management Plan. Regular checks made to ensure inventory of raw materials is sufficient, including monitoring of additives used during the AD process within tanks. Annual generation of residues monitored when sent from the Site in accordance with Duty of Care requirements and reported via Waste Returns (quarterly and annual). See Section V: Appendix 17: Residues Management Plan. For generation of wastewater (liquor returns to the head of works at Hayle STW) see Section III: Supporting Information, Form C3, Question 2 Point Source Emissions to Air, Water and Land for Emissions Inventory to Water. Action plan for improvements to allow for the monitoring of liquor leaving the installation is included in the Improvement Programme. Section II: Technical Description and Section III: Supporting Information, Form C2, Question 3d Management systems
Emissions to air	

Requirement	Relevant sections for reference / notes on applicability
BAT 12. In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:	
— a protocol containing actions and timelines; — a protocol for conducting odour monitoring as set out in BAT 10; — a protocol for response to identified odour incidents, e.g. complaints; — an odour prevention and reduction programme designed to identify the source(s); to characterise the contributions of the sources; and to implement prevention and/or reduction measures.	**BAT in place.** Refer to Section V: Appendix 9: Odour Management Plan.
BAT 13. In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to use one or a combination of the techniques given below.	
a. Minimising residence times. Minimising the residence time of (potentially) odorous waste in storage or in handling systems (e.g. pipes, tanks, containers), in particular under anaerobic conditions. When relevant, adequate provisions are made for the acceptance of seasonal peak volumes of waste. b. Using chemical treatment. Using chemicals to destroy or to reduce the formation of odorous compounds (e.g. to oxidise or to precipitate hydrogen sulphide). c. Optimising aerobic treatment. In the case of aerobic treatment of water-based liquid waste, it may include: — use of pure oxygen; — removal of scum in tanks; — frequent maintenance of the aeration system. In the case of aerobic treatment of waste other than water-based liquid waste, see BAT 36.	**BAT in place.** Refer to Section V: Appendix 9: Odour Management Plan.
BAT 14. In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour, BAT is to use an appropriate combination of the techniques given below.	
Depending on the risk posed by the waste in terms of diffuse emissions to air, BAT 14d is especially relevant. a. Minimising the number of potential diffuse emission sources. This includes techniques such as: — appropriate design of piping layout (e.g. minimising pipe run length, reducing the number of flanges and valves, using welded fittings and pipes); — favouring the use of gravity transfer rather than using pumps; — limiting the drop height of material; — limiting traffic speed; — using wind barriers. b. Selection and use of high integrity equipment. This includes techniques such as: — valves with double packing seals or equally efficient equipment; — high integrity gaskets (such as spiral wound, ring joints) for critical applications; — pumps/compressors/agitators fitted with mechanical seals instead of packing; — magnetically driven pumps/compressors/agitators; — appropriate service hose access ports, piercing pliers, drill heads, e.g. when degassing WEEE containing VFCs and/or VHCs. " c. Corrosion prevention. This includes techniques such as: — appropriate selection of construction materials; — lining or coating of equipment and painting of pipes with corrosion inhibitors. d. Containment, collection and treatment of diffuse emissions. This includes techniques such as:	**BAT not in place** Refer to: Section V: Appendix 9: Odour Management Plan. Section V: Appendix 10: Bioaerosol Risk Assessment. For b and c – Assets and equipment on Site meet SWW Technical Standards and WIMES, where applicable. See Section III: Supporting Information, Form C3, Question 3b General Requirements, Section V: Appendix 20 – Technical Standards. For d – An action plan detailing improvements to ensure all relevant tanks with

Requirement	Relevant sections for reference / notes on applicability
— storing, treating and handling waste and material that may generate diffuse emissions in enclosed buildings and/or enclosed equipment (e.g. conveyor belts); — maintaining the enclosed equipment or buildings under an adequate pressure; — collecting and directing the emissions to an appropriate abatement system via an air extraction system and/or air suction systems close to the emission sources. e. Dampening. Dampening potential sources of diffuse dust emissions (e.g. waste storage, traffic areas, and open handling processes) with water or fog. f. Maintenance. This includes techniques such as: — ensuring access to potentially leaky equipment; — regularly controlling protective equipment such as lamellar curtains, fast-action doors. g. Cleaning of waste treatment and storage areas. This includes techniques such as regularly cleaning the whole waste treatment area (halls, traffic areas, storage areas, etc.), conveyor belts, equipment and containers. h. Leak detection and repair (LDAR) programme. See Section 6.2. When emissions of organic compounds are expected, a LDAR programme is set up and implemented using a risk-based approach, considering in particular the design of the plant and the amount and nature of the organic compounds concerned.	a potential to generate diffuse emissions are lidded is included in the Improvement Programme. For details of odour extraction systems and their position within the Site, see Section V: Appendix 9 - Odour Management Plan. For f – Details regarding maintenance inspection and regime is provided in the Environmental Accident Management Plan, See Section V: Appendix 13. For g – Details regarding housekeeping for the Site are provided in the Environmental Accident Management Plan, See Section V: Appendix 13. For h – See Section II: Technical Description, Section III Supporting Information Form C3, Question 3b General Requirements – LDAR programme (Appendix 21).
BAT 15. BAT is to use flaring only for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns) by using both of the techniques given below.	
a. Correct plant design. This includes the provision of a gas recovery system with sufficient capacity and the use of high integrity relief valves. b. Plant management. This includes balancing the gas system and using advanced process control.	**BAT not in place** Refer to Section II: Technical Description Records for the past year indicate flare in operation for >10% however this reading was a result of reactive CHP engine failure. The CHP's have since been subject to improvements in 2021. It is anticipated that the flare will as such be used only for emergencies and <10% in typical working conditions. Monitoring will validate and ensure this is achieved. Additional improvements are required to improve gas utilisation, including replacement or calibration of flowmeter to flare to monitor gas flare utilisation and the replacement of all PVRV

Requirement	Relevant sections for reference / notes on applicability
	(whessoe valves) where required. See improvement Plan in Appendix 5 for further details.
BAT 16. In order to reduce emissions to air from flares when flaring is unavoidable, BAT is to use both of the techniques given below.	
a. Correct design of flaring devices. Optimisation of height and pressure, assistance by steam, air or gas, type of flare tips, etc., to enable smokeless and reliable operation and to ensure the efficient combustion of excess gases. b. Monitoring and recording as part of flare management. This includes continuous monitoring of the quantity of gas sent to flaring. It may include estimations of other parameters (e.g. composition of gas flow, heat content, ratio of assistance, velocity, purge gas flow rate, pollutant emissions (e.g. NOX, CO, hydrocarbons), noise). The recording of flaring events usually includes the duration and number of events and allows for the quantification of emissions and the potential prevention of future flaring events.	**BAT not in place (tbc)** Refer to Section II: Technical Description As per BAT 15 an action plan detailing investigations to ensure flaring is <10% are included in the Improvement Programme.
Noise and vibration	
BAT 17. In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and vibration management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:	
1. A protocol containing appropriate actions and timelines; 2. A protocol for conducting noise and vibration monitoring; 3. A protocol for response to identified noise and vibration events, e.g. complaints; 4. A noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures.	**BAT in place.** Noise or vibration nuisance at sensitive receptors is not expected and no substantiated noise and vibration nuisance complaints have been received. Noise and vibration management plan not required. Refer to Section V: Appendix 11 – Noise & Vibration Risk Assessment. Form C2, Question 3d Management systems
BAT 18. In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of the techniques given below.	
a. Appropriate location of equipment and buildings. Noise levels can be reduced by increasing the distance between the emitter and the receiver, by using buildings as noise screens and by relocating building exits or entrances. b. Operational measures. This includes techniques such as: (i) inspection and maintenance of equipment; (ii) closing of doors and windows of enclosed areas, if possible; (iii) equipment operation by experienced staff; (iv) avoidance of noisy activities at night, if possible; (v) provisions for noise control during maintenance, traffic, handling and treatment activities. c. Low-noise equipment. This may include direct drive motors, compressors, pumps and flares. d. Noise and vibration control equipment. This includes techniques such as:	**BAT in place.** Refer to Section V: Appendix 7 Environmental Risk Assessment and Appendix 11 Noise & Vibration Risk Assessment.

Requirement	Relevant sections for reference / notes on applicability
(i) noise reducers; (ii) acoustic and vibrational insulation of equipment; (iii) enclosure of noisy equipment; (iv) soundproofing of buildings. " e. Noise attenuation. Noise propagation can be reduced by inserting obstacles between emitters and receivers (e.g. protection walls, embankments and buildings).	
Emissions to water	
BAT 19. In order to optimise water consumption, to reduce the volume of waste water generated and to prevent or, where that is not practicable, to reduce emissions to soil and water, BAT is to use an appropriate combination of the techniques given below.	
a. Water management. Water consumption is optimised by using measures which may include: — water saving plans (e.g. establishment of water efficiency objectives, flow diagrams and water mass balances); — optimising the use of washing water (e.g. dry cleaning instead of hosing down, using trigger control on all washing equipment); — reducing the use of water for vacuum generation (e.g. use of liquid ring pumps with high boiling point liquids). b. Water recirculation. Water streams are recirculated within the plant, if necessary, after treatment. The degree of recirculation is limited by the water balance of the plant, the content of impurities (e.g. odorous compounds) and/or the characteristics of the water streams (e.g. nutrient content). c. Impermeable surface. Depending on the risks posed by the waste in terms of soil and/or water contamination, the surface of the whole waste treatment area (e.g. waste reception, handling, storage, treatment and dispatch areas) is made impermeable to the liquids concerned. d. Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels. Depending on the risks posed by the liquids contained in tanks and vessels in terms of soil and/or water contamination, this includes techniques such as: — overflow detectors; — overflow pipes that are directed to a contained drainage system (i.e. the relevant secondary containment or another vessel); — tanks for liquids that are located in a suitable secondary containment; the volume is normally sized to accommodate the loss of containment of the largest tank within the secondary containment; — isolation of tanks, vessels and secondary containment (e.g. closing of valves). e. Roofing of waste storage and treatment areas. Depending on the risks posed by the waste in terms of soil and/or water contamination, waste is stored and treated in covered areas to prevent contact with rainwater and thus minimise the volume of contaminated run-off water. f. Segregation of water streams. Each water stream (e.g. surface run-off water, process water) is collected and treated separately, based on the pollutant content and on the combination of treatment techniques. In particular, uncontaminated wastewater streams are segregated from wastewater streams that require treatment. g. Adequate drainage infrastructure. The waste treatment area is connected to drainage infrastructure. Rainwater falling on the treatment and storage areas is collected in the drainage infrastructure along with washing water, occasional spillages, etc. and, depending on the pollutant content, recirculated or sent for further treatment. h. Design and maintenance provisions to allow detection and repair of leaks. Regular monitoring for potential leakages is risk-based, and, when necessary, equipment is repaired. The use of underground components is minimised.	**BAT not in place** For a & b – BAT in place For details of wastewater generation and management refer to Section III: Supporting Information, Form C3, Question 2 Point source emissions to air, water and land. For details of water use refer to Section III: Supporting Information, Form C3, Question 6d Explain and justify the raw and other materials, other substances and water that you will use For c and d – BAT not in place. Initial investigations carried out to areas where improvements are required to ensure BAT is in place, see Secondary Containment Risk Assessment (Appendix 16) which includes containment solutions that will consist of impermeable surfacing and containment walls, with proposed impermeable surfaced area also shown on Figure 7. Figure 6 Site Surfacing shows the extent of impermeable surfacing on the Site. A detailed action plan and further information is included in the Improvement Programme table below. Condensate is currently stored in suitable receptacles before being periodically removed and returned to the drainage system. A detailed

Requirement	Relevant sections for reference / notes on applicability
When underground components are used and depending on the risks posed by the waste contained in those components in terms of soil and/or water contamination, secondary containment of underground components is put in place. i. Appropriate buffer storage capacity. Appropriate buffer storage capacity is provided for waste water generated during other than normal operating conditions using a risk-based approach (e.g. taking into account the nature of the pollutants, the effects of downstream waste water treatment, and the receiving environment). The discharge of wastewater from this buffer storage is only possible after appropriate measures are taken (e.g. monitor, treat, re-use).	action plan detailing improvements to ensure condensate is directed to the sealed drainage system is included in the Improvement Programme. For e – BAT in place. Sludge contained within pipework and assets; cake stored within roofed areas. For f and g– Drainage system present on Site (see Figure 5). An initial investigation has been completed which has identified improvements required for the drainage system, please see Improvement Programme below for further information. For details of techniques to minimise accidental/unplanned discharges to the environment from surfacing, storage areas, tanks, vessels, drainage systems etc refer to the Accident Management Plan - Form C2, Q6-6, Appendix 4: Site Condition Report, Appendix 6: Environmental Quantitative Risk Assessment and Appendix 16: Secondary Containment Risk Assessment For h – BAT not in place. Preventative maintenance plan to be put in place to satisfy BAT requirements once full drainage investigations and associated improvement works are completed. To note that initial surveys are completed, with follow-on surveys required and scheduled in for January 2024. Further information is provided in the Improvement Programme below. For i – BAT in place

Requirement	Relevant sections for reference / notes on applicability
BAT 20. In order to reduce emissions to water, BAT is to treat wastewater using an appropriate combination of the techniques given below.	
a. Equalisation b. Neutralisation c. Physical separation, e.g. screens, sieves, grit separators, grease separators, oil-water separation or primary settlement tanks d. Adsorption e. Distillation/rectification f. Precipitation g. Chemical oxidation h. Chemical reduction i. Evaporation j. Ion exchange k. Stripping l. Activated sludge process m. Membrane bioreactor n. Nitrification/denitrification when the treatment includes a biological treatment o. Coagulation and flocculation p. Sedimentation q. Filtration (e.g. sand filtration, microfiltration, ultrafiltration) r. Flotation	**BAT in place** There are no direct emissions to water from the Site (other than liquor returns to the head of works at Hayle STW). All drains flow to the head of works at Hayle STW. Refer to Section II: Technical Description. For details of process liquor generation and management refer to Section III: Supporting Information, Form C3, Question 2 Point source emissions to air, water and land.
Emissions from accidents and incidents	
BAT 21. In order to prevent or limit the environmental consequences of accidents and incidents, BAT is to use all of the techniques given below, as part of the accident management plan (see BAT 1).	
a. Protection measures. These include measures such as: — protection of the plant against malevolent acts; — fire and explosion protection system, containing equipment for prevention, detection, and extinction; — accessibility and operability of relevant control equipment in emergency situations. " b. Management of incidental/accidental emissions. Procedures are established and technical provisions are in place to manage (in terms of possible containment) emissions from accidents and incidents such as emissions from spillages, firefighting water, or safety valves. c. Incident/accident registration and assessment system. This includes techniques such as: — a log/diary to record all accidents, incidents, changes to procedures and the findings of inspections; — procedures to identify, respond to and learn from such incidents and accidents."	**BAT in place.** Refer to: Section V: Appendix 13 – Environmental Accident Management Plan and associated Appendix 7 Environmental Risk Assessment. Note – incidents, complaints and investigations sections also included in the Odour Management Plan, see Section V: Appendix 9. See Section V: Appendix 16 - Secondary Containment Risk Assessment.
Material efficiency	
BAT 22. In order to use materials efficiently, BAT is to substitute materials with waste.	
Waste is used instead of other materials for the treatment of wastes (e.g. waste alkalis or waste acids are used for pH adjustment, fly ashes are used as binders).	**BAT in place.** Opportunities to substitute materials with waste are very limited. However, final treated effluent is used in preference to water from the

Requirement	Relevant sections for reference / notes on applicability
	mains water supply wherever feasible. Refer also to Section III: Supporting Information, Form C3, Question 6e.
Energy efficiency	
BAT 23. In order to use energy efficiently, BAT is to use both of the techniques given below.	
a. Energy efficiency plan. An energy efficiency plan entails defining and calculating the specific energy consumption of the activity (or activities), setting key performance indicators on an annual basis (for example, specific energy consumption expressed in kWh/tonne of waste processed) and planning periodic improvement targets and related actions. The plan is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc. b. Energy balance record. An energy balance record provides a breakdown of the energy consumption and generation (including exportation) by the type of source (i.e. electricity, gas, conventional liquid fuels, conventional solid fuels, and waste). This includes: (i) information on energy consumption in terms of delivered energy; (ii) information on energy exported from the installation; (iii) energy flow information (e.g. Sankey diagrams or energy balances) showing how the energy is used throughout the process. The energy balance record is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.	**BAT in place.** Refer to Section III: Supporting Information, Form C3, Question 6a and 6b; and Section V: Appendix 12 – Energy Management Plan.
Reuse of packaging	
BAT 24. In order to reduce the quantity of waste sent for disposal, BAT is to maximise the reuse of packaging, as part of the residues management plan (see BAT 1).	
Packaging (drums, containers, IBCs, pallets, etc.) is reused for containing waste, when it is in good condition and sufficiently clean, depending on a compatibility check between the substances contained (in consecutive uses). If necessary, packaging is sent for appropriate treatment prior to reuse (e.g. reconditioning, cleaning).	**BAT in place.** Limited opportunities exist as packaging waste arisings are very low. Refer to Section III: Supporting Information, Form C3, Question 6e for further information about residues management; and Section V: Appendix 17 – Residues Management Plan.
General BAT conclusions for the biological treatment of waste	
BAT 33. In order to reduce odour emissions and to improve the overall environmental performance, BAT is to select the waste input.	
The technique consists of carrying out the pre-acceptance, acceptance and sorting of the waste input (see BAT 2) so as to ensure the suitability of the waste input for the waste treatment, e.g. in terms of nutrient balance, moisture or toxic compounds which may reduce the biological activity.	**BAT in place** See Section V: Appendix 18 – IED Waste Pre-Acceptance, Acceptance and Rejection Procedure. Refer to Section II: Technical Description and Section III: Supporting Information, Form

Requirement	Relevant sections for reference / notes on applicability
	C2, Question 3d Management systems.
BAT 34. In order to reduce channelled emissions to air of dust, organic compounds and odorous compounds, including H_2S and NH_3, BAT is to use one or a combination of the techniques given below.	
a. Adsorption. b. Biofilter. c. Fabric filter. d. Thermal oxidation. e. Wet scrubbing.	**BAT not in place.** Odour monitoring programmes are established within the Odour Management Plan. See Section V: Appendix 9 Odour Management Plan. Refer to Section II: Technical Description and Section III Supporting Information Performance investigation (including odour sampling) conducted in August 2023 to confirm 3 OCU's (using peacemaker media) achieve the 1,000 odour unit requirement. One OCU is a biofilter and one is an activated carbon adsorption unit and will require upgrading/replacement to meet the 1,000 odour unit requirement. Results of investigation is pending with scope of OCU upgrades to be confirmed. See Improvement Programme below.
BAT 35. In order to reduce the generation of wastewater and to reduce water usage, BAT is to use all of the techniques given below.	
a. Segregation of water streams. Leachate seeping from compost piles and windrows is segregated from surface run-off water (see BAT 19f). b. Water recirculation. Recirculating process water streams (e.g. from dewatering of liquid digestate in anaerobic processes) or using as much as possible other water streams (e.g. water condensate, rinsing water, surface run-off water). The degree of recirculation is limited by the water balance of the plant, the content of impurities (e.g. heavy metals, salts, pathogens, odorous compounds) and/or the characteristics of the water streams (e.g. nutrient content). c. Minimisation of the generation of leachate. Optimising the moisture content of the waste in order to minimise the generation of leachate.	**BAT in place** Final effluent is used in preference to water from mains water supply wherever feasible.
BAT conclusions for the anaerobic treatment of waste	
BAT 38. In order to reduce emissions to air and to improve the overall environmental performance, BAT is to monitor and/or control the key waste and process parameters.	
Implementation of a manual and/or automatic monitoring system to:	**BAT not in place.**

Requirement	Relevant sections for reference / notes on applicability
— ensure a stable digester operation; — minimise operational difficulties, such as foaming, which may lead to odour emissions; — provide sufficient early warning of system failures which may lead to a loss of containment and explosions. This includes monitoring and/or control of key waste and process parameters, e.g.: — pH and alkalinity of the digester feed; — digester operating temperature; — hydraulic and organic loading rates of the digester feed; — concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate; — biogas quantity, composition (e.g. H2S) and pressure; — liquid and foam levels in the digester.	Sampling and monitoring are completed for digesters for HACCP. Monitoring suite is currently being investigated to improve and expand to include additional parameters in line with BAT e.g. VFA's. Refer to Section II: Technical Description

Improvement Programme

This EP variation application provides the necessary documentation to confirm that the proposed operations at Hayle WWTW achieves the required Best Available Techniques (BAT) for the installation. Where this is not the case, a proposed Improvement Programme is provided below, detailing the necessary improvements required in order to achieve BAT or BAT equivalent compliance.

IC No.	Area	BAT	Description	Completed to Date	Next Steps		
					Short Term (July 2024)	Medium Term (By 31 March 2025)	Long Term (By End of AMP8)
Containment and Drainage							
1	Drainage Upgrades	BAT 7	Works are proposed to be undertaken to provide further details for the drainage plan, including class 4 and 5 remedial actions. The additional information / drainage survey is due to be started in January 2024 and made available to the EA. Replacement of below ground drainage pipework identified as defective (condition 4 and 5) on the initial drainage survey conducted by Glanville Environmental and undertake localised repairs to pipework condition 3. This encompasses approximately 325m of below ground 150mm vitrified clay pipework. Areas not investigated in the original survey will be surveyed at the time of these repairs being completed, and any rectifying works will be undertaken in line with the above criteria. Replacement of existing ACO	Drainage survey completed in February 2023. Identified pipework in poor condition, blockages, and condition issues. Drainage survey confirmed return to head of the works. Second survey completed in August 2023 for survey sections aborted in original survey.	Procurement and commencement of works for replacement/repairs with framework contractors.	Contractor to complete repair works and recommissioning survey.	

IC No.	Area	BAT	Description	Completed to Date	Next Steps		
					Short Term (July 2024)	Medium Term (By 31 March 2025)	Long Term (By End of AMP8)
			drains in thickened sludge area and inside centrifuge building to restore condition of grating.				
2	Condensate Drainage	BAT 19	Condensate from existing condensate pots to be contained, with a view to being directed to the sealed drainage system.	Condensate pot's locations identified on site and interim solution in place to ensure containment of condensate.	Local containment from condensate pot drain to be installed in January 2024.	Develop drainage routes to connect the drain discharge from condensate pot to sealed drain system.	
3	Secondary containment	BAT 19	Provision of concrete impermeable areas within the perimeter of the sludge thickening plant, primary and secondary digesters compound, with minimum crossfall of 1:100 towards site drainage. Provision of secondary containment in the site sections identified as part of the containment solution (spill modelling) using walls. Containment volumes will be retained via flood gates where vehicular access is required to the bunded areas. Investigations are in progress to	Site visit completed in April 2023. Drone survey completed in June 2023 to update surface data for modelling. Spill modelling revisited to include for additional tanks in December 2023 and to consider EA correspondence with other utilities. To provide revised spill modelling to EA using improved	Prepare design brief for secondary containment option solution. Revised spill containment solution including any additional required assets, to account for potential sludge strategy, to be provided to EA. Solution to be agreed with relevant stakeholders and subject to statutory approvals e.g. planning permission. Jetting mitigation measures are to be put in place, the detail of this is still to be confirmed. For further detail see Appendix 16 Secondary Containment Assessment.		Contractor to be engaged for the detailed design and construction of spill containment solution.

IC No.	Area	BAT	Description	Completed to Date	Next Steps		
					Short Term (July 2024)	Medium Term (By 31 March 2025)	Long Term (By End of AMP8)
			finalise the approach for the area surrounding the filtrate pumping station, to ensure full containment within the Installation boundary in the event of the catastrophic failure of the secondary digesters. This area poses challenges due to the topography of the site and the relative low level on site where the filtrate pumping station is located. Sole mitigation of a 1.5m wall height in the area surrounding the filtrate pumping station would not fully contain a spill. Options being investigated to ensure full containment include increasing the wall height to 1.75m in the vicinity of the pumping station (Option 1), and to define potential additional storage volume and pump operation required to achieve required containment (Option 2).	surfacing data, if the solution deviates substantially (technical challenges with software).			
Liquors							

IC No.	Area	BAT	Description	Completed to Date	Next Steps		
					Short Term (July 2024)	Medium Term (By 31 March 2025)	Long Term (By End of AMP8)
4	Monitoring of resource consumption	BAT 11	Liquors recirculated from sludge thickening and dewatering processes currently not monitored. Monitoring to be installed in accordance with BAT.	Investigation to identify improvement. Challenges as current discharge is not full bore to allow for the installation of a traditional Magflow.		Flow monitoring to be installed on liquor return line.	
5	Sampling and monitoring (Liquor Returns and Digester feed)	BAT 6 / BAT 7	Sampling and monitoring of Digester Feed and Liquor Return lines in accordance with revised sampling suite to characterise liquors. Revised sampling suite to include additional determinands to ensure fully compliant with BAT 7.	Initial sampling of determinands submitted in original application. Initial investigation to expand sampling suite to include all relevant determinands.	Investigation into sampling requirements and need for third-party support (including accreditations) for additional determinands and establishing programme. Submission of sampling and analysis plan on completion of above.		
6	Sampling and monitoring (Liquor Returns)	BAT 3	Sampling suite and flow/discharge rates to be finalised and confirmed for inclusion into the Permit.	Investigation into sampling requirements and need for third-party support (including accreditations).	Characterisation of liquor returns to the head of works at Hayle STW and provision of analysis to EA.		

IC No.	Area	BAT	Description	Completed to Date	Next Steps		
					Short Term (July 2024)	**Medium Term (By 31 March 2025)**	**Long Term (By End of AMP8)**
					Note - there may be challenges regarding capacity of laboratories to accommodate volumes of sampling requests. Investigation to confirm suitability of sampling point. Installation of sampling point. Flow and discharge rates to be made available to the EA.		
Emissions to Air							
7	Sampling and Monitoring (Channelled Emissions to Air)	BAT 8	Sampling locations for channelled emissions to air to be defined and equipment installed (as required) to allow for monitoring. Defining of locations relies on clarifying condition and type of odour control unit.	Odour control unit performance surveys completed in Summer 2023. Pending report with conclusions for review.	Review report on OCU condition and performance. Determine adequacy and suitable locations for sampling. Implement sampling programme.	Improvements (as required) to OCUs to ensure compliance.	
8	Odour Control	BAT 34	Sampling and testing of OCUs to confirm performance of each unit and potential refurbishment/upgrades to units for adequate operation and	OCU Performance survey completed in August 2023 (results report pending review to incorporate recommendations).	Review the OCU report and incorporate recommendations. Scope of OCU	Remedial action to existing OCUs, as identified.	Upgrade/replacement of any OCU's identified in OCU report. Replacements to consider connection to

IC No.	Area	BAT	Description	Completed to Date	Next Steps		
					Short Term (July 2024)	Medium Term (By 31 March 2025)	Long Term (By End of AMP8)
			location for sampling to meet BAT. Odour emissions characterisation to be completed at odour inlet to confirm need for full suite of determinands. HLC and VCOL may not be relevant. Refurbishment and recommissioning of Odour Control Unit 7 (thickening building) and any other OCU's identified as needing improvements. Scope to be defined by the OCU Performance survey.		upgrades to be developed. Procurement routes and design routes to be developed accordingly. Odour monitoring at inlet and analysis of HCL and VCOL concentrations. Analysis to be provided to EA for consideration.		any other assets to improve performance or for any additional assets as part of sludge strategy.
Asset Improvements							
9	Asset condition	BAT 19	Internal inspection to confirm condition of assets: - Imported Sludge Balancing tank - Screened sludge tank - Primary Digesters - Secondary Digesters	External inspection programme completed in October/November 2023. Programme for internal inspection of	Procure survey with contractor. Procurement and repair of lightning protection and replacement of primary digesters cladding.	Programme survey and plan for taking units off service; drain and clean. Undertake internal inspection. Review report on asset condition and	Repair / replacement programme (priority given to assets relevant to digester performance and significant pollution risk).

IC No.	Area	BAT	Description	Completed to Date	Next Steps		
					Short Term (July 2024)	Medium Term (By 31 March 2025)	Long Term (By End of AMP8)
			Complete lightning protection survey on all tanks and repair/refurbish as required. Replace damaged cladding of Primary Digesters. Repair/replace assets identified as requiring improvement.	primary digesters scheduled for 2024.		develop repair / replacement programme for above ground assets.	
10	Asset covering / Emissions to water	BAT 19 / BAT 14	To ensure relevant assets are covered; replacement of existing above ground glass coated steel tanks with provision of new GRP roofs: - Thickened sludge tank - Return liquor balancing tank To ensure containment of sludge cake to mitigate risk from storage of cake and associated leachate reaching land or water; replacement of lateral panels and roof for the cake barn. Note - sludge barn is proposed to be ventilated.	External inspection programme completed in October/November 2023.	Investigate options for replacement of assets.	Programme replacement works for identified assets.	Complete replacement works of assets, including any temporary/enabling works required.

IC No.	Area	BAT	Description	Completed to Date	Next Steps		
					Short Term (July 2024)	Medium Term (By 31 March 2025)	Long Term (By End of AMP8)
11	Site Capacity	BAT 4/ BAT 19	Additional secondary digestion capacity to be provided to increase retention time to digestion process, by the addition of a new tank. The addition of this tank is proposed to be included as part of a later variation to the Environmental Permit.		Develop conceptual design of new secondary digester, including spill modelling and bunding requirements updates.		Permit variation to the EA for inclusion of new secondary digester. Construction and commissioning of new secondary digester, subject to any statutory requirements e.g. planning permission.
12	Monitoring of gas flaring	BAT 15 / BAT 16	Upgrades to biogas plant to reduce flaring and emissions from pressure relief valves (whessoe valves).	Gas system modelling completed to define the reasons and issues associated with excess flaring. Gas consumers (3No. CHPs) replaced like-for-like to restore consumption on site. Inspection of digester PVRV (whessoe valves) completed.	Replacement or calibration of flowmeter to flare for monitor of gas flare utilisation. Replacement of all PVRV (whessoe valves) where required.		

IC No.	Area	BAT	Description	Completed to Date	Next Steps		
					Short Term (July 2024)	Medium Term (By 31 March 2025)	Long Term (By End of AMP8)
General Compliance							
13	Appropriate Measures	BAT's (+)	Investigations to determine full extent of Appropriate Measures (AM) requirements and associated action plans towards AM compliance for AMP8. Note - Technical Standards in progress of being updated to fully reflect BAT compliance in tandem with Improvement Conditions being completed to fully reflect upgrades / changes on site. Technical Standards will undergo a secondary update to fully reflect Appropriate Measures using the same approach.	Draft revised technical standards/addendums under review.	Amended relevant Technical Standards to be made available to EA (BAT Compliant).	Action plans for meeting AM to be provided to EA.	Amended relevant Technical Standard to be made available to EA (AM Compliant)
14	Appropriate measures	BAT's (+)	Investigations and improvements into calibration of equipment and process monitoring.	Ongoing	To review location of all monitors and instruments, calibration status	Provide EA with proposals for AM compliance	Recalibrate / replace instruments if needed to improve the site control and monitoring of the overall site.

Appendix 6: Environmental Quantitative Risk Assessment (EQRA)

Appendix 7: Environmental Risk Assessment

Appendix 8: Air Emissions Risk Assessment

Appendix 9: Odour Management Plan

Appendix 10: Bioaerosol Risk Assessment

Appendix 11: Noise & Vibration Risk Assessment

Appendix 12: Energy Management Plan

Appendix 13: Environmental Accident Management Plan

Appendix 14: Hayle WWTW - Photolog

Appendix 15: Nature and Heritage Conservation - Screening Report

Appendix 16: Secondary Containment Risk Assessment

Appendix 17: Residues Management Plan

Appendix 18: IED Waste Pre-Acceptance, Acceptance and Rejection Procedure

Appendix 19: Material Safety Data Sheets (MSDS)

Appendix 20: Technical Standards

Appendix 21: Leak Detection and Repair (LDAR) Programme