IED Permit Application

Basildon Sludge Treatment Centre

Anglian Water Services Ltd
December 2021 (Updated May 2024)

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Non-Technical Summary

1.1 Introduction

The Non-technical summary has been written to support an application for a new bespoke Environmental Permit for Basildon Sludge Treatment Centre (STC) (the "site") by Anglian Water (AWS) ('the Operator'). In order to satisfy the requirements of the Environmental Permitting Regulations (EPR) 2016, the Operator must apply to the Environment Agency for a new bespoke Installation Environmental Permit.

1.2 Overview of the site and activities

Basildon Water Recycling Centre (WRC) and Sludge Treatment Centre (STC) is located Basildon Water Recycling Centre, Courtauld Road, Basildon, Essex, SS13 1DB (NGR: TQ 73830 90741). The WRC is operated under the Urban Wastewater Treatment Regulations (UWwTR) and has a standalone Water Discharge Activity Environmental Permit, which will remain an independent permitted activity. The STC operation is a non-hazardous waste activity which is currently carried out under a waste operation permit (EPR/GB3735RL/V002). The waste activity comprises of imports, physio-chemical and anaerobic digestion (AD) treatment, and the storage of waste, all for recovery purposes. The STC handles waste derived from the wastewater treatment process indigenously produced on-site and imported wastes. The site undertakes AD of sewage sludge from the on-site WRC and will continue this operation under a new bespoke Industrial Emissions Directive (IED) installation permit.

The Combined Heat and Power plant is also currently permitted under a waste operation permit (EPR/CP3038HT/V004). Electricity and heat for the site are primarily provided by the combustion of biogas generated from the 2 spark ignition CHP engines (1.4 MWth input each) and combustion of biogas in two composite boilers (1.455 MWth each) from receipt of materials to dispatch of products and waste, and by dual fuel (biogas and natural gas) steam raising boiler providing steam to the biological hydrolysis process (HpH) plant.

AWS are applying for a variation to the existing STC waste operation permit and consolidate with the CHP waste operation permit. This will form a Bespoke Installation Permit for the STC waste activity, as a joint Environment Agency and Department for Environment, Food and Rural Affairs (DEFRA) decision has been made that AD treatment facilities at WRCs and STCs are covered by the Industrial Emissions Directive and should no longer operate as separate waste activities.

The primary permitted installation activity will be the AD treatment activity. The AD activity will treat indigenously produced sludges and imported sludges. Permitted Directly Associated Activities (DAAs) will be the physio-chemical treatment of sludges; the storage of sludges and cake from AD activity; the storage of biogas derived from the AD treatment of waste and the combustion of biogas in an on-site Combined Heat and Power plant (CHP). In the event the CHP cannot run in an emergency or due to operational issues, biogas will be combusted via an on-site flare stack and boiler system. The liquor treatment plant, AMTREAT, a biological process, is also situated on the site and treats over 50 tonnes per day.

As part of this permit variation, AWS wishes to add one new EWC waste code, 16 10 02, to allow for chemical toilet wastes "blue loo" to be discharged at Basildon. 16 10 02 needs to be added to allow for tankered imports of domestic wastes, alongside 20 03 04 which is already on the existing permit. The full list of EWC waste accepted at Basildon, and to be included on the permit, are listed in Appendix B.

The IED permit will include:

- 1 x Imported & Primary sludge tank
- 1 x Blending tank
- 1 x HpH Process, comprising of;
  - 1 x Heating Tank
  - 2 x Pasteurisers
  - 1 x Hydrolysis Tank
- 2 x Digestors
- 1 x Gas Holder
- 1 x Post Digestion Tank
- 1 x RO Plant Salt Storage
- 1 x Waste Oil Tanks in CHP engines
- 2 x CHP engines
- 1 x Anoxic Tank
- 1 x AMTREAT Plant (2 tanks)
- 1 x Poly Make up Silo
- 2 x Centrifuges (Duty/Duty) (final product dewatering)
- 2 x Composite dual fuel steam raising boilers
- 1 x Biogas burner (flare stack)
- Cake pad (cake made on site)
- 4 x SAS PFTs
- 2 x SAS belts
- 2 x drum thickener

The following are outputs from the process:

- Cake (dewatered post digestion sludge) - stored in cake bay before being transported for use on agricultural land
- Bio-gas - stored in an existing gas holder, and is then either:
- – Burnt in CHPs, for use on site with surplus exported to the grid
- – Burnt in the fired steam boiler
- – Flared in the waste biogas burner.

2 Introduction

2.1 Overview

This document has been prepared to support the application for a new bespoke installation Environmental Permit (hereafter referred to as 'the permit') for the Basildon Sludge Treatment Centre (STC) ('the site') Anglian Water (AWS) ('the Operator').

The site currently holds two Environmental Permits under the Environmental Permitting Regulations (EPR) 2016 for sludge treatment activities and combined heat and power activities. Following the joint Environment Agency and DEFRA decision that AD treatment facilities at WRCs and STCs are covered by the Industrial Emissions Directive (IED), this application is being submitted to ensure the site is permitted in line with the IED and the EPR 2016, as amended.

This document contains a description of the site and proposed permitted activities and DAAs, an assessment of the possible effects of these activities and responses to questions in Parts A, C2, C3, C6 and F1 of the application documentation (plus supporting information where required).

2.2 Document content and structure

The following application forms have been completed to support the application and have been submitted as stand-alone documents:

- Part A: About You
- Part C2: Varying a bespoke permit
- Part C3: Variation to a bespoke installation permit
- Part C6: Variation to a point source emission to water from an installation
- Part F1: Charges and declarations
- Part C0.5: Administrative variation of a standard or bespoke permit

The main body of the permit application document ('the Main Supporting Document') includes all the supplementary information required in response to relevant questions within the Part A, Part C2, Part C3, Part C6 and Part F1 application forms for which there was insufficient space on the forms to answer the questions in full.

The Environmental Permit variation application document ('the Main Supporting Document') consists of two main parts:

- Chapter 5 provides the general information required to inform Form C2 relating to the variation of a bespoke permit; and
- Chapter 6 provides the more detailed information required to inform Form C3 relating to the variation of a bespoke installation permit.
- Chapter 7 provides the more detailed information required to inform Form C6 relating to the variation of point source emissions to water from an installation

Form F1 covers the required financial information required for payment of the application fee.

Form C0.5 was completed so the two existing permits are formally consolidated.

Additional information included as part of this submission and not as stand-alone documents, are found in the following appendices:

- Appendix A – Customer Complaints
- Appendix B – European Waste Catalogue (EWC) Codes
- Appendix C – Site location plans
- Appendix D – Site plan
- Appendix E – National Grid References
- Appendix F – Sensitive Receptors
- Appendix G - AMP7 Strategy on a Page
- Appendix H - STC Sampling
- Appendix I – Monitoring Points for Effluent for Form C6
- Appendix J – Site Infrastructure Plan

Stand-alone documents included as part of this submission, are detailed below:

- Environmental Risk Assessment
- Environmental Management Plan
- Accident Management Plan
- Climate Change Risk Assessment
- Drainage Plan (HAZOP)
- HACCP Plan
- Basildon Waste Acceptance
- Tranche 1-5 Site BAT Analysis
- Basildon Emission Points
- Containment Assessment for Basildon Sludge Treatment Centre
- ISO 9001 Certificate
- ISO 14001 Certificate
- Evidence of Technical Competence (CMS Certificate)
- Odour Management Plan
- Odour Assessment Report
- Process Safety Risk Assessment
- Bioaerosol Risk Assessment
- Operational and Contingency Plan
- Proximity to Wildlife Sites - Basildon Nature and Heritage Conservation Screening Report Maps
- Storage Capacity and Assets
- Basildon LDAR plan

- Site Condition Report
- Annexes to original permit application
- Site Maps (Also in Appendix C to E)
- Letter of Delegation
- AWS convictions up to May 2023
- Form A
- Form C0.5
- Form C2
- Form C3
- Form C6
- Form F1
- IED – STC Calculated Liquor Returns spreadsheet
- Testing from engines email
- RBP Report – Anglian Water Basildon

3 Process Description

Indigenous liquid sludge is received from Basildon WRC primary settlement tanks and blended with any liquid tankered sludge imports. This blended sludge is passed through sludge screens to remove any rag and debris before the sludge is blended with the indigenous screened thickened surplus activated sludge and dilute imported raw dewatered sludge cake.

The combined blended sludge is thickened and then pumped to the HpH biological hydrolysis process at approx. 7-9% dry solids.

The HpH process is a three-stage advanced anaerobic digestion system that conditions and pasteurises the sludge prior to digestion. Stage 1 – Heating. The raw sludge is heated to approx. 40C using recovered heat from the CHP engine cooling circuit via a sludge/Low temperature hot water heat exchanger. The warm sludge is then pumped to stage 2 – Pastuerisation. This step consists for two batch tanks where sludge is received, heated by injection of steam to a minimum set point temperature (55C) and held for a minimum of 5 hours to pasteurise the sludge for onward pumping to stage 3. The steam is provided by steam raising boilers and the primary heat source for steam raising is from the hot engine exhaust gases which are passed through the boilers. In the event the CHP engines are off-line or are unable to meet the process heat demand the boilers can be fuelled by natural gas or biogas to raise process steam and hot water for the process. Stage 3 – Hydrolysis. The pasteurised sludge is mixed and stored for up to 2 days at 38-42 C to allow hydrolysis to take place. This conditions the sludge prior to digestion and allows for a high overall organic matter conversion to biogas when compared to conventional anaerobic digestion system

Following the HpH process the sludge is pumped to the digestion process where it is held for 14 days retention at the design throughput. Methane produced is captured and collected in a double membrane gas holder. The stored gas is then used beneficially to fuel the CHP engines or boilers with any surplus being burned in a low-level waste gas burner.

Treated sludge displaced from the digester gravitates to a post digestion tank where it is buffered prior to dewatering using centrifuges. The centrifuges dewater to produce the final treated biosolids product which is stored on a cake storage pad prior to recycling for beneficial use in agriculture as a soil conditioner.

Liquors generated during the dewatering process are treated in a AMTREAT liquor treatment plant to reduce ammonia levels to approx. 700 mg/l or less prior to being returned to the WRC for further treatment and discharge to the environment. Daily sampling of liquors includes: pH, final ammonia, and mixed liquors.

Throughout the STC process, sampling is done to ensure the process is operating within critical limits. Sampling done at Basildon is detailed in Appendix H.

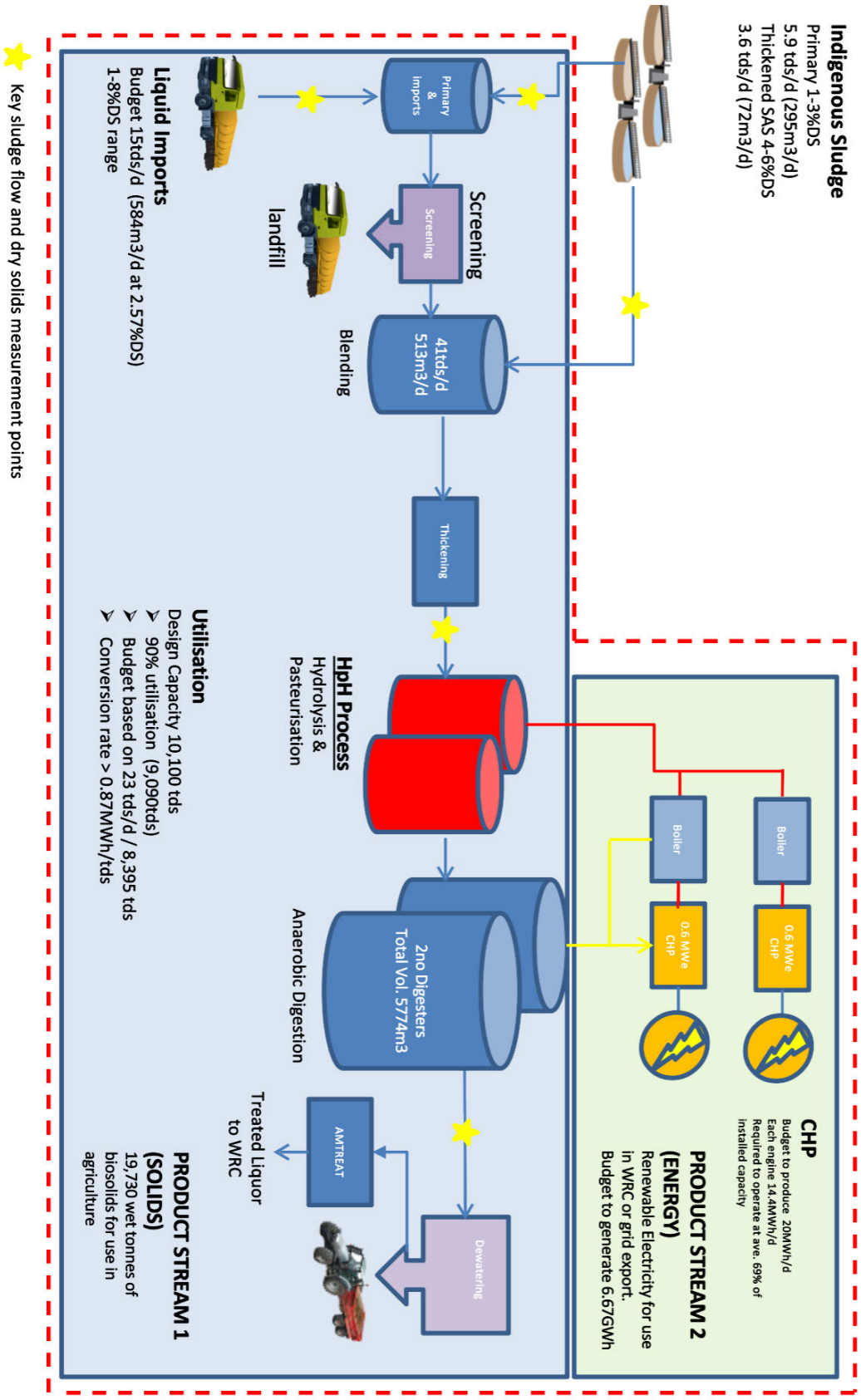


Figure 1: Basildon Process Flow Diagram

4 Part A – About you

4.1 Question 7: Contact details

Application contact:

Name: Don Haymes

Address: Anglian Water Services, Lancaster House, Lancaster Way, Huntingdon, PE29 6XU

Contact: 07811 606787 dhaymes@anglianwater.co.uk

Operational contact:

Name: Phil Seamons

Address: Basildon Water Recycling Centre, Courtauld Road, Basildon, Essex, SS13 1DB

Contact: 07740072156, pseamons@anglianwater.co.uk

Anglian Water Services is a registered company. The company registration number is 02366656, registered 1 April 1989.

Director and Company Secretary contacts:

Barry, John Richard (Mr) [redacted]

Ceeney, Natalie (Ms) - [redacted]

Courtice, Veronica Anne (Dame) [redacted]

Donnelly Anthony – [redacted]

Nassuphis, Alexandros [redacted]

Ogier, Batiste Thomas Degaris [redacted]

Patel, Zarin Homi (Ms) - [redacted]

Phillips-Davies Paul Merton Alistair – [redacted]

Rivaz Rosalind Catherine (Dr) [redacted]

Simpson, Peter (Mr) - [redacted]

Vassileva, Albena Simeonova – [redacted]

Russell, Claire (Ms) - [redacted]

Directors dates of birth should be redacted wherever this application is made public.

5 Part C2: General – varying bespoke permit

5.1 Question 2: About your proposed changes

This application is for a substantial variation to the existing STC waste EPR permit (EPR/GB3735RL/V002) which is an already consolidated with the STC waste and CHP waste operation permit. This will variation will form a Bespoke Installation Permit for the STC waste activity under the Industrial Emissions Directive.

The only additional waste code to be added in this variation are 16 10 02 which is to reflect the Environmental Agency's recent change in guidance to separate chemical toilet "blue loo" wastes from cess and septic wastes.

No site operations or assets are changing because of this variation.

5.2 Question 3a and Appendix 2: Relevant offences

No relevant person in AWS relating to this permit application has been convicted of any relevant offence. Any information relating to previous AWS convictions is provided in the standalone document AWS Convictions up to May 2023 which has the most up to date information and includes the last conviction..

5.3 Question 3b: Technical ability

Operational management is provided by qualified individuals and considered to be technically competent. All staff on site are trained to manage and operate activities without causing pollution. Competency in terms of the requirements of the environmental permit will be ensured through the appropriate training of all staff, covering:

- Awareness of the regulatory implications of the Permit for the permitted activity and their own work activities
- Awareness of all potential environmental effects from operation under normal and abnormal circumstances
- Awareness of the need to report any deviation from the permit
- Prevention of accidental emissions, and action to be taken when accidental emissions occur.

All staff are aware of the implications of activities undertaken including the operation of the site. Skills and competencies necessary to work on site are documented and records of training needs and training received for these posts are maintained.

Currently AWS uses the AWS developed technical competency course to demonstrate that personnel have the appropriate technical skills and knowledge to manage the activities undertaken. The AWS scheme is independently certificated as meeting the requirements of the Standard. The Competence Management System (CMS) enables Operators to demonstrate technically competent management on the basis of corporate competence and employees' individual competence. Individual competence remains a key component with each employee having the relevant technical competences required to carry out their role.

AWS engage a third-party certification body (currently LRQA; Lloyds Register Quality Assurance) to audit and certify the CMS. . It should be noted that AWS is transitioning to BSI as the certification body and as such a copy of the contract between AWS and BSI is included (AWS BSI Proposal Q740629 – signed contract). The contract references Pyewipe STC in the list of sites included in the Appendix on page 2 of the contract.

Details on technically competent people at Basildon STC: Paul Champness, Thomas Marden, , Phillip Seamons, Martin Amor.

Phillip Seamons also provides technical competency for Cambridge Sludge Treatment Centre (EPR/LP3196ER/V002) and Chelmsford Sludge Treatment Centre (IED Installation permit currently being determined).

The Waste Permitting Scientist located within the Environmental Quality team for AWS provides face to face CMS training to all appropriate AWS personnel and the Treatment Manager. Training provides information regarding waste management and obligations of the Environmental Permit for the site.

5.4 Question 3c: Finances

No relevant persons within AWS have current or past bankruptcy or insolvency proceedings against them.

5.5 Question 3d: Management System

5.5.1 Integrated Management System

AWS operates a number of management systems, scoped and configured to provide the best overall level of assurance and value to the business. The Integrated Management System (IMS) unifies several management system processes into a single framework, enabling our organisation to work as a single unit with unified objectives. The management system standards which support this framework share the same core structure and use common system clauses, terms and definitions, bringing consistency and compatibility between standards.

Key benefits of the IMS framework are:

- Aligned IMS Policy and management system objectives
- Improved risk management and integration
- Optimised use of business resources
- Enhanced customer satisfaction through the successful delivery of service expectations
- Efficiencies gained from the third-party assessment process - by planning external assessments against a core set of requirements across AW functions and activities, we reduce business impact and maximise value, both in cost and assurance
- Full alignment with AW strategic priorities, business goals and outcomes.

Under the umbrella IMS framework, there several smaller management systems which operate together to cover several areas relevant to AWS. For this permit application, the most relevant management systems are ISO 9001 Quality Management and ISO 14001 Environmental Management.

ISO 9001 Quality Management which is concerned with many aspects of water services, water recycling, labs, and AWS's Water Recycling Operational Logistics (WROL) and Circular Economy (CE) departments which manages tankering and cake storage on sites.

ISO 14001 Environmental Management only covers WROL's / CE's activities on site and sludge and cake movements between AWS sites. The WROL / CE environmental management system manages the impact of the activities carried out by the team, applicable to Basildon STC, as detailed below:

- Temporary cake storage on site
- Haulage of AWS cake from the site
- Spreading biosolids on land – the regulation of this activity is covered under a separate mobile plant permit.

The scope of ISO 14001 covers the activities that WROL / CE carry out, rather than the STCs itself as the site's responsibility lies with the Water Recycling team (the site owners). Locations that are listed on the ISO 14001 certificate relate to the main office bases for the WROL / CE teams.

Process controls for the sludge product are managed by the Water Recycling team, and HACCP monitoring points are in place at strategic positions in the treatment process, with hardwired measures in place that prevent non-compliant product moving forwards through the treatment process and are detailed in the sites HACCP plans. Compliance to the HACCP plans is reported on at key internal meetings attended by the Director of Water Recycling and heads of department.

The Water Recycling team own and manage the permit and have operational control over the STC, and work in conjunction with WROL /CE who oversee cake movements and temporary storage of cake on site. Any complaints received proven to be specific to WROL's / CE's operations will be passed on to WROL's / CE's Environmental Compliance Team for further investigation.

5.5.2 Environmental Management Plan

AWS's water recycling operations department has internal quality procedures for the operation, maintenance, and monitoring of its treatment assets. AWS continues to develop these standards, policy and procedures to improve environmental performance at its treatment plants.

A site-specific Environmental Management Plan (EMP) is in place, prescribing requirements for:

- Establishing an environmental policy
- Determining environmental aspects and impacts of products / activities / services through a risk assessment process
- Planning environmental objectives and measurable targets
- Implementing and operating programs to meet objectives and targets
- Ensuring compliance with environmental legislation including the requirements of environmental permits
- Checking and corrective action
- Management review.

The EMP allows for the auditing of environmental performance against given criteria and those within the Environmental Permit to demonstrate continual improvement as part of the Plan, Do, Check, Act methodology.

AWS has a site-specific environmental management plan for each AWS site, including Basildon STC. The site-specific environmental management plan (refer to EMP in application folder) was developed to identify potential risks of the activities carried out, manage and control these impacts. The EMP also acts as a signposting tool for staff to understand what plans and mitigation are in place for:

- Emergency response
- Odour control
- Accident management.

AWS has a number of policies and procedures covering the O&M and monitoring of wastewater treatment processes that include sludge treatment plants; these policies and procedures fall within AWS's overarching management systems. The key procedures are called POSWASTES, POSMAINT and POSTEL.

POSWASTES includes policies, procedures and standards covering aspects of wastewater treatment operation, including day-to-day operation, training requirements for operators and sampling / testing. POSMAINT covers policies and standards for the maintenance of assets such as planned preventative maintenance and reactive maintenance. POSTEL covers AWS remote monitoring telemetry systems, including policies and standards for alarm action codes, response times and data collection.

Roles and Responsibilities

The Treatment Manager is supported and advised by experts within the Energy Team, Process Science team and the Environmental Regulation team. The Treatment Manager has a staff of works technicians reporting to them. The Treatment Manager reviews the EMP annually to ensure it is relevant and complete.

AWS ensures compliance with both relevant legislation and appropriate standards (for example Environmental Permit conditions) by undertaking regular legislation reviews to identify updates to legislation and guidance applicable to the Plant and its management. The Waste Permitting Scientist monitors waste imports into site to ensure they are below permitted limits.

The Treatment Manager is in regular contact with several colleagues regarding operational and compliance issues.

Through the IED permit application process, it has been highlighted that a regime of reviewing existing management plans is currently not in place. AWS is proactively working on developing this system to safeguard the management plan and ensure they are all as up to date as reasonably possible. The review schedule of each plan will be done on a risk-based approach.

5.5.3 Complaints

Where complaints have been directly associated with or about Basildon STC in the last 2 years, they would be listed in Appendix A. However the site has not received any complaints in the last two years therefore there are none to report. Action would be taken to rectify the concern at the time, in accordance to the odour management plan.

Plans provided, to satisfy question 5a, can be found in the following documents:

- Site Location Plans – see Appendix C
- Site Layout Plan - see Appendix D
- National grid references of key assets – see Appendix E
- Drainage Plan – see standalone document
- Process Flow – See section 3 above

5.6 Question 5b: Site condition report

In accordance with Environment Agency requirements, a Site Condition Report (SCR) was produced during the original permit application for the CHP permit (2012) to demonstrate the condition of the land on issue of the permit. This permit variation will not result in a change to the permitted boundary however the permit is being varied from a waste operation to an installation therefore the site condition report has been updated.

Site details and condition of the land at permit issue can be found in the original permit application.

5.7 Question 6a: Environmental risk assessment

As part of the application for an environmental permit, operators must assess the risk to the environment and human health from the activities that they propose to undertake, using the methodology outlined in the EPR Guidance (H1), [1].

The ERA sets the requirements for the management of the permitted area, emission control measures etc. It assesses the risks to the environment, amenity and human health. All control measures within the rules must be adhered to in order to obtain the permit.

The ERA assesses the impacts from the following environmental concerns (where necessary):

- Point source and fugitive emissions to air
- Point source and fugitive emissions to water and land
- Noise and vibration
- Odour
- Litter, mud and debris
- Human health and environment safety (i.e. visual impacts, site security, flood risk)
- Natural habitats and ecology.

Where emissions result in insignificant effects these have been screened out and where further detailed assessments of potential environmental impacts are required this is noted.

A copy of the ERA can be found as a stand-alone document in the application folder.

5.8 Question 6b: Climate change risk screening

The site is planned to operate and require an IED permit for more than five years and, therefore, requires a Climate Change Risk Assessment (CCRA). It has been submitted as part of the application because the screening score exceeds 5.

The score was calculated as follows:

- Timescale: the site is anticipated to operate beyond 2060;
- Flooding: the site is not susceptible to extreme flooding from rivers or sea without flood defences, and no flood defences are present; and
- Water use: Majority of water use for the proposed permitted activities is sourced from recycled secondary washwater. Mains supply is used for:

[1] Environment Agency (2020) Risk assessments for your environmental permit. Available online at: https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit

- Poly make up - uses potable water
- Boiler water feed system
- Eye baths and safety showers
- Limited wash-down points where it would be uneconomic to extend the final effluent wash-water system
- Office messing facilitiesFE washwater is used wherever possible.

As the risk assessment score is more than 5, a copy of the CCRA can be found as a standalone document in the application folder. The mitigation measures are also included in the environmental management plan.

6 Part C3 – Variation to a bespoke installation permit

6.1 Question 1: Table 1a: Activities applied for

Table 1: Activities applied for Basildon STC Installation (Table 1a in form C3)

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
Listed Activities					
S5.4, Part A (1), (b) and (i)	Anaerobic digestion	124,063 tonnes [1]	Recovery or a mix of recovery and disposal of non-hazardous waste with a biological treatment capacity exceeding 100 tonnes per day if the only waste treatment activity is anaerobic digestion. R3 - Recycling/reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes) R13 - Storage of waste pending any of the operations numbered R1 to R12.	0 m3	8721 Annual tDs capacity 23 Daily tDs capacity
Liquor Treatment Plant (AMTREAT)	Biological treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations numbered D 1 to D 12		D8		Maximum 985 m^3 per day is returned to the WRC for treatment.
Directly Associated Activities					
Physical treatment of waste	Recycling/ reclamation of organic substances which are not used as solvents.		R3		
Gas combustion to produce heat and power. Use of Biogas	Use principally as a fuel or other means to generate energy		R1		
Use of auxiliary standby flares	Incineration on land		D10		
Standby boilers			D10		

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
Use of pressure release valves					
Storage	Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced).		R13		
Physico-chemical treatment of waste	Physico-chemical treatment of waste not specified elsewhere in Annex IIA which results in a final compound or mixtures which are discard by means of any of the operations numbered D1 to D8 and D10 to D12		D9		
Storage	Storage of waste pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where it is produced).		D15		
Raw material storage	Storage of raw materials including chemicals, lubrication oil, antifreeze, diesel, activated carbon.				
Discharge of condensate	Condensate from the CHP exhaust, flare gas pipelines, gas storage bag From collection to the point of discharge at the adjacent WRC.				

Schedule 1 or other references	Description of the Activity	Activity capacity	Hazardous waste treatment capacity	Non-hazardous waste treatment capacity
Total storage capacity		24,009 m^3		
Annual throughput (volumetric feed)	Anaerobic Digestion	124,063 m^3	0	124,063 m^3
Annual throughput (feed throughput)	Anaerobic Digestion	8721 tDs		8721 tDs

[1] Note: This does not include storage of associated raw materials used in the AD process such as poly make up tanks and liquor treatment tanks

[2] Note: This includes STC assets and associated raw materials e.g. the polymer silo. There is also 400 tonne capacity cake bay which only stores cake made at Basildon STC.

The full list of asset sizes is now provided as a separate document entitled “Basildon Storage Capacity and Assets”

6.2 Question 1: Table 1b: Types of waste accepted

There will be no changes to the current waste acceptance procedure as described in the original application. The EWC codes accepted at Basildon are in line with the existing waste operation permit. The only additional waste codes to be added in this variation is 16 10 02 for chemical toilet domestic wastes to be imported into the head of works.

Sludge coded 19 08 05 is accepted from the onsite Water Recycling Centre and from other AWS sites. Incoming vehicles delivering imported sludge from other Water Recycling Centres are directed to the reception import tank via coupled hoses. At the waste acceptance point, there is a light system in place so delivery drivers are aware when discharges can be made. A weighbridge should be used before and after discharge. There is a designated vehicle waiting area for vehicles and the discharge point is located on an impervious surface with drainage is diverted to the head of the Water Recycling Centre.

The following acceptance procedures are in place:

- Quantity of sludge delivered is measured
- The capacity of the import tank is checked to ensure that there is sufficient storage capacity
- Unloading is undertaken by trained operative
- Documents are checked and recorded via a tracking system.

AWS is aware of the composition of the waste, handling requirements and the EWC codes to ensure that these are compliant with the EWC codes of waste that can be accepted as contained in the Environmental Permit. Sampling is detailed in the waste acceptance procedure, provided as a standalone document (Basildon Waste Acceptance) and in Appendix H.

The reception area is regularly inspected to ensure that there are no cracks or damage to the integrity of the impervious areas. The reception area has drainage to ensure that any spillages are collected and contained and transferred to the head of the Water Recycling Centre for treatment.

AWS will accept sludges from 3rd parties only where they meet the same Biosolids Assurance Scheme requirements as sludges from AWS operations. No raw or digested cake is imported to Basildon STC.

All sewage wastes accepted into the STC have already been screened for grit and screenings.

A full list of EWC coded wastes can be found in Appendix B.

6.3 Question 2: Point source emissions to air, water and land

Emissions to air

Table 2: Point Source Emissions to Air

Installation name	Basildon STC [1]			
Point source emissions to air				
Emission point reference and location	Source	Parameter	Quantity [2]	Unit
Stacks for CHPs		Oxides of Nitrogen (as NO2)	500	Mg/m^3

CHP1: TQ 73793 90734 CHP2: TQ 73797 90734 Both are 15.5m high from the ground	CHP engine exhaust stacks burning biogas (1.4 MWth each)	Carbon Monoxide	1400	Mg/m^3
		Total VOCs	1000	Mg/m^3
Surplus waste gas burner (flare stack) TQ 73890 90730	Combustion gases	Operational hours	No emission limits set 10% of year	Hours
Boiler exhaust stack serving fired side of composite 2 boilers (1.455 MW x 2)	Combustion gases	Oxides of Nitrogen (NO and NO2 expressed as NO2)	No limits set	NA
		Sulphur Dioxide (if burning biogas)	No limits set	NA
		Carbon Monoxide	No limits set	NA
Odour Control Unit TQ 73782 90762	Channelled emissions form Biofilter and odour abatement stack	Hydrogen Sulphide Ammonia Odour Concentration	No limits set	N/A
Odour Control Unit TQ 73891 90864	Channelled emissions form Biofilter and odour abatement stack	Hydrogen Sulphide Ammonia Odour Concentration	No limits set	N/A
Odour Control Unit TQ 73851 90700	Channelled emissions form Biofilter and odour abatement stack	Hydrogen Sulphide Ammonia Odour Concentration	No limits set	N/A

[1] This represents the wording of the existing the permit.

[2] These limits do not apply during start up and shut down. This is the same as the current permit.

The emission points are shown in Appendix E in the site plan.

Basildon currently meets the permitted air quality limits as certified by the annual emission report done by an MCERTS accredited contractor. The limits shown in Table 2 above are applicable until January 1st 2030, at which time the CHP engines will be classed as an existing specified generator operating on biogas therefore the limits will be:

- SO_2 = 60 mg/Nm^3
- NO_x = 190 mg/Nm^3

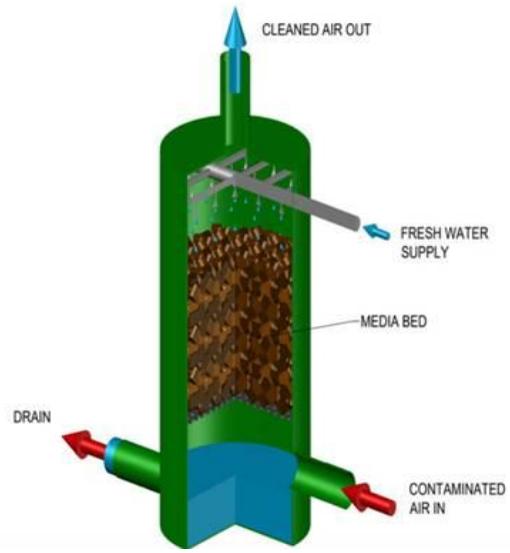
These ELVs are based on a temperature of 273.15K, a pressure of 101.3kPa and a standardised O_2 content of 15%.

The odour control units (OCUs) at Basildon STC are as detailed in the below summaries:

Biofilter and carbon

Biofilter and Peacemaker

Biofilter



BIOFILTERS

Biofilter technology is used for high concentrations of malodorous compounds and water soluble volatile organic compounds (VOCs), including sulphur compounds such as hydrogen sulphide. The contaminated air passes through a moist media bed, which acts as a host for a layer of biofilm. Microorganisms, fungi and bacteria inhabit the biofilm and degrade the odorous compounds, significantly reducing their level in the exhausted airstream.

Biofilters can be stand-alone, or often combined with dry media such as activated carbon for polishing.

1: System of Activated Carbon Adsorption

The principle of adsorption is used in activated carbon-based systems, which adsorb the odorous gas molecule to the surface of the medium, oxidize the odorous gas, and release the odourless gases to the atmosphere. For wastewater odour removal applications, filter medium capable of eliminating Hydrogen Sulfide, Ammonia, VOCs, and mercaptans are used.

Activated carbon medium that can efficiently handle these odorous gases should be used.For sewage odours, chemically impregnated activated carbon media and specifically treated virgin activated carbon media are used.

3.1.2 Biotrickling Biofilter

The Biofilter contains lava rock and has filtered final effluent being fed into the top of the Biofilter at a rate of Final Effluent supply of min 2m³/Hr at 3.6 bar, filtered to 250µm – **Actual flow will be Set at Commissioning**.

A Biomass is generated within the Biofilter.
This Biomass breaks down the airborne odours by using them as a food source.
The filtered final effluent and odorous air is needed on a constant basis to prevent the Biomass from being depleted.
It is important to maintain constantly both the odorous air and filtered final effluent to prevent loss of the Biomass and the consequent loss of efficiency.

3.1.3 Peacemaker

The Peacemaker Unit contains a number of dry medias. Diox™ Media is used to remove Hydrogen Sulphide and mercaptans. Carbon is used to remove VOC's. A bypass is available to enable running of the plant should the peacemaker units be offline for maintenance. In this case, to maintain the desired flow rate, the bypass should be utilised.

The carbon granules within the peacemaker are designed to remove the non soluble odorous compounds (VOC's) that have not been removed by the wet scrubbing process units.

The dry scrubber media in the Peacemaker gradually becomes expired and has to be removed from the vessel to be replaced.

Emissions to water (other than sewers)

Not considered applicable as the drainage network sends water to the head of the works for treatment. There are no direct potentially contaminated discharges to controlled surface waters.

There are no direct potentially contaminated discharges to groundwaters or direct discharges to controlled waters.

Accidental releases of materials to the environment are controlled through adequate containment measures and working procedures.

Emissions to sewers, effluent treatment plants or other transfers off Site

There will be no point source emissions or direct discharges to controlled waters or public sewers, as part of the permit operation. All condensate from the CHP exhausts, flare stacks and biogas along with any other liquid waste will either be reused or discharged to the drainage system of the adjacent Basildon WRC and will undergo treatment via the AMTREAT plant and receive full treatment through the works, before being discharged under an existing water discharge permit. On-site WRC effluent will meet the requirements of the existing discharge consent. The water used at the site will be contained in a closed circuit; all wastewater streams will either be recycled within the process or captured and rerouted to the adjacent WRC for treatment.

Discharges will be minimal, typically arising from periodic maintenance/cleaning operations. As such, there are no direct potentially contaminated discharges to controlled surface waters and no significant impacts. All drainage (surface water or foul water) will be captured by the on-site drainage system and returned to the head of the WRC. A drainage plan of the site is provided with the application as a standalone document.

The Liquor Return point location is at NGR TQ 73677 90816 and is shown on the monitoring location plan within the standalone document Basildon STC Maps.

On the WRC storm water tank is upstream of the liquor return point therefore there is no risk that liquor returns could be discharged to the watercourse in storm conditions. The stormwater drainage of potentially contaminated areas from within the site boundary will be routed into the sewage treatment process with no discharge outside of the site. There will, therefore, be no risk of polluted runoff affecting off-site features not in storm conditions.

Due to the anticipated very low levels of contamination of the water and the volumes involved, no monitoring of its composition is proposed prior to discharge to the WRC.

Any areas of the site, where there is a risk of contamination of surface water, groundwater or discharge of process waters are located on impermeable concrete surface. All surface water from these areas drain to the WRC internal drainage system and are returned to the head of the works for treatment prior to discharge as final effluent.

A list of the point source emissions to sewers, effluent treatment plants and other transfers off site is included as Table 3.

Table 3: Point Source Emissions to Sewer

Emission point reference, and location	Source	Characteristics	Frequency	Monitoring / mitigation measures prior to final discharge and emission point discharge.
Condensate discharged to Basildon WRC	Condensate from the gas pipelines and gas storage bag This is located adjacent to biogas storage	Condensate with slightly elevated levels of H2S dissolved from the biogas, resulting in a low level of acidity	Negligible	Rerouted to adjacent WRC.

Drain down of plant	Occurs during maintenance when it is necessary to drain down the feed water, hot well or boiler shell.	High purity water with traces of chemicals (used for boiler dosing).	Infrequent	Rerouted to adjacent WRC.
Rainwater	Uncontaminated roof water from buildings.	Clean rainwater from building roofs only.		Rerouted to adjacent WRC
Rainwater	Run off from impervious surfaces	Clean rainwater from runoff		Rerouted to adjacent WRC
Sanitary water	Domestic facilities.	Foul waste.	Negligible	Rerouted to adjacent WRC.
Washwater	From the washing down of mechanical equipment during maintenance activities	Variable.	Negligible	Rerouted to adjacent WRC.

Please refer to the ERA (standalone document) on the environmental risk the water emissions pose and how these are mitigated, where relevant.

Emissions to land

All surface water and rainwater on site feeds into the site drainage which circulates back to the head of works for full treatment. There multiple soakaways on site for the condensate discharges which are listed on the map in Appendix E.

6.4 Question 3: Operating techniques

This section provides a technical overview of the components, the proposed techniques and measures to prevent and reduce waste arising and emissions of substances and heat, including during periods of start-up or shut-down, momentary stoppage and malfunction, and leaks. Specifically, consideration is made of:

- The technology to be used
- The process, in terms of how it will be operated and controlled
- In-process controls and Best Available Techniques (BAT) Assessment
- Measures implemented to control emissions to air, water, sewer and land.

Table 3a lists the technical guidance notes (TGNs) used to inform the techniques and measures proposed to prevent and reduce waste arising and emissions of substances, including during periods of start-up and shut down, momentary stoppage and malfunction, and leaks.

The technical guidance and BAT requirements will also be addressed within the Improvement Plan, to be made available to staff to ensure compliance with a permit, which covers the following:

- Management of activities, including security and staffing

- Site record keeping
- Emissions and monitoring, including:
    - point sources to air, water and land
    - fugitive emissions,
    - site drainage
    - storage of waste
    - odour, noise and vibration

Table 4: Technical standards

Description of the schedule 1 activity or directly associated activity	Best available technique (BATC, BREF or TGN reference)	Document reference
Section 5.4 non-hazardous waste installation - anaerobic digestion installation regulated under the Industrial Emissions Directive, utilisation biogas for energy	How to Comply with Your Environmental Permit Additional Guidance for Anaerobic Digestion Best available techniques (BAT) conclusions, for common waste water and waste gas treatment/ management systems in the chemical sector (SGN S5.06)	https://www.wiseenvironment.co.uk/wp-content/uploads/2020/07/ How-to-Comply-with-Your-Environmental-Permit-Additional-Guidance-for-Anaerobic-Digestion.pdfhttp://eippcb.jrc.ec.europa.eu/reference/BREF/BATC_CWW.pdf https://www.gov.uk/government/publications/sector-guidancenote-s506-recovery-anddisposal-of-hazardous-and-nonhazardous-waste
General	How to comply with your environmental permit Monitoring stack emissions: technical guidance for selecting a monitoring approach M1 sampling requirements for stack emission monitoring Environment Agency environmental permitting guidance, including: Environment Agency's horizontal environmental permitting guidance, including: H1 - Risk assessments for your environmental permit H2 Energy efficiency (Energy efficiency for combustion and energy from waste power plants) H3 Noise assessment and control H4 Odour management H5 Site condition report Control and monitor emissions for your environmental permit	https://www.gov.uk/government/publications/how-to-comply-withyour-environmental-permit https://www.gov.uk/guidance/monitoring-stack-emissions-technical-guidance-for-selecting-a-monitoring-approach https://www.gov.uk/government/publications/m1-sampling-requirements-for-stack-emission-monitoring https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit https://www.gov.uk/government/publications/energy-efficiencyfor-combustion-and-energyfrom-waste-power-plants https://www.gov.uk/government/publications/environmentalpermitting-h3-part-2-noiseassessment-and-control https://www.gov.uk/government/publications/environmentalpermitting-h4-odourmanagement https://www.gov.uk/government/publications/environmentalpermitting-h5-site-conditionreport https://www.gov.uk/guidance/control-and-monitor-emissions-for-your-environmental-permit

Description of the schedule 1 activity or directly associated activity	Best available technique (BATC, BREF or TGN reference)	Document reference
1.16.12 Physical Treatment of Non Hazardous Waste Basildon Head of Works Imports	Non-hazardous and inert waste: appropriate measures for permitted facilities	Non-hazardous and inert waste: appropriate measures for permitted facilities - Guidance - GOV.UK (www.gov.uk)

Source: Mott MacDonald

A copy of the drainage plane describing the operation and process can be found as a stand-alone document in the application.

6.5 BAT Assessment

An assessment against the BAT Conclusions set out in the 2014/738/EU: Commission Implementing Decision of 9 October 2014 establishing best available techniques (BAT) conclusions, under the Industrial Emissions Directive 2010/75/EU has been undertaken for the Basildon site, and the outcome of these conclusions can be found in the standalone document Tranche 1-5 BAT Analysis. AWS can currently comply with the majority of the conclusions assessed, with the exception of parts of BAT 7, BAT 8, BAT 14 and BAT19. Further modelling and assessments are being undertaken and will continue to be to provide compliant solutions and these will be discussed with the Environment Agency prior to implementation. It is therefore, considered that these will be added as Improvement Conditions to the permit.

Secondary Containment (BAT 19)

The following information demonstrates our current position with the design and implementation plan for our secondary containment at Pyewipe STC, it also shows that we at AWS are still committed to full compliance with BAT. To date an initial full spill modelling and analysis of secondary containment has been carried out for Pyewipe STC. A copy of the assessment report has been provided as a stand alone document (Containment Assessment for Basildon Sludge Treatment Centre_Rev01). In September 2023 AWS approved a £2M parcel of works for our @one alliance to undertake optioneering and secondary containment detailed design for nine of our STC sites, including Pyewipe STC. The design process for all nine sites will run concurrently.

The finalised design(s) and specifications shall be produced by the appropriate competent individuals (qualified civil or structural engineer), in accordance with the methodology detailed within CIRIA C736 (2014) guidance.

Initial site visits have been completed, detailed surveys have been initiated and the design team are in contact with equipment suppliers. The formal optioneering phase commenced on the 5th of December 2023, this is due to conclude in March 2024 with detail design following by July 2024. The above timescales are dependent on timely responses from other stakeholders.

The site was designed and constructed in accordance with the latest version of CESWI at the time of the build (Civil Engineering Specification for the Water Industry) and WIMES (Water Industry Mechanical & Electrical Specifications). However, AWS has undergone a thorough risk assessment of the site which includes scenarios such as a 'Catastrophic failure of Bio-gas distribution system and/or process tanks'; this can be found in the Process Safety Risk Assessment document in the application folder.

Operational teams check and monitor physical condition of assets on the site as part of the day to day operations. Issues and defects are recorded and raised, this is either as a maintenance job on SAP or where capital investment is required this is raised via a RIF (Risk Information Form). RIFs are assessed and prioritised

for investment based on the risk score, assessment is done with a 'peer group' made up of operations, maintenance and engineering experts together with budget holders. Prioritised investments are promoted for approval through the Water Recycling Sub Stream Investment Group and Water Recycling Totex Investment Group. The RIF form and SAP maintenance jobs record information on the issue/risk, this would include photographs and technical reports as appropriate. AWS acknowledge there is opportunity to improve further on this by including additional fields in the sludge technicians' STC Mate App to prompt and formalise more regular visual inspections. Any remedial work required on the site would be completed in accordance with the water industry specifications and standards as described above.

Regarding preventative maintenance and inspection regimes for site infrastructure, this will be evidenced through AWS formalising the inspection regime for the site operations via the STC Mate App. This will cover the regular visual inspection of above ground assets and tanks. For below ground tanks and assets, this will be formulised after further risk assessments and modelling to better understand the requirements on CIRIA. This will enable AWS to set an appropriate frequency of inspections for the site.

In addition there will be a maintenance standard for tanks and bunds at STC sites (1 yearly, 5 yearly and 20 year inspections) which will provide the details of the inspection regime of our tanks and will include:

- 1 yearly Ops inspection inspections will be conducted
- 5 yearly "competent persons" inspection (civil/structural engineer)
- 20 year internal inspection inline with MAS or unless recommended on previous inspections

For high risk assets, such as pressure vessels (steam boilers), these are already covered by a formal inspection regime under the Pressure Regulations. This work includes an annual inspection and working test (as witness and signed off by Lloyds Register), and a 5-year thorough exam that includes non-destructive testing of the pressure vessels.

Further details on AWS's asset inspections and leak detection & repair (LDAR) at Basildon STC is available in the LDAR plan provided in the application Folder (Basildon LDAR)..

Uncovered post digestion tank and Stable Digestion Process (BAT 14 & BAT 38)

AWS have as a start to understanding the stability of the digestion process commissioned residual biogas potential tests to inform an assessment as to whether any uncovered post digestion tanks need to be covered and connected to the gas system or if just covering having considered the guidance Biological waste treatment: appropriate measures for permitted facilities. The aim of the assessments would be to produce a report to submit to the Environment Agency . The report would include the final designs and an implementation schedule for the installation of enclosures/covers (and where deemed necessary associated waste gas abatement systems) for waste water/stable digestate storage tanks. Again this demonstrates AWS's commitment to utilise our best endeavours to meet the relevant BAT conclusions.

An inventory of PRV assets are detailed in the figure below:

Figure 2: Inventory of Pressure Relief Values

Site Name	FunctLocation	FunctLocDescrip	Description	Equipmt	Manufacturer	ManufPartNo	ManufSerialNo
BASILDON STW	BASIST-2G-DIG-TS01-PRM001	Safety Pressure Valve 1 - Digester 1	Pressure Relief Valve	2178466	Motherwell Control Systems Ltd	CNC 381	17364
BASILDON STW	BASIST-2G-DIG-TS01-PRM002	Safety Pressure Valve 2 - Digester 1	Pressure Relief Valve	2178467	Motherwell Control Systems Ltd	CNC 382	17375
BASILDON STW	BASIST-2G-DIG-TS01-PRM003	Safety Pressure Valve 3 - Digester 1	Pressure Relief Valve	2178468	Motherwell Control Systems Ltd	CNC 381	17363
BASILDON STW	BASIST-2G-DIG-TS01-PRM004	Safety Pressure Valve 4 - Digester 1	Pressure Relief Valve	2178469	Motherwell Control Systems Ltd	CNC 382	17376
BASILDON STW	BASIST-2G-DIG-TS02-PRM001	Safety Pressure Valve 1 - Digester 2	Pressure Relief Valve	2178470	Motherwell Control Systems Ltd	CNC 381	17365
BASILDON STW	BASIST-2G-DIG-TS02-PRM002	Safety Pressure Valve 2 - Digester 2	Pressure Relief Valve	2178471	Motherwell Control Systems Ltd	CNC 382	17377
BASILDON STW	BASIST-2G-DIG-TS02-PRM003	Safety Pressure Valve 3 - Digester 2	Pressure Relief Valve	2178472	Motherwell Control Systems Ltd	CNC 381	17366
BASILDON STW	BASIST-2G-DIG-TS02-PRM004	Safety Pressure Valve 4 - Digester 2	Pressure Relief Valve	2178473	Motherwell Control Systems Ltd	CNC 382	17378
BASILDON STW	BASIST-2G-PSR-TS04-PRK001	Safety Pressure Valve 1 HPH Heating Tank	Pressure Relief Valve	2178474	Motherwell Control Systems Ltd	CNC 380	17379
BASILDON STW	BASIST-2G-PSR-TS04-PRK002	Safety Pressure Valve 2 HPH Heating Tank	Pressure Relief Valve	2178475	Motherwell Control Systems Ltd	CNC 380	17380
BASILDON STW	BASIST-2G-PSR-TS05-PRK001	Safety Pressure Valve 1 HPH Pasteurisation Tank 1	Pressure Relief Valve	2178476	Motherwell Control Systems Ltd	CNC 380	17381
BASILDON STW	BASIST-2G-PSR-TS05-PRK002	Safety Pressure Valve 2 HPH Pasteurisation Tank 1	Pressure Relief Valve	2178477	Motherwell Control Systems Ltd	CNC 380	17382
BASILDON STW	BASIST-2G-PSR-TS06-PRK001	Safety Pressure Valve 1 HPH Pasteurisation Tank 2	Pressure Relief Valve	2178478	Motherwell Control Systems Ltd	CNC 380	17383
BASILDON STW	BASIST-2G-PSR-TS06-PRK002	Safety Pressure Valve 2 HPH Pasteurisation Tank 2	Pressure Relief Valve	2178479	Motherwell Control Systems Ltd	CNC 380	17384
BASILDON STW	BASIST-2G-THH-TS01-PRK001	Safety Pressure Valve 1 HPH Hydrolysis Tank	Pressure Relief Valve	2178480	Motherwell Control Systems Ltd	CNC 380	17385
BASILDON STW	BASIST-2G-THH-TS01-PRK002	Safety Pressure Valve 2 HPH Hydrolysis Tank	Pressure Relief Valve	2178481	Motherwell Control Systems Ltd	CNC 380	17386
BASILDON STW	BASIST-2G-DIG-PV03-PRM001	Safety Pressure Valve - Gas Holder Gycoll Mix	Pressure Relief Valve	2210837	Kirk Environmental Ltd	SV350/30	K-010710-300-20-33
BASILDON STW	BASIST-2G-DIG-BB06-FLA001	Flarestack - Waste Gas Burner	Flare Stack	2163596	Uniflare Ltd	Enclosed Ground Flare	UF10-814 No1157

6.6 Question 3b: General requirements

6.6.1 Overview

This section provides an overview of the measures in place at the site for controlling fugitive emissions, namely noise and odour. An Environmental Risk Assessment has been completed, in accordance with the H1 ERA Guidance and is provided with the application. The response to this question relates to Table 4 in the Part C3 form.

Due to the non-flammable nature of wastes handled at the installation, the site falls outside the requirement to prepare and operate a fire prevention plan (FPP).

6.6.2 Control of fugitive emissions to air

There should be no significant fugitive emissions to air of gases, vapours, or particulates as part of normal site operation.

Details of the procedures AWS follow with regards to the control of mud and debris and potentially polluting leaks and spillages are addressed in the EMP.

As combustion activities are not being changed on site as a result of the proposal, it is not anticipated that Air Quality Dispersion Modelling is required to address the emissions of the CHP units. This is because the units do not yet need permitting under the Medium Combustion Plant Directive since they are existing MCPs. The existing CHPs on site are tested annually to assess the emissions as required by the current CHP permit.

The results of the air quality desktop study indicate compliance with all relevant air quality standards for both the protection of human health and designated sites. This desk study looked at compliance to the current CHP permit emission limits. Overall impacts of all air pollutants are considered to be low from the routine activities undertaken on the site. The existing approaches and relevant procedures presented in the EMP, OMP, and operational procedures are considered to adequately address the emissions that may present a risk.

6.6.3 Odour

The site is situated relatively close to residential houses, with the closest property approximately 250 metres to the west of the cake pad, and there is an industrial area to the north and south of the site. To the east,

approximately 650m away from the cake pad, there is another industrial building across from an open grassy area. To the north west there is a retail park which borders the A127 dual carriageway and a large industrial park. In the last two years, there have been no odour complaints. Currently there is no on-site work to be undertaken in respect of odour as a part of this permit application (i.e. building additional assets), therefore, the activities on-site are not anticipated to increase the off-site impact or result in adverse impact on nearby sensitive receptors or the amenity of the area surrounding the site.

The OMP contains guidance of good practices for carrying out operational and maintenance activities, identifies specific measures for odour control and sets out procedures to monitor and respond to odour complaints. The OMP was written in accordance with the Environment Agency's H4 Odour Management guidance (2011).

Leak detection (methane gas analyser) is also installed on biogas holder to ensure any leaks from the inner bag are detected. Any leaks detected on the biogas system would always be fixed immediately by AWS due to the process safety risk of posed by biogas.

Basildon STC also has a Leak Detection and Repair (LDAR) plan which describes the methods applied to locating, identifying and mitigating against fugitive emissions to air as part of the Environmental Permitting Regulations requirements. It details the maintenance requirements to identify fugitive biogas emissions from seals, flanges, valves, pumps, pipework and tanks. The LDAR plan includes an asset list which are scheduled for routine proactive inspection by thermal imaging camera on a 6-month basis. This asset list is based on the potential for biogas leakage at each specific location.

Management of the odour risks at the site is also addressed in the Odour Management Plan. Odour modelling has been carried out as part of this permit application. The risk assessment provides mitigation measures to be followed by all staff to ensure normal operation minimises in odours leaving the STC boundary:

- Scrape clean and remove cake on left on the ground surface
- Clear and report all spillages to site office
- Ensure washdown of vehicles is carried out before leaving site

Since the level of odour risk from the site is considered to be low, as shown in ERA, and the existing Odour Management Plan provides sufficient mitigation, a new plan is not considered to be required but has been reviewed as part of this application.

Refer to the stand-alone Odour Modelling Report (Basildon Odour Modelling Report) which provides more information about the current odour condition, and possible mitigation to be reviewed as part of a stepped improvement plan.

6.6.4 Noise

Initial screening has been carried out for the site; the site has not received any noise complaints and since the site is not undergoing changes to equipment and vehicle movements prior to application submission, a Noise Impact Assessment (NIA) is not considered to be required and has been screened out. Appropriate mitigation for noise and vibration impacts are provided in the ERA. Site staff are able to report any noise/amenity issues as part of their routine site rounds.

A Noise Management Plan would be required where the NIA concludes that noise and vibration requires management, and such as monitoring and maintaining abatement measures. Since noise and vibration impacts

are considered to be appropriately mitigated in the ERA, a Noise Management Plan is also not considered to be required.

6.6.5 Dust and particulates

There are not considered to be any significant dust or particulate sources from the site as identified in the Environmental Risk Assessment. Dust is actively managed by a 3rd party contractor road sweeper which is on site once per week.

The site has no historic records of dust complaints which indicates that the existing dust prevention measures are adequately mitigating the risk. At this time there is no need to use water sprays to control the dust on site.

6.6.6 Bio-aerosols

A bio-aerosols risk assessment (Basildon Bioaerosol Risk Assessment) has been undertaken for the site as the site sits within 250m of sensitive receptors (workplaces and houses). Pitsea Marsh is the closest SSSI to the south of the site, but is over 3km away from the site at the closest point. The closest industrial type building is approximately 170m north of the cake storage area.

See Appendix F for a map of the site in relation to the sensitive receptors. Refer to the stand-alone bio-aerosol risk assessment for further information.

6.6.7 Control of fugitive emissions to surface water, sewer and groundwater

There are not considered to be any fugitive emissions to surface water, sewers or groundwater. There is appropriate containment for the control of liquid wastes put in place to minimise any potential releases, as identified in the EMS.

6.6.8 Control of fugitive emissions to land

Waste generated on the site includes the following:

Table 5: Waste recovery of different waste streams

Activity	Waste stream	Waste recovery/disposal
Sludge thickening and sludge dewatering	Centrate	Returned to the WRC for treatment
Treatment of high strength liquor from digested sludge dewatering	Effluent from post digestion liquor treatment plant	A maximum of 985 m^3 per day is returned to the WRC for treatment.
Anaerobic digestion	Biogas	Transferred to CHP unit for electricity and heat production
CHPs	Waste oil	Recycled at waste oil recycling facilities
	Carbon from siloxane filter	Disposed of appropriately with 3rd party
	Concentrate from RO plant	Disposed to hot well in boiler house
	RO plant filters	Disposed of appropriately with 3rd party
	CHP disposables e.g. oil filters	Disposed of appropriately with 3rd party as detailed in EMS
Waste generated from other site activities (i.e. offices)	General waste	Recycled where possible at a materials recycling site. Non-recyclable waste is disposed of to a designated landfill site.
	Scrap metal	Recycled at scrap metal recycling facilities
	WEEE	Recycled at WEEE recycling facilities

Refer to POSWASTE for more information

To reduce volumes of waste:

- All materials and consumables delivered to site are inspected to ensure that they are fit-for-purpose. Damaged items are refused and returned to the supplier.
- Sewage sludge is de-watered from the works to be treated at the site. Treated cake is then recycled to agricultural land as a soil fertiliser. The treated cake meets the Biosolids Assurance Scheme Quality Standards. The volume of cake recycled to agricultural land is monitored by the WROL / CE teams.
- The biogas from the AD process is burned in a CHP engine and is used to provide power for the site processes.
- Polymer intermediate bulk containers (IBCs) are sent back to the supplier for re-use.
- WEEE, batteries, waste oils and oil contaminated items such as oily rags are treated as hazardous waste in accordance with legislation, these are removed from site by an approved supplier, using approved waste carriers.
- Gas Cylinders are collected by 3rd party as they deliver a batch of new cylinders.

Basildon WRC has a several waste management areas on site, detailed in the Environmental Management Plan, although there are in the area of NGR TQ 73835 90699. All skips and containers are located on a hardstanding to prevent leaching into the ground. Skips and containers are clearly labelled. All waste from the site is sorted into this waste area at the main site other than the gas cylinders (these are exchanged directly and removed from site).

If a complaint is made with respect to litter the complaints procedure will be followed. The Treatment Manager will arrange for litter pickers to clear up as appropriate and will assess whether further control measures will be required to ensure that the risk of recurrence is minimised. The details of the complaint and actions taken to resolve the issue will be recorded in the Site Diary and the complaints register.

6.6.9 Site security

Activities are managed and operated in accordance with the management system. Access to site and waste is restricted by a 2.5m high chain link and steel security fence. A steel, electronic barrier secures the main access and is controlled by a timer and keypad. The site is manned 6am-6pm, 7 days a week. For visitors and unauthorised personnel, contacts to ring are in the main office. The site also benefits from a CCTV system, consisting of 7 cameras on the STC and 4 in the office. Regular inspections of the boundary fencing and buildings are undertaken to ensure that these have not been compromised and continue to prevent easy access to site.

Other risks relating to human health and the environment is presented in Environmental Risk Assessment.

6.6.10 Complaints procedure

All complaints received relating to any aspect of the site and its activities will be recorded and acted upon. Complaints, and actions taken, will be either recorded in the Site Diary or on a complaint record form. If a site receives a complaint, this form should be completed and shown to the Environment Agency when they next inspect the site. The forms will be used as evidence that any complaints received have been taken seriously and that actions have been taken to rectify any problems identified.

Complaints will be investigated promptly, and any appropriate remedial action taken. The complainant and anyone else likely to have been affected, should be informed about what has been found and actions taken in a timely manner. The details of the complaint and the actions taken will be recorded in the Site Diary or log.

The aim will be to undertake measures to prevent complaints from being raised. However, where this is not possible, proactive measures will be taken to prevent further complaints from being made. For example, if a complaint is made with respect to dust, the Treatment Manager will arrange for dust suppression equipment to be used. The Treatment Manager will assess whether further control measures will be required to ensure that the risk of recurrence is minimised. The details of the complaint will be recorded in the Site Diary and the complaints register. If a complaint is received AWS will be informed as soon as is practicable and the complaints procedure will be followed. Confirmation will be recorded in the Site Diary or inspection log. The Treatment Manager will inform the Environment Agency of the complaint, if appropriate.

Any drivers who regularly cause a dust or mud and debris nuisance as a result of mismanagement of their vehicles will be discussed and advice sought if relevant.

If a complaint is made with respect to insects the Treatment Manager will investigate whether any of the activities at the site could be the source of the nuisance.

If a complaint is made with respect to litter the Treatment Manager will arrange for litter pickers to clear up as appropriate and will assess whether further control measures will be required to ensure that the risk of recurrence is minimised. The details of the complaint will be recorded in the Site Diary.

Any complaints relating to fugitive emissions and the actions taken will also be recorded in the Site Diary and copies of the incident reports (including those provided to the Environment Agency) retained on-site.

If a complaint is made with respect to vermin or an infestation is suspected, where normal treatment activities appear to be unsuccessful, the Treatment Manager will discuss and agree any further measures required with the pest control firm. The complaint reporting procedure will be followed as described below.

If a complaint is made with respect to noise or vibration the Treatment Manager will assess the cause of the complaint and will report the findings. If the noise or vibration leading to the complaint has been caused by a continuing operation, additional noise or vibration surveys may be required to confirm the degree of impact upon the receptor. The Treatment Manager will make any recommendations for further noise or vibration control to the Management Team and shall inform the Environment Agency of the complaint as soon as it is practicable to do so.

In the unlikely event that a complaint is made with respect to odour the Treatment Manager will investigate the source of the odour and take steps to reduce its impact. If the source appears to come from the site then appropriate actions to reduce the odour will be taken.

Complaints investigation procedure

In the event of any complaint, this section deals with the complaint assessment procedures. The primary role of this assessment will be to ascertain whether the complaint is associated with any site operations and what action should be taken to prevent or minimise the probability of a recurrence.

It is important that any person acting on behalf of AWS is appropriately trained and that all steps and decisions are documented.

Step 1 – Complaint received

The site operator or Environment Agency receives a complaint regarding the STC. Details logged within the complaints register.

Step 2 – How to respond

Complainant is contacted to inform them the complaint has been received and request further information, where required.

The primary reasons for investigation of complaints are to identify the likely cause and source for the complaint and it is important to gather as much information about the complaint as possible. At the outset of any investigation, the Treatment Manager is to determine the priority for responding to the complaint.

If possible, someone from the Environment Agency will attend after a complaint has been made so that they can carry out an effective and subjective appraisal of the complaints and note any results into the complaints register.

Step 3 – Determine what to record and how

The complaint details and the investigation outcomes and actions taken are to be recorded in the CSMS. This information must be filled in on site at the time of notification of the complaint.

Step 4 – Follow-up investigation

In order to resolve any problems successfully, it is essential to understand fully the source, reason and the operational conditions that led to the complaint. The first step in the investigation will be to select the most appropriate methodology for assessment. All the information collected should be filled in on the internal complaints form and a note made referencing this in the complaints register.

Step 5 – Communication with the complainant

The Treatment Manager or contractor tasked with addressing the complaint is responsible for collecting all the information and providing feedback to the complainant, or the Customer Contact Centre will contact the complainant. Wherever possible an explanation of the actions taken and the reasons for the decision should be made to the complainant.

If it is decided that there was no ground for the complaint this should be clearly explained to the complainant, along with information about what they should do, if they are unhappy with the response.

Step 6 – Monthly complaints records

AWS will be developing a system to log and track complaints so they are more easily accessible for site teams. Currently all complaints AWS receives are stored on a computerised system (SAP).

6.7 Question 3c: Types and amounts of raw materials

The list of types and amounts of raw materials for the site is presented in Table 6.

Table 6: Types and amounts of raw materials used on site

Name of the installation		Basildon STC		
Capacity [1]		35 tonnes		
Schedule 1 activity	**Description of raw material and composition**	**Maximum amount [2]**	**Annual throughput**	**Description of the use of the raw material including any main hazards**
5.4, Part A (1), (b) and (i)	Natural Gas / Biogas (~63% Methane, 35% Carbon Dioxide, 2% Oxygen/ Nitrogen)	Direct feed	NA	Flammable if heated Vapour mists or fumes may cause irritation to eyes and respiratory tract Harmful if swallowed Prolonged contact may cause dermatitis or other skin disorders
	Polymer (liquid)	15 tonne bulk storage	105,200 tonnes	Mild skin and eye irritation May cause irritation of mucous membranes slippery underfoot when spilt Used as coagulant for thickening sludge to remove water.
	Polymer (powder)	25 tonne silo	39,200 tonnes	
	Potable water	Direct feed	45000 litres	No risk Used in RO plant and boilers
	Anti Foam	Maff 900	50,000 tonnes	No risk Polymer make up and on site stand pipes
	Siloxane Filters	1 fixed on site	Re-generated annually	Gas filtration for CHPs
	Oil Filters	18 spares	CHP1- 24 CHP2- 24	Used in CHPs.
	Air filters	2 spares	CHP1- 3 CHP2- 3	Used in CHPs.

[1] This is the approximate total storage capacity (m^3 is deemed equal to litres) – see Basildon Storage Capacity and Assets Standalone document for more information.

[2] the maximum amount of raw materials on the site at any one time.

See the Process Safety Risk Assessment for more information regarding safety measure

6.7.1 Question 4: Monitoring

This section provides a summary of the proposed monitoring at the site.

Stack emissions monitoring will be undertaken for each stack in accordance with M5 monitoring guidance, MCERTS BS EN 14792 and the requirements of the environmental permit issued for the site.

Periodic monitoring will be undertaken on an annual basis as part of the routine maintenance programme. No abatement technology is required, and continuous monitoring is not considered necessary. Sample monitoring will be carried out after each maintenance period on the CHPs and boilers, in order to ensure compliance with ELVs as required in the Environmental Permit.

The last periodic monitoring report undertaken for Basildon's CHPs was May 2023 which was done by an MCERTS accredited contractor.

Once permitted monitoring will be undertaken in accordance with the relevant standards. It is anticipated the monitoring standards required are as in Table 7.

Table 7: Monitoring of air emissions

Emission point type	Parameter	Reference period	Monitoring frequency	Monitoring standard or method
Stacks on engines Burning biogas	Oxides of Nitrogen (NO and NO2 expressed as NO2)	Periodic over minimum 1-hour period	Annual	In accordance with TGN M5 – Monitoring of stack emissions to air
	Carbon monoxide			
	Sulphur dioxide			
	Total volatile organic compounds including methane			
Boilers (Natural gas or biogas)	Oxides of Nitrogen (NO and NO2 expressed as NO2)	Periodic over minimum 1-hour period	Annual	In accordance with TGN M5 – Monitoring of stack emissions to air
Channelled emissions to air (biofilter water scrubber with carbon polish media system)	Ammonia	Periodic over minimum 1-hour period	-	Emissions of pollutants into the environment through any kind of duct, pipe, stack, etc
	H2S		As per OMP	
	Odour concentration		As per OMP	BS EN 13725
Auxiliary flare	Operational hours	Recorded duration and frequency.	Continuously monitoring hours run and flow	Operational record including date, time and duration of use shall be recorded

Emission point type	Parameter	Reference period	Monitoring frequency	Monitoring standard or method
Pressure relief valves	Biogas release and operational events	Recorded duration and frequency.	Daily inspection and on 6 monthly inspections and maintenance regime	Operational record including date, time duration of pressure relief events and calculated annual mass release

AWS acknowledge that the auxiliary flare is appropriate for emergency use (up to 10% of the operational hours), records from monitoring will be reviewed regularly to reduce the use of the flare.

The daily site walk around does includes monitoring of the digester and CHP performance. This would highlight any significant passing of gas through the relief values as a drop in measured performance would be observed.

The uncertainties regarding monitoring of the CHPs stated in the existing permit should be kept in this permit variation until such time that the site falls under MCPD in 2030.

The EA's IED application guidance for variation applications states the operator is only required to submit an air emission risk assessment or any associated modelling if the Agency have not previously assessed the impacts as part of a permit determination. There have been no changes to how the combustion plant operates therefore no air emission risk assessment or any associated modelling has been prepared as part of this permit application. The most recent test of the CHP emissions was done on May 2023, and this has already been shared with the Environment Agency.

The below table shows the monitoring parameters maintenance activities along with the frequencies for the different type of OCU units on AWS STC sites.

Type of unit	Locations, Parameters and Units		Weekly	6 Monthly
OCU Biofilter	OCU Biofilter media moisture	Moisture content	x	
	Gas temperature inlet	Temperature	x	
	Gas temperature outlet	Temperature	x	
	Biofilter drainage effluent	pH	x	
	Biofilter Thatching compaction	Back pressure	x	
	Inlet gas stream	Hydrogen Sulphide		x
		Ammonia		x
		Odour Concentration		x
	Outlet gas stream	Hydrogen Sulphide		x
		Odour Concentration		x

	Efficiency Assessment	Media health, airflow distribution and emission removal efficiency		x
Dry chemical scrubber	Gas inlet	Moisture content	x	
	Gas outlet	Moisture content	x	
	Back pressure	Pressure differential using sensors	x	
	Inlet gas stream	Hydrogen Sulphide		x
	Outlet gas stream	Hydrogen Sulphide		x
	Inlet gas stream	Ammonia		x
	Efficiency Assessment	Emission removal efficiency		x
Carbon filter	Moisture content	Moisture content	x	
	Back pressure	Back pressure	x	
	Inlet gas stream	Hydrogen Sulphide		x
		Ammonia		x
		Odour Concentration		x
	Outlet gas stream	Hydrogen Sulphide		x
		Odour Concentration		x
	Efficiency Assessment	Emission removal efficiency		x

6.7.2 Assessment of the sampling locations

AWS will work with sub-contractors accredited to MCERTS to monitor the emissions points in accordance with the permit requirements. An assessment of sampling locations is therefore not appropriate as this will be the responsibility of the sub-contractors.

The sub contractor has provided the following information obtained from the Environment Agency on the monitoing and sampling locations in respect of emissions from engines and boilers on AWS sites, a copy of the email is included as a standalone document (Testing from engines).

We state the following in Monitoring stack emissions: low risk MCPs and specified generators - GOV.UK (www.gov.uk)

If you only need to sample gas concentrations, you can sample at a single point and from a location close to the MCP or SG where the gases are well mixed. For example, you can assume a downstream location that is close to the combustion zone is well mixed.

This is for low-risk plants, so is not directly applicable to MCERTS monitoring but the same principle applies.

The measurement locations document (M1) states that sampling arrangements for gas concentrations is more straightforward than other sampling but does not specify where the sampling can be done.

6.7.3 Emissions to water (other than sewers)

There are no direct releases to controlled waters of emissions arising from the STC. As such, no monitoring or reporting is required.

6.7.4 Emissions to sewers, effluent treatment plants or other transfers off Site

All condensate pots discharge directly to soakaways which diverts water to the head of the works of the adjacent Basildon WRC. This condensate is clean, uncontaminated water and occurs in small volumes. As such, no monitoring or reporting is required. There are no direct releases to public sewer or other transfers off site of emissions arising from the STC.

6.7.5 Emissions to land

There are no direct releases to land of emissions arising from the STC. As required by the EMP various housekeeping and waste management practices are in place to monitor waste emissions. These include segregation of wastes according to their classification and nature, labelling waste and using designated storage containers.

In accordance with the EMP solid waste is disposed of in accordance with 'Duty of Care' Regulations. The composition of the waste, its hazard characteristics and any relevant precautions are clearly stated on the transfer notes provided to licensed waste contractors removing waste from site for recycling and/or disposal. Records are maintained on site and will be reported to the regulator as required by the EPR permit.

6.8 Question 5: Environmental impact assessment

The proposal is not subject to an environmental impact assessment under Council Directive 85/337/EEC of 27 June 1985 [Environmental Impact Assessment] (EIA).

6.9 Question 6: Resource efficiency and climate change

6.9.1 Basic energy requirements

AWS aims to maximise the efficiency of the energy flows from its processes ensuring that, where possible, heat is recovered, and energy is not wasted.

There are several pieces of infrastructure and equipment that use electrical energy supply including:

- Fans, coolers and heating
- Motors and motor drivers and drive systems
- Aeration
- Pumps / boosters/conveyors
- Facilities – heating and lighting
- Sludge handling and management e.g. AD, dewatering and polymer dosing equipment
- Ventilation and odour control/abatement systems

Biogas is used to provide energy, produced by burning in a CHP engine, for the site's processes. Surplus biogas can also be used to fuel the auxiliary steam boiler for top up heating as required, natural gas is also used on site to provide top up heating as required where there is insufficient heat for the process demand available from the CHP engines and where no biogas is available.

6.10 Question 6a: Basic measures for improving energy efficiency

Anglian Water has a company wide programme for reducing carbon emissions from the activities undertaken, since 2010 it has set ambitious carbon reduction targets and has recently played a leading role across the water sector in developing a WaterUk route map for net zero 2030. The recovery of energy and beneficial use through the generation of renewable energy from biogas has been and continues to be a corner stone of this strategy to meeting targets and to deliver on net zero goals by 2030.
AWS has recently published a 'Routemap to Net Zero Carbon' report which can be found on the website here and reaffirms AWS's commitment to energy efficiency and carbon neutrality.

AWS's goal is have the capacity to generate 44% of our energy demand from renewables by 2025. The CHP plants, like at Basildon, will play a big part in achieving this alongside wind and solar. Consumption of onsite renewables is a fundamental component in our ambition of being net zero by 2030. More company wide information regarding energy efficiency and AWS goals can be found in Appendix G.

AWS recognise that target setting for, and measurement of, energy and carbon reduction is pivotal to reducing energy use and carbon emissions in new and existing installations.

AWS is dealing with the measurement and reporting of operational carbon emissions in existing installations through:

- Monitoring of energy use from electricity meters
- Annual estimation and reporting of operational carbon emissions for regulatory reporting (Ofwat and CRC)
- Optimiser team will search for energy efficiency measures implemented at the site include. This includes (but not limited to) the following:
- The combustion temperature is maintained relatively constant for reduced Nox emissions and increased efficiency
- The engines are equipped with turbochargers, further increasing energy efficiency
- Ongoing monitoring of plant operating parameters is carried out to ensure process is operating optimally and to enable constant optimisation to increase the plant's efficiency
- Good housekeeping measures are employed, and regular preventative maintenance will ensure the operations, and therefore energy efficiency, is optimised
- Low cost measures in place to avoid inefficiencies of excessive heating or cooling, including insulation of main hot water pipes and insulation of heating equipment such as hot water heat exchanger, boiler feed water tank and boiler feed water pumps and pipework

  .

Utilising low energy equipment for lighting such as:

- High frequency fluorescent lighting, high pressure sodium or LED
- Allowing for local or modular switching, where appropriate
- Consideration of energy recovery and the deployment of renewable energy systems

The CHP area is not located in a building but housed in acoustic containers. There are limited opportunities for energy efficiency requirements as the buildings are not heated. Energy efficient lighting will be used throughout the building.

Heat generated from the CHP is used in the AD process. The energy created by burning of biogas in the CHP engine is used to supply the site to reduce the need to import electricity from the grid.

In addition, AWS implements optimisation measures across all its sites in a proactive approach to ensuring efficiency measures across all its site operations meets optimal and efficient operating requirements.

6.11 Question 6b: Changes to the energy the permitted activities use up and create

There will not be any changes to the energy that the permitted activities use or create.

6.12 Question 6c: Climate change levy agreement

AWS is not a participant to the Climate Change Levy (CCL) agreement. Power generated and used on site is exempt from this agreement as CHP generated power is not subject to CCL. A substantial amount of power is exported to the grid, and the power is purchased and supplied onto the electricity company's customers.

6.13 Specific measures for improving energy efficiency (Question 6c)

The treatment process is closely monitored in terms of energy used and energy generated. For energy generation a conversion rate measure is used (MWh/TDS) and tracked on a rolling daily basis against targets. A reduction in conversion rate prompts an improvement planning process, this to identify and address root cause of the performance change and to put in place appropriate timely actions to rectify.

The site also has detailed operating cost models linked to throughput, this allows teams to compare actual consumption and production versus forecasts. These models cover projected power generation, power consumed and fossil fuel input per tds (tonne dry solids) of sludge processed.

Power generation is directly related to the biological performance of the HpH and digestion plant. Daily sampling to key process parameters such as pH, VFA, alkalinity, dry solids, and ammonia are undertaken. This data is captured and shared though a digital app giving the ability to share across sites and with biosolids experts, the app can also flag to operators where data is trending out of range and hitting action limits. This gives greater focus on asset and process health and is aimed at optimising the energy recovered from the sludge treated.

6.14 Question 6d: Raw and other materials, other substances and water use

The raw materials required to operate the installation are identified in Table 6 above.

Raw materials are optimised for efficiency by the Treatment Manager and CHP team. This is reviewed against the previous year's annual throughput and budgetary constraints.

All materials will be handled and stored in such a way are to ensure containment. Fugitive emissions to the environment are therefore negligible.

Biogas is the primary raw material. Its consumption will be monitored. The use of biogas as the fuel source offers the best environmental option and there is therefore no environmental incentive to reduce biogas consumption and consider an alternative source of fuel. Biogas is stored within 1 No. double membrane inflatable bag type holders, constructed of PVC coated polyester fabric, which is resistant to UV and microbial degradation. The base of the holders are constructed from reinforced concrete treated

to withstand the potentially acidic conditions within the holder. The gas bag is completely enclosed so the gas is not in contact with the concrete.

Secondary raw materials include chemicals used in processes such as water treatment, polymer and natural gas for the boilers. Their consumption will be monitored, based on purchase records.

Water treatment chemicals are stored within on impermeable surfaces in a contained area. Polymer is stored in sealed IBC/bags located on bunded areas.

The AWS purchasing procedures are included in EMS. The procedures ensure purchased items conform to specified requirements, including quality parameters, and review suitability for use, including efficiency and minimisation of use of raw materials.

All substances are assessed for COSHH (Control of Substances Hazardous to Health) compliance, where relevant. Material safety data sheets for all materials used and kept on site will be maintained on the site.

All raw materials are handled and stored within the confines of the buildings on site, or in IBCs in bunded areas, with the exception of biogas which is contained within the gas handling system.

Releases of raw materials to land are considered to be negligible due to adequate containment of the materials within suitable storage vessels and presence of a contained drainage system.

Potable water usage on site include:

- Poly make up - uses potable water
- Boiler water feed system
- Eye baths and safety showers
- Limited wash-down points where it would be uneconomic to extend the final effluent wash-water system
- Office messing facilities

To ensure appropriate use of raw materials to prevent releases of substances to the environment and limit environmental impact AWS will follow quality assurance procedures for the purchasing of materials. The raw materials will be selected from specialist suppliers determined by their to pre-established material specifications; these are to include environmental considerations. Priority choice of purchased raw material will be given to those with the least environmentally harmful chemicals compared to their alternatives, wherever practicable.

Resource efficiency will be achieved through the minimum use of raw materials and water (where possible), and AWS will undertake the following:

- Maintain records of raw materials and water used
- Routine resource efficiency audits
- Review the feasibility of alternative materials that could reduce environmental impact or provide further opportunities to improve resources efficiency at least once every four years
- Implement further appropriate measures identified from a review.

6.15 Question 6e: Reducing production of waste

AWS manages its waste in accordance with the Council Directive 2008/98/EC on waste (the Waste Framework Directive), legal requirements and the EMP, by maximising materials re-use, prevent waste, minimise waste generation and maximise recycling and recovery of waste generated from the operation of the site. Only minimal volumes of waste shall be generated at the STC, with waste streams segregated and recovered for recycling where possible. All waste streams shall be managed in accordance with existing EMPs, with any final off-site disposal to be carried out by licensed waste contractors in accordance with Duty of Care requirements, and the application of the waste hierarchy is central to any decision-making process.

Implementation of EMP procedure ensures optimum disposal of the wastes produced. Submission of a detailed assessment is not considered necessary due to the minimal quantity of waste produced.

Further consultation with waste contractors will ensure that all waste streams have been considered. The sampling and characterisation of wastes will be covered under the requirements of Duty of Care. The wastes are handled to a minimum and are stored in suitably designed containers prior to being removed from site, to minimise releases of pollutants to the environment.

The main wastes produced by the installation are waste oils and filters associated with the operation and maintenance of the engines. Other wastes include from site office (paper, packaging etc), waste collected from general housekeeping across the site (debris, litter), scrap metals and waste electronic and electrical equipment (WEEE, such as computer equipment, printers etc).

Waste generation from the operation of the plant is minimal and limited only to essential maintenance fluids and materials. Waste streams are segregated and recovered for recycling where possible, as shown in Table 6 for different site activities. General waste is sent for recycling, where possible, scrap metal is sent to metal merchants for recycling and WEEE sent to specialist WEEE recycling facilities. AWS apply Duty of Care by ensuring waste is removed by a suitable licenced waster carrier.

6.16 Question 7 and Appendix 1 Question 13: Combustion plant

Table 8: Combustion plant details

	Install date	MWth input	Annual Operational hours (90% of year)	Fuel	Manufacturer
CHP1	2010	0.6	8,147	Biogas	MWM
CHP2	2010	0.6	8,147	Biogas	MWM
		MW Heat input	Max output		
Boiler	2012	1.455	2438 kg/hr	Natural gas / biogas	ICI CALDAIE
Boiler	2012	1.455	2438 kg/hr	Natural gas / biogas	ICI CALDAIE

Basildon's CHPs are all existing engines installed before December 2018.

Basildon's CHPs do not currently fall within the scope of the Medium Combustion Plant Directive (MCPD) at the time of the application, and the details listed under Annex I of the MCPD are not relevant at the time of this application. The two boilers are classed as MCPs whereas the 2 CHPs are classed as both Tranche A MCPs and specified generators, therefore their compliance date under MCPD is 01/01/2030.

As such a response to Appendix 1 Question 13 in the C3 form is not necessary at this time.

7 Part C6: Point source emission to water from an installation

7.1 Question 1: Description of effluent

7.1 Question 1a

Basildon STC is a sludge treatment centre comprising anaerobic digestion dewatering of imported and indigenous sludge. The liquors arise from the treatment process, and are discharged into the head of works for full treatment through the water recycling centre. There is a description of the changes proposed in the non technical sumamry at section 1 above.

7.2 Question 3b, 3c, 3d, and 3f

The maximum volume of effluent to be discharged in a day is 985 m3

The maximum rate of discharge in litres per second will be 11.4 litres per second

The maximum volume of non rainfall dependent effluent to be discharged in a day will be 985 m3

For the calculation of the figure for the effluent to be discharged in a day in m3 please see the standalone spreadsheet “IED - STC Calculated Liquor Returns”.

The calculation of the litres per second is shown below:

(985m3) / 24 / 60 / 60 x 1000 = 11.4 litres per second.

7.3 Question 5a and 5b2

Not applicable – the installation is located within Basildon wastewater treatment works (WwTW) and the installation return liquor emission discharges into the works UWWT inlet via the site’s sealed drainage system.

7.4 Question 6a, 6b and 6c

Return Liquor generated by the STC process are not subject to pre-treatment at the STC. Return Liquor is discharged into the WRC and are treated through an activated sludge plant (conventional plug flow with air diffused aeration) comprising aeration tanks and final settlement tanks.

The return liquor point is at TQ 73677 90816

The discharge will take place all year, as it is part of an existing site operation.

7.5 Question 7e, 7f and 7g

Liquors have solely come from AWS operated processes on site, and do not leave the site for treatment. AW samples regularly to understand the constituents of the liquor returns, and to ensure the final FE discharge consent is not breached, and WRC health is not be adversely affected.

- The return liquor point is at TQ 73677 90816
- The discharge will take place all year, as it is part of an existing site operation.
- The liquor sampling is done once per month, the parameters are in Appendix H.
- There is an AMTREAT liquor treatment plant at Basildon STC

See section 6.3 above for more information regarding point sources to sewers.

The maximum temperature of the return liquor would be 35 degrees Celsius

The expected temperature change compared to the incoming indigenous effluent would be an increase of 25 degrees Celsius.

There would be no temperature decrease compared to the incoming indigenous effluent.

7.6 Question 8d, 8e and 8f

N/A There will be no discharges to groundwater also see section 6.3 above for more information regarding groundwater.

N/A The final effluent discharge from the WRC is to a tidal river.

N/A No environmental impact assessment has been undertaken as the proposal is not subject to one.

7.7 Questions 9a to 9i

The return liquor point where it leaves the installation to go to the WRC is TQ 73677 90816.

There are no direct emissions to water from the STC activities. The return liquor is returned to the head of the works of the WRC for treatment, before being discharged (indirectly) via the WRC final effluent discharge. The information included here therefore relates to the WRC Water Discharge Consent (B0890).

- UWWTR inlet sampling point: TQ 73674 90798
- FE sample point: TQ 73639 90607
- The Urban Waste Water Treatment Directive FE sampling point: TQ 73639 90607
- Flow monitoring point: TQ 7368 9080.
- The flow monitor has MCERTS certificate, SIRA ME 22 4107
- There is no UV disinfection efficacy monitoring point.
- The event duration monitoring point (EDM): TQ 7368 9062
- The above points are shown in plans at Appendix I.
- Yes effluent monitoring where possible will be done by AWS.

7.8 Question 10a, 10b and 10c

There are no direct emissions to water from the STC activities. The return liquor is returned to the head of the works for treatment, before being discharged (indirectly) via the WRC final effluent discharge. The information included here and in the relevant appendix therefore relates to the Water Discharge Consent (B0890) for the WRC.

The return liquor after treatment at the WRC will discharge into a tidal river, tidal stream, estuary or coastal water.

The discharge is from a single outlet.

7.9 Appendix 4 Questions 4.1 to 4.9

The following information relates to the FE discharges from Basildon WRC. These are already permitted under the separate EPR discharge permit (B0890):

- The discharge point is TQ 7370 8740
- The tidal river, tidal stream, estuary or area of coastal water is the Pitsea Creek
- The discharge is to a tidal river
- The discharge does not reach the watercourse by flowing through a surface water sewer.
- The discharge point is not above the mean low water spring tide mark.
- The discharge is made from an open pipe.
- The discharge is not made to a roadside drain or ditch

8 Part F1 – OPRA, charges and declarations

8.1 Question 1: Working out charges

8.2 Question 3: Payment

Payment will be by BACS payment.

Unique reference number for the application: PSCAPPANGLI001

Who is paying: Anglian Water Services Ltd

Fee paid: £18,648

Break down of fee: Anaerobic Digestion installation £13,984 + Habitats £779 + Odour Management Plan £1246 + Bioaerosol risk assessment £1241 + liquor treatment plant £1398

Date PO order sent: 22/12/2021

8.3 Question 5: Confidentiality and National Security

AWS do not wish to claim confidentiality with this application.

8.4 Question 6: Application Checklist

Refer to Form F1 for the completed table listing the stand-alone documents which support this permit application.

A full list of stand-alone documents which form part of the application can also be found in section 2.2 above. References to all other questions are referred to in the section title. Specific sections to the MSD are identified in the relevant forms.

A. Appendix A – Customer Complaints

In the last two years, Basildon STC has not received any complaints, therefore there is nothing to report.

B. Appendix B - European Waste Catalogue (EWC) Codes

Table 9 EWC codes for Basildon STC

The waste codes below are the only wastes to be imported into Basildon. The descriptions are taken from directly WM3. The main text in Section 6 above offers more clarification over specific wastes.

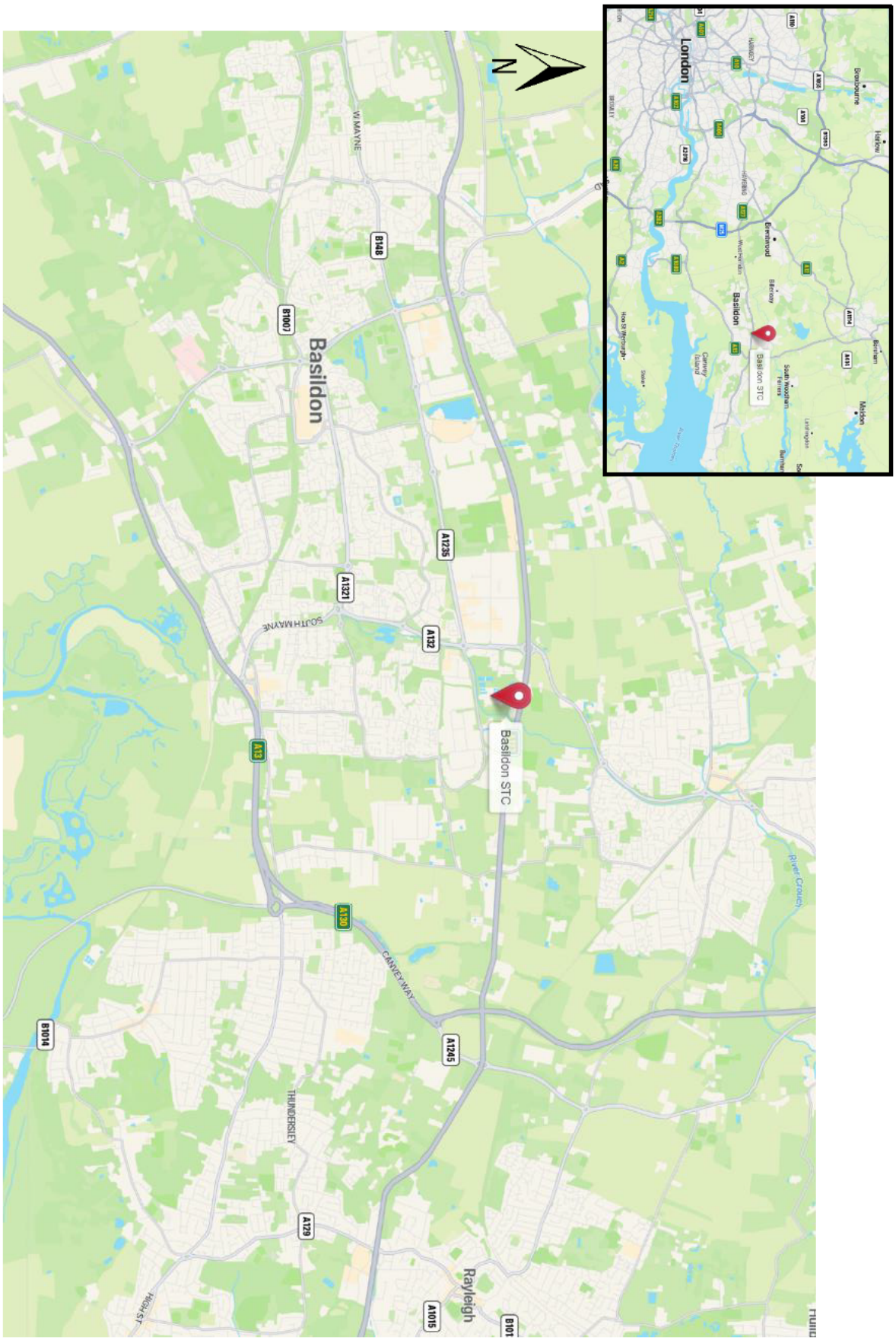
EWC	EWC Description	Where the waste streams enter the process
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE	
19 08	wastes from waste water treatment plants not otherwise specified	
19 08 05	sludges from treatment of urban waste water	Sludge Import Tank

Table 10 EWC codes for Basildon Head of Works

The waste codes below are the only wastes to be imported into Basildon. The descriptions are taken from directly WM3. The main text in Section 6 above offers more clarification over specific wastes.

EWC	EWC Description	Where the waste streams enter the process
16	WASTES NOT OTHERWISE SPECIFIED IN THE LIST	
16 10	aqueous liquid wastes destined for off-site treatment	
16 10 02	aqueous liquid wastes other than those mentioned in 16 10 01	Head of works
20	MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS	
20 03	other municipal wastes	
20 03 04	Septic tank sludge	Head of works

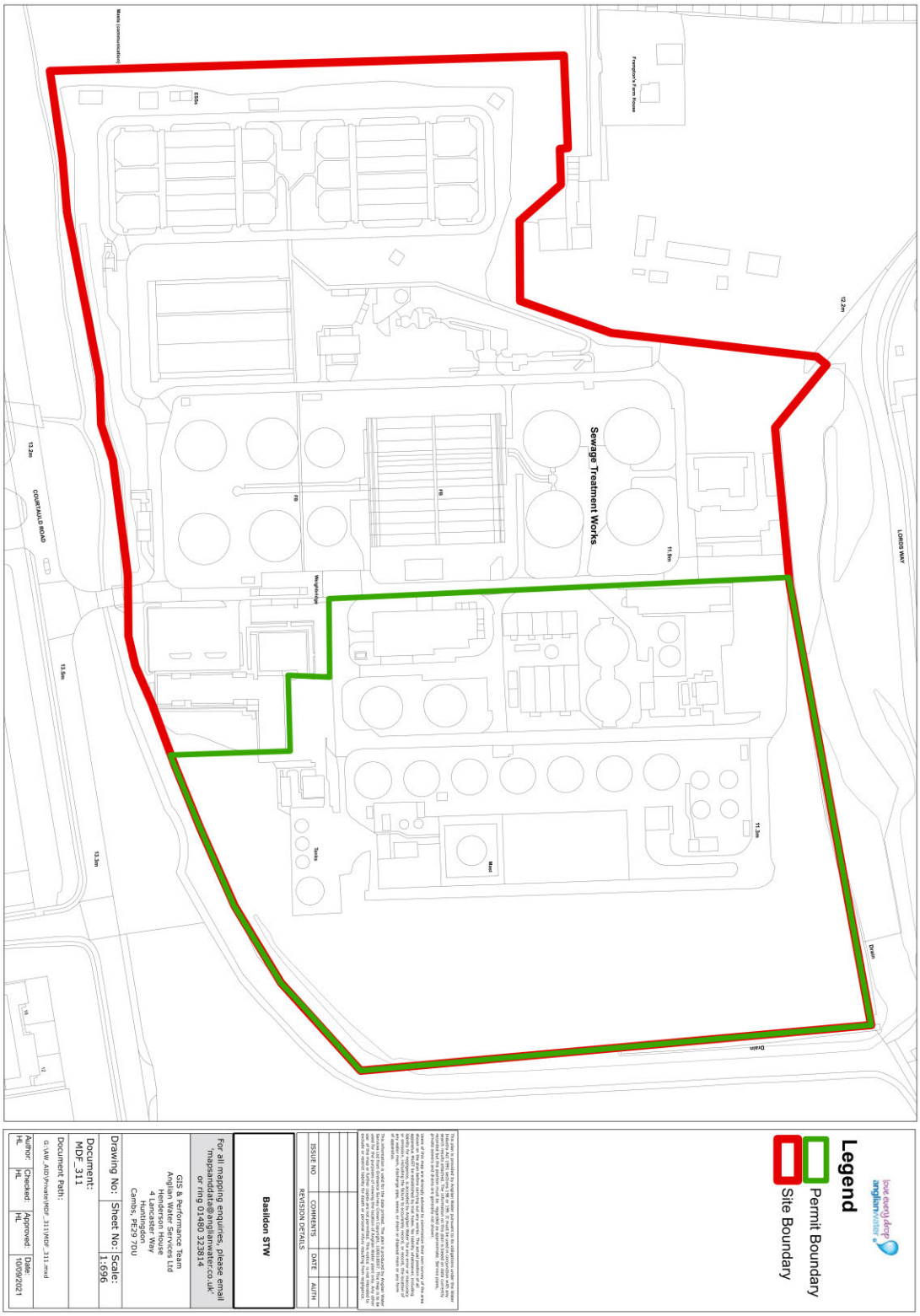
C. Appendix C – Site Location Plans




NEVENDON ROAD
CRICKETERS WAY
BISHOPS CLOSE
CHURCH LANE
FENNERS WAY
LORDS WAY
COURTAULD ROAD
COURTAULD CLOSE
SWINBOURNE ROAD
A127

D. Appendix D – Site Plan

This site plan and permit boundary is taken from the existing STC permit (EPR/GB3735RL/V002). The permit boundary has been recreated for this permit variation, but has not been changed.



E. Appendix E – Point Sources

Ref Number	Points to Air Location	NGR	Colour	X	Y
24	OCU	TQ 73891 90864	Black	573891	190864
25	OCU	TQ 73782 90752	Black	573782	190752
26	OCU	TQ 73851 90700	Black	573851	190700

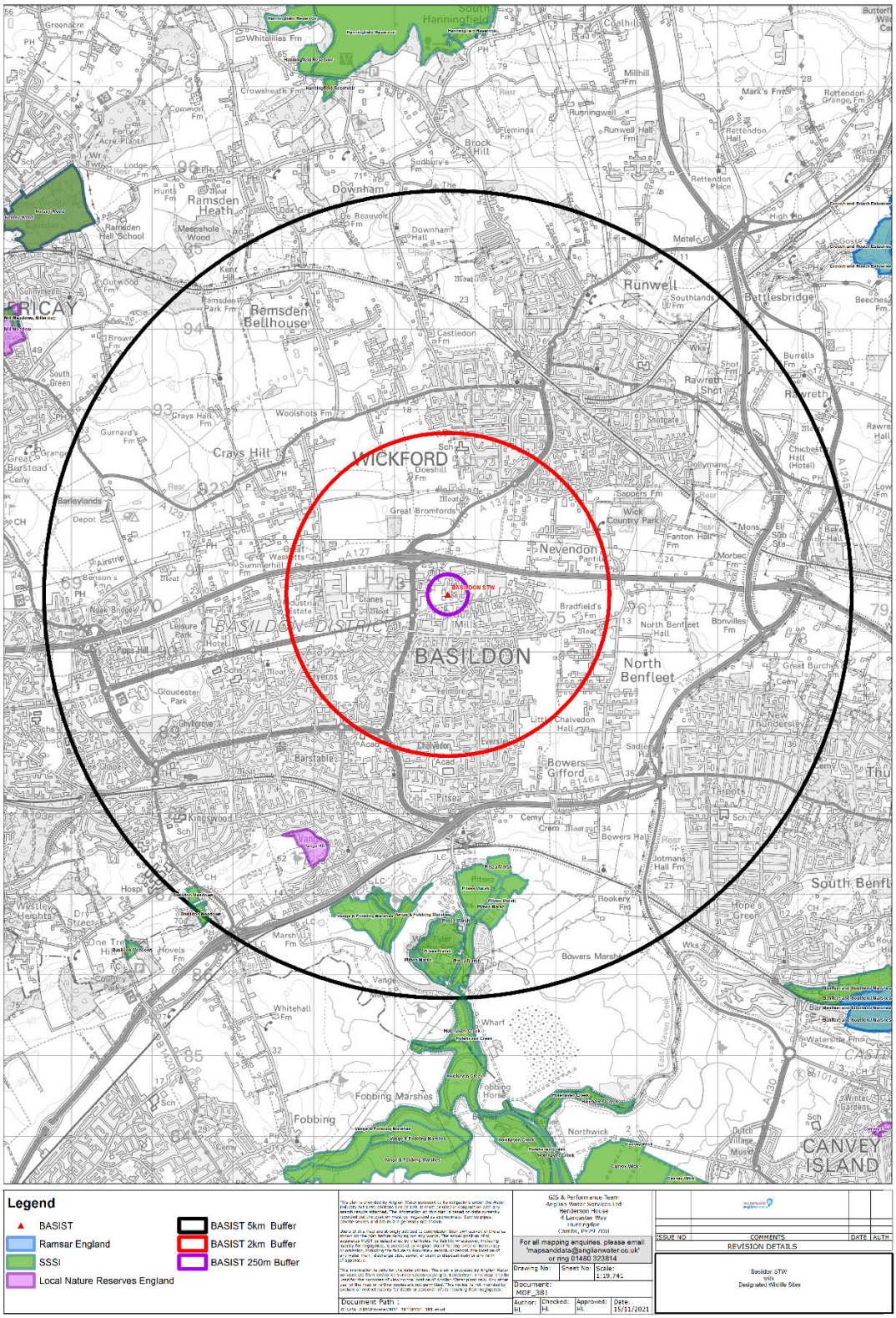
Ref_Number	POINTS TO LAND LOC	NGR	Colour	X	Y
1	Gas Pit Soak away	TQ 73693 90759	Red	573693	190759
2	Condensate pot	TQ 73691 90756	Red	573691	190756
3	Condensate pot	TQ 73868 90735	Red	573868	190735
4	Condensate pot	TQ 73852 90735	Red	573852	190735
5	Condensate pot	TQ 73819 90751	Red	573819	190751
6	Condensate pot	TQ 73871 90705	Red	573871	190705

Ref_Number	Monitoring	NGR	Colour	X	Y
1	Pasteurizer feed - d/s and flow rate only	TQ 73885 90899	Green	573885	190899
2	Digester feed - d/s and feed rate only	TQ 73907 90704	Green	573907	190704
3	Digester discharge - pH, CFA, Alkalinity, Ammonia, d/s	TQ 73821 90727	Green	573821	190727
4	Final product - d/s and HACCP compliance	TQ 73819 90868	Green	573819	190868

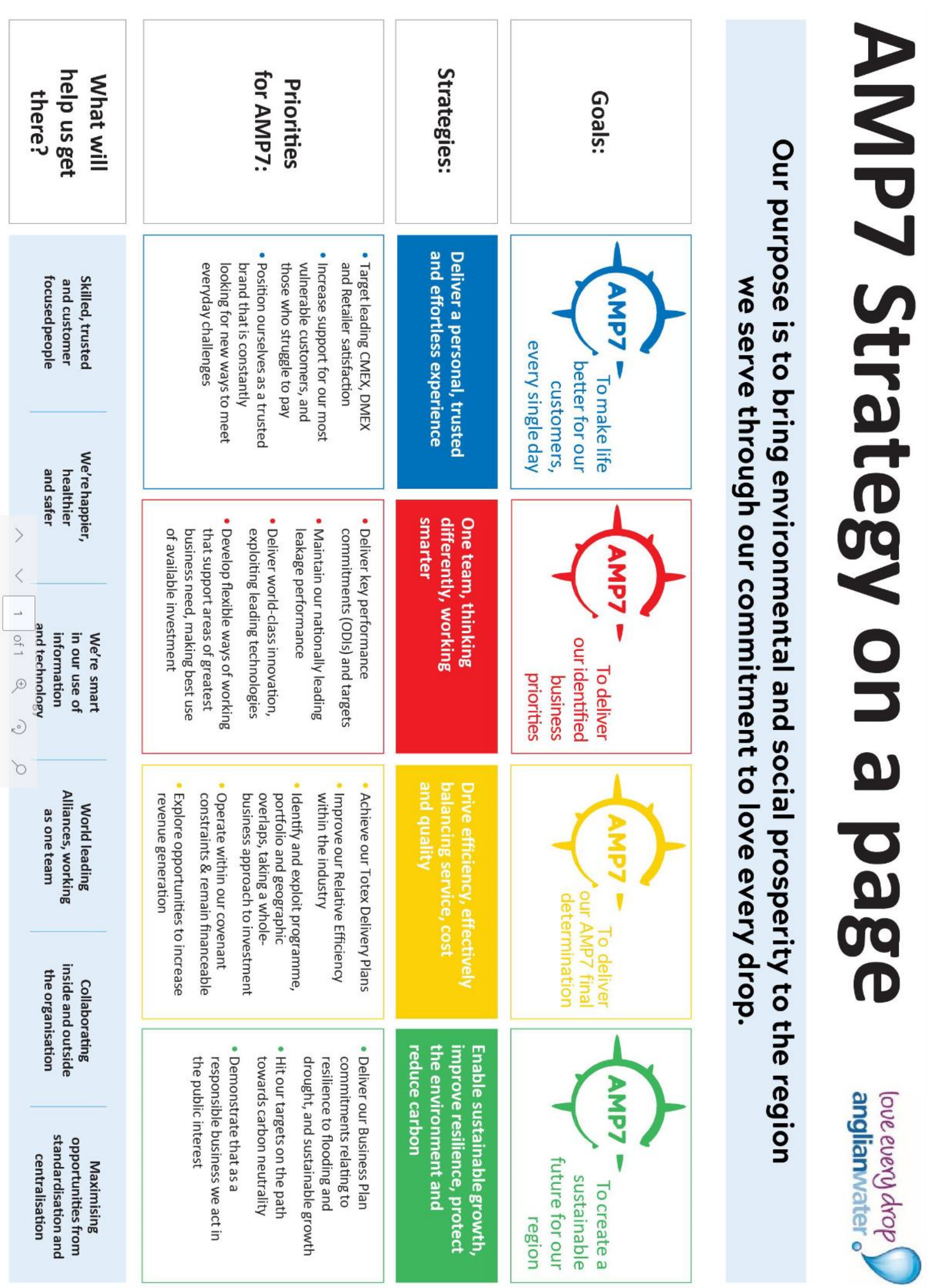
Appendix E is also provided as a separate document in the application folder.

Asset Name	National Grid Reference
AMTREAT Plant	TQ 73822 90796
Blend Tank	TQ 73862 90808
Boiler House	TQ 73795 90729
Centrifuge Building	TQ 73825 90874
CHP 1 stack	TQ 73793 90734
CHP 2 stack	TQ 73797 90734
Digester 1	TQ 73829 90756
Digester 2	TQ 73830 90728
Flare stack	TQ 73890 90730
Gas Holder	TQ 73893 90766
Head of works	TQ 73671 90711
HPH	TQ 73895 90696
Import Tank	TQ 73861 90788
Liquor return point	TQ 73677 90816
Liquor treatment	TQ 73810 90801
Post Digester Tank	TQ 73822 90813
S Drum thickeners	TQ 73866 90699
SAS holding tanks	TQ 73859 90851
Sludge reception	TQ 73838 90802
Treated cake pad	TQ 73821 90888
Waste hub	TQ 73838 90699
OCU	TQ 73891 90864
OCU	TQ 73782 90762
OCU	TQ 73851 90700
Emission Point to Land	
Gas Pit Soak away	TQ 73893 90759
Condensate pot	TQ 73891 90758
Condensate pot	TQ 73888 90735
Condensate pot	TQ 73852 90735
Condensate pot	TQ 73819 90751
Condensate pot	TQ 73871 90705
Monitoring Locations	
Head of Works emission point	TQ 73695 90642
Pasteurizer feed - d/s and flow rate only	TQ 73885 90699
Digester feed - d/s and feed rate only	TQ 73907 90704
Digester discharge - pH, CFA, Alkalinity, Ammona, d/s	TQ 73821 90727
Final product - d/s and HACCP compliance	TQ 73819 90888

F. Appendix F – Sensitive Receptors



G. Appendix G – AMP 7 Strategy on a Page



H. Appendix H – Sewage Treatment Centre Sampling

A number of parameters are measured through the Sludge Treatment process (on the blend tank, digester feed, on the digester and post digestion, see below) on a regular basis in order to ensure that we understand our process and are able to maintain healthy and efficient digestion, gas production and green energy production. AWS aim to monitor daily but have the target of a 90-95% completion rate which allows for operational issues when sampling or data isn't submitted. The data is captured from instrumentation on site or from manual lab tests carried out in the site lab and all data is submitted to a Microsoft sharepoint list, Excel file and PowerBi dashboard which allows monitoring and trending of data.

Feed Sludge

- Raw Sludge Blend Actual Feed (M^3/Day) Previous 24 hours
- Raw Sludge Blend pH
- Raw Sludge Blend Dry Solids (%)
- Total Solids in Blend (tDS/day)

HpH

- Heating Tank Dry Solids (%)
- Heating Tank pH
- Heating Tank VFA (mg/l)
- HpH Actual Feed Rate (M^3/Day) Previous 24 hours
- Solids Feed rate (tDS/day)

Digester Feed

- Hydrolysis Tank Dry Solids (%)
- Hydrolysis Tank pH
- Hydrolysis Tank VFA (mg/l)

Digester 1

- Dry Solids (%)
- pH
- VFA (mg/l)
- Alkalinity (mg/l)
- Ammonia (mg/l)
- Temperature (°C)
- Actual Feed Volume (M^3/Day)
- Feed Split (%)
- Solids Feed Rate (tDS/day)
- Digester retention time
- Digester VS loading Calculation

Digester 2

- Dry Solids (%)
- pH
- VFA (mg/l)
- Alkalinity (mg/l)
- Ammonia (mg/l)
- Temperature (°C)
- Actual Feed Volume (M^3/Day)
- Feed Split (%)
- Solids Feed Rate (tDS/day)
- Digester retention time
- Digester VS loading Calculation

Dewatering

- Cake Pad Fill Volume (%)
- Centrifuge 1 Cake Dry solids (%)
- Centrifuge 2 Cake Dry solids (%)
- Average. dry solids (%)
- Lime Tank Storage (T) – this is only April - October

Biogas

- Methane content (%) – automatically monitored
- Hydrogen Sulphide (ppm) - automatically monitored
- Actual to Waste Gas Burner (M^3/Day) Previous 24 hours

AMTREAT Liquor Treatment Plant

- Amtreat MLSS (mg/l)
- Amtreat Ammonia (mg/l)

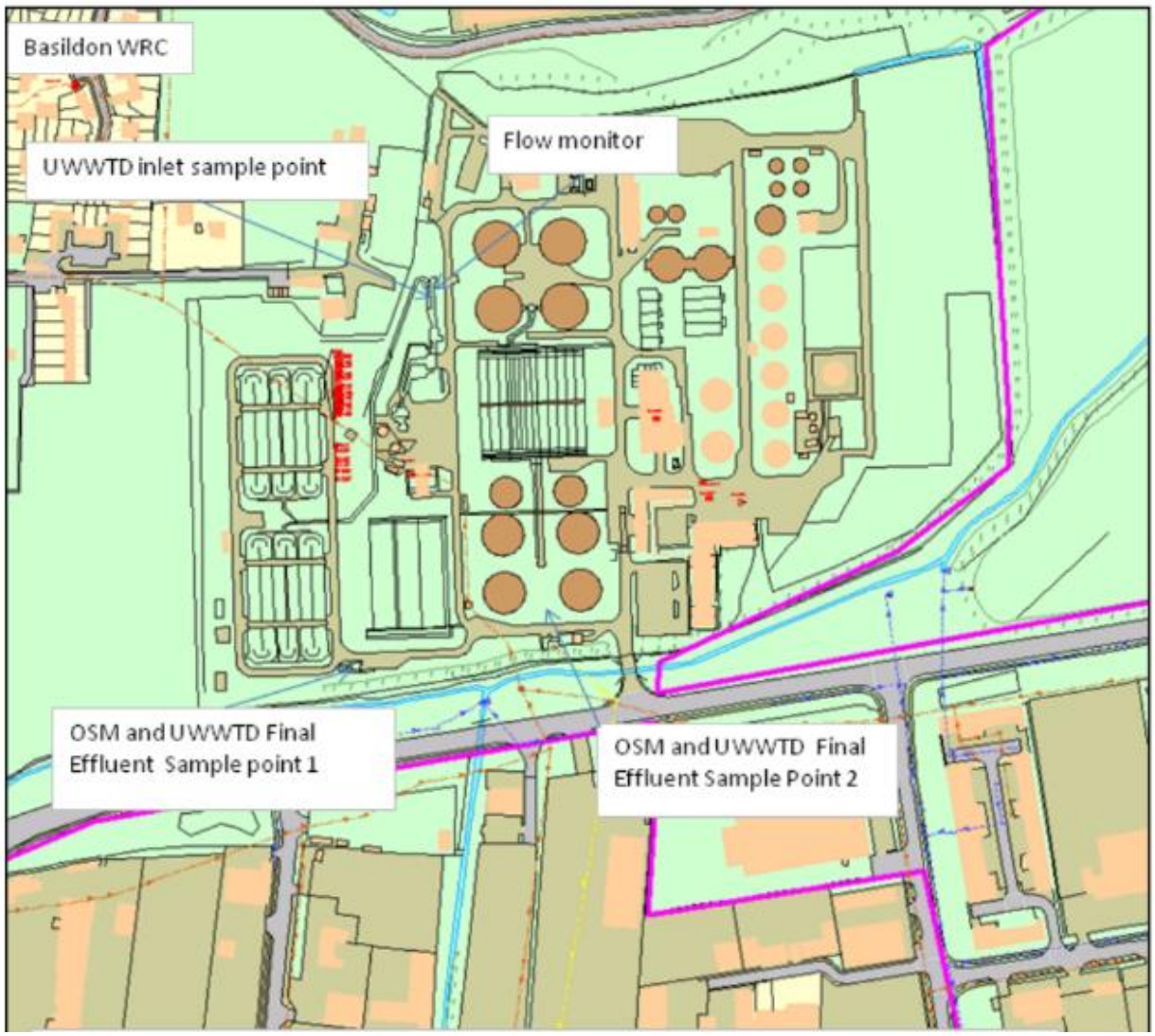
Poly Stock

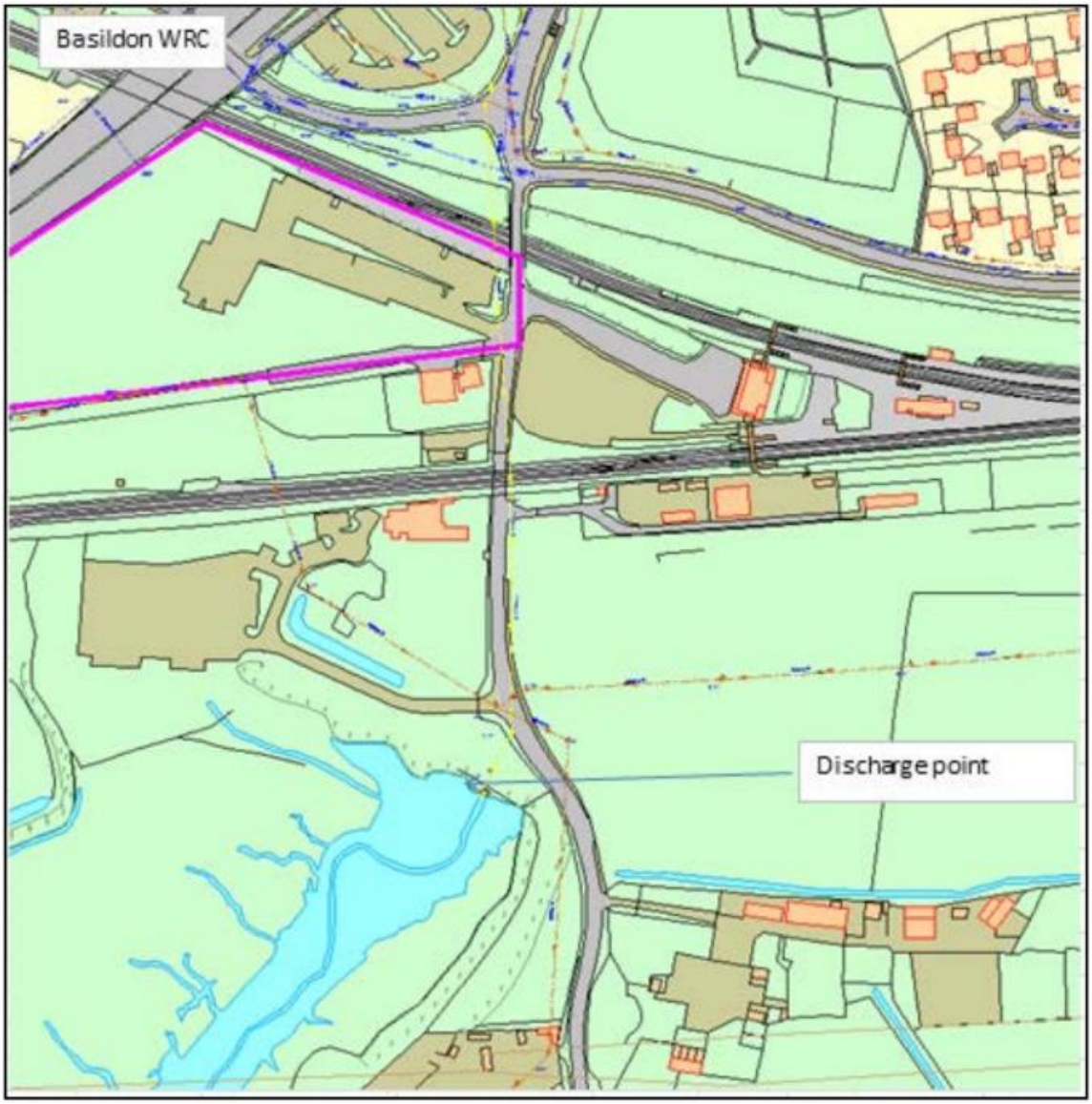
- SAS Liquid Poly IBC level (%)
- Powder Poly Silo (%)
- Liquid Poly Bulk Tank Level (%)

Return Liquor

- Ammonia, Settled BOD, COD and Total Solids plus PFOS, PFOA, Total Nitrogen, Total Organic Carbon and Total Phosphate

I. Appendix I Monitoring Points for Effluent form C6 Questions 9a to 9g




Basildon WRC
Discharge point

J. Appendix J Basildon STC Infrastructure Plan