IED Permit Application

Kings Lynn Sludge Treatment Centre

Anglian Water Services Ltd

June 2021 (Updated April 2024)

Contents

Non-Technical Summary

1.1 Introduction

The Non-technical summary has been written to support an application to vary the bespoke Environmental Permit for Kings Lynn 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 to vary the existing consolidated Environmental Permit waste operation permit to an installation permit.

1.2 Overview of the site and activities

Kings Lynn Water Recycling Centre (WRC) and Sludge Treatment Centre (STC) is located Kings Lynn Sludge Treatment Centre, Clockcase Lane, Clenchwarton, Kings Lynn, Norfolk, PE34 4BZ (NGR: TF 60342 22060). The WRC is operated under the Urban Wastewater Treatment Regulations (UWwTR) for the treatment of indigenous sewage sludge whereas waste imports and the STC operates under the Environmental Permitting Regulations (EPR). The STC operation is a non-hazardous waste activity which is currently carried out under a bespoke waste operation permit (EPR/DP3692SL). 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. No hazardous waste is imported or treated at Kings Lynn STC. The site has a standalone Water Discharge Activity Environmental Permit which will remain an independent permitted activity.

The Combined Heat and Power (CHP) plant is also currently permitted under the same waste operation permit (EPR/YP3234UV). Electricity and heat for the site are primarily provided by the combustion of biogas generated from the 2 CHP engines (3.303 MWth input each spark ignition engines) and on-site treatment processes, and by a 3.3 MWth input dual fuel (gas oil and biogas) steam raising boiler providing steam to the enhanced enzymic hydrolysis (EEH) plant.

AWS are applying for a variation to the existing waste operation permits into 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 CHPs 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 and domestic waste. Permitted Directly Associated Activities (DAAs) will be the physio-chemical treatment of sludges; waste imports for treatment and storage; the storage of sludges and cake from AD activity; and the storage of biogas derived from the AD treatment of waste and 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 back-up boiler system.

As part of the permit variation, AWS wishes to add a new EWC waste code to allow for [raw cake] to be imported onto site for treatment. This code is 19 02 06 “sludges from physico/chemical treatment other than those mentioned in 19 02 05” [raw cake]. 16 10 02 also needs to be added to allow for tankered imports of cess wastes and non hazardous chemical toilet waste to the head of works

(WRC), alongside 20 03 04 which is already on the existing permit The full list of EWC waste accepted at Kings Lynn, and to be included on the permit, are listed in Appendix A.

The IED permit will include:

- 2 x Liquid Sludge Import tanks and screening
- 4 x strain presses
- 2 x pre-thickening tanks
- 4 x GBT thickeners
- 1 x pre-Monsal tank
- 6 x Monsal enhanced enzymic hydrolysis tanks (EEH) (1 unused)
- 2 x Digesters
- 1 x Post Digestion Tank
- 1 x Gas Holder
- 1 x Import Cake Reception Building including cake bunkers
- 1 x RO Plant Salt Storage
- 2 x CHP engines including waste oil tanks and waste heat recovery boiler on CHPs
- 1 x Standby fired steam boiler
- 1 x Poly storage tank
- 1 x Disinfection tank
- 1 x Sodium hydrochloride silo
- 3 x Centrifuges (Duty/assist/Standby)
- Biogas burner (flare stack)
- Cake storage

The following are outputs from the process:

- Cake (dewatered post digestion sludge) - stored in cake bays before being shipped for beneficial use in agriculture as a soil conditioner
- Bio-gas - stored in an existing gas holder, and is then either:
- Burnt in CHPs, for use on site (no export to grid)
- Burnt in the auxiliary 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 Kings Lynn 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, 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 – European Waste Catalogue (EWC) Codes
- Appendix B – Site location plan
- Appendix C – Site plan
- Appendix D – NGR Emission points on Site Plan
- Appendix E – Sensitive Receptors
- Appendix F – AMP 7 Strategy on a Page
- Appendix G - STC Sampling
- Appendix H – Monitoring Points for Effluent for Form C6
- Appendix I – Site Infrastructure Plan

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

- Environmental Risk Assessment
- Environmental Management Plan
- Climate Change Risk Assessment
- Drainage Plan (3 documents)
- HACCP Plan
- Kings Lynn Waste Acceptance
- Site Schematics (HAZOP) (2 documents)
- Tranche 1-5 BAT Analysis
- Kings Lynn Emission Points
- Containment Assessment for Kings Lynn Sludge Treatment Centre
- ISO 9001 Certificate
- ISO 14001 Certificate
- Evidence of Technical Competence (CMS)
- Odour Management Plan
- Odour Modelling Report
- Process Safety Risk Assessment (Bowtie)
- Accident Management Plan
- Contingency and Operational Plan
- Proximity to Wildlife Sites (Map)
- Storage Capacity and Assets
- Kings Lynn LDAR plan
- FERP (Flooding Plan)
- Annexes to original permit application
- Letter of Delegation
- AWS convictions up to May 2023

- Residue Management Plan
- Form A
- Form C2
- Form C3
- Form C6
- Form C0.5
- Form F1
- Form F1 additional fees
- IED – STC Calculated Liquor Returns spreadsheet
- Testing from engines email
- RBP Report – Anglian Water Kings Lynn

3 Process Description

Kings Lynn Sludge Treatment Centre (STC) is co-located on Kings Lynn Water Recycling Centre (WRC). The STC treated urban waste water sludge produced at the WRC. Sludge is imported from other Anglian Water sites into Kings Lynn WRC, and domestic wastes are imported from 3rd party companies. These are imported to the head of works and pass through screens to remove grit and screenings.

The Sludge Treatment Centre (STC) received UWWTD sludges for treatment in three forms. Liquid sludge production from the host WRC on site (indigenous sludge), liquid sludge imports by road tanker (liquid import) and dewatered raw sludge cake by bulk tipper (cake imports).

Liquid imports are received and blended with indigenous primary sludges, this blend is screened to remove debris before mechanical thickening. This thickened sludge is then combined with and diluted imported cake before treatment.

Imported cake is received in a cake reception building, cake is tipped into an odour-controlled bunker before transfer to a holding silo. The sludge is diluted with final effluent to reduce the dry solids content so it can be efficiently mixed with other sludges prior to treatment.

Prior to treatment the sludges are batched and mixed in three batch tanks. From the batch tanks the sludge is pumped forward to the advanced anaerobic digestion system which is a Monsal Enhanced Enzymic Hydrolysis (EEH) plant. The EEH plant consists of two process steps, biological hydrolysis to condition the sludge prior to digestion and a pasteurisation step to reduce pathogens to enable a safe high quality product to be produced in accordance with the safe sludge matrix suitable for beneficial use in agriculture as a soil conditioner. Stage 1 of the process is heated via heat exchange using recovered heat from CHP engines to approx. 40°C and stage 2 is heated to a minimum of 55°aC for 5 hours by steam injection. Steam is generated from recovered exhaust gas heat from the CHP engines via waste heat recovery boilers.

After EEH the conditioned and pasteurised sludge is pumped to the two anaerobic digesters where it is held in a mixed tank for approx. 14 days at the design throughput. Biogas produced by the digesters is captured and stored in a single 2000m^3 double membrane gas holder.

The biogas is primarily used to fuel two combined heat and power engines (CHP) to generate heat for the process and renewable electricity. The electricity generated is used to power the STC and adjacent WRC with additional power exported to the national grid. The CHP engines produce heat for use in the process as hot water for heating stage 1 of EEH and steam from exhaust gases by passing the exhaust through waste heat recovery steam boilers.

When CHP's are offline for maintenance and there is a surplus of biogas this is used to fuel the auxiliary fired boiler. This boiler provided top up or full heating to the EEH process as required. The burner is dual fuel and can be operated on gas oil where biogas is not available.

In the event that there is an excess of biogas any surplus is flared via a low-level waste gas burner.

The digested sludge is passed to a post digestion tank prior to final dewatering using centrifuges. The site has three centrifuges configured to operate duty/assist/standby. The treated sludge is dewatered to approx. 25%DS and stored in cake storage skips or an open storage bay prior to transport off site and application for beneficial use on agricultural land as a soil conditioner under the sludge use in agriculture regulations. The treated biosolids cake is a quality assured product under

the Biosolids Assurance Scheme (BAS). Liquors produced during the dewatering stage are returned to the WRC for treatment.

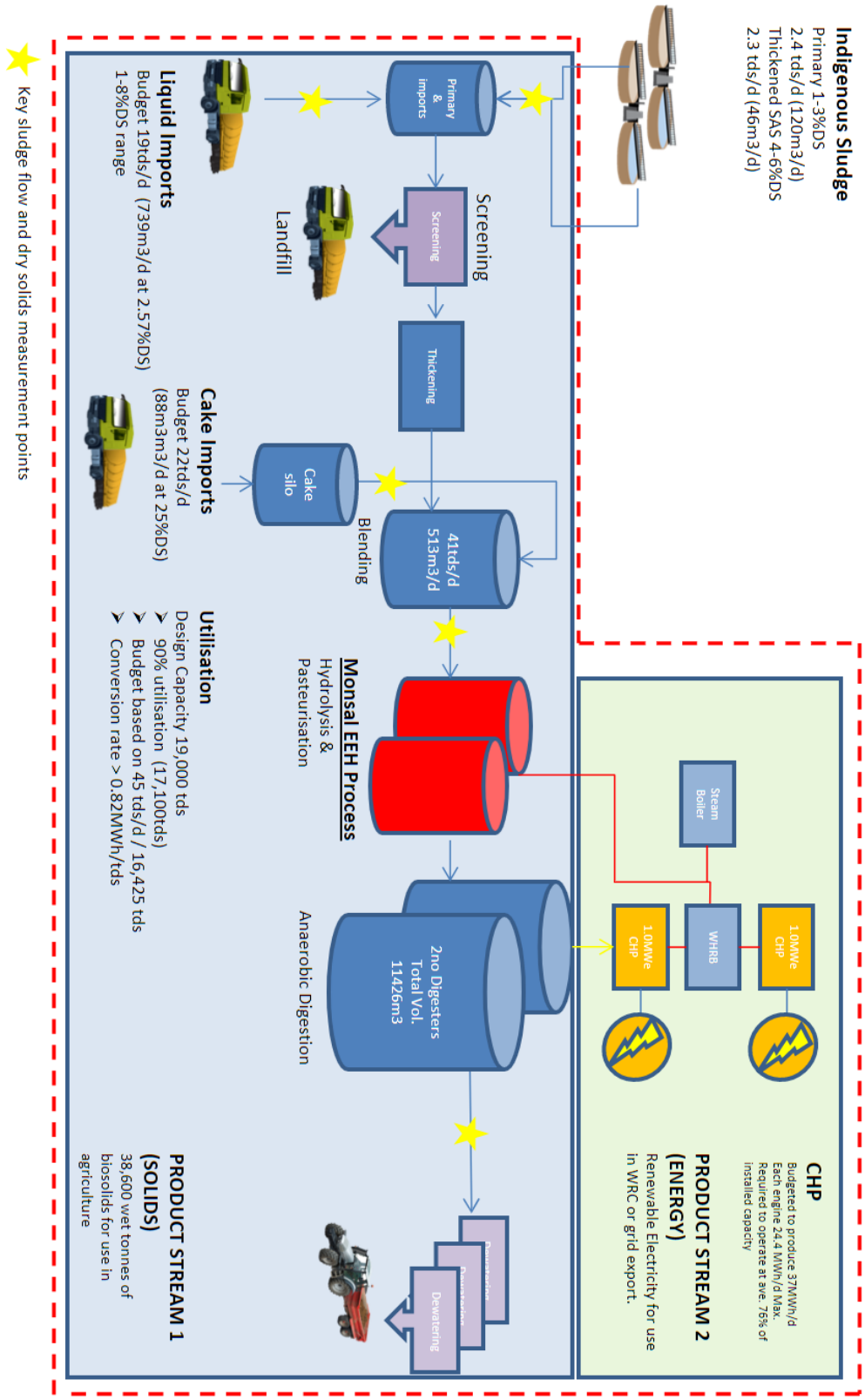


Figure 1: Process Flow Diagram for Kings Lynn Installation

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

Phone number: 07811 606787

Email: dhaymes@anglianwater.co.uk

Operational contact:

Name: Sarah Collier

Address: Kings Lynn Sludge Treatment Centre, Clockcase Lane, Clenchwarton, Kings Lynn, Norfolk, PE34 4BZ

Phone number: 07702 340949

Email: sCollier@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:

[redacted]

[redacted]/02/1975

[redacted]

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

5 Part C2– General – varying a bespoke permit

5.1 Question 2: About your proposed changes

This application is for a substantial variation to the existing EPR permit (EPR/DP3692SL/V003) waste operation permit into a bespoke installation permit under the Industrial Emissions Directive. The CHP and STC waste activities are currently on a consolidated permit therefore these activities should continue to be included on the same IED permit.

No site operations are changing because of this variation. Please refer to Table 1 in section 6.1 for detailed information of the current activities.

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; and
- 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 (LRQA) 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.

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, and once issued, training will be provided in respect of the obligations of the Environmental Permit for the site.

Details on technically competent people at Kings Lynn STC: , Lewis Fountain Adam Kellegher, and Scott Barrow

In addition, Chris Simpson and Kevin Robinson are WAMITAB trained.

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 several 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 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 as detailed below:

- Cake storage on site and it's compliance to the waste permit
- Haulage of AWS sludge and cake to and 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 team.

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 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 Kings Lynn 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 several 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 all 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.

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 Kings Lynn STC in the last 3 years, they have been listed below.

Table 1: Table of Complaints

Complaint date	Summary	Actions taken
01/09/2020	Traffic on roadway to site	Roadway outside property has been resurfaced by Council
01/09/2020	Traffic on roadway to site	No vehicles to go past the customers property to access site.

5.6 Question 5a: Site layout plan and process diagram

- Plans provided, to satisfy question 5a, can be found in the following stand-alone documents:
- Site Location Plan – See Appendix B
- Site Layout Plan – See Appendix C
- National grid references of key assets – see Appendix D
- Process Flow – See Figure 1 in section 3 above
- Drainage Plan – See standalone document
- Schematics – see standalone document.

5.7 Question 5b: Site condition report

In accordance with Environment Agency requirements, a Site Condition Report (SCR) was produced during the original permit applications to demonstrate the condition of the land and groundwater at the site on issue of the proposed permit. As part of a permit variation in 2017, an updated SCR was done by Mott MacDonald which included the sludge import tanks to the north of the site. In this permit variation for IED, only these import tanks are being added to the permitted boundary. These tanks are existing assets and have been operational prior to this permit application and do not pose a risk to the surrounding environment. This permit variation will not result in a change to the permitted boundary but a revised site condition report has been prepared and is the standalone Site Condition Report (SCR) document..

5.8 Question 6: 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
- Vermin and insects (pests)
- Human health and environment safety (i.e. visual impacts, site security, flood risk); and
- 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.

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

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

5.9 Question 6b: Climate change risk screening

The site is planned to operate 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
- Water use: Majority of water use for the proposed permitted activities is sourced from recycled secondary wash water. Mains supply is used for:
  - Poly make up
  - Boiler water feed systems
  - 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
  - No water is currently abstracted from surface and/or groundwater
  - FE washwater is used wherever possible.

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

The site also has a Flood Emergency Response Plan and a copy can be found as a standalone document in the application folder (kings Lynn WRC FERP).

Further information is also in the Environmental Management Plan as required by the C2 guidance.

6 Part C3 – General – variation to a bespoke installation permit

Table 2 below relates the activities carried out at Kings Lynn STC.

6.1 Question 1: Table 1a: Changes to existing activities

Table 2: Activities applied for Kings Lynn STC

Installation name	Schedule 1 or other references	Description of the Activity	Activity capacity	Annex I (D codes) and Annex II (R codes) and descriptions	Hazardous waste treatment capacity	Non-hazardous waste treatment capacity
Kings Lynn STC	S5.4, Part A (1), (b) and (i)	Anaerobic digestion	44,720 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 R 1 to R 12.	0 m3	Annual 1900 T/Ds
Directly associated activities						
	Physical treatment of waste	Recycling/ reclamation of organic substances which are not used as solvents.		R3		
	Physico-chemical treatment	Physico-chemical treatment not specified elsewhere which results in final compounds or mixtures which are discarded by the means of any of the operation numbered D1 to D12		D9		

Installation name	Schedule 1 or other references	Description of the Activity	Activity capacity	Annex I (D codes) and Annex II (R codes) and descriptions	Hazardous waste treatment capacity	Non-hazardous waste treatment capacity
	Gas combustion to produce heat and power.	Use principally as a fuel or other means to generate energy		R1		
	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		
	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		
	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				

Installation name	Schedule 1 or other references	Description of the Activity	Activity capacity	Annex I (D codes) and Annex II (R codes) and descriptions	Hazardous waste treatment capacity	Non-hazardous waste treatment capacity
		From collection to the point of discharge at the adjacent WRC.				
For installations that take waste						

Installation name	Schedule 1 or other references	Description of the Activity	Activity capacity	Annex I (D codes) and Annex II (R codes) and descriptions	Hazardous waste treatment capacity	Non-hazardous waste treatment capacity
Kings Lynn STC	Total storage capacity		65,720 tonnes [2]			
	Annual throughput (volumetric feed)	Anaerobic Digestion	163,814 m^3		0	163,814 m^3
	Annual throughput (feed throughput)	Anaerobic Digestion	12,712 tDs		0	12, 712 tDs

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

[2] Note: This includes STC assets and associated raw materials, however the cake bays hold an additional 250 tonnes.

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 Kings Lynn are in line with the existing waste operation permit. The only additional waste codes to be added in this variation are:

- 19 02 06 Sludges from physico/chemical treatment other than those mentioned in 19 02 05 (sewage sludge only) [raw cake] which is to reflect the Environmental Agency's recent change in guidance to separate biosolids in raw or limed cake
- 16 10 02 aqueous liquid wastes other than those mentioned in 16 10 01 for cess domestic wastes and non hazardous chemical toilet wastes
- 19 09 02 sludges from water clarification (iron sludges) to be imported into the head of works (WRC).

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 (see Appendix D). At the waste acceptance point, there is a light system in place so delivery drivers are aware when discharges can be made. A weighbridge must 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.

Sludges from physico/chemical treatment other than those mentioned in 19 02 05 (sewage sludge only) [raw cake] coded 19 02 06 is accepted from the onsite Water Recycling Centre and from other AWS sites for storage and treatment on site. Dewatered raw sludge cake is received by bulk tipper. The trucks enter the site and are weighed at a weighbridge before being directed to one of two cake bays. Trucks reverse into an enclosed building, the reception bunker door is opened once the lorry is inside before tipping commences. The bunker is fitted with odour extraction and connected to an odour control plant. The building is positively ventilated, and the bunker extracted giving an air flow into the bunker during the tipping operation. Fugitive emissions from the building during tipping are mitigated by use of an odour surfactant spray system. A trailer washing system is also fitted.

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 (Kings Lynn Waste Acceptance) and in Appendix G.

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 WRC for treatment.

AWS will accept sludges from 3rd parties only where they meet the same Biosolids Assurance Scheme requirements as sludges from AWS operations. All wastes accepted into the STC have already been screened for grit and screenings. The management of importing domestic wastes from 3rd parties is laid out in the environmental management plan.

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

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

Table 3: Point source emissions

Installation name	Kings Lynn				
Point source emissions to air					
Emission point reference and location	**Source**	**Parameter**	**Limit [1]**	**Unit**	**Monitoring Method**
Stack for CHP 1 and CHP 2 3.303 MWth TF 60319 22041 Stack height – 17m	Exhaust of 2 CHP engines via a vertical unimpeded multiflue burning biogas.	Oxides of Nitrogen (as NO2)	500	Mg/m^3	In accordance with Environment Agency guidance note LFTGN 05 "Guidance for monitoring enclosed landfill gas flares"
		Carbon Monoxide	1400	Mg/m^3	
		Sulphur Dioxide	No limits set	Mg/m^3	
		Total VOCs	1000	Mg/m^3	
		Non Methane VOCs	75	Mg/m^3	
Waste gas burner (flare stack) TF 60202 22002		Operational hours	876 hours in calendar year	Hours	
Standby steam boiler (3.3 MWth) TF 60319 22041	Exhaust of steam raising boiler via vertical unimpeded multiflued stack (same point as Stack 1)	Oxides of Nitrogen (NO and NO2 expressed as NO2)	No limits set	Mg/m^3	NA
		Sulphur Dioxide (if burning biogas)	No limits set	Mg/m^3	

Installation name	Kings Lynn			
Gas holder pressure relief valve		Biogas release and operational events	No limits set	NA
OCU TF 60470 22030	Channelled emissions form Biofilter and odour abatement stack	Hydrogen Sulphide Ammonia Odour Concentration	No limits set	NA
OCU TF 60298 22020	Channelled emissions form Biofilter and odour abatement stack	Hydrogen Sulphide Ammonia Odour Concentration	No limits set	NA
OCU TF 60402 22145	Channelled emissions form Biofilter and odour abatement stack	Hydrogen Sulphide Ammonia Odour Concentration	No limits set	NA

[1] Note: These limits do not apply during start up and shut down. This is the same condition as in the existing permit.

[2] Annual monitoring is only required when flares operate in excess of 10% of the time, taken on an annual assessment period.

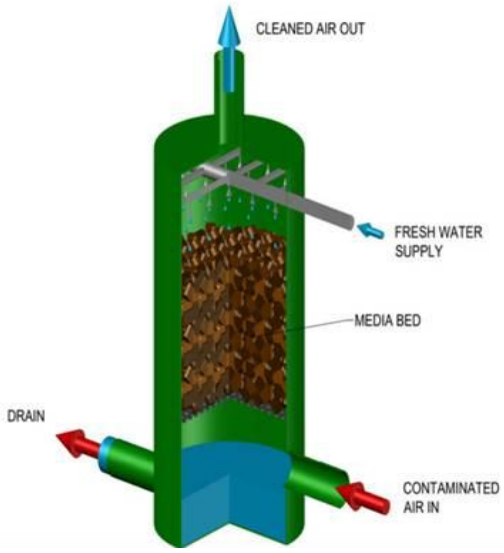
Emission points are shown in the site plan (see Appendix D).

Kings Lynn currently meets the permitted air quality limits as certified by the annual emission report done by an MCERTS accredited contractor.

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

Biofilter and carbon

Biofilter and bio scrubber



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.

Emissions to water (other than sewers)

Not considered applicable as the drainage network sends water to the head of the works for treatment – there is a French drain near the offices however this is outside of the permit boundary.

There will be no direct discharge of wastewater to controlled waters.

There are no direct potentially contaminated discharges to groundwaters or controlled surface 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 are no effluent treatment plants at Kings Lynn.

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 Kings Lynn WRC and will undergo 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.

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, see the stand-alone documents in the application folder.

The Liquor Return point location is at NGR TF 60373 22013 and is shown on the monitoring location plan within the standalone document Kings Lynn STC Maps.

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 due to the creation of a new hardstanding area.

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 and rainwater 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 in Table 4 below.

Table 4: Point source emissions to sewers, effluent treatment plants or other transfers off site

Emission point reference, and location	Source	Location	Characteristics	Frequency	Monitoring /mitigation measures prior to final discharge and emission point discharge.
Discharged to Kings Lynn WRC)	Condensate from the gas pipelines and gas storage bag	Adjacent to biogas storage	-	-	-
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.
Condensate	Gas pipelines and new gas storage bag		Condensate with slightly elevated levels of H2S dissolved from the biogas, resulting in a low level of acidity	Negligible	Rerouted to adjacent WRC.

Refer to the Environmental Risk Assessment on the environmental risk the water emissions pose and how these are mitigated, where relevant.

Emissions to land

There will be no routine point source emissions to land as part of the activities carried out on-site. There are French drains on site however these are near the car park/office area and outside of the permitted boundary.

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 5 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 5: 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

Description of the schedule 1 activity or directly associated activity	Best available technique (BATC, BREF or TGN reference)	Document reference
		https://www.gov.uk/government/publications/sector-guidancenote-s506-recovery-anddisposal-of-hazardous-and-nonhazardous-waste
General	How to comply with your environmental permit	https://www.gov.uk/government/publications/how-to-comply-withyour-environmental-permit
	Monitoring stack emissions: technical guidance for selecting a monitoring approach	https://www.gov.uk/guidance/monitoring-stack-emissions-technical-guidance-for-selecting-a-monitoring-approach
	M1 sampling requirements for stack emission monitoring	https://www.gov.uk/government/publications/m1-sampling-requirements-for-stack-emission-monitoring
	Environment Agency environmental permitting guidance, including:	https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit
	Environment Agency's horizontal environmental permitting guidance, including:	https://www.gov.uk/government/publications/energy-efficiencyfor-combustion-and-energyfrom-waste-power-plants
	H1 - Risk assessments for your environmental permit	https://www.gov.uk/government/publications/environmentalpermitting-h3-part-2-noiseassessment-and-control
	H2 Energy efficiency (Energy efficiency for combustion and energy from waste power plants)	https://www.gov.uk/government/publications/environmentalpermitting-h4-odourmanagement
	H3 Noise assessment and control	https://www.gov.uk/government/publications/environmentalpermitting-h5-site-conditionreport
	H4 Odour management	https://www.gov.uk/guidance/control-and-monitor-emissions-for-your-environmental-permit
	H5 Site condition report	
	Control and monitor emissions for your environmental permit	

The process flow diagram can be found in section 3 above.

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 Kings Lynn site, and the outcome of these conclusions can be found in the stand alone document Tranche 1-5 BAT Analysis. AWS can currently comply with the majority of the conclusions assessed against, with the exception of parts of BAT 7, BAT 8, BAT 14 and BAT19. Further spill 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 this 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 Kings Lynn STC, it also shows that we at AWS are still committed to full compliance with BAT. At the time of application, To date an initial full spill modelling and or analysis of primary/secondary containment has not been carried out for Kings Lynn STC. A copy of the assessment report has been provided as a stand alone document (Kings Lynn STC – Containment assessment_Rev02). 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 Kings Lynn 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). 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 stand-alone document.

Operational teams as part of the day to day operations check and monitor physical condition of assets on the site. 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). RIF’s 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 of 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 Kings Lynn STC is available in the LDAR plan provided in the application Folder (Kings Lynn LDAR).

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

Site Name	FunctLocation	FuncLocDescrip	Description	Equipment	Manufacturer	ManufPartNo.	ManufSerialNo.
KINGS LYNN STW	KLYNST-2G-DIG-BB03-FLA001	Flarestack - Low Level Waste Gas Burner	Flare Stack	2086040	Flare Products Ltd	Ground Flare HiLo	72002
KINGS LYNN STW	KLYNST-2G-DIG-PV01-SAV006	Safety Pressure Valve 1 - Gas Holder 8" Valve	Pressure Relief Valve	2122611	Motherwell Control Systems Ltd	381	NO INFO
KINGS LYNN STW	KLYNST-2G-DIG-PV01-SAV001	Safety Pressure Valve 2 - Gas Holder Air Blower Jacket	Pressure Relief Valve	2086233	Motherwell Control Systems Ltd	381	12070
KINGS LYNN STW	KLYNST-2G-DIG-PV01-SAV002	Safety Pressure Valve 3 - Gas Holder 6" Valve	Pressure Relief Valve	2086234	Motherwell Control Systems Ltd	384	11947
KINGS LYNN STW	KLYNST-2G-DIG-TS01-SAV001	Safety Pressure Valve 1 - DigesterT401A Top	Pressure Relief Valve	2086253	Shand & Jurs Co	94020C49210001	7252111
KINGS LYNN STW	KLYNST-2G-DIG-TS01-SAV002	Safety Pressure Valve 2 - DigesterT401A Top	Pressure Relief Valve	2086254	Shand & Jurs Co	94020C49210001	7252112
KINGS LYNN STW	KLYNST-2G-DIG-TS02-SAV001	Safety Pressure Valve 3 - DigesterT401B Top	Pressure Relief Valve	2086276	Shand & Jurs Co	94020C49210001	7252114
KINGS LYNN STW	KLYNST-2G-DIG-TS02-SAV002	Safety Pressure Valve 4 - DigesterT401B Top	Pressure Relief Valve	2086277	Shand & Jurs Co	94020C49210001	7252113
KINGS LYNN STW	KLYNST-2G-EHH-TS04-SAP001	Safety Pressure Valve 1 - Monsal Plant	Pressure Relief Valve	2087459	Shand & Jurs Co	94020	7252115
KINGS LYNN STW	KLYNST-2G-EHH-TS04-SAP002	Safety Pressure Valve 2 - Monsal Plant	Pressure Relief Valve	2087460	Shand & Jurs Co	94020	7252116

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, 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 are 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 EMS.

As combustion activities are not being changed on site as a result of the permit application, it is not anticipated that Air Quality Dispersion Modelling is required to show 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 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. Overall impacts of all air pollutants are considered to be low from the activities undertaken on the Site. The existing approaches and relevant procedures are presented in the EMP and operational procedures are adequately addressed with respect to emissions.

6.6.3 Odour

The site is situated relatively close to residential areas and a small industrial estate. Odour complaints are shown in Table 1, however neither are from odour. There are no proposed works to be undertaken on the site in respect of this permit application, therefore, the activities on-site are not anticipated to increase the off-site impact or result in adverse impact upon 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 using the Environment Agency's H4 Odour Management guidance (2011).

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

Kings Lynn 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. This provides mitigation measures to be followed by all staff to ensure normal operation does not result 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
- Ensure trucks are covered with sheeting before and after depositing cake on site

The level of odour risk from the site is considered to be manageable, as shown in the Environmental Risk Assessment. The existing odour modelling has been updated to incorporate the latest details and any further actions and procedures which may need to be implemented.

Refer to the stand-alone Odour Modelling Report (Kings Lynn 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. Appropriate mitigation for noise and vibration impacts are provided in the ERA.

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 (sweeper) as needed.

The site has no historic records of dust complaints which indicates that the existing dust prevention measures are adequately mitigating the risk.

6.6.6 Bio-aerosols

A bio-aerosols risk assessment has not been undertaken for the site as the point and area source emissions are not considered to be any significant risks to nearest sensitive receptors. See Appendix E for a map of the site in relation to the sensitive receptors. There are no wildlife sites with statutory designations or dwellings within 250 metres of the site.

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

Solid waste

Waste generated on the site includes the following:

Table 6: 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	Approximately 810 m3 per day is Returned to the WRC for treatment
Anaerobic digestion	Biogas	Transferred to CHP unit for electricity and heat production (and export to grid)
CHPs	Waste oil	Recycled at waste oil recycling facilities
	Concentrate from RO plant	Returned to the WRC for treatment

	RO plant filters	Disposed of appropriately with 3rd party as detailed in EMS
	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 and the standalone Residue Management Plan 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 treated and de-watered at the site. Treated sludge is then recycled to agricultural land as a soil conditioner. The treated sludge meets the Biosolids Assurance Scheme Quality Standards. The volume of sludge recycled to agricultural land is monitored by WROL / CE teams.
- The biogas from the AD process is burned in a CHP engine and is used to provide heat & 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 for Nitrogen/Odorant/Calibration Gas etc. are collected by a 3rd party contractor from the Site as they deliver a batch of new cylinders.

Kings Lynn WRC has a designated waste management area that is located at NGR TF 60294 22427 by the offices. All skips and containers are located on a hardstanding. Skips and containers are clearly labelled. All waste from the site is sorted into this waste area other than the gas cylinders.

If a complaint is made with respect to litter the complaints procedure will be followed. The Site 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 security fence. A galvanised steel, electronic, palisade gate secures the main access and is controlled by the control room. The site is manned 6-6 pm, 7 days a week. For visitors and unauthorised personnel an intercom system at the site entrance, is used. The site also benefits from a CCTV system. Cameras are on the gates, offices, and STC. 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. Repairs are undertaken in accordance with the EMS requirements.

Other risks relating to human health and the environment is presented in the ERA.

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. Where action is needed, a specific action plan would be created in order to rectify the situation as much as reasonably possible.

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 Site Manager will arrange for dust suppression equipment to be used. The Site 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 Site 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 Site 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 Site 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 Site 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 Site 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 Site 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 Site 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 Site 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 Site 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 –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 7.

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Table 7: Types and amounts of raw materials used on site

Name of the installation	Kings Lynn			
Capacity [1]	34,390 tonnes [1]			
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)	Gas oil	30,000 litres	137,596 litres	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 Used to fuel boilers
	Biogas (~63% Methane, 35% Carbon Dioxide, 2% Oxygen/ Nitrogen)	Direct feed	NA	Feed gas for biomethane enhancement. Hazard of fire/explosion asphyxiation
	Oil Filters	9 tonnes	18 for CHP 1, 18 for CHP 2	Off gas cleaning/ carbon filtration. Carbon dust – respirable hazard/irritant
	Air Filters	2 tonnes	4 for CHP 1, 4 for CHP 2	
	Polymer (Liquid)	15 litres in silo	86.250 tonnes	Mild skin and eye irritation May cause irritation of mucous membranes slippery underfoot if spilt
	Polymer (Powder)	25 tonnes	83.220 tonnes	

				Used as flocculant to enhance thickening and dewatering processes.
	Potable water	1000 m^3 x 2 tanks	40.990 m^3	Used in RO plant and boilers
	Filter FE	From FE point	NA	Used for polymer make up, wash down, raw cake dilution and cooling
	Oil	250 litres in 25 litre drums	4900 litres	Oil is a lubricant for various equipment Used in boiler treatment Alkbuild is corrosive
	Salt (Soft Sel)	25 kg x 2 pallets	400 bags at 25 kg each	
	Corroban 27	300 litre tank	1850 litres	
	Corroban 64	300 litre tank	1400 litres	
	Alkbuild	300 litre tank	2000 litres	
	Sodium Hypo	1200 m^3 tank	26,280 litres	

[1] This is the approximately total storage capacity (tonnes)

[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 Kings Lynn's CHPs was August 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 follows:

Table 8: 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 (biogas and gas oil)	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	Ad hoc as needed	Emissions of pollutants into the environment through any kind of duct, pipe, stack, etc
	H2S			

Emission point type	Parameter	Reference period	Monitoring frequency	Monitoring standard or method
	Odour concentration		Only done if receive odour compliant	BS EN 13725
Auxiliary flare	Operational hours	Recorded duration and frequency.	Continuous	Operational record including date, time and duration of use shall be recorded
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

Note: Emission outputs from boilers and CHPs are measuring annually, but the biogas inputs are measured monthly.

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.

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

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.

No air emission modelling has been done as part of this permit application because the site is already able to demonstrate compliance to the air emission limits as shown in the annual air emission monitoring. This has already been shared with the Environment Agency.

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 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 bring in 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 discharge directly to the site drainage system which diverts water to the head of the works of the adjacent Kings Lynn 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 AWS EMS 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 AWS EMS Policy 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 a number of 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; gas oil 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 companywide 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 routemap 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's goal is have the capacity to generate 44% of our energy demand from renewables by 2025. The CHP plants, like at Kings Lynn, 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 F.

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
- Quarterly estimation and reporting of operational carbon emissions for internal reporting purposes
- Annual estimation and reporting of operational carbon emissions for regulatory reporting (Ofwat and CRC)
- Energy efficiency measures implemented at the site include (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, include:
- 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, including CHP and use of solar panels and wind generation

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.

The development of an energy efficiency plan will be considered once the site is permitted; this will determine areas of improvement and will be developed under AWS Environmental Policy and EMS.

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 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 EEH and digestion plant. Daily sampling to key process parameters such as pH, VFA, alkalinity and dry solids 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 5 above. This list will be maintained and updated throughout the lifetime of the permit and updated within the site Operating Manual.

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 is 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 1No. 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 is 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 gas oil for the boilers and generators. 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 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 - concerns over the impact of using final effluent for this purpose
- Boiler water feed system
- Eye baths and safety showers - potable water essential
- Limited wash-down points where it would be uneconomic to extend the final effluent wash-water system
- Office messing facilities - kitchen, washing and welfare facilities etc
- Odour control odorisers - dilution of chemicals to correct concentration.

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; and;
- 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 site specific 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. There will be a Waste Management Plan that includes details of the types of waste produced at site, how wastes are segregated, stored and removed from site. Only minimal volumes of waste shall be generated at the STC, with waste streams segregated and recovered for recycling where possible. 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 EMS procedures and the current Environmental Policy 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. These are dealt with by a contracted waste management company who disposes of the wastes appropriately. 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. 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 a Duty of Care by ensuring waste is removed by a suitable licenced waster carrier.

The sampling and characterisation of wastes and the final off-site transport of waste is carried out by licensed waste contractors in accordance with Duty of Care requirements.

6.16 Appendix 1 Combustion plant

Table 9: Combustion plant details

	Install date	MWth input	Annual Operational hours (90% of year)	Fuel	Manufacturer
CHP1	2007	3.303	8,147	Biogas	Jenbacher
CHP2	2007	3.303	8,147	Biogas	Jenbacher
			Max output		
Boiler	2007	3.3	1380kg/hr	Gas oil / biogas	

Kings Lynn's CHPs are all existing engines installed before December 2018 but exceed the thermal rated input of 1MWth. Therefore, they do not currently fall within the scope of the Medium Combustion Plant Directive (MCPD) and the details listed under Annex I of the MCPD are not relevant at the time of this application.

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

7.1 Question 1a

Kings Lynn 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 1137 m3

The maximum rate of discharge in litres per second will be 13.2 litres per second

The maximum volume of non rainfall dependent effluent to be discharged in a day will be 1137 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:

(1137m3) / 24 / 60 / 60 x 1000 = 13.2 litres per second.

7.3 Question 5a and 5b2

Not applicable – the installation is located within Kings Lynn 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 splitter chamber for the primary settlement tanks, and activated sludge treatment comprising aeration tanks and final settlement tanks.

The return liquor point is at TF 60373 22013

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 TF 60373 22013
- 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 G.
- There is no liquor treatment plant at Kings Lynn STC

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

The maximum temperature of the return liquor would be 40 degrees Celsius

The expected temperature change compared to the incoming indigenous effluent would be an increase of 30 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 TF 60373 22013.

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 Dischareg Consent (AECTS3037/11334).

- UWWTR inlet sampling point: TF 60370 22330
- FE sample point: TF 60430 22170
- The Urban Waste Water Treatment Directive FE sampling point: TF 60430 22170
- Flow monitoring point: TF 60340 22330.
- The flow monitor has MCERTS certificate, SIRA ME 19 3233
- There is no UV disinfection efficacy monitoring point.
- The event duration monitoring point (EDM): TF 6043 2219
- The above points are shown in plans at Appendix H.
- 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 Dischareg Consent (AECTS3037/11334) 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 will be form a single outlet

7.9 Appendix 4 Questions 4.1 to 4.9

The following information relates to the FE discharges from Kings Lynn WRC. These are already permitted under the separate EPR discharge permit (AECTS3037/11334):

- The discharge point is TF 60535 22225
- The tidal river, tidal stream, estuary or area of coastal water is the River Great Ouse
- 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

Substantial variation of the AD 1.16.2.1 is £12,586, plus £1,246 for Odour Management Plan review, plus £779 habitats assessment. The total application charge is therefore £14,611.

8.2 Question 3: Payment

Payment will be by BACS payment.

Unique reference number for the application: PSCAPPANGLI 008

Who is paying: Anglian Water Services Ltd

Fee paid: £14,611

Date payment sent: 30/06/2021

Additional fees payment

Payment will be by Credit Card payment.

Unique reference number for the application: PSCAPPANGLI 008

Who is paying: Anglian Water Services Ltd

Fee paid: £3,965

Date additional F1 form sent 08/04/2024

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 be found in section 2.2 above. References to all other questions are found in the MSD which refers to the question in the subtitle. Specific sections to the MSD are identified in the relevant forms.

A. Appendix A – EWC Codes

Table 10 EWC codes for Kings Lynn STC

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

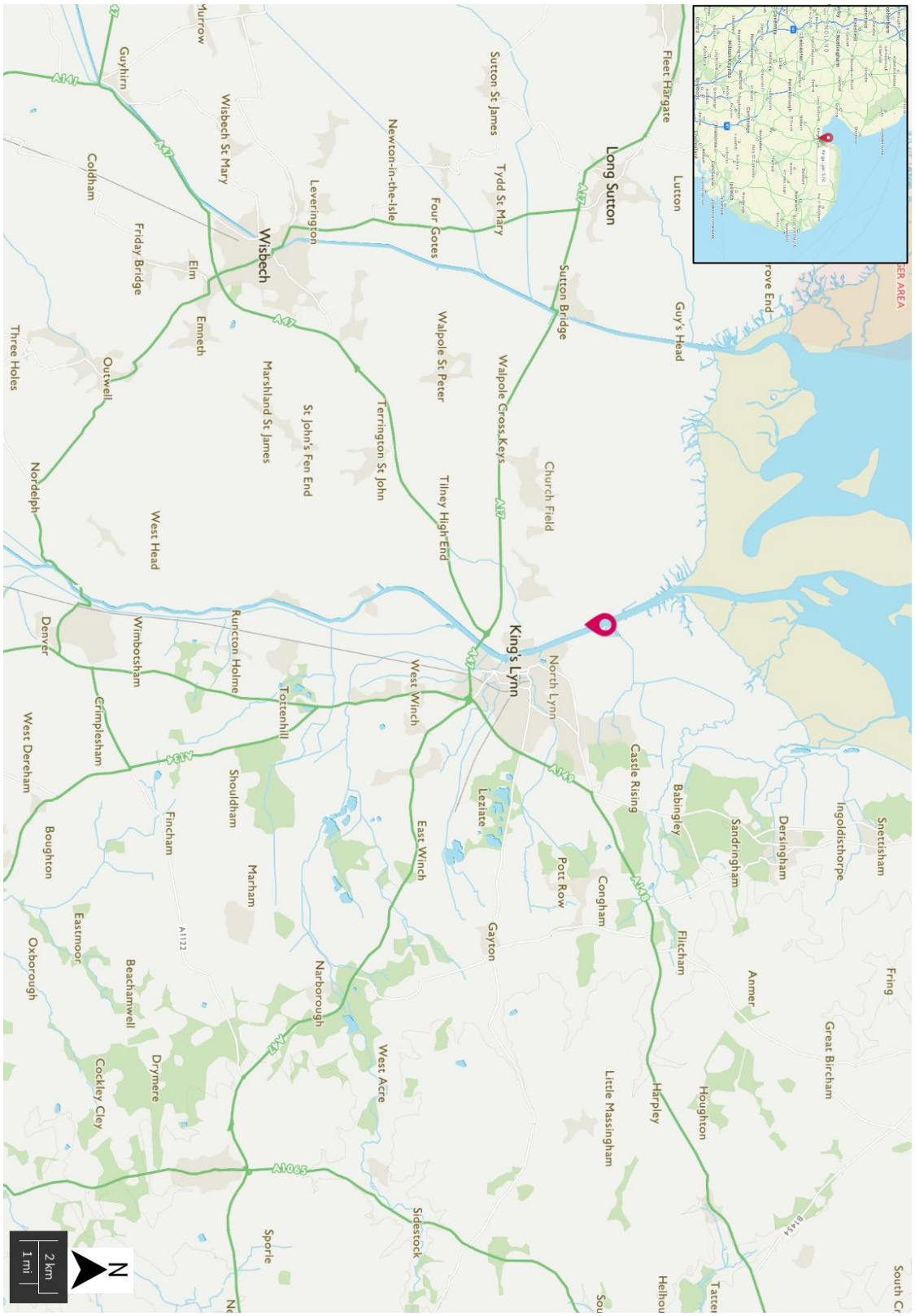
EWC code	EWC Description	Where the waste streams enter the process
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE	
19 02	wastes from physico/chemical treatments of waste	
19 02 06	Sludges from physico/chemical treatment other than those mentioned in 19 02 05 (sewage sludge only)	Imports to cake reception building
19 08	wastes from waste water treatment works	
19 08 05	sludges from treatment of urban waste water	Sludge Import Tank

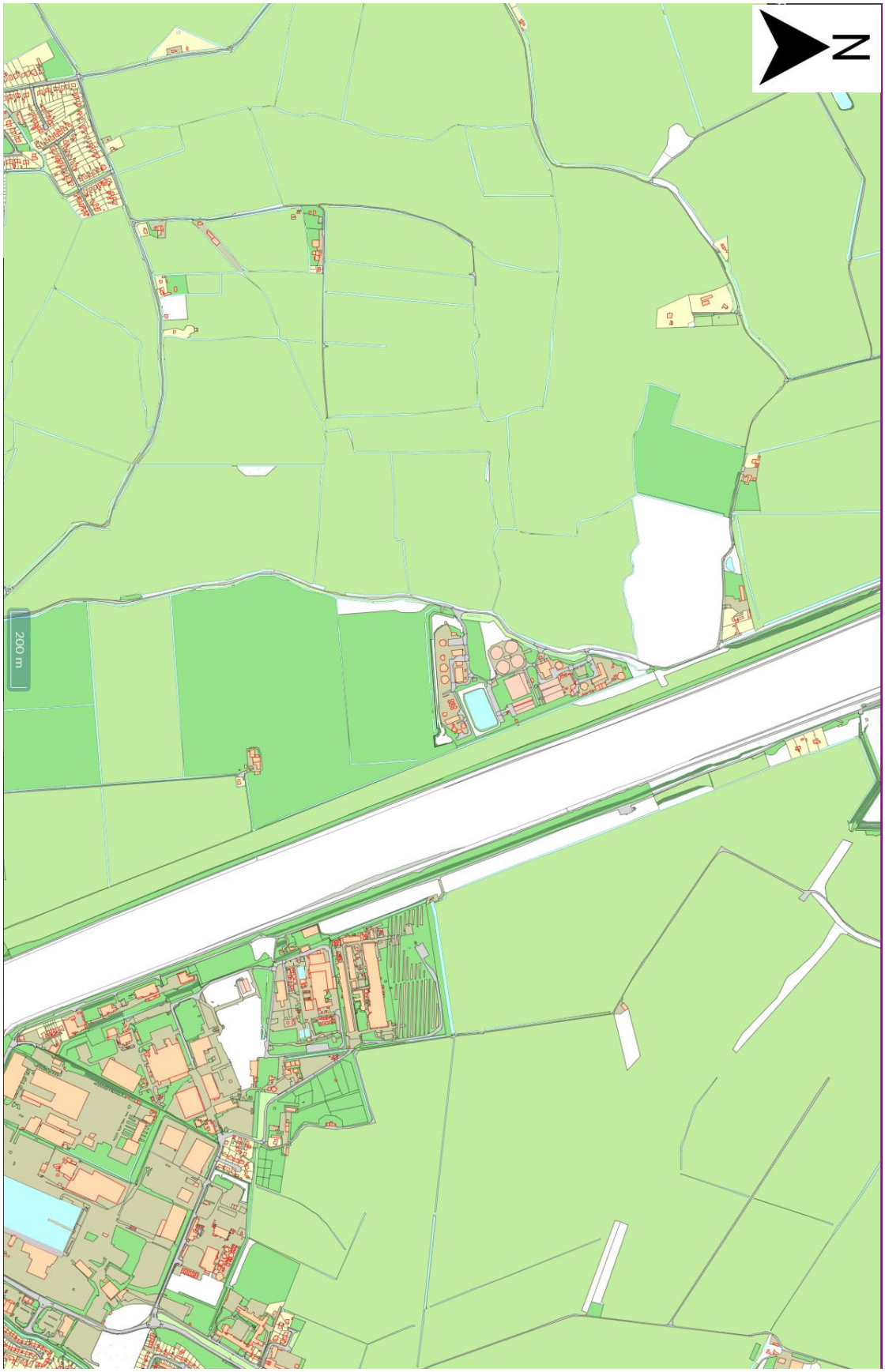
Table 11 EWC codes for Kings Lynn Head of Works (WRC)

The waste codes below are the only wastes to be imported into Kings Lynn Head of Works (WRC). The descriptions are the same as listed in SR 2021 No. 10. The main text in Section 6 above offers more clarification over specific wastes.

EWC code	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
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 09	wastes from the preparation of water intended for consumption or water for industrial use	
19 09 02	sludges from water clarification	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

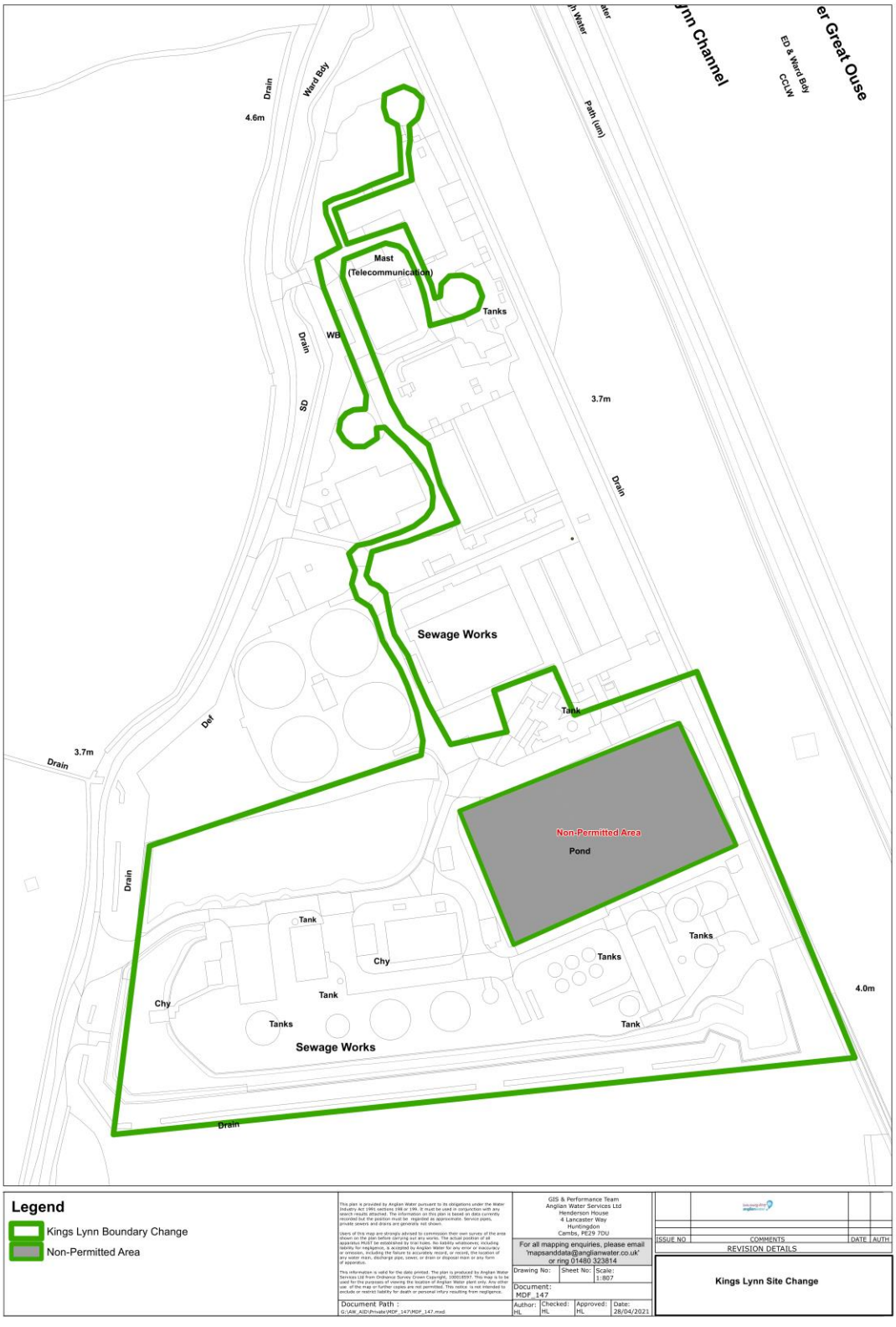
B. Appendix B – Site Location Plans




N
200 m

C. Appendix C – Site Plan

This site plan and permit boundary is taken from the existing STC permit, and the import tanks have now been added to the top of the site

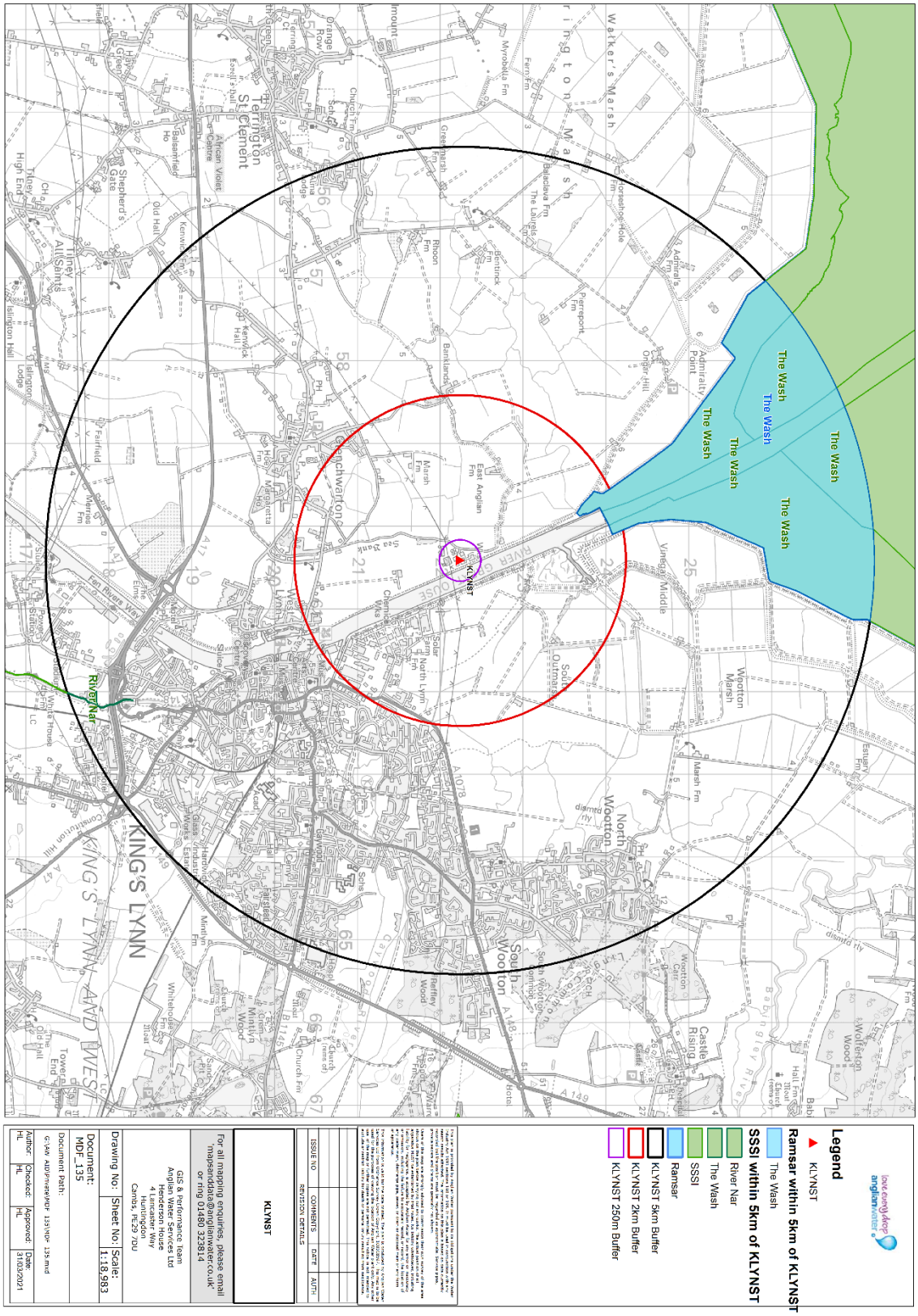


D. Appendix D – NGR Emission points on Site Plan

POINTS TO AIR		
Asset Name	Latitude/Longitude	National Grid Reference
Digester 1	52.77182, 0.37547	TF 60347 22004
Digester 2	52.7718, 0.37503	TF 60318 22001
Thickening Plant	52.77201, 0.3771	TF 60457 22029
OCU for thickening building	52.77202, 0.3773	TF 60470 22030
OCU for centrifuge and post digestion tank	52.77198, 0.37475	TF 60298 22020
OCU for cake reception building	52.77307, 0.37635	TF 60402 22145
Flare stack	52.77185, 0.37332	TF 60202 22002
CHP stack	52.77216, 0.37506	TF 60319 22041
Post Digester Tank	52.77177, 0.37468	TF 60294 21996
Gas Bag	52.77177, 0.37412	TF 60257 21995
Centrifuge Building	52.77211, 0.3745	TF 60281 22034
Treated cake pad	52.77312, 0.37707	TF 60451 22152
Liquor Return	52.77189 0.375835	TF 60373 22013
Head of Works waste reception point	52.77483 0.376116	TF 60380 22340

OTHER POINTS OF NOTE		
Asset Name	Latitude/Longitude	National Grid Reference
Cake reception building	52.77313, 0.3761	TF 60385 22151
Waste hub	52.77564, 0.37488	TF 60294 22427
Main sludge import tank	52.7745, 0.37501	TF 60307 22301
Secondary sludge import tank	52.77506, 0.37581	TF 60359 22365
Third sludge import tank	52.77594, 0.37542	TF 60329 22462
Boiler House	52.77216, 0.37539	TF 60341 22041
Monsal Plant	52.77199, 0.37648	TF 60415 22025

E. Appendix E – Sensitive Receptors



F. Appendix F – AMP 7 Strategy on a Page

AMP7 Strategy on a page

love every drop anglianwater

Our purpose is to bring environmental and social prosperity to the region we serve through our commitment to love every drop.

Goals:	AMP7 – To make life better for our customers, every single day	AMP7 – To deliver our identified business priorities	AMP7 – To deliver our AMP7 final determination	AMP7 – To create a sustainable future for our region
Strategies:	**Deliver a personal, trusted and effortless experience**	**One team, thinking differently, working smarter**	**Drive efficiency, effectively balancing service, cost and quality**	**Enable sustainable growth, improve resilience, protect the environment and reduce carbon**
Priorities for AMP7:	• Target leading CMEX, DMEX and Retailer satisfaction • Increase support for our most vulnerable customers, and those who struggle to pay • Position ourselves as a trusted brand that is constantly looking for new ways to meet everyday challenges	• Deliver key performance commitments (ODIs) and targets • Maintain our nationally leading leakage performance • Deliver world-class innovation, exploiting leading technologies • Develop flexible ways of working that support areas of greatest business need, making best use of available investment	• Achieve our Totex Delivery Plans • Improve our Relative Efficiency within the industry • Identify and exploit programme, portfolio and geographic overlaps, taking a whole-business approach to investment • Operate within our covenant constraints & remain financeable • Explore opportunities to increase revenue generation	• Deliver our Business Plan commitments relating to resilience to flooding and drought, and sustainable growth • Hit our targets on the path towards carbon neutrality • Demonstrate that as a responsible business we act in the public interest
What will help us get there?	**Skilled, trusted and customer focused people**	**We're happier, healthier and safer**	**We're smart in our use of information and technology**	**World leading Alliances, working as one team**	**Collaborating inside and outside the organisation**	**Maximising opportunities from standardisation and centralisation**

G. Appendix G – 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.

MONSAL

Feed Thickness Dry Solids (%)

Feed Sludge pH

Feed Sludge VFA (mg/l)

Actual Feed Volume (M^3/Day) Previous 24 hours

Solids Feed Rate (tDS/day)

DIGESTER FEED

Digester Feed Thickness Dry Solids (%) Monsal Stage 3

Digester Feed pH Monsal Stage 3

Digester Feed VFA (mg/l) Monsal Stage 3

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 (%)

Avrg. dry solids (%)

BIOGAS

Methane content (%)

Actual to Waste Gas Burner (M^3/Day) Previous 24 hours

Flare Stack Meter Read

CHP

CHP 1 Gross Meter Read

CHP 1 Parasitic Meter Read

CHP 2 Gross Meter Read

CHP 2 Parasitic Meter Read

POLY STOCK

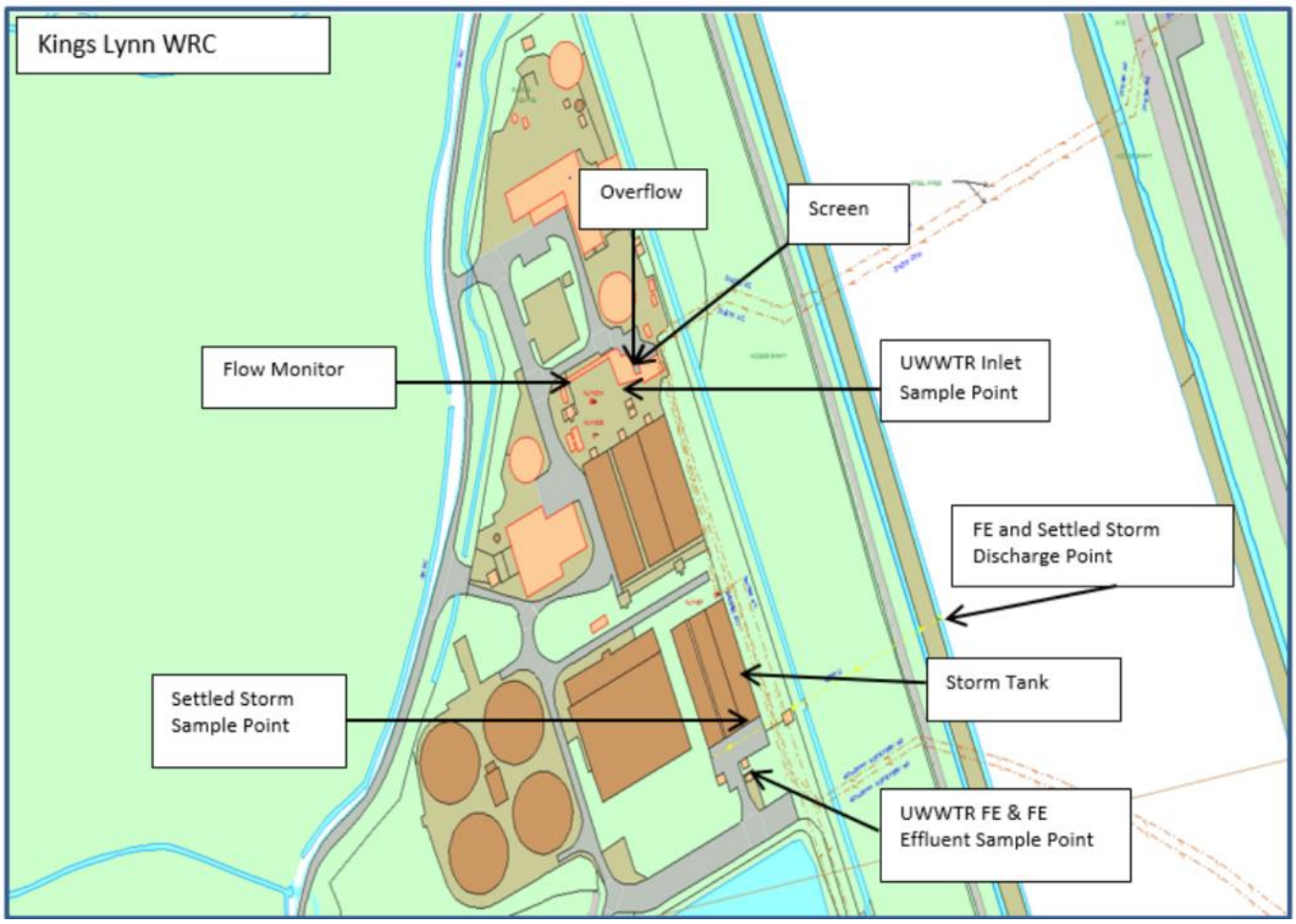
Powder Poly Silo (%)

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

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



I. Appendix I Kings Lynn Site Infrastructure Plan